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Emerging technologies and timber products in construction - compendium of products and technologies

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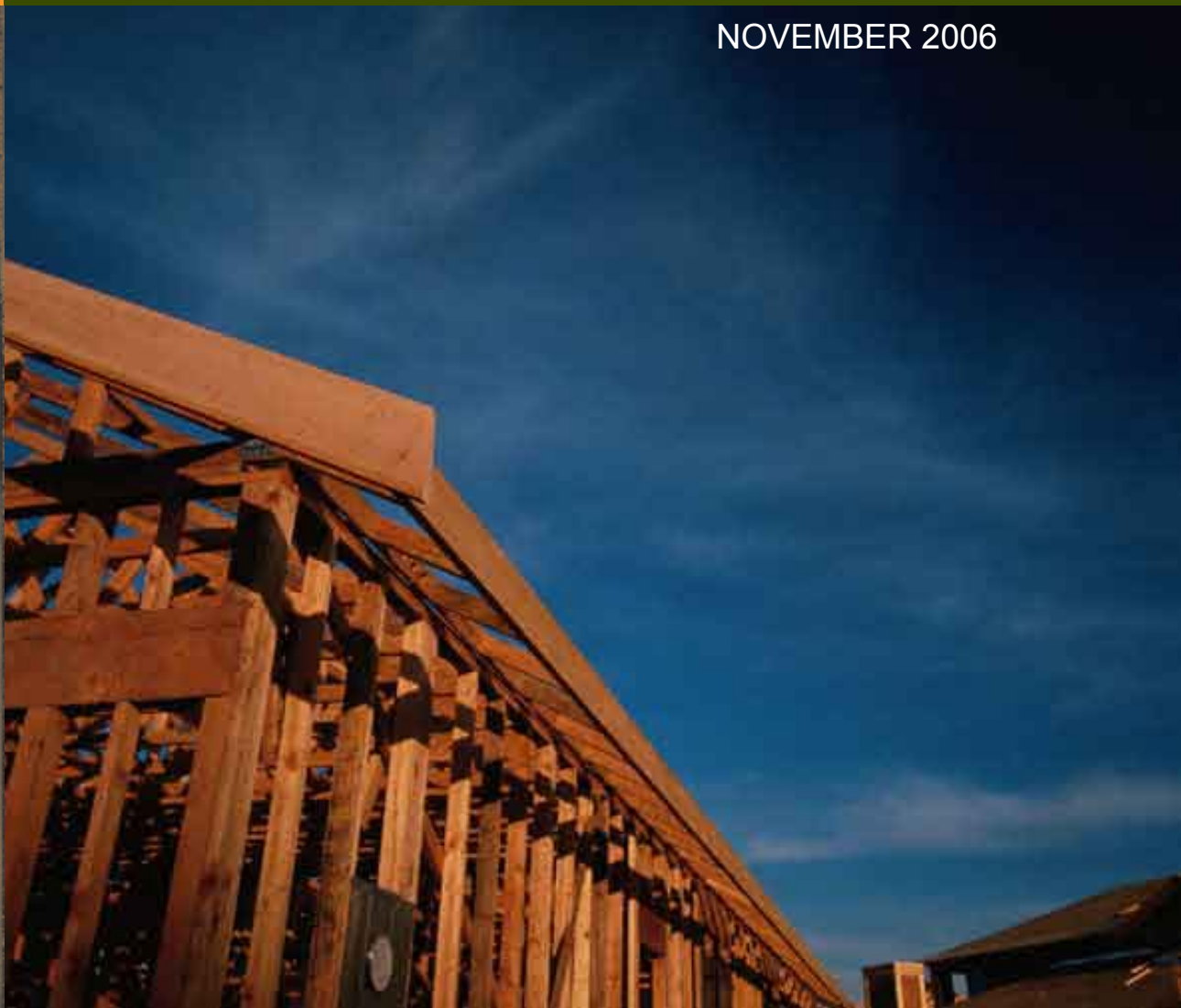
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Emerging technologies and timber products in construction – compendium of products and technologies

Prepared for the

**Forest and Wood Products
Research and Development Corporation**

by

P. Paevere and C. MacKenzie

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wood products industry and the Australian Government.**



Australian Government
Forest and Wood Products
Research and Development
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Project no: PN05.1022

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1. Overview & Scope of Report

This document contains a compilation of all of the technologies, products and systems that have been identified for the project 'Emerging Technologies and Timber Products in Construction', funded by the Forest & Wood Products Research & Development Corporation (FWPRDC) of Australia. A description of the overall project and its objectives is given in Section 2. A Literature Review, which includes an overview of drivers, challenges and opportunities relevant to the project is given in a separate report.

The information presented in this compendium was identified by a group of international consultants who were engaged on the project to undertake a survey of innovative technologies, systems and products from various parts of the world, which could have an impact on the timber construction sector in Australia. Specific regions of the world were targeted, based on their extensive use of timber in construction, and reputation for innovation. Brief profiles of each of the lead consultants who contributed to the project are given in Section 3.

The regions and the surveyed countries are as follows:

- **Scandinavia:** Sweden, Denmark, Norway, Finland
- **Europe:** UK, Netherlands, France, Germany, Switzerland, Austria, Italy
- **North America:** USA, Canada
- **Australasia:** Japan, New Zealand

Note: Australia specific technologies or systems have not been considered in this review as most that are accessible are already in the public domain and are known by local industry.

Each entry in the compendium contains a description of the technology across a range of categories, contact details, links, and descriptive photographs and images in most cases. An analysis of the technologies in the compendium will be undertaken, and recommendations will be given in the Analysis and Recommendations Report to follow. In this report however, no detailed analysis of the submissions has been presented. The analysis of the data is limited to:

- Determining a ‘first cut’ of technologies that will be included in the next-phase assessment;
- Provision of a brief comment on the applicability of the technologies to the Australian industry context;
- Categorisation of the 114 technologies into 11 broad categories
 - Prefabricated factory housing
 - Panelised construction
 - Improved wood
 - Wood composite
 - Engineered wood product
 - Structural system
 - Flooring
 - Cladding & Insulation
 - Frame and Truss Manufacture
 - Research Project
 - Miscellaneous

2. Project Summary

Timber framed house and light commercial building systems and technology in Australia is, in the main, mature construction technology. Whilst the current site-based and trade-focused practices are considered very cost efficient by world standards, there are emerging pressures on traditional timber construction which may threaten the market share. These pressures include regulatory impost (sustainability in construction, LCA and durability, energy efficiency, bushfires etc), competitive alternative materials and systems (steel, lightweight fibre cement, insulated panels etc), aesthetic style and design trends, shortages of skilled labour, and emerging technologies (computerised manufacturing, mass-customisation, nanotechnology etc). New and emerging technologies could become increasingly relevant to the construction sector in Australia if the construction process moves away from the site-built focus, towards a 'manufacturing' or 'mass-customised product' paradigm. Any shift along these lines could have big ramifications for the timber industry, particularly if it is unable to embrace or compete with such innovations.

Despite the acknowledged efficiency of Australia's timber framed house construction industry, there are still significant potential triple-bottom-line benefits that could be achieved. A key task in this project is to assess the potential economic and environmental benefits which can be realised through the adoption of new and emerging technologies. The direct economic benefit to industry is easily summarised by considering the potential losses or gains related to housing. A 1% swing either way represents an annual loss or gain in retail timber sales of up to \$10 million per annum in Australia. There is also still a large potential margin for gains in cost efficiency, considering that the cost to the consumer of the base structure of a house is still many times more than the cost of the materials that go into it.

In addition to this, FWPRDC have also identified and are pursuing a somewhat complimentary R&D project to investigate maximising the use of low grade softwood.

It is anticipated that some of the technologies/systems identified in this project may contribute to the objectives of this new project.

The potential environmental benefits to be gained from improved processes, systems and new technologies are also significant in terms of recycling, waste & pollution minimisation, energy efficiency and greenhouse gas reduction. Given the increased regulatory requirements, and consumer awareness around these issues, demonstrable 'greenness' will also help to sustain or increase market share, and inevitably flow on to economic benefit in the medium to long term.

Challenges and opportunities exist for the timber industry to review new and emerging national and international timber building systems, new technologies and trends, and to assess which opportunities have the most potential in an Australian context.

The aim of this project is to conduct an international survey and scoping study on innovative building products/systems and new technologies relevant to light-framed timber construction, and to predict which of the technologies and systems examined could have the greatest potential impact, and greatest chance of successful implementation in the Australian industry context. This will be achieved through a detailed analysis of the real and perceived business and environmental benefits that can be generated from these innovations when they are mapped onto the Australian construction industry structure, capability and ethos, market forces and regulatory environment. An examination of the current and potential future drivers and barriers to the adoption of these new innovations in Australia will also be undertaken.

3. Consultants

Scandinavia

Dr Erik Aasheim

Norwegian Institute of Wood Technology

Group Leader - Utilisation and Durability

Europe

Professor Frits Scheublin

University of Technology Eindhoven, Professor in Construction Engineering

Royal BAM Construction Group, Director of Engineering

North America

Professor Bo Kasal

Pennsylvania State University

Director, Pennsylvania Housing Research Center

Japan

Mikiko Ota

Stonehenge International

Architectural Consultant and Project Manager

New Zealand

Karen Bayne

SCION Research

Manager, Built Environment Unit

International

Anna Svensson

CSIRO Sustainable Ecosystems

Student Researcher

4. Products and Technologies

Table 1 – Listing of all technologies, products and systems in the compendium

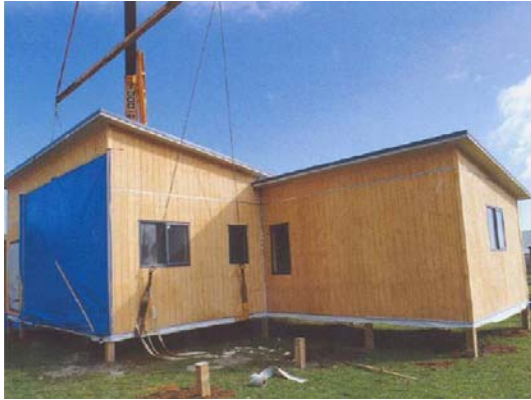
Technology / Product	Country	Category
Carters Modular	NZ	Prefab factory housing
TEHA Modular building system	Netherlands	Prefab factory housing
PULTE HOMES, INC.	USA	Prefab factory housing
Alvsbyhus	Sweeden	Prefab factory housing
loft cube	Germany	Prefab factory housing
Hedalm Laft AS	Norway	Prefab factory housing
Hedalm-Anebyhus	Norway	Prefab factory housing
Internal Facades system	Netherlands	Panelised construction
Massive timber systems Die Brettstapelbauweise	Germany	Panelised construction
UN building system	Netherlands	Panelised construction
Lignotrend timber systems	Germany	Panelised construction
MHM Solid wood wall	Germany	Panelised construction
Solid wood elements	Norway	Panelised construction
Leno®-Massiv timber systems	Germany / Italy	Panelised construction
R-Control	USA	Panelised construction
Pacemaker Building Systems, Inc.	USA	Panelised construction
Structural Building Systems, Inc.	USA	Panelised construction
THERMAPAN	Canada	Panelised construction
Building Innovation Industries, LLC.	USA	Panelised construction
Modular Systems with SIP Panels	USA	Panelised construction / Prefab factory housing
Fort Housing System	Netherlands	Panelised construction / Prefab factory housing
Hinged Roofs	Netherlands	Panelised construction / Prefab factory housing
ACES	Netherlands	Panelised construction / Prefab factory housing
Panelized housing	USA	Panelised construction / Prefab factory housing
Hybrid Modular/Panelized Systems	USA	Panelised construction / Prefab factory housing
LP Smart Side	USA	Improved wood
ZIP System Roofing	USA	Improved wood
Genetically altered wood	USA	Improved wood
Lignia hardened pine	NZ	Improved wood
CELL+FUNEN	Japan	Improved wood
Natwood oil modification	Austria	Improved wood
TITAN Wood chemical wood modification	UK / Netherlands	Improved wood
ThermoWood	Finland	Improved wood
WoodHeart	Finland	Improved wood
Kebony Wood Treatment	Norway	Improved wood
Greenseal / Indurite Hardened pine	NZ	Improved Wood
KAUNA PANEL	Sweden	Improved wood
Fibre angle / heartwood content measurement in sawn wood	Sweden	Improved wood

Technology / Product	Country	Category
Quattrolit	Sweden	Improved wood
ND NanoCides	USA	Improved wood
Durisol Building Systems	Canada	Wood composite
Wood-polymer lumber	USA	Wood composite
Composite fabric reinforced plywood	USA	Wood composite
Ein Super Wood	Japan	Wood composite
M-Wood 2	Japan	Wood composite
Substiwood	USA	Wood composite
KARTRO LÄTTREGL	Sweden	Engineered wood product
ABUILD Flitches	NZ	Engineered wood product
TECBEAM	Australia	Engineered wood product
Comwood	Sweden	Engineered wood product / Structural system
Triboard	NZ	Engineered wood product
Gitterbjelke	Norway	Engineered wood product
RANTI-bjelken	Norway	Engineered wood product
K-bjelken	Norway	Engineered wood product
Swelite-balken	Sweden	Engineered wood product
Twinaplate	NZ	Engineered wood product
HySpan I Beams	NZ	Engineered wood product
Unilogs	NZ	Structural system
SIMPSON Strong Tie Walls	USA	Structural system
Steel Stud System - TSN	USA	Structural system
RBS Encapsulated building system	Canada	Structural system
Steel-expanded polystyrene system	USA	Structural system
GIB Braceline	NZ	Structural system
TECHNOSTRUCTURE	Japan	Structural system
G-Frame Construction	Japan	Structural system
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Tumiki House - Timber Block House	Japan	Structural system
Big Frame & ProudioBF	Japan	Structural system
SE Structure Method	Japan	Structural system
j.Pod - Recurrent light-frame building system	Japan	Structural system
Steko-blocks	Switzerland	Structural system
Kontio Loghouses	Finland	Structural System
Rantasalmi Oy	Finland	Structural System
Super Wall Construction Method	Japan	Structural system / Panelised construction
HSTPU - High Strength Timber Panel Unit	Japan	Structural system / Prefab factory housing
ICF - Insulated Concrete Forms	USA	Structural system
The SoundBar System	Finland	Flooring / Structural system
SemiBjälklaget	Sweden	Flooring / Panelised construction
Lignatur floor systems	Switzerland / Germany	Flooring / Panelised construction
Timberbond flooring	NZ	Flooring / Engineered wood product
Powerscape Peace	NZ	Flooring
Bamboo floors	USA/Australia	Flooring
Mortarless Brick Veneer	USA	Cladding & Insulation
Radiant Barrier Sheathing - Plywood or OSB	USA	Cladding & Insulation
HAL Industries INC.	Canada	Cladding & Insulation
Icynene Spray Insulation Foam	Canada	Cladding & Insulation
Spray Fiber Insulation	USA	Cladding & Insulation
Shadowclad	NZ	Cladding & Insulation
Thermakraft Cover-up	NZ	Cladding & Insulation
Wool Bloc insulation	NZ	Cladding & Insulation

Technology / Product	Country	Category
Steelbuilding	Denmark	Cladding & Insulation
Radiant barriers -Innovative Insulations, Inc.	USA	Cladding & Insulation
Wintec modern window technology	NZ	Miscellaneous
GRB Jamb Tie	NZ	Miscellaneous
Greenweld	NZ	Miscellaneous
DuroWell	Switzerland	Miscellaneous
Koljern	Sweeden	Miscellaneous
MIFS Window socket flashing system	USA	Miscellaneous
Plastic Composite Nails	USA	Miscellaneous
Bamboo housbuilding	China	Miscellaneous
Flexible Framing Track	USA	Miscellaneous
SödraSmart	Sweden	Miscellaneous
Boligprodusentenenes Forening	Norway	Miscellaneous
Block Watne AS	Norway	Miscellaneous
Origin retaining wall profile	NZ	Miscellaneous
Recycle Wood Chip Spraying - Civil Engineering Technology	Japan	Miscellaneous
Open Prototype Initiative	USA	Research Project
Ridgified inflatable structures	USA	Research Project
OSBA House Chassis	USA	Research Project
Integrated Interior Infill Modules	USA	Research Project
Wood Welding	France	Research Project
MangoTech automated saws	NZ	Frame & Truss Manufact
MangoTech automation	NZ	Frame & Truss Manufact
MODUL	Norway	Frame & Truss Manufact

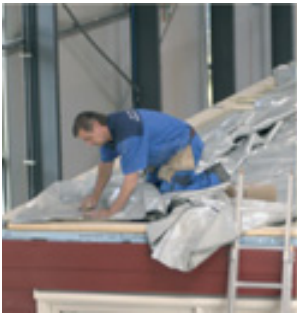
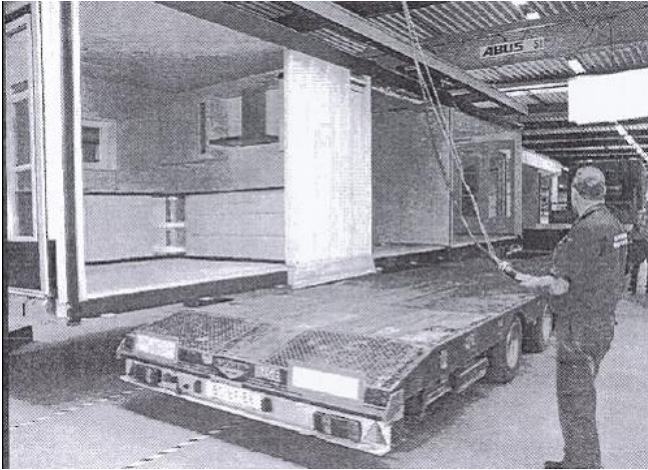
Carters Modular			
Category: <i>Prefabricated factory housing</i>	Country: <i>NZ</i>	Consultant: <i>Bayne</i>	ID: <i>101</i>
Description: Carters modular is a natural evolution of Carters preail frame and truss. The modular building system has been hugely successful in USA and Scandinavia. Factory production has many advantages on the time saved, work conditions and quality of products.			
Benefits: Controlled factory conditions means avoiding weather related problems. Employees work in good conditions: tools, machines and materials, to produce high quality products.			
Limitations: Need to offer a large choice of design to be attractive, and need 10 to 20 units of one design to be profitable			
Building Type: all	Application Point: whole house	Construction Type: new	
Material Types: wood	Innovation Type: process	Development Maturity: mature	
Current Availability: not this year, but can restart soon			
Experience in Use: not available			
Experience in Service: not available			
Example Projects: not available			
IP & Commercial Issues: unknown			
Company Contact Details: Carters Modular 68 Harris Road, East Tamaki, Private bag 94-027, South Auckland Mail center Phone :+64 9 272 7200 Fax: +64 9 272 7262 Email:		Contact: Grant Crowhurst Phone: +64 9 273 6803 Email: grant.crowhurst@chh.co.nz	
Comments: This type of modular factory fabricated housing should have excellent potential where directed at repititious developments such as townhouse construction.			
Include in Assessment: Yes			
Web Links: www.carters.co.nz			





TEHA Modular Building System				
Category: <i>Prefabricated factory housing</i>		Country: <i>Netherlands</i>	Consultant: <i>Scheublin</i>	ID: <i>102</i>
Description: TEHA prefabricates elements up to complete houses. For TEHA Flex Line, units are developed from which complete houses are prefabricated. Even the bathroom and kitchen are prefabricated. A minimum of different units are used to complete the house.				
Benefits: Extremely short building period due to the very high level of prefabrication; most of the installations and finishing is prefabricated and placed into position in the factory.				
Limitations: Although the system is called "TEHA Flex Line" there are some limitations concerning design flexibility due to the modular units with which the homes are constructed.				
Building Type: detach res		Application Point: whole house		Construction Type: new
Material Types: wood		Innovation Type: product / business system		Development Maturity: developing
Current Availability: - Yes - TEHA Elementengroep, Haaksbergen, The Netherlands				
Experience in Use: unknown				
Experience in Service: TEHA uses a complete house as part of their own office. Furthermore, student homes in Wageningen are built with the Flex Line system.				
Example Projects:				
IP & Commercial Issues: unknown				
Company Contact Details: TEHA Elementengroep PO Box 145 7480 AC Haaksbergen Phone :+31 53 5736666 Fax: +31 53 5736665 Email:			Contact: Han ter Huurne Raymond ter Huurne Phone: +31 53 5736666 Email:	
Comments: System may suit repetitious type designs such as townhouses, flats etc where economies of scale and fixed designs prevail. Like all factory fabricated systems, requires a large capital investment before returns are potentially realised. Potential of these should be considered with external 'add-ons'/finishes such as decks/verandahs etc.				
Include in Assessment: Yes				
Web Links: www.teha.nl				





PULTE HOMES, INC.			
Category: <i>Prefabricated factory housing</i>	Country: <i>USA</i>	Consultant: <i>Kasal</i>	ID: <i>103</i>
Description: Mass home production (building company). The company offers the entire package including financing.			
Benefits: Large-scale home building company. Using panelized system approach and modern construction techniques. Company offers limited sets of plans with limited selections and flexibility in return for efficient construction and price. Entire subdivisions are planned and built allowing for use of machinery, prefabricated parts and sequential construction.			
Limitations: Number of designs and variations is limited.			
Building Type: All	Application Point: whole house	Construction Type: new	
Material Types: comb.	Innovation Type: business system	Development Maturity: mature	
Current Availability: Yes			
Experience in Use: unknown			
Experience in Service: Yes, many			
Example Projects:			
IP & Commercial Issues: no			
Company Contact Details: Pulte Homes, Inc. 100 Bloomfield Hills Parkway, Bloomfield Hills, Michigan 48304 Phone :1-866-PULTE-25 (785-8325) Fax: see web site Email: see weblinks		Contact: PHRC (Kasal) can arrange visit Phone: Email:	
Comments: Not sure if this is factory fabricated, but if so, seems to be a home builder that delivers the total package like Australian builders but from a factory base!			
Include in Assessment: Yes			
Web Links: http://www.pulte.com/			

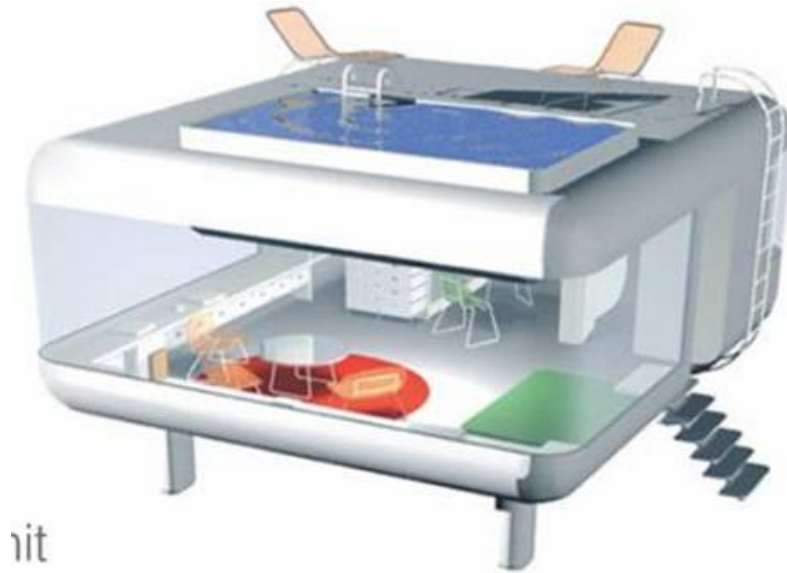


Alvsbyhus			
Category: <i>Prefabricated factory housing</i>	Country: <i>Sweeden</i>	Consultant: <i>Svensson</i>	ID: <i>104</i>
Description: Alvsbyhus started making houses in 1960. They have a very well developed way of making prefabricated houses. One of Europe's most effective producers of prefabricated houses.			
Benefits: Excellent quality. Quick installation at building site. Low costs			
Limitations: Only active in Scandinavia and Finland			
Building Type: Residential	Application Point: whole house	Construction Type: new	
Material Types: Wood	Innovation Type: product/process	Development Maturity: mature	
Current Availability: not in australia			
Experience in Use: unknown			
Experience in Service: unknown			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: Alvsbyhus Stallverkstv. 6, 942 81 Alvsbyn Phone :+46 929 162 00 Fax: +46 929 162 99 Email: marknad@alvsbyhus.se		Contact: Phone: Email:	
Comments: Appears that they concentrate on a limited number of fixed house designs, so expect that it would have limited acceptance in Australian market for mainstream housing			
Include in Assessment: Yes			
Web Links: www.alvsbyhus.se			



loft cube				
Category: <i>Prefabricated factory housing</i>		Country: <i>Germany</i>	Consultant: <i>Svensson</i>	ID: <i>105</i>
Description: A cube (like a studio apartment) that can be built from any lightweight material and goes on top of buildings in skyline cities around the world.				
Benefits: saves space in city, easy to move and install. This could be a niche market for the timber industry.				
Limitations: Requires existing building with appropriate rooftop space and adequate load capacity.				
Building Type: residential		Application Point: whole house		Construction Type: new
Material Types: different materials possible		Innovation Type: product/ idea		Development Maturity: developing
Current Availability: Yes, in Europe				
Experience in Use: unknown				
Experience in Service: unknown				
Example Projects: www.loftcube.net				
IP & Commercial Issues: unknown				
Company Contact Details: Loft Cube maximillianstrasse 35A, D-80539, Munchen, Germany Phone :+49 89 242 18 111 Fax : +49 89 242 18 200 Email : info@loftcube.net studio@aisslinger.de office@and8.de			Contact: Christian Friedrich Phone : +49 89 242 18 111 Email : christian.friedrich@loftcube.net	
Comments: A novel concept that may have limited or niche market appeal.				
Include in Assessment: Yes				
Web Links: www.and8.de www.aisslinger.de				





Hedalm Laft AS			
Category: <i>Prefabricated factory housing</i>	Country: <i>Norway</i>	Consultant: <i>Ascheim</i>	ID: <i>106</i>
Description: Hedalm Laft AS has an industrial production facility for log houses. The walls are massive wood structures without additional thermal insulation. The dimensions of the log material are 3" x 7", 5" x 6", 6" x 6" or 6" x 8". The most used is 6" x 8". The log material is processed by machines. In Norway most log houses are used as holiday homes and/or cottages because of the strict requirements regarding thermal insulation in domestic buildings. However Hedalm Laft AS exports log houses as detached residences to Scotland, Belgium, Germany and France. The log houses can delivered as a building kit or as a complete finished house with all necessary equipment ready for use.			
Benefits: Because of the production method and organisation Hedalm Laft AS has very high quality control with small tolerances. In addition they use slow grown pine (Pinus sylvestris) with long lengths. In this way they have a strong material and they do not need to make any timber joints.			
Limitations: The greatest limitation is the national requirements regarding thermal insulation. (This would be less of an issue in Australia)			
Building Type: Detached residence Log house or holiday cottage	Application Point: Whole house	Construction Type: New	
Material Types: Wood	Innovation Type: product/process	Development Maturity: mature	
Current Availability: Yes - refer contact details below			
Experience in Use: Yes - refer contact details below			
Experience in Service: Yes - refer contact details below			
Example Projects: Yes - refer contact details below			
IP & Commercial Issues: None			
Company Contact Details: Hedalm Laft AS NO-2335 Stange Phone :+47 62 58 57 70 Fax: 47 62 58 57 71 Email: firmapost@hedalm-laft.no		Contact: Bård Wetten Phone: +47 99 57 47 58 Email: bardw@hedalm-laft.no	
Comments: There are a number of existing log structures/systems already in Australia that have established small niche markets for holiday cabins etc. This system seems quite sophisticated compared to Australian methods and could probably only be justified here if much greater numbers were built.			
Include in Assessment: Yes			
Web Links:			

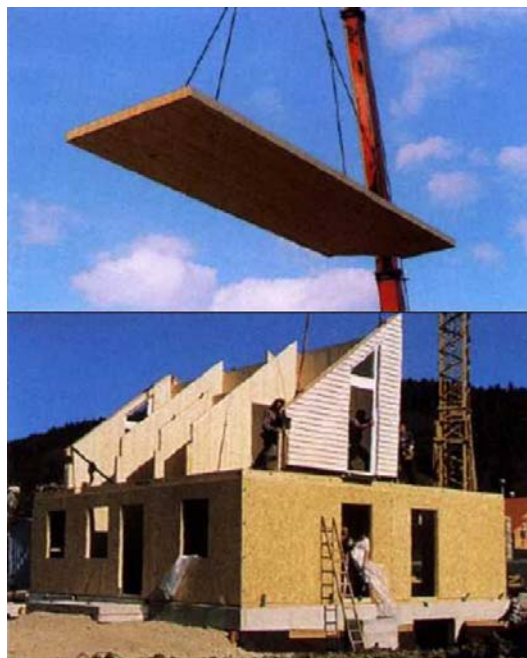
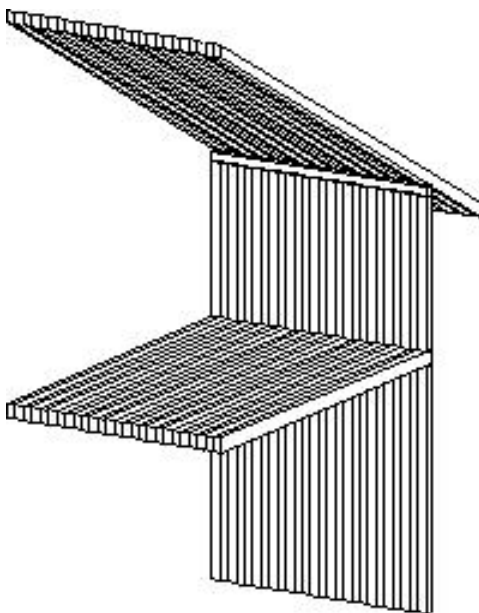
Hedalm-Anebyhus			
Category: <i>Prefabricated factory housing</i>	Country: <i>Norway</i>	Consultant: <i>Ascheim</i>	ID: <i>107</i>
Description: Hedalm-Anebyhus AS has probably the most up-to-date computerized production of light-framed timber elements in the Nordic countries. The products are mainly wall elements, but production of floor elements is in the early beginning and it is also planed to start production of roof elements in the near future. The final wall elements include in addition to the structural part (frame work) cladding, wind tight layer, windows and thermal insulation. The most of the element production is done by computer-controlled machines (e.g. nailing, placing the thermal insulation etc.). The elements are both so-called small and big. Regarding roof structures Hedalm-Anebyhus AS produce their own roof trusses (W trusses).			
Benefits: The prefabricated elements and trusses are produced indoor at dry condition mainly by computer-controlled machines. This gives products with exact performance and constant high and equal quality. Element building systems entail a short construction period onsite, fixed costs, cost reductions regarding equipment and employees, less construction waste and in this manner less need for clearance work at building site, and less need for building site administration and control.			
Limitations: The maximum element size is defined by the actual transport/traffic conditions/possilities i.e. bridges/subpassages, curvature of the road etc. The elements of Anebyhus AS are designed in the 6M modul system and are dependent of materials/equipment which fit in with that modul system. Anebyhus AS do not have any department in Australia. However they can contribute with very much know-how and experience regarding computerized production of prefabricated structural light-framed timber elements and the following assembling on building site.			
Building Type: Detach (and undetach) res - but also holiday homes/cottages	Application Point: Wall & floor. Roof are comming in the very near future	Construction Type: New	
Material Types: Wood – mainly	Innovation Type: product/process	Development Maturity: mature	
Current Availability: Yes			
Experience in Use: Yes - refer contact details below			
Experience in Service: Yes - refer contact details below			
Example Projects: Yes - refer contact details below			
IP & Commercial Issues: None			
Company Contact Details: Hedalm-Anebyhus AS NO-2344 Ilseng, Norway Phone :+47 62 58 13 33 Fax: 47 62 58 13 88 Email: firmapost@hedalm-boliger.no		Contact: Terje Dahl Phone: +47 62 58 13 33 Email: terjed@hedalm-anebyhus.no	
Comments: Contact details may be worth noting in the report for industry who may wish to visit a state of art truss and frame prefabrication plant.			
Include in Assessment: No - similar to Australian practice			
Web Links: Hedalm-Anebyhus by Terje Dahl prefer that you contact him direct.			

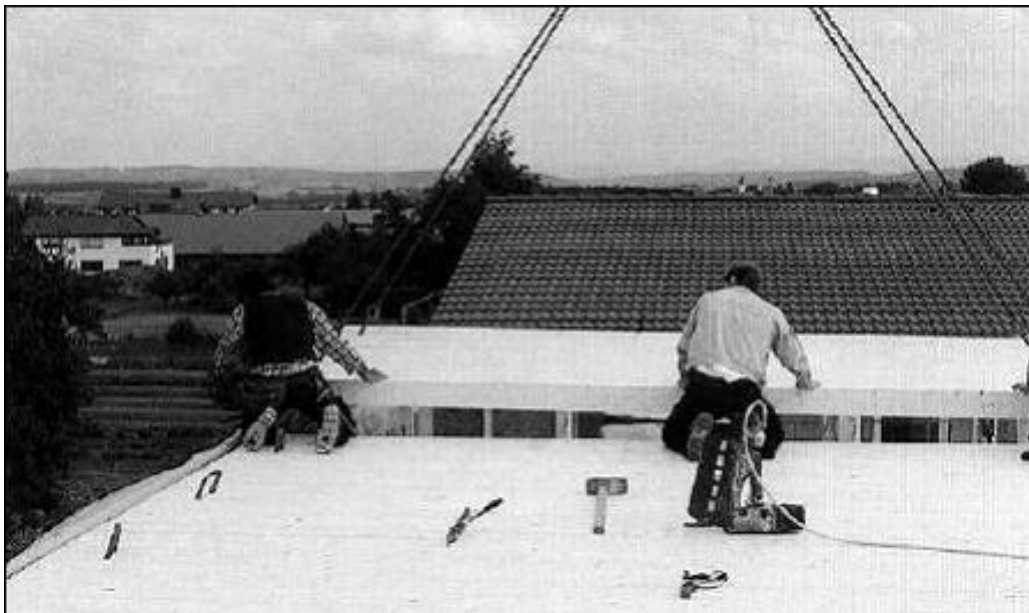
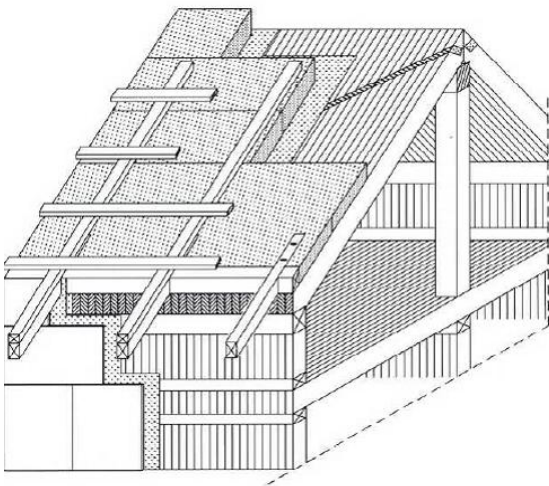
Internal Facades system			
Category: Panelised construction	Country: Netherlands	Consultant: Scheublin	ID: 201
Description: In the Netherlands, most houses are built in rows with a concrete wall between the individual houses. This is similar to 'tilt-up concrete construction in Australia where there are no loadbearing elements inbetween adjacent walls. Front facades and back facades are made with a variety of materials to the architects choice. It is in the interest of the contractor to make the houses weathertight quickly. To achieve this the wood industry developed prefabricated wooden elements to close the houses immediately after the concrete frame is ready. These are basically factory prefabricated wall panels, with linig, cladding, doors, windows and services pre-installed. While masons are still working on the final exterior finishing, internally the finishing of the houses can already be started.			
Benefits: Allows for faster construction times of tilt-up type multi-res dwellings			
Limitations: Crane is required, but is usually already be on-site to install tilt-up concrete panels			
Building Type: all	Application Point: walls	Construction Type: new	
Material Types: wood	Innovation Type: product	Development Maturity: mature	
Current Availability: Yes - refer contact details below			
Experience in Use: Already applied in hunderds of houses, only in the Dutch market			
Experience in Service: Already applied in hunderds of houses, only in the Dutch market			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: Stam & Landman bv Phone :+31-72-576.03.60 Fax: Email: info@stamenlandman.nl		Contact: Mr Gjalt Roo Phone: Email: G.Roo@StamenLandman.nl	
Comments: An interesting concept which could potentially be a niche market for factory-built timber framed pre-fabricated panels in concrete tilt-up construction			
Include in Assessment: Yes			
Web Links:			





<h1>Massive timber systems</h1> <h2>Die Brettstapelbauweise</h2>			
Category: Panelised construction	Country: Germany	Consultant: Scheublin	ID: 202
Description: Die Brettstapelbauweise is a massive timber plate construction for private houses and for public buildings. The primary structural elements consist of massive plate elements which are pre-manufactured automatically by, mostly, nailing boards together. The wall elements are between 80 and 120 mm thick, the floor elements between 120 and 200 mm. If "very" large spans for floors are needed larger thicknesses are available. Furthermore, the elements can easily be combined with concrete to create combined timber-concrete floors to reach larger spans, with improved noise insulation and fire resistance. The elements can be sanded for wall or floor finishing. In Germany there are about 10 manufacturers prefabricating these type of elements.			
Benefits: large floor and wall elements can be built up from simple beams. In combination with concrete a floor can perform very well at sound reduction. Low-grad material can be used.			
Limitations: In floor and wall elements there are no spaces to cater for running service pipes etc. although these can be machined in as part of the manufacturing process if necessary. Also because of swelling and shrinking of the members, potential shrinkage gaps can develop.			
Building Type: all	Application Point: whole house	Construction Type: new / floor renovation	
Material Types: wood	Innovation Type: product / process	Development Maturity: developing	
Current Availability: Yes, refer to contact details below			
Experience in Use: unknown			
Experience in Service: unknown			
Example Projects: Mainly in Germany, also some pilot projects in the Netherlands and in Austria.			
IP & Commercial Issues: unknown			
Company Contact Details: Merkle Holzbau GmbH Fabrikstrasse 31 D-73266 Bissingen Teck Phone : +49 7023 900590 Fax: +49 7023 9005959 Email: info@merkle-holzbau.de		Contact: Phone: Email:	
Comments: Cost of this system may be an issue in single family dwellings where acoustic etc performance is less of a criteria. Also, ability to locate air-conditioning and heating ducts would need to be addressed. The simple use of nails to laminate appeals. Would be advantageous if panels can be potentially made from low-grade material.			
Include in Assessment: Yes			
Web Links: www.iez-natterer.de/forschung1.html			





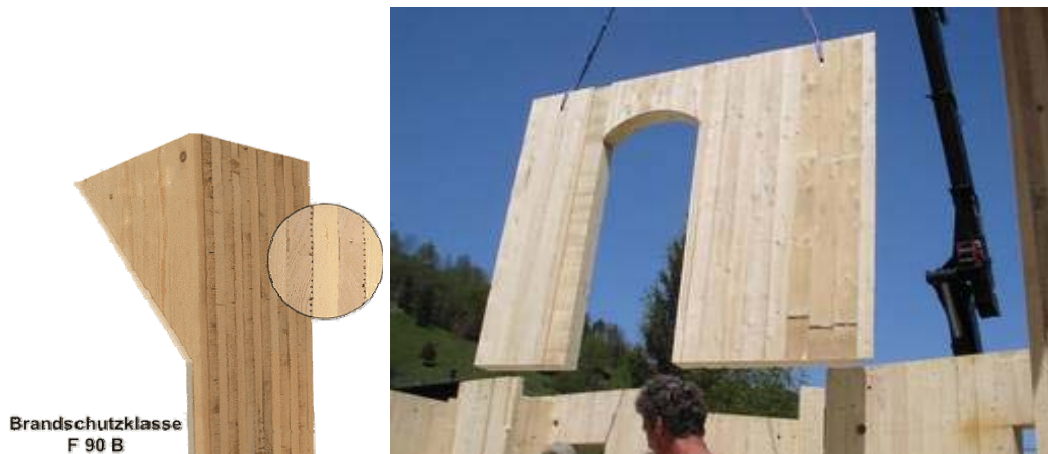
UN building system				
Category: <i>Panelised construction</i>		Country: <i>Netherlands</i>	Consultant: <i>Scheublin</i>	ID: <i>203</i>
Description: A flexible pre-fabricated housing system developed by Unidek light building systems in Gemert, The Netherlands. The building elements are cut out of a, theoretically, endless long element which has a width of 10 meters. Window and door openings can be cut out "everywhere" where needed. The elements have a standard thickness currently of 150 mm, built up out of two plates of 10 mm OSB, 130 mm of EPS insulation and timber ribs. All elements are glued together which results in a combination of stressed skin and sandwich panel (SIPS).				
Benefits: The complete house is constructed with just one type of element (inner and outer walls, floors and roof). Insulation is integrated as well.				
Limitations: There are limitations in span, which affects floors most. However the production system allows a reduction in the distance between the timber ribs.				
Building Type: detach res		Application Point: whole house		Construction Type: new
Material Types: wood / isolation		Innovation Type: product / process / business system		Development Maturity: developing
Current Availability: - Yes - Unidek B.V., Gemert, The Netherlands				
Experience in Use: The acceptance of the product is satisfactory, although some problems still have to be solved, mainly due to its rationality.				
Experience in Service: Recreation bungalows in parks "Molenheide", Houtthalen, Belgium (www.molenheide.be opens with a view a recreation home realised with the UN system.				
Example Projects:				
IP & Commercial Issues: unknown				
Company Contact Details: Unidek B.V. Scheiweg 26 5421 XL Gemert, The Netherlands Phone :+31 492 378111 Fax: +31 492 378258 Email: info@unidek.nl			Contact: Ben Klaassen Phone: +31 492 378111 Email: b.klaassen@unidek.nl	
Comments: The thickness of wall panels may be an issue in the Australian context and also costs would need to be considered where such high levels of insulation are not required here.				
Include in Assessment: Yes				
Web Links: www.unidek.nl – note that information on this product was not included on the website at the time of publishing this report.				



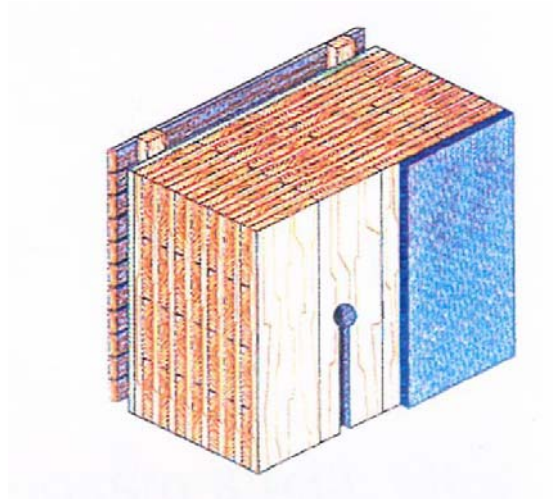
Lignotrend timber systems			
Category: Panelised construction	Country: Germany	Consultant: Scheublin	ID: 204
Description: Lignotrend elements are created in several layers with the grain directions perpendicular to each other. The elements are not massive but hollow.			
Benefits: Lignotrend elements are (just as Lenotec elements) very stable due to glued layers perpendicular to each other. Lignotrend floors are light weight floors with high structural capability.			
Limitations:			
Building Type: detach res / multi res	Application Point: whole house	Construction Type: all	
Material Types: wood	Innovation Type: product	Development Maturity: emerging	
Current Availability: - Yes - Lignotrend Produktions GmbH, Weilheim-Bannholz, Germany			
Experience in Use: The product is "widely" accepted and used (more than 4000 projects realised). Examples can be seen on www.lignotrend.de/objekte			
Experience in Service: unknown			
Example Projects: The product is "widely" accepted and used. Examples can be seen on www.lignotrend.de/objekte			
IP & Commercial Issues: unknown			
Company Contact Details: Lignotrend Produktions GmbH Landstrasse 25 D-79809 Weilheim-Bannholz Phone :+49 7755 92000 Fax: +49 7755 920055 Email: info@lignotrend.com		Contact: Phone: Email:	
Comments: Cost of this system may be an issue in single family dwellings where acoustic etc performance is less of a criteria. Also, ability to locate air-conditioning and heating ducts would need to be addressed.			
Include in Assessment: Yes			
Web Links: www.lignotrend.de			



MHM Solid wood wall			
Category: <i>Panelised construction</i>	Country: <i>Germany</i>	Consultant: <i>Svensson</i>	ID: <i>205</i>
Description: A massive solid wood wall (can be floor) supports the requirements of a healthy environment with natural air filtering, moisture and temperature regulating properties of wood. The wall is an ecological solid wood wall for house construction, consisting of random width, dried 24mm thick boards. The boards are pre-processed with specially developed cutterhead which cuts a 3mm step groove on either side and a series of 3mm x 3mm kerfs on one surface of the board. From the formed boards the "Wall Master" produces raw wall elements varying in sizes from 1,5m x 1,5m up to 3,25m x 6m and a thickness from 7cm to 34.5 cm, in which the boards are installed perpendicular (lengthwise and crosswise) and connected with aluminium groove spikes layer by layer. Each board intersection is nailed with two spikes in the greatest possible distance to each other (diagonally). This ensures the greatest possible stability. After reaching the desired wall thickness the raw wall element is moved into the CNC-portal processing centre PBA, where the element is formatted and the necessary door and window openings are cut. Also drilling for lifting slings, slots and recesses for heating and sanitary, as well as electrical sockets and other installation preparations are milled into the wall element by computer-controlled tools.			
Benefits: Accomodates design flexibility. Pre manufactured, quick, no glue or chemicals.			
Limitations: Weight, cost			
Building Type: Residential	Application Point: whole house	Construction Type: new	
Material Types: Wood	Innovation Type: product / process	Development Maturity: mature	
Current Availability: good			
Experience in Use: Yes			
Experience in Service: unknown			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: MHM (massiv-Holz-Mauer) Auf der geigerhalde 41 D-87459 Pfronten-Weissbach Phone :+49 8332 923319 Fax: +49 8332 923311 Email: info@massivholzmauer.de		Contact: Phone: Email:	
Comments: The concept of a glue free, nailed only, fully automated manufactured panel is appealing. Material cost would be a possible issue, but it may suit use of low grade timber.			
Include in Assessment: Yes			
Web Links: www.massivholzmauer.de			







Solid wood elements			
Category: Panelised construction	Country: Norway	Consultant: Ascheim	ID: 206
Description: Structural elements of cross laminated solid wood used as floor, wall and roof structures. The elements are structural glued comprising 20 - 35 mm thick boards (normally spruce) where the outer layers form the elements main direction. Because of the effect from the cross lamination the elements stiffness perpendicular to the main direction is good. The elements thicknesses are a multiple (symmetrical cross sections, odd number of layers and at least 3) of the board thickness. The requisite thickness is given by the end use (wall, floor, roof). The total element thickness is from 65 mm to 240 mm. The elements will be prefabricated with designed lengths, widths and details such as openings for windows, doors, stairs etc. The elements are easily assembled at a building site by a small size mobile crane.			
Benefits: The Moelven MassivTre elements in solid wood are prefabricated and produced under a system with high factory production control (FPC). All elements are specially designed/produced for each project. This, together with the FPC will give a customised product. Elements may be used with polished/open surface as wall, roof and floor elements which gives the room a timber look. Since all elements are lightweight and specially designed regarding end use size, the building time will be short. Normally a smaller mobile crane is enough to serve the construction site. Because of the compact cross section the fire characteristics (reaction to fire, charring rate etc.) of the elements are good, which also have been proved during full scale fire tests of the elements. Since a high level of element strength and stiffness can be attained by adding enough numbers of layers, the elements fit well for multistorey timber buildings where quite unrestrained requirements to the structural sectioning might be a target. It is possible to utilize timber with lower quality, both regarding strength/stiffness and visual characteristics, in the inner layers. This gives the opportunity to use a big volume of low quality materials in an effective way in a high quality product to a good price.			
Limitations: Since the elements are produced from dry timber layers (moisture content approx. 12 %) the elements are sensitive to rain and/or other forms of high moisture influence during the building process. In multi-residential construction, the connection between different element types (e.g. wall/floor) involve special design because of potential flanking sound transmission. If the elements are used as floors between two separated flats/apartments it is necessary to improve the sound insulation regarding impact noise. Elements with exposed timber out in access/egress areas might be limited by building regulations. In Nordic areas (snow, wind etc) the elements need additional thermal insulation because of national requirements. The maximum span (single supported) of an element in use is often limited by the resonant frequency, and will normally be about 7,5 m.			
Building Type: All	Application Point: whole house	Construction Type: Mostly new constructions, but also some renovation e.g. balconies etc	
Material Types: Wood	Innovation Type: Mainly product, but also building process in some extent	Development Maturity: developing / mature	
Current Availability: Yes - refer contact details below			
Experience in Use: A list of builders/homeowners can be produced if interested			
Experience in Service: Not any known experience with reported in-service issues.			
Example Projects: Yes - refer contact details below			
IP & Commercial Issues: unknown			
Company Contact Details: Moelven MassivTre AS N-3535 Krøderen, Norway Phone :+ 47 32 15 08 50 Fax : + 47 32 15 08 51 Email : massivtre@moelven.com		Contact: Knut Arne Johansen Phone : + 47 32 15 08 52 Email : knut-arne.johansen@moelven.com	
Comments: Cost of the massive panels may be an issue and also as they are solid, the need to cater for running services becomes a consideration. Gluing may have an impact on indoor air quality.			
Include in Assessment: Yes			
Web Links: http://www.moelvenmassivtre.no/			



Leno®-Massiv timber systems			
Category: Panelised construction	Country: Germany / Italy	Consultant: Scheublin	ID: 207
Description: Leno®-Massiv timber systems by "Merk Holzbau" in Southern Germany. The Trentino Area in Northern Switzerland cooperates with "Merk Holzbau" for the development of the Trentino forests. Massive elements (plates) are created with fingerjointed long boards which are glued together in several layers. As in plywood the grain direction of the layers is perpendicular to the neighbouring layers. With the use of Massiv elements for the whole house (wall / floor / roof) an outstanding system for high air-borne noise and heat control, inner climate control and fire resistance is realised.			
Benefits: The system is flexible to use since the massive timber elements, in which the grain directions are in two directions perpendicular, allow holes to be cut in (for window framing and doors). The benefit of different grain directions is also a decrease in swelling and shrinkage properties. The details are standardised by the manufacturer. The system is pre-fabricated and so, less sensitive to degradation at building site. Because the system supplies floor, wall and roof solutions, only one supplier is nescesary			
Limitations: The system is completely made out of timber plate elements. Depending on the climate conditions the erection on site has to be planned carefully. Also, because of the massiveness of the floor system, facilities for drainage must be placed under the floor.			
Building Type: All	Application Point: whole house	Construction Type: new / floor renovation	
Material Types: wood	Innovation Type: product / process	Development Maturity: deleloping/emerging	
Current Availability: Yes, refer to contact details below			
Experience in Use: unknown			
Experience in Service: unknown			
Example Projects: several dwellings in Germany / Italy / the Netherlands			
IP & Commercial Issues: unknown			
Company Contact Details: Finnforest Merk GmbH Industriestraße 2, 86551 Aichach Phone :+49 82519080 Fax: +49 82516005 Email: info@merk.de		Contact: Dipl.-Ing. Michael Keller Phone: Email: michael.keller@finnforest.com	
Comments: This system uses very large volumes of timber which, if it was suitable for utilizing low grade plantation softwood, could have potential for development in Australia providing cost issues were addressed. Use of Glue may have some air qualty implications compared to similar nailed products.			
Include in Assessment: Yes			
Web Links: www.merk.de			

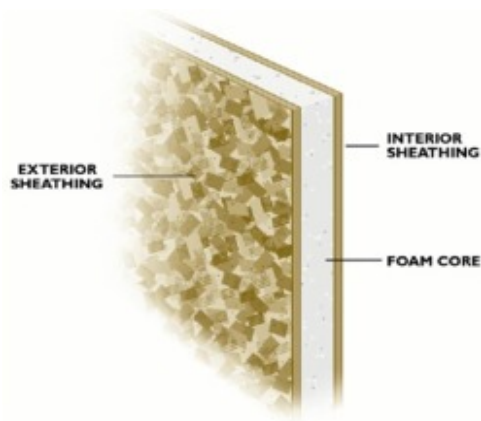
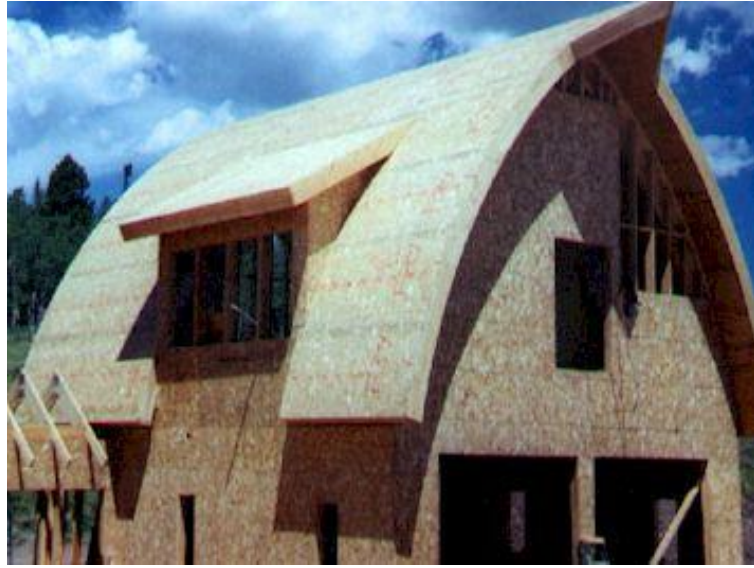






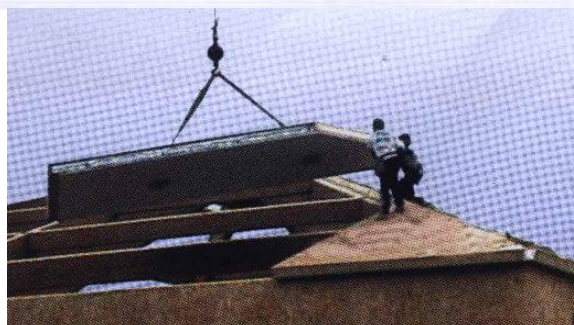
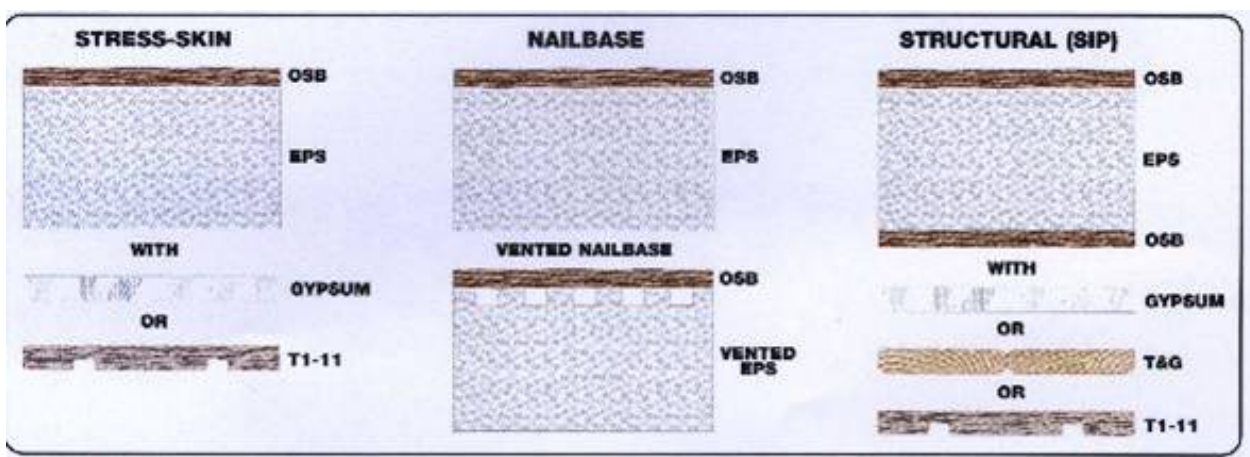
R-Control			
Category: Panelised construction - SIPS		Country: USA	Consultant: Kasal
ID: 208			
Description: R-control manufactures SIP panels, termite-resistant expanded polystyrene, EPS insulation, roof insulation panels and fire-resistant coating.			
Benefits: Benefits include relatively fast erection times and good control over the insulation properties. The SIP panels offer a degree of prefabrication by combining the structural and insulation functions of the building envelope. The system is evolving and may include reflective layers, closed air gaps, insect control chemicals, etc.			
Limitations: SIP panels are relatively difficult to connect, Attention must be paid to the connection details, penetrations and manipulation.			
Building Type: all	Application Point: wall; roof	Construction Type: new/renovation	
Material Types: wood, plastic	Innovation Type: product	Development Maturity: developing to mature	
Current Availability: Yes (Nth America/Europe), limited in Australia- see the company web site			
Experience in Use: Limited - the system is considered as relatively new in the US			
Experience in Service: no long-term use data available; no issues reported so far			
Example Projects: examples exist across the US - see listed web links			
IP & Commercial Issues: unknown			
Company Contact Details: R-control AFM R-Control/CushPack, 211 River Ridge Circle #102, Burnsville, MN, USA, 55337 8808 Luise Ln. Bozeman, Montana 59715 Phone :952-474-0809 phone Fax: (952) 474-2074 fax Email: afm@r-control.com		Contact: Mike Tobin Phone: 800 377 3626, 406 586 9346, 612 965 1352, 800 255 0176 Email: mtobin@r-control.com	
Comments: Structural insulated panels are considered to have some potential in Australia as our energy ratings are escalating, but would displace solid timber.			
Include in Assessment: Yes			
Web Links: http://www.r-control.com http://www.sips.org/			





Pacemaker Building Systems, Inc.

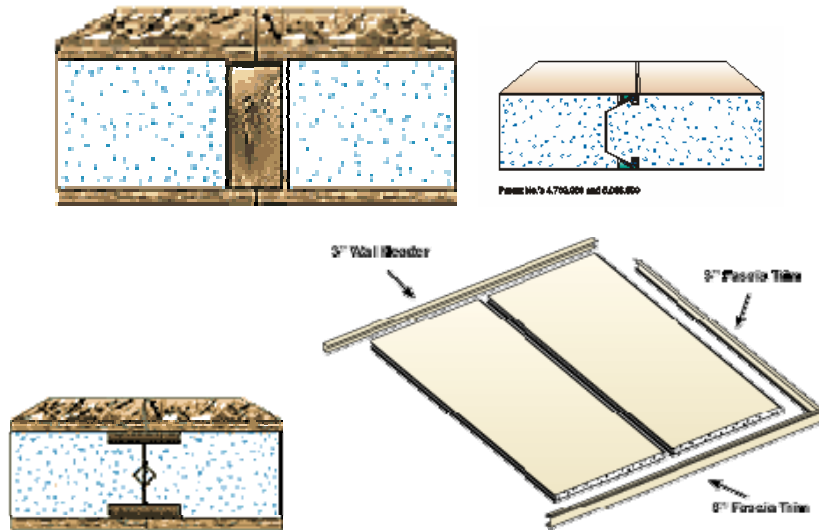
Category: Panelised construction - SIPS	Country: USA	Consultant: Kasal	ID: 209
Description: SIP Panels, insulated roof panels			
Benefits: Benefits include relatively fast erection times and good control over the insulation properties. The SIP panels offer a degree of prefabrication by combining the structural and insulation functions of the building envelope.			
Limitations: SIP panels are relatively difficult to connect, Attention must be paid to the connection details, penetrations and manipulation.			
Building Type: all	Application Point: whole house	Construction Type: new/renovation	
Material Types: wood, plastic	Innovation Type: product	Development Maturity: developing to mature	
Current Availability: Yes (Nth America/Europe), limited in Australia- see the company web site			
Experience in Use: Limited - the system is considered as relatively new in the US			
Experience in Service: no long-term use data available; no issues reported so far			
Example Projects: examples exist across the US - see listed web links			
IP & Commercial Issues: unknown			
Company Contact Details: Pacemaker Building Systems, Inc. 13900 Industry Avenue Becker, MN 55308 Phone :1-800-551-9799 Fax: Email: customercare@plymouthfoam.com		Contact: Joel Lister Phone: 724 836 7788 Email: joell@plymouthfoam.com	
Comments: Structural insulated panels are considered to have some potential in Australia as our energy ratings are escalating, but would displace solid timber.			
Include in Assessment: Yes			
Web Links: http://www.pacemakerbuildingsystems.com/			





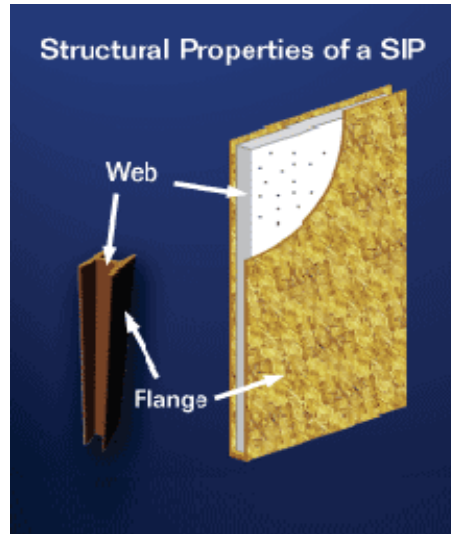
Structural Building Systems, Inc.			
Category: Panelised construction - SIPS	Country: USA	Consultant: Kasal	ID: 210
Description: SIP Panels, insulated roof panels			
Benefits: Benefits include relatively fast erection times and good control over the insulation properties. The SIP panels offer a degree of prefabrication by combining the structural and insulation functions of the building envelope.			
Limitations: SIP panels are relatively difficult to connect, Attention must be paid to the connection details, penetrations and manipulation.			
Building Type: all	Application Point: whole house	Construction Type: new/renovation	
Material Types: wood, plastic	Innovation Type: product	Development Maturity: developing to mature	
Current Availability: Yes (Nth America/Europe), limited in Australia- see the company web site			
Experience in Use: Limited - the system is considered as relatively new in the US			
Experience in Service: no long-term use data available; no issues reported so far			
Example Projects: examples exist across the US - see listed web links			
IP & Commercial Issues: unknown			
Company Contact Details: Structural Building Systems, Inc. 350 Burbank Road Oldsmar, FL 34677 Phone :1-800-969-3706 Fax: Email:		Contact: Jeff Domb Phone: 800 969 3706 x218 Email: jdomb@structall.com	
Comments: Structural insulated panels are considered to have some potential in Australia as our energy ratings are escalating, but would displace solid timber.			
Include in Assessment: Yes			
Web Links: http://www.structall.com			





THERMAPAN				
Category: Panelised construction - SIPS		Country: Canada	Consultant: Kasal	ID: 211
Description: Structural insulated panels (SIP) for wall and roof applications. Panels manufactured in sizes: 4x8 4x9 4x10 4x12 4x14 4x16ft. R-value ranges from 20 to 45 depending on panel thickness. Installation guidelines and tables are available. Standard details have been developed.				
Benefits: Fast construction times and defined thermo insulation properties. Efficient use of the materials in a sandwich panel.				
Limitations: SIP panels are relatively difficult to connect, Attention must be paid to the connection details, penetrations and manipulation.				
Building Type: detached		Application Point: walls and roofs		Construction Type: new
Material Types: wood, plastic		Innovation Type: product		Development Maturity: product is mature; application are developing
Current Availability: Yes (Nth America/Europe), limited in Australia- see the company web site				
Experience in Use: cases of limited use are documented on the website				
Experience in Service: limited to none				
Example Projects: http://www.thermapan.com/testimonials/residential.html				
IP & Commercial Issues: Yes - company cited sensitive information and R&D issues				
Company Contact Details: Thermapan Structural Insulated Panels 1380 Commerce Parkway; Fort Erie, ON, Canada; L2A 5M4 Phone : (905) 994-7399 Fax: (905) 994-7400 Email: info@thermapan.com			Contact: N/A Phone: Email:	
Comments: Structural insulated panels are considered to have some potential in Australia as our energy ratings are escalating, but would displace solid timber.				
Include in Assessment: Yes				
Web Links: http://www.thermapan.com/				





Building Innovation Industries, LLC.			
Category: Panelised construction - SIPS	Country: USA	Consultant: Kasal	ID: 212
Description: Pre-manufactured steel insulated panels that are made of expanded polystyrene (EPS) foam.			
Benefits: Panelized system; tight quality control possible (factory made panels); fast construction; resistance to insect and fungi attacks; relatively low masses; insulation properties can be tightly controlled			
Limitations: Potentially negative environmental impact: total greenhouse gas production will be high (steel and plastic manufacturing). Need to train workforce in construction. Code acceptance issues.			
Building Type: detach res / multi res	Application Point: wall systems	Construction Type: new	
Material Types: metal and plastic	Innovation Type: system	Development Maturity: mature	
Current Availability: Yes, see the link below			
Experience in Use: not widely accepted and used in the US, examples available			
Experience in Service: no long-term use data available; no issues reported so far			
Example Projects: see listed web links			
IP & Commercial Issues: no			
Company Contact Details: Building Innovation Industries, LLC. KAMillerAssociates 631 N. Stephanie Street Suite 508 Henderson, NV 89014 www.KAMA-EEBS.com Phone : 702.451.7155 Fax: 702.446.0445 Email: kamiller@kama-sip.com		Contact: Ken A Miller Phone: 702.451.7155 Email: kamiller@kama-sip.com	
Comments: Potential threat to timber framed constuction. Environmental and fire issues.			
Include in Assessment: Yes			
Web Links: http://www.biiiaz.com/foam_panel_framing.htm http://www.kama-sip.com/HomePage.asp			



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Modular Systems with SIP Panels			
Category: <i>Panelised construction - SIPS / Prefabricated factory housing</i>	Country: <i>USA</i>	Consultant: <i>Kasal</i>	ID: <i>213</i>
Description: SIP panels are used to construct the modules in the factory. The modules can be up to 80% finished but wiring and plumbing is done on-site. SIP panels offer higher degree of prefabrication (OSB-Rigid Foam-Gypsum or Composite Board). The modules contain windows and doors and can have exterior siding.			
Benefits: Speed of construction. Low costs. High degree of prefabrication. SIP panels can be produced very consistently and with well-defined thermo-insulation properties (see entry on SIP panels).			
Limitations: Relatively new technology may require special tools on-site			
Building Type: detach res	Application Point: whole house	Construction Type: new	
Material Types: wood, plastic	Innovation Type: product / process / business system	Development Maturity: emerging	
Current Availability: Yes. Limited manufacturing exists - see link below.			
Experience in Use: limited			
Experience in Service: limited			
Example Projects: http://www.fischersips.com/finishedprojects.html			
IP & Commercial Issues: no			
Company Contact Details: Fischer SIPS, KY 1843 Northwestern Pkwy Louisville, KY 40203 Phone : 1-800-792-SIPS Fax: 502-778-0508 Email: sales@fischersips.com		Contact: Structural Insulated Panel Association P.O. Box 1699 Gig Harbor, WA 98335 Phone: (253) 858-SIPA (7472) Email: staff@sips.org	
Comments: This type of housing would require a philosophical change in delivery of housing in Australia.			
Include in Assessment: Yes			
Web Links: SIP Panel Association http://www.sips.org			



Fort Housing System			
Category: <i>Panelised construction / Prefabricated factory housing</i>	Country: <i>Netherlands</i>	Consultant: <i>Scheublin</i>	ID: <i>214</i>
Description: Wood framed panels with wood based sheets are prefabricated. On site these elements are built together to create a full house. This is only the loadbearing structure and the inner half of the exterior walls. On site an outer wall, usually of typical Dutch brickwork is installed.			
Benefits:			
Limitations:			
Building Type: all	Application Point: Whole house	Construction Type: new	
Material Types: wood	Innovation Type: product	Development Maturity: mature	
Current Availability: Yes - refer contact details below			
Experience in Use: Already applied in hunderds of houses, only in the Dutch market			
Experience in Service: Already applied in hunderds of houses, only in the Dutch market			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: Fort Ava Bouw bv PO Box 10, 4285 ZG Woudrichem, Netherlands Phone :+31-183-30.62.62 Fax: +31-183-30.17.80 Email: info@fortbouw.nl		Contact: Mr Patrick van Leeuwen Phone: Email:	
Comments: Cost of this system may be an issue in single family dwellings, although design flexibility is impressive in fully CAD-automated factory. Seems like a natural extension of prefabricated wall frames ah la aussie!			
Include in Assessment: Yes			
Web Links: http://www.fortbouw.nl/			

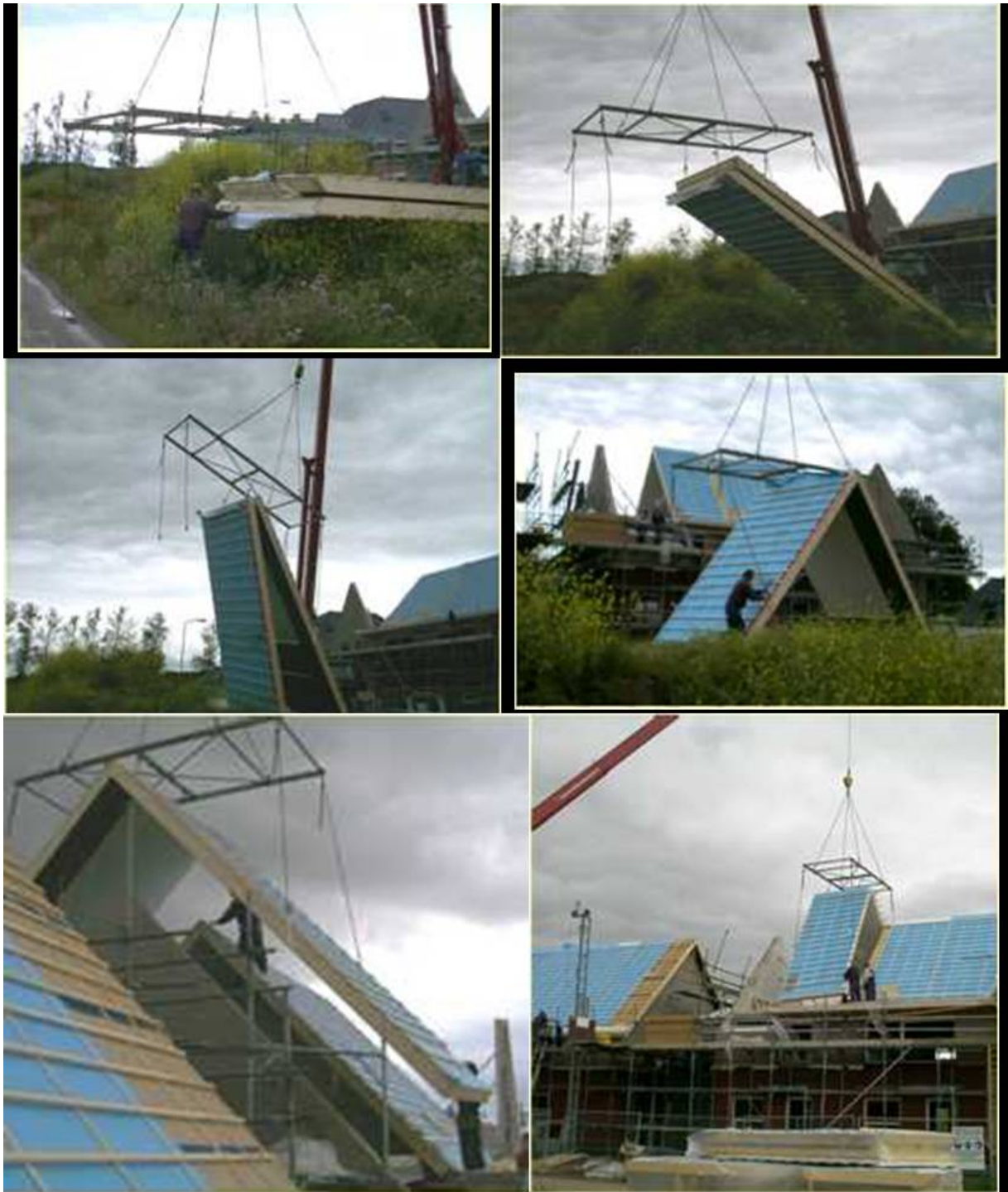






Hinged Roofs			
Category: Panelised construction / Prefabricated factory housing	Country: Netherlands	Consultant: Scheublin	ID: 215
Description: Pitched roofs are made at a factory where the two sides are connected to each other by a hinge constuction at the apex. The roofs are transported in folded position. On site the roof is folded open and as a whole mounted on the concrete stucture. The system saves a lot of time when compared to traditional roof construction on site.			
Benefits: Speed of construction, reduced on-site labour costs			
Limitations: Crane required for installation			
Building Type: detached and houses in a row	Application Point: Roofs	Construction Type: new	
Material Types: wood	Innovation Type: product	Development Maturity: mature	
Current Availability: Yes - refer contact details below			
Experience in Use: Already applied in hunderds of houses, only in the Dutch market			
Experience in Service: Already applied in hunderds of houses, only in the Dutch market			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: Brabant Prefab bv Phone : 31-412-65.32.50 Fax: Email: info@brabantprefab.nl		Contact: Mr Bart van Grunsven Phone: Email:	
Comments: Novel, but see limited potential in Australia, unless coupled with other prefabrication. Roof design flexibility would be constrained eg hips, dutch gables etc.			
Include in Assessment: Yes			
Web Links: www.BrabantPrefab.nl			





ACES			
Category: Panelised construction / Prefabricated factory housing	Country: Netherlands	Consultant: Scheublin	ID: 216
Description: Composite wall panels for industrial house building. The method of house building is based on full industrial production of light weight load carrying wall panels			
Benefits: Only a few elements are necessary to erect the house. Large light weight wall elements, supported by the floors, are able to support the studs and, consequently, prevent these studs from buckling under relatively large axial loads.			
Limitations: cost and design flexibility			
Building Type: detach res	Application Point: walls	Construction Type: new	
Material Types: wood / hardboard / isolation	Innovation Type: product	Development Maturity: developing	
Current Availability: - the elements are available but not yet used as described			
Experience in Use: The acceptance of the product might be significant, mainly due to its rationality.			
Experience in Service: Just one pilot project was realised.			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: Phone : Fax: Email:	Contact: Faas Moonen Phone: Email: s.p.g.moonen@bwk.tue.nl		
Comments: There is insufficient information on this development at this stage to assess due to difficulties in obtaining COST E29 Symposium proceedings.			
Include in Assessment: Yes – when information is available			
Web Links: Proceedings of the COST E29 Symposium - Florence - 2004, pages 191 - 199.			

Panelized housing			
Category: <i>Panelised construction / Prefabricated factory housing</i>	Country: <i>USA</i>	Consultant: <i>Kasal</i>	ID: <i>217</i>
Description: Panelized housing has been used for decades but it is gaining more attention in the US recently - mainly in planned subdivision construction.			
Benefits: Increase in construction quality due to the premanufactured components. Decrease of construction time (depends on level of prefabrication).			
Limitations: Effective in larger projects (e.g.complete subdivisions.). Less flexibility in design of plans.			
Building Type: all	Application Point: whole house	Construction Type: all	
Material Types: combination	Innovation Type: process	Development Maturity: mature	
Current Availability: Yes			
Experience in Use: accepted; experience exists			
Experience in Service: no-in service issues			
Example Projects: CENTEX Homes, Inc. subdivision design			
IP & Commercial Issues: no			
Company Contact Details: Multiple manufacturers - see links see web link Phone : Fax: Email:		Contact: Bo Kasal Phone: Email:	
Comments: This type of housing would require a philosophical change in delivery of housing in Australia.			
Include in Assessment: Yes			
Web Links: http://www.centexhomes.com/			

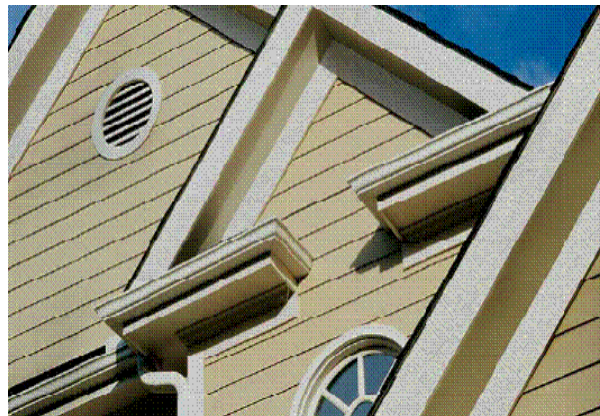
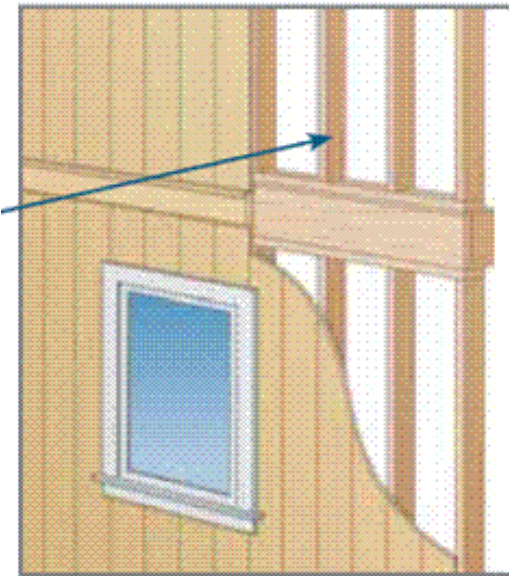
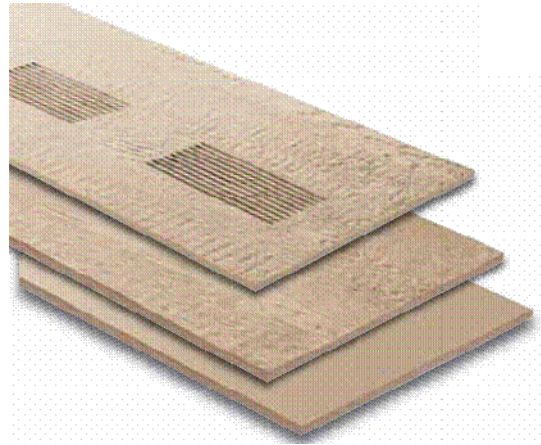


Hybrid Modular/Panelized Systems				
Category: <i>Panelised construction / Prefabricated factory housing</i>		Country: <i>USA</i>	Consultant: <i>Kasal</i>	ID: <i>218</i>
Description: Panelized systems are manufactured in the factory and delivered to the construction site either as components (such as walls) or subassemblies (roofs, entire floor sections). Site and foundation systems are usually prepared in advance by the 3rd party. The panelized systems may be also delivered as 3-dimensional (spatial) units. The units will include factory installed complete plumbing and wiring, windows, doors and built-in furniture and appliances. High level prefabrication is possible.				
Benefits: Quality control of the final product since the components are factory made. Shorter erection times as compared to typical framed construction. Reduced costs.				
Limitations: Although custom homes have been built using the modular systems, the technology is most effective when standard homes are built.				
Building Type: detach		Application Point: whole house		Construction Type: new
Material Types: combination		Innovation Type: process		Development Maturity: mature
Current Availability: Yes, many different suppliers across the US				
Experience in Use: accepted				
Experience in Service: the system is well established and numerous examples exist - see listed web links				
Example Projects: see listed web links				
IP & Commercial Issues: no				
Company Contact Details: Modular Building Systems Association Phone : Fax: Email:			Contact: Chad C. Harvey Phone: (717) 238-9130 Email: chad@modularhousing.com	
Comments: This type of housing would require a philosophical change in delivery of housing in Australia.				
Include in Assessment: Yes				
Web Links: http://www.custruct.com/ http://www.foresthomes.com/ http://www.simplexind.com/ http://www.signaturecustomhomes.com/ http://www.pennlyon.com/ http://www.havenhomes.com/ http://www.epochhomes.com/ http://www.modularhousing.com/				





LP Smart Side				
Category: <i>Improved wood</i>		Country: <i>USA</i>	Consultant: <i>Kasal</i>	ID: <i>301</i>
Description: OSB treated with zinc-borate based preservative with a resin-saturated overlay and edge protection. This product was introduced after the failed OSB siding and number of law suits in the US. The overlay provides the water resistance during the construction process.				
Benefits: Increased water resistance and durability. The manufacturer offers 30 year warranty and 20 year termite resistance.				
Limitations: Material will still intake water if exposed for a prolonged period of time. The material has been on the market for about 9 years and therefore the claimed warranties have not yet been 'tested'.				
Building Type: all		Application Point: whole house		Construction Type: new/renovation
Material Types: wood		Innovation Type: product		Development Maturity: mature
Current Availability: Available on the market as siding product and trim. Comes in 9.5 mm and 11.1mm thickness as strips (147 mm to 300 wide), 4.9 m in length or as panels (122 x 244 cm). Supplied by LP corporation - see links below.				
Experience in Use: Product is accepted but competes with other siding products including non-wood.				
Experience in Service: Less than 10 years.				
Example Projects:				
IP & Commercial Issues: no				
Company Contact Details: LP Corporation 414 Union St. 2000 Nashville, TN 37219 USA Phone : 1-888-820-0325 1-800-683-1669 Fax: Email:			Contact: LP Engineered Wood Products 2706 Highway 421 North Wilmington, NC 28401 Phone: 1-800-354-0334 Email:	
Comments: If there was an Australian OSB manufacturer, greater potential for this type of product in Australia could be anticipated.				
Include in Assessment: Yes				
Web Links: http://www.lpcorp.com/				



ZIP System Roofing			
Category: <i>Improved wood</i>	Country: <i>USA</i>	Consultant: <i>Kasal</i>	ID: <i>302</i>
Description: OSB sheathing that includes the water resistant layer. The system can be attached to roof rafters via conventional nailing. Tape is used to cover the joints. Efficient prefabricated system that eliminates the application of the felt paper.			
Benefits: Reduced labor requirements - the application saves an entire step in roof construction.			
Limitations: Potentially increased manufacturing costs.			
Building Type: all	Application Point: roof	Construction Type: all	
Material Types: wood	Innovation Type: product	Development Maturity: mature	
Current Availability: Yes see below for information			
Experience in Use: unknown			
Experience in Service: limited experimentally used in NC and TN			
Example Projects: see above			
IP & Commercial Issues: no			
Company Contact Details: HOBBER Engineered Woods 10925 David Taylor Drive Suite 300 Charlotte, NC 28262 Phone : 704 548 5248 Fax: 704 731 0148 Email: wpbsc@huber.com		Contact: Brian Carlson Phone: 704 548 5248 Email: wpbsc@huber.com	
Comments: Similar to LP Smart Side, would significantly increase construction costs in Australia as we do not use shingle/asphalt based roofing.			
Include in Assessment: Yes			
Web Links: http://www.huber.com/ http://huberwood.com/			



What is the Zip System?

ZIP System Moisture Barrier

- ▶ 1/2" ZIP System Roofing panel and moisture barrier all-in-one

ZIP Tape & Tape Gun

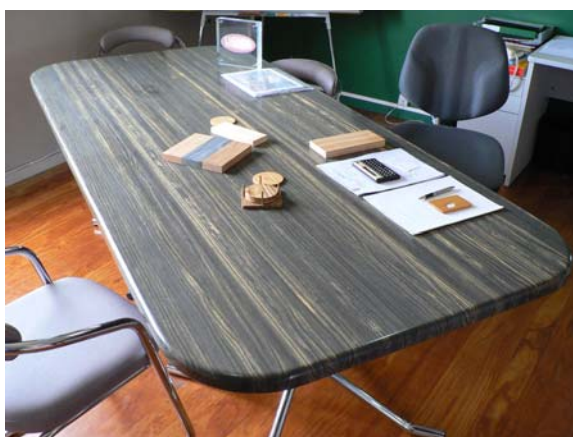
- ▶ Moisture resistance for seams, valleys and ridges
- ▶ Lighter than a roll of felt
- ▶ Tape Gun for easy, accurate installation

ZIP System Tape Guide & Fastening Guide

- ▶ For faster, easier, more accurate installation

Genetically altered wood			
Category: <i>Improved wood</i>	Country: <i>USA</i>	Consultant: <i>Kasal</i>	ID: <i>303</i>
Description: Genetic engineering in forestry is focusing on mechanical properties of the genetically treated material with the goals of penetrating construction markets. Genes were identified that can reduce the amount of lignin for up to 40% and greenhouse studies are under way. Mechanical and viscoelastic properties of the genetically altered wood are studied with the goals of establishing links between genes and mechanical properties.			
Benefits: New material with improved properties that include mechanical properties and durability.			
Limitations: Potential environmental barriers.			
Building Type: all	Application Point: other	Construction Type: all	
Material Types: wood	Innovation Type: product	Development Maturity: emerging	
Current Availability: no			
Experience in Use: none			
Experience in Service: none			
Example Projects: NCSU FORBIRC consortium of Forest Products Companies			
IP & Commercial Issues: Yes - Aggressive international consortium addressing the issues of genetically treated wood. New material is being developed specifically for the construction industry.			
Company Contact Details: FORBIRC Consortium FORBIRC Consortium NCSU Raleigh, NC 27695 Phone : Fax: Email:		Contact: Vincent Chang Phone: 919.513.0098 Email: Vincent_Chiang@ncsu.edu	
Comments: Very long term possibilities			
Include in Assessment: Yes			
Web Links: FORBIRC web site http://www2.ncsu.edu/unity/lockers/project/forestbiotech/news.html			

Lignia hardened pine			
Category: <i>Improved wood</i>	Country: <i>NZ</i>	Consultant: <i>Bayne</i>	ID: <i>304</i>
Description: Hardened pine is a process of densifying lumber by 'pouring' wood (cellulose) into wood - i.e. the cell cavities. The process was devised by NZFRI and was commercialised by Pacific Hardwoods as Greenseal TM. Today the product renamed Lignia is commercialised by the company Fibre7 managed by Wallace Roome. The process has been improved, notably concerning chemicals (new and less chemicals and less VOC) to obtain coloured product with dimensional stability, hardness and high density.			
Benefits: Hardness, less expensive and more renewable/ sustainable option than hardwoods for similar density. Better stability and machining properties. Coloured throughout			
Limitations: Even when coloured it still has a pine look with large growth rings			
Building Type: all	Application Point: internal timber mouldings, flooring, and furniture	Construction Type: all	
Material Types: wood	Innovation Type: process	Development Maturity: mature	
Current Availability: Yes, from Fibre 7, manufactured in Tauranga			
Experience in Use: accepted in marketplace, export product mostly in Japan			
Experience in Service: not available			
Example Projects: http://www.fibre7.com/partners.htm			
IP & Commercial Issues: Yes, new formulation developed by Fibre 7			
Company Contact Details: Fibre 7 Head Office Fibre 7 Limited, 18 Sherson Street, Greerton, Tauranga, New Zealand Phone :+64 7 578 5990 Fax: +64 7 578 9550 Email: info@fibre7.com		Contact: Wallace Roome Phone: + 64 274 592 248 Email: wallace.roome@fibre7.com	
Comments: Very limited application or potential in context of this project			
Include in Assessment: Yes			
Web Links: http://www.techlink.org.nz/techpractice/indurite1.htm			

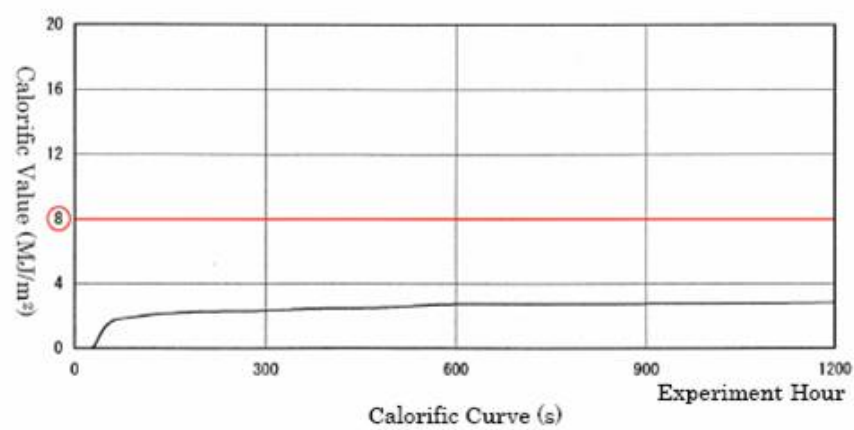




CELL+FUNEN			
Category: <i>Improved wood</i>	Country: <i>Japan</i>	Consultant: <i>Ota</i>	ID: <i>305</i>
Description: CELL+FUNEN is non-flammable/fire resistant timber made from Japanese cedar, cypress and pine + boric acid & borax. CELL+FUNEN has the following characteristics; 1. There are no poisonous gasses produced during pyrolysis. 2. Protects from rot, termite and mould. CELL+FUNEN does not burn/flare, it is only carbonized. Claimed to be stronger than normal timber. The look & smell are the same as natural timber. No formaldehyde is contained in the treatment. Some of CELL+FUNEN is made of waste wood forestry thinnings as a material. Please refer to attached product data/test results. The production technology of CELL-FUNEN is also innovative.			
Benefits: The essential advantage of CELL+FUNEN is nonflammable and the look & smell are same as natural timber - CELL+FUNEN is applicable at the Fire Prevention area as building materials. Under the Japanese Fire Regulations, natural timber has limitation in application and is unable to use for external walls or other part at the Fire Prevention area.			
Limitations: It is better to be used in a place with a little influence of water to maintain a flaming retardant effect, or it is better to coat the surface by paint.			
Building Type: all	Application Point: whole house / internal & external wall / floor / furniture	Construction Type: new / renovation	
Material Types: wood	Innovation Type: product and its production technology	Development Maturity: mature	
Current Availability: Yes - refer to the contact details below			
Experience in Use: builders and homeowners are satisfied with its colour and material feeling - it is the same as natural timbers.			
Experience in Service: When this product is exposed to wind and rain for a long time, the surface becomes white, and it becomes less non-flammable after extensive weathering.			
Example Projects: PRADA shop in Ginza Tokyo - Commercial building - CELL+FUNEN is used for the front external walls (as façade design) - refer to attached photo			
IP & Commercial Issues: Yes - This company is very sensitive to IP. We must get the permission from this company before opening any information about this product to the public, so that we must show the draft of final reports and get the permission before opening it to the public.			
Company Contact Details: Asano Fire-Retardant Lumber Co., Ltd 102-3 Yamatake Maruoka-cho Sakai-gun Fukui, Japan 910-0204 Phone : 81-776-68-0680 Fax: 81-776-68-0610 Email: funen-fukui@mb.viplt.ne.jp		Contact: Mr Takahito Asano Phone: 81-776-68-0680 Email: funen-asano.t@mb.viplt.ne.jp	
Comments: Boran/borate treated fire retardent timber has been around for a long time, so I don't understand what is different about this product. Maybe they have found ways to improve fixity of the borates? Also don't see how the strength properties are improved! Maybe worth further investigation with respect to bushfire resistance and interior products requiring fire ratings under the BCA.			
Include in Assessment: Yes			
Web Links: http://www.viplt.ne.jp/WHCAY4PK/funen/seino.html http://www.viplt.ne.jp/WHCAY4PK/funen/image/english_pafu.pdf			



Nonflammable authorization



(Japan Testing Center for Construction Materials)

Natwood oil modification			
Category: <i>Improved wood</i>	Country: <i>Austria</i>	Consultant: <i>Scheublin</i>	ID: <i>306</i>
Description: Real Wood again finds growing popularity in construction and decorative application due to it's many advantages and material characteristics ideal for "healthy environments" within homes and buildings. Wood is a re-generating natural resource but nevertheless the inadequate hardness of fast growing species in particular and the general tendency for swelling and shrinking quite often leads to the utilization of artificial or synthetic materials. In commercial use there are high requirements on materials. Weathering resistance is the most important criteria if it comes to outdoor use. NATwood® is free of any solvents. The process only applies natural substances. The thermal treatment is essential for the increase in hardness of NATwood® processed wood. Even with low scale resin absorption the extent of hardness improves disproportionally to the increase in weight. Natwood® treated real wood features low hygroscopic behaviour with reduced water absorption. The increase in weight and volume changes are minimized resulting in dimensional stability and durability			
Benefits: Sheeting of timber is placed often outside and therefore resistance to fungal and termite attack must be high. The Natwood-solution can modify fast growing (cheap) wood species into durable ones without using substances that pollute the environment. The Natwood-solution also does not effect the natural color and smell of wood.			
Limitations: The modification proces increases the brittleness of the wood. Sawing and screwing in the wood therefore can cause failure of the wood.			
Building Type: all	Application Point: outdoor elements and sheathing / cladding	Construction Type: all	
Material Types: wood	Innovation Type: Process	Development Maturity: developing	
Current Availability: Yes, refer to contact details below			
Experience in Use: unknown			
Experience in Service: unknown			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: tilo GmbH Magetsham 19, 4923 Lohnsburg Phone :+43(0)7754/400-316 Fax: +43(0)7754/400-140 Email: m.leodolter@tilo.at		Contact: Dipl.-Ing. Martin Leodolter Phone: Email:	
Comments: If it is inexpensive as claimed, then it would have potential application in Australia to improve timbers durability performance.			
Include in Assessment: Yes			
Web Links: www.natwood.at/natwood.htm			





TITAN Wood chemical wood modification			
Category: <i>Improved wood</i>	Country: <i>UK / Netherlands</i>	Consultant: <i>Scheublin</i>	ID: <i>307</i>
Description: Acetylation protects wood by actually changing its chemical structure: wood technologists describe the effect of acetylation as being analogous to effectively creating a "new wood". Indeed, they argue that acetylated wood should be considered by consumers as an entirely new species, so different are its properties from the underlying material from which it is made. Durability can be "upgraded" to the durability of the most durable hardwoods, the swelling and shrinking due to the change in moisture content is reduced dramatically. Research is still going on to alter wood for "improving" other properties, like fire resistance, resistance against insects (termites?).			
Benefits: The principle benefits are the increase in natural durability and the reduction in shrinkage and swelling, which increases the lifetime of finishing.			
Limitations: Limitaitons are in the field of structural use. Limited research carried out on elements of structural sizes show a reduction in strength properties at the characteristic level.			
Building Type: all	Application Point: elements	Construction Type: all	
Material Types: wood	Innovation Type: product / process	Development Maturity: developing	
Current Availability: - Yes - TITAN Wood, Arnhem, The Netherlands			
Experience in Use: The acceptance of the product for the use in housing is not yet proven.			
Experience in Service: Experiences in practice are mainly at a laboratory level, where the increased durability and reduced shrinkage and swelling is proven.			
Example Projects: cladding			
IP & Commercial Issues: unknown			
Company Contact Details: TITAN Wood Phone : The Netherlands: +31 26 366 3576 United Kingdom: +44 20 7598 4055 Fax: The Netherlands: +31 26 366 5936 United Kingdom: +44 20 7598 4050 Email:		Contact: Bert Kattenbroek (The Netherlands) Phone: Email: bert.kattenbroek@titanwood.com	
Comments: Any product or system that can markedly improve the durability and stability of wood at an economical cost and without the need for 'preservative' chemicals, should have enormous potential.			
Include in Assessment: Yes			
Web Links: www.titanwood.nl			

Untreated Wood Acetylated Wood





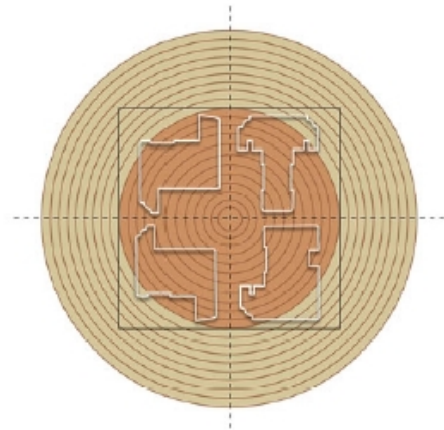
ThermoWood			
Category: <i>Improved wood</i>	Country: <i>Finland</i>	Consultant: <i>Ascheim</i>	ID: <i>308</i>
Description: ThermoWood is manufactured using a method developed by VTT (Finnish State Research Centre). The wood material is heated to a temperature of at least 180 degrees Celsius while it is protected by steam. Besides providing protection, the steam also affects the chemical changes taking place in the wood. As a result of the treatment, ThermoWood is created. Its colour darkens, it is more stable than normal wood in conditions of changing humidity and its thermal insulation properties are improved. The process is licensed to members of the Finnish ThermoWood Association, for example Finnforest and Stora Enso.			
Benefits: The product has improved stability when compared to normal kiln dried pine. Swelling and Shrinking are only 50 % of the values for untreated Nordic pine. ThermoWood has improved durability and has high resistance to most decay fungi. Thermal conductivity is reduced by 20 - 25 % compared with unmodified softwoods.			
Limitations: The strength properties are reduced. The screw holding strength is about 20 % less. The smell (charred wood smell) of ThermoWood might not be appreciated by all, but the emissions are not harmful or dangerous. The colour is affected by the process. The higher the temperature the darker the appearance.			
Building Type: All	Application Point: The main products targeted for this development are external cladding, battens and similar.	Construction Type: All	
Material Types: wood	Innovation Type: product & process	Development Maturity: developing	
Current Availability: limited			
Experience in Use: limited to date			
Experience in Service: limited to date			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: Finnforest P.O.Box 50, FI-02020 Metsä, Finland Phone : 00358 1046 05 Fax: Email: info@finnforest.com		Contact: Phone: Email:	
Comments: This product is another example of the growing 'non-chemical' developments to improve timbers durability performance. As such, it is worth serious consideration for it's potential to provide an alternative to chemical treatment.			
Include in Assessment: Yes			
Web Links: www.finnforest.com http://www.finnforest.com/default.asp?path=1;53;152;1185 http://www.storaenso.com/CDAvgn/main/0..1_EN-4901-6000-.00.html			

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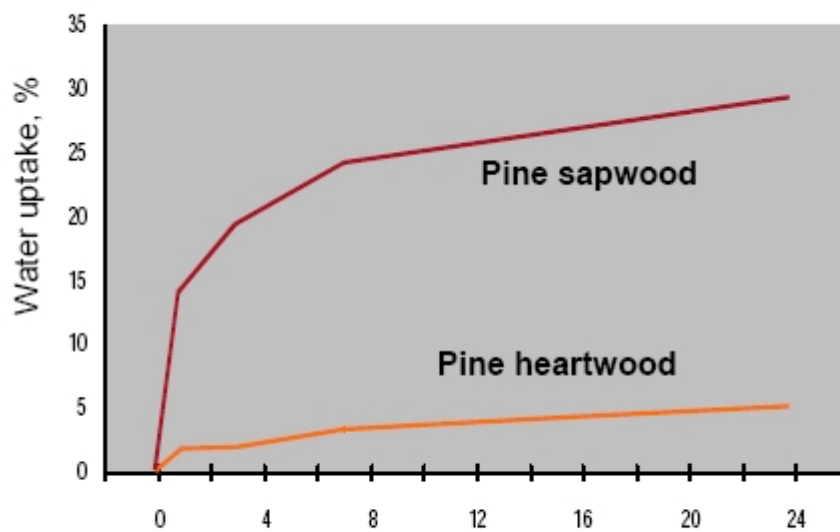
WoodHeart			
Category: <i>Improved wood</i>	Country: <i>Finland</i>	Consultant: <i>Ascheim</i>	ID: 309
Description: The concept of WoodHeart is to utilise the pine heartwood content in all the externally exposed surfaces of windows and doors where high stability and durability is needed. WoodHeart logs are sawn taking into account end use profiles, ensuring best possible use of the heartwood. During the production of components, small amounts of sapwood will remain in the final component. To ensure best performance and to remove the need for chemicals, this sapwood should be orientated to the inside of the window or machined away during profiling.			
Benefits: Benefits for windows and doors are summarised as follows: Good dimensional stability, high durability, stable base for coatings, good visual aspects, good strength properties, high insulation values and environmentally sound.			
Limitations: WoodHeart is a special product for a limited range of applications. To produce a completely sapwood-free component will lead to a high material cost.			
Building Type: All	Application Point: Joinery industry, first of all windows and doors.	Construction Type: All	
Material Types: wood	Innovation Type: Product	Development Maturity: developing	
Current Availability: Yes, produced at Honkalahti sawmill, Finland			
Experience in Use: unknown			
Experience in Service: unknown			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: Stora Enso Timber, Honkalhti Sawmill P.O.Box 12, FI-54101 Joutseno, Finland Phone :358 2046 113 Fax: 358 2046 21680 Email: info@storaenso.com		Contact: Phone: Email:	
Comments: Limited application in Australia for easily treated plantation softwoods, but may increase as we try and utilize small diameter plantation hardwoods. Definite opportunity for cypress which has refractory (can't treat) sapwood, but highly durable heartwood. In this regard, opportunities would be verandah posts and similar exposed to the weather.			
Include in Assessment: Yes			
Web Links: http://www.storaenso.com/CDAvgn/main/0,,1_EN-4522-5473-,00.html http://www.storaenso.com/CDAvgn/main/0,,1_EN-4899-6006-,00.html			

Introducing Stora Enso WoodHeart

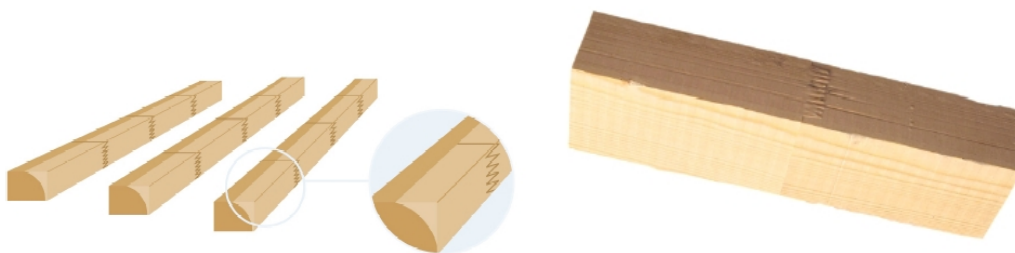
- Improved dimensional stability
- Natural durability, no chemical input
- Defect free, flexible length components
- Continuous grain structure
- Homogeneous material
- Environmentally friendly



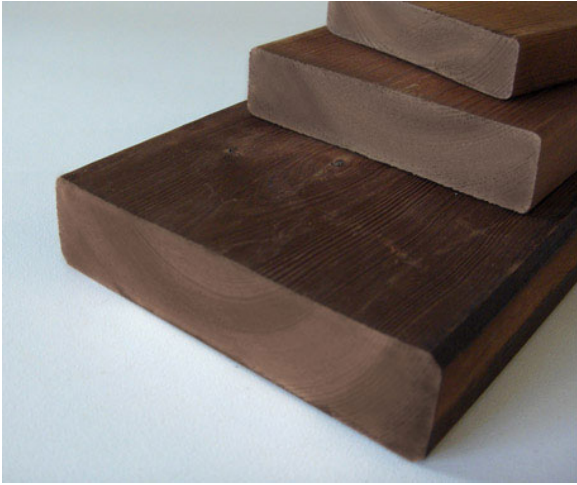
Moisture content change Heartwood versus Sapwood



Time exposed to water spraying, hours
(Source: Svensson & Nussbaum 1998)



Kebony Wood Treatment			
Category: <i>Improved wood</i>	Country: <i>Norway</i>	Consultant: <i>Ascheim</i>	ID: <i>310</i>
Description: WPT is a Norwegian research and development company that has established a production and sales company (Kebony Products) for a new environmentally friendly treatment of wood and wood products. The main component in the treating solution is furfuryl alcohol (FA). FA is a renewable chemical produced from hydrolysed biomass waste. The timber is vacuum pressure impregnated with a treating solution by the full cell process with a vacuum step, a pressure and a short post vacuum step. The timber will achieve a brown colour after the treatment, but will turn grey during outdoor exposure. The products can be painted or stained if different colours are wanted. Two qualities are available, i.e. VisorWood and Kebony. Kebony is the trade name of treated Nordic hardwoods (e.g. birch, beech and maple). Kebony gives the timber a better dimensional stability regarding moisture influence and can be supplied in several sub-qualities. Kebony is used as floor material and is also used in wood based furniture. VisorWood is an environmentally friendly alternative to classic heavy metal impregnated timber meant for outdoor use and structures. VisorWood will have a better dimensional stability regarding moisture influence compared to untreated timber. VisorWood is produced in pine (in the Nordic countries i.e. Pinus sylvestris). VisorWood gives an improved resistance against biological decay known from the Nordic countries.			
Benefits: The product is environmentally friendly and made of renewable resources (biomass waste). The product is an alternative to preservatives that are more toxic containing heavy metals etc. There are no restrictions on waste materials, and they are put in the same category as untreated timber materials. Test results (tested according to AWP Standard Method E1-97) indicate an improved resistance against termite attack. The key properties indicate long life (above ground, in ground contact and in marine environments), maintenance free and good surface treatment applicability			
Limitations: Compared to untreated timber materials, FA treated timber is more expensive. Currently it is mainly a Nordic product, but an international expansion is expected. The impact strength is somewhat reduced.			
Building Type: All	Application Point: Whole house	Construction Type: All	
Material Types: wood	Innovation Type: product & process	Development Maturity: developing / mature	
Current Availability: Yes - mainly in the Nordic countries. Kebony Products Norway - BSW timber UK			
Experience in Use: High degree of acceptance from builders - positive feedback from users			
Experience in Service: Not any known experience with reported in-service issues.			
Example Projects: Insufficient as yet.			
IP & Commercial Issues: unknown - Production process / product protected by international patents			
Company Contact Details: Wood Polymer Technologies ASA P.O. Box 1431, Vika, NO 0115 Oslo Phone : (+47) 23 01 23 17 Fax: (+47) 23 01 23 06 Email: em@wpt.no		Contact: Espen Myhre Phone: (+47) 23 01 23 17 Email: em@wpt.no	
Comments: This improved wood/treatment process is a very encouraging and positive initiative as it has the potential to address many of the environmental shortcomings of conventional treatment if the economies and claimed properties are realised. Australia has the necessary bio-mass industry (sugar cane) to provide the FA. The costs of the process are reported to be a significant issue as well as the industrial considerations associated with the use of FA and high temperatures.			
Include in Assessment: Yes			
Web Links: www.wpt.no www.kebonyproducts.com			



Greenseal / Indurite Hardened pine				
Category: Improved Wood		Country: NZ	Consultant: Bayne	ID: 311
Description: A process of densifying lumber by 'pouring wood (cellulose) into wood- ie. the cell cavities. The process was devised by NZFRI and commercialised by Pacific Hardwoods as Greenseal TM. The product can be coloured throughout, and process imparts dimensional stability, hardness and density to the timber.				
Benefits: hardness, less expensive and more renewable/ sustainable option than hardwoods for similar density. Better stability and machining properties.				
Limitations: Even when coloured it still has a pine look with large growth rings				
Building Type: all		Application Point: internal timber mouldings, flooring, and furniture		Construction Type: all
Material Types: wood		Innovation Type: process		Development Maturity: developing
Current Availability: Yes.				
Experience in Use: unknown				
Experience in Service: Availability was the main issue, and startup/ commercialisation issues with supply				
Example Projects:				
IP & Commercial Issues: unknown				
Company Contact Details: Phone : Fax: Email:			Contact: Phone: Email:	
Comments: Same product as earlier entry				
Include in Assessment: No				
Web Links: http://www.metaform.co.nz/metabtmframe.htm				

KAUNA PANEL				
Category: <i>Improved wood</i>		Country: <i>Sweden</i>	Consultant: <i>Ascheim</i>	ID: <i>312</i>
Description: Kauna is a spruce cladding and the production is based on a special process consisting of 13 important steps where the producer is responsible for the first 9 and the house owner of the last 4. If the Kauna process is complied with, the time interval between surface treatment of the external wall can be increased by 50 %. The Kauna process also minimizes the risk of decay.				
Benefits: The expenses and work regarding surface treatment of the external wall i.e. painting etc. will be considerably reduced during a house's length of life. This is obtained without any chemical treatment.				
Limitations: Kauna Panel is a quite expensive to purchase compared with traditional spruce cladding. The result is very dependent on conscientious compliance with the 13 essential points.				
Building Type: All		Application Point: External wall		Construction Type: All
Material Types: wood		Innovation Type: process		Development Maturity: mature
Current Availability: Yes				
Experience in Use: unknown				
Experience in Service: unknown				
Example Projects:				
IP & Commercial Issues: unknown				
Company Contact Details: Kauna Panel is more a process than a product. Several manufacturers produce Kauna Panel. I recommend that you contact SP Trätek in Stockholm which was the research institute who were responsible for the Kauna Project. Box 5609, SE-114 86 Stockholm, Sweden Phone :+46 87 62 18 00 Fax: +46 87 62 18 01 Email: tratek@tratek.se			Contact: Jan Ekstedt Phone: +46 8 762 18 23 Email: jan.ekstedt@sp.se	
Comments: This process may be worth further investigation to determine its value and economics in respect of high value external timber applications that are now quite 'trendy' in Australia ie screens, solid timber cladding etc. It may not work on our higher density hardwoods!				
Include in Assessment: Yes				
Web Links: http://www.kauna.com/kmarkt.htm http://www.kauna.com/13ratt.htm http://www.martinsons.se/default.asp?id=12989				

Fibre angle / heartwood content Measurement in sawn wood			
Category: <i>Improved wood</i>	Country: <i>Sweden</i>	Consultant: <i>Ascheim</i>	ID: <i>313</i>
Description: This refers to a project the aim of which is to integrate technology for measuring fibre angle and heartwood content into equipment that measures both properties during transverse feed in green sorting. The results show that technology based on laser and image analysis makes this possible. The project has also shown that it is possible to produce straighter lumber by sorting out the part that is most prone to skewness and put these boards in the bottom of the stack during drying. The results were very clear and when following up the results in the secondary processing, the yield was improved in both cross-cutting and planing. The next step should be to verify that the technology works also on spruce and to study the potential in combining measurement technology with improved drying technology.			
Benefits: Improved sawn wood quality			
Limitations: early development stage only			
Building Type:	Application Point:	Construction Type:	
Material Types: wood	Innovation Type: process	Development Maturity: Emerging/developing	
Current Availability:			
Experience in Use: unknown			
Experience in Service: unknown			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: SP Trätek Box 857, SE-501-15 Borås, Sweden Phone :+46 33 16 50 00 Fax : +46 33 13 55 02 Email : tratek@tratek.se		Contact: Johan Oja Phone : +46 910 547 13 Email : johan.oja@sp.se	
Comments: Any processes that can be economically introduced at the green chain to better sort or characterise timber prior to downstream processing is very worthy of pursuit or further investigation, but no doubt this technology has already been identified by Australian producers!.			
Include in Assessment: Yes - marginally applicable to this project, but maybe useful to include to bring to industry attention			
Web Links: http://www.sp.se/tratek/eng/			

Quattrolit				
Category: <i>Improved wood</i>		Country: <i>Sweden</i>	Consultant: <i>Ascheim</i>	ID: <i>314</i>
Description: Quattrolit is a wooden pole produced from round logs. The logs are cut in four sectors, turned with the inside out and glued together again. After this process, the heartwood forms the outside of the pole, and a hole is created in the center of the pole. The wood species is spruce or pine, and the moisture content is 12 - 14 %. The posts are square with dimensions from 110x110 mm up to 180x180 mm.				
Benefits: The poles have an increased durability and a good dimensional stability. The hole in the middle can be utilised for connections or for installations.				
Limitations: A limited production capacity, and a limited dimension range.				
Building Type: Detach res, sound barriers		Application Point: As poles/columns in different applications.		Construction Type: All
Material Types: wood		Innovation Type: product		Development Maturity: developing
Current Availability: Yes, Spikab				
Experience in Use: unknown				
Experience in Service: unknown				
Example Projects:				
IP & Commercial Issues: unknown				
Company Contact Details: Spikab Ställverksvägen 8, SE-942 36 Älvsbyn, Sweden Phone :0046 929 108 50 B18 Fax: 0046 929 123 26 Email: info@spikab.se			Contact: Ulf Ölund Phone: Email:	
Comments: Limited application in Australia for easily treated plantation softwoods, but may increase as we try and utilize small diameter plantation hardwoods. Definite opportunity for cypress which has refractory (can't treat) sapwood, but highly durable heartwood. In this regard, opportunities would be verandah posts and similar exposed to the weather.				
Include in Assessment: Yes				
Web Links: www.spikab.se www.spikab.se/?p=8				

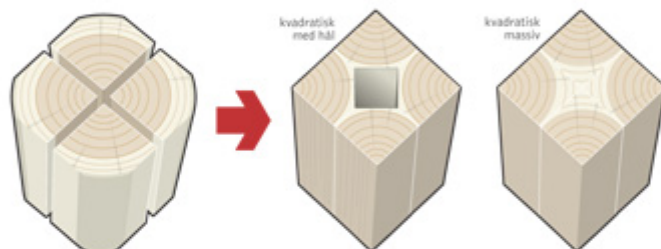
Quattrolit™

Kvalitetsstolpar för konstruktioner utomhus:
bullerplank, lekparkar, uteplatser...

MÅNGA ANVÄNDNINGSMÖJLIGHETER

Quattrolit passar överallt där du behöver en lättmonterad, robust stolpe som enkelt kan justeras i efterhand, till exempel: Stolpar till bullerplank, lekparkskonstruktioner, verandastolpar mm.

DETTA ÄR QUATTROLIT



1. Stocken delas i fyra delar.

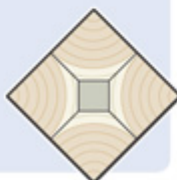
2. Delarna limmas ihop så att kärnvirket är vänt utåt.

FÖRDELAR MED QUATTROLIT™

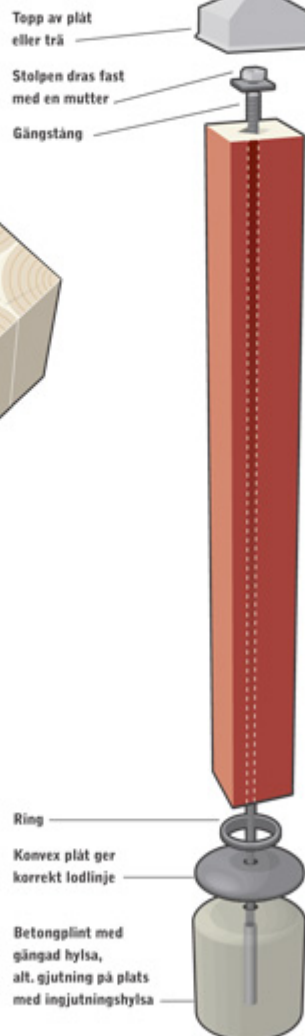
- Kärnvirket är vänt utåt
- Hög rotbeständighet
- Miljövänlig: ingen impregnering behövs
- Rak, sprickfri stolpe
- Fogen är UV-beständig – tål kokning i 72 tim
- Hålet i stolpen underlättar infästning
- Hålet i stolpen låter träet andas

FAKTA/ QUATTROLITSTOLPAR FRÅN SPIKAB

Dimensioner	Material	Fuktkvot
110 x 110	Gran och furu	12 - 14 %
120 x 120		
135 x 135	Längd	Lim
155 x 155	< 6 m	Melamin-urea, transparent
180 x 180		



MONTERINGSEXEMPEL

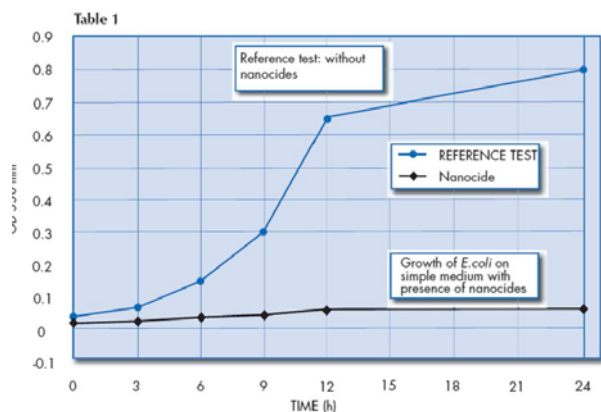


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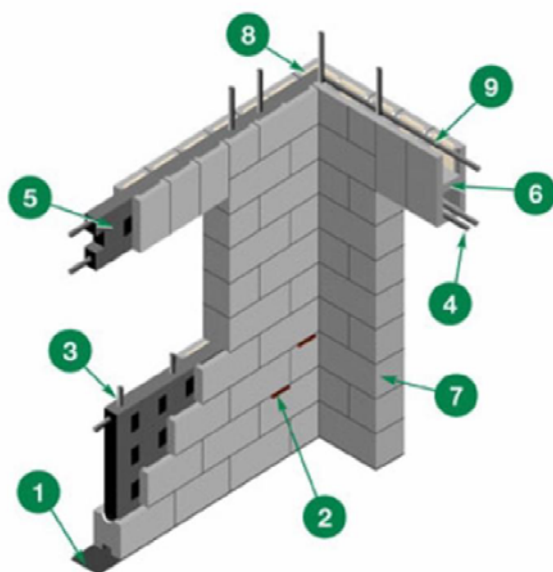
942 36 ÄLVSBYN

TEL: 0929-108 50, FAX 0929-123 26, WWW.SPIKAB.SE, INFO@SPIKAB.SE

ND NanoCides			
Category: <i>Improved wood</i>	Country: <i>USA</i>	Consultant: <i>Kasal</i>	ID: 315
Description: Clay nanonotubes are used to encapsulate the biocidic materials that inhibit mold and fungus growth. Can be used in various composite products including wood composites.			
Benefits: Inhibits the growth of molds and fungi.			
Limitations: Technology is new and at the stage of testing.			
Building Type: all	Application Point: whole house	Construction Type: new	
Material Types: combination	Innovation Type: product and process	Development Maturity: emerging	
Current Availability: Available on experimental basis. Seems to be ready for pilot tests.			
Experience in Use: none yet; experiments			
Experience in Service: none			
Example Projects: N/A			
IP & Commercial Issues: no			
Company Contact Details: NanoDynamics, Inc. 901 Fuhrman Blvd. Buffalo, NY 14203 Phone : 716 853 4900 Fax: 716 853 8996 Email: ksmith@tech-scouts.net		Contact: Dana Marie Hammer-Fritzingler Phone: 716 853 4900 Email: dmhfritzingler@nanodynamics.com	
Comments: Main potential in Australian context would be improved durability properties as mould and health issues are not at the forefront here just yet.			
Include in Assessment: Yes			
Web Links: http://www.nanodynamics.com/			



Durisol Building Systems				
Category: Wood composite		Country: Canada	Consultant: Kasal	ID: 401
Description: Durisol is a proprietary cement-bonded wood fiber material. It is composed of specially graded recycled waste wood (100% clean, natural softwood lumber), that is neutralized and mineralized, and then bonded together with Portland cement. Hardened Durisol is lightweight, porous and very durable. It does not rot nor decay. It is vermin, termite and insect proof and does not support fungus growth. Durisol is environmentally safe, does not contain nor emit any toxic elements, and is fully recyclable. It contains no plastic, foams or polystyrenes				
Benefits: Numerous: R-value, termites, constructability, fire, mold and moisture, etc; uses recycled wood				
Limitations: Cost, availability, lack of familiarity				
Building Type: all		Application Point: whole house		Construction Type: new
Material Types: wood, cement		Innovation Type: product		Development Maturity: mature
Current Availability: Yes, see enclosed docs				
Experience in Use: unknown				
Experience in Service: see additional documentation				
Example Projects:				
IP & Commercial Issues: unknown				
Company Contact Details: Durisol Building Systems Inc. 67 Frid Street, Hamilton, Ont. L8P 4M3 Phone : Fax: Email: info@durisolbuild.com			Contact: John deGraauw Phone: Email:	
Comments: Reconstituted cement based wood panels or products offer a multitude of potential opportunities to the timber industry for both recycling low grade/contaminated/treated timber and new/substitution market development.				
Include in Assessment: Yes				
Web Links: http://www.durisolbuild.com/				



The System

1. Optional Mortar Bed
2. Levelling Shims
3. Wall Reinforcing
4. Lintel Reinforcing
5. Concrete Fill
6. Lintel Form (Cut on-site)
7. Square End Form
8. Corner Form
9. Insulation Inserts



Wood-polymer lumber			
Category: <i>Wood composite</i>		Country: <i>USA</i>	Consultant: <i>Kasal</i>
ID: <i>402</i>			
Description: Recycled wood and plastic (polyethylene) are used in the lumber replacement product.			
Benefits: Increased durability of the exposed wood material.			
Limitations: The recyclability problem is shifted to the consumer who will have to recycle the aged product.			
Building Type: all	Application Point: other	Construction Type: all	
Material Types: wood, plastic	Innovation Type: product	Development Maturity: mature	
Current Availability: Yes; see links below for the information			
Experience in Use: Yes; used in exterior applications			
Experience in Service: Yes. see the text above: recycling problem is shifted towards consumer			
Example Projects: http://www.trex.com/Universal/showcase/default.asp			
IP & Commercial Issues: unknown			
Company Contact Details: TREX Trex Company, Inc. Chairman Box 658 65 High Ridge Road Stamford, CT 06905 Phone : 1-800-289-8739 Fax: Email: question@trex.com		Contact: Phone: Email:	
Comments: These products are available and in use in Australia now.			
Include in Assessment: Yes			
Web Links: http://www.trex.com/			

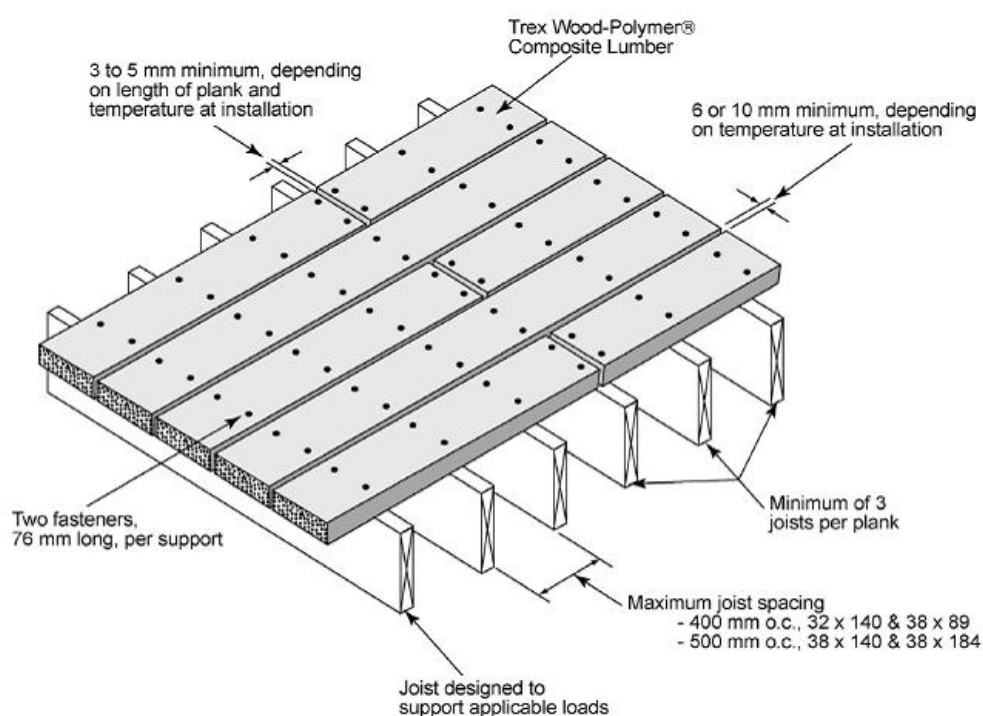
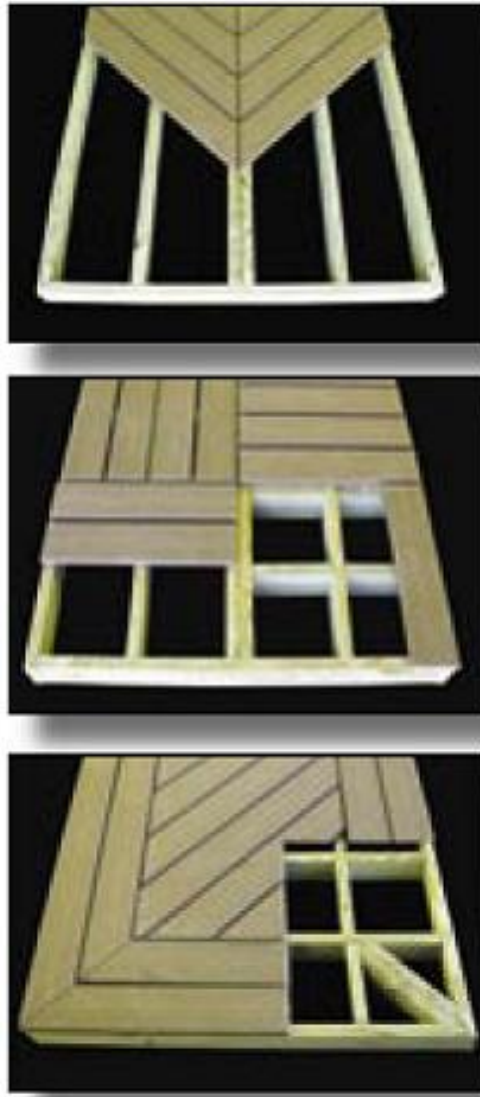


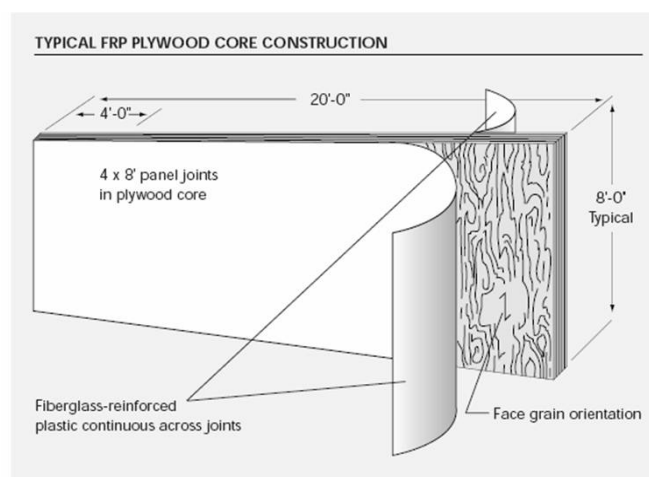
Figure 1. Installation of "Trex Wood-Polymer® Composite Lumber" Decking



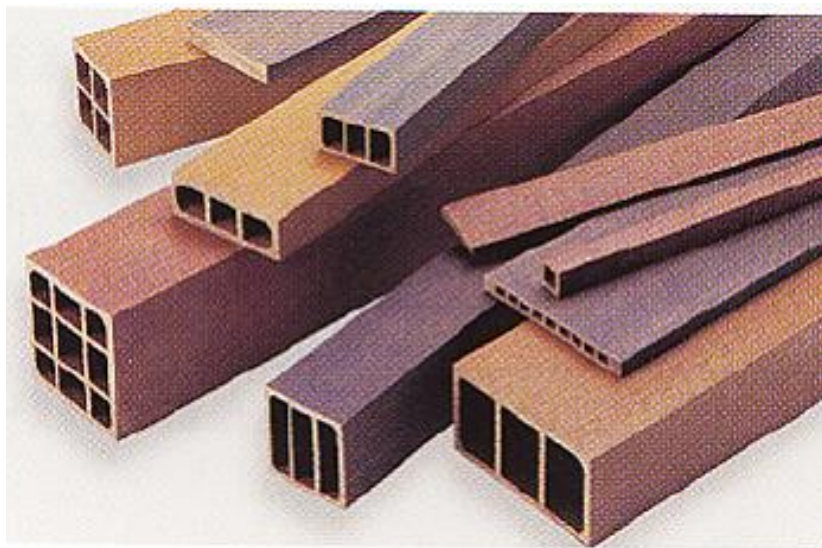
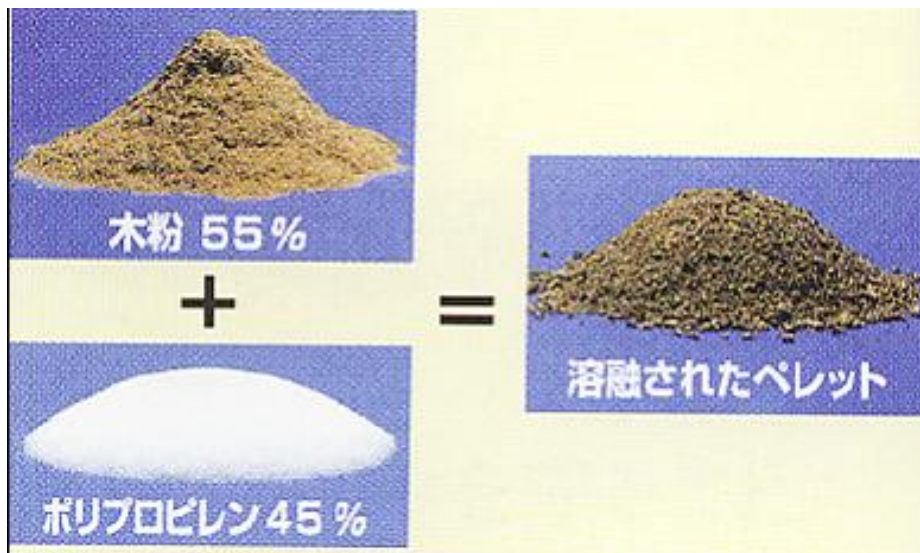


Composite fabric reinforced plywood

Category: Wood composite	Country: USA	Consultant: Kasal	ID: 403
Description: Sheet of composite fabric (such as non-woven fiberglass mat) is inserted in-between the veneer of the plywood sheet. The fabric is then bonded with the matrix (adhesive). Resulting composite material has higher strength and dimensional stability. This is a relatively old concept that is becoming more feasible with the decreased costs of the reinforcing fabric.			
Benefits: Increased strength and dimensional stability.			
Limitations: Costs.			
Building Type: all	Application Point: wall, floor, roof sheathing	Construction Type: all	
Material Types: wood, plastic	Innovation Type: product and process	Development Maturity: emerging	
Current Availability: The technology and products are available and are currently used mostly in packaging and transportation. The process is established and experiments in applications in residential construction have been carried out at the research environment.			
Experience in Use: none			
Experience in Service: none			
Example Projects: N/A			
IP & Commercial Issues: unknown			
Company Contact Details: Kemlite Company, Inc. Kemlite Company, Inc. 23525 W. Eames St. Channahon, IL 60410 U.S.A. Phone : 1-800-435-0080 Fax: 1-815-467-8666 Email: bbeaubien@kemlite.com		Contact: Barbara Beaubien Phone: 815 467 8600 Email: bbeaubien@kemlite.com	
Comments: Specialist applications only			
Include in Assessment: Yes			
Web Links: http://www.kemlite.com http://www.kemlite.com/glasbord/glasbord_kemply.cfm#glasbord_p			

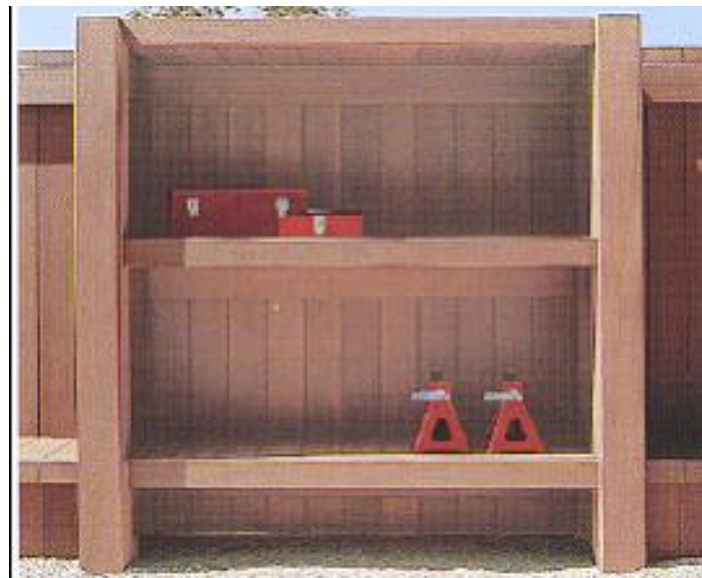


Ein Super Wood			
Category: Wood composite	Country: Japan	Consultant: Ota	ID: 404
Description: Ein Super Wood is a wood/plastic composite made from 100% recycled materials - e.g. waste timbers from building site, factories and other places / recycled plastics and others. Pulverizing recycled plastics and waste timbers etc, then heating and mixing together with thermoplastic resin and extruding Ein Super Wood products. The surface of Ein Super Wood looks like natural timber. All kinds of shapes can be produced its dimensional stability is high.			
Benefits: The essential advantage of the Ein Super Wood is that it is made from waste timber & plastics etc. The surface of Ein Super Wood looks like natural timber and any kind of profile can be made. Ein Super Wood was developed not only for using recycled materials positively but also it has a lot of other positive characteristics. 1) Decay and termite resistant 2) Saving natural resources 3) Recycled 4) Weather durability, 5) Water durability 6) easy to maintain - reduced management & maintenance cost 7) long term stability			
Limitations: This product is combustible and has limitation of use where Fire Regulations may prevail			
Building Type: all	Application Point: external	Construction Type: new / renovation	
Material Types: wood, plastic, recyclables	Innovation Type: product & its production technology	Development Maturity: mature	
Current Availability: Yes - refer to contact details below			
Experience in Use: owners are happy about timber feeling of the materials			
Experience in Service: not available			
Example Projects: Tokorozawa Gymnasium - address : Tokorozawa-shi Saitama, Japan - refer to the photo / this company has more 500 project experiences.			
IP & Commercial Issues: Yes - this company is applying to get its patent at the moment. Must get the permission from this company before opening the information in this sheet & others to the public.			
Company Contact Details: Ein Top Co., Ltd 528-1, Takaoka Takino-cho Katou-gun Hyogo, Japan note: this address may be changed in April 206 - please confirm w MO Phone : 81-795-48-0855 Fax: 81-795-48-0857 Email: j.ogura@ein-top.com		Contact: Mr. Jin Ogura Phone: 81-795-48-0855 Email: j.ogura@ein-top.com	
Comments: Similar products (Modwood) are already available in Australia and are gaining market share as replacements for solid timber. Advances in usage of recycled materials may become more important into the future.			
Include in Assessment: Yes			
Web Links: http://www.ein-top.com			

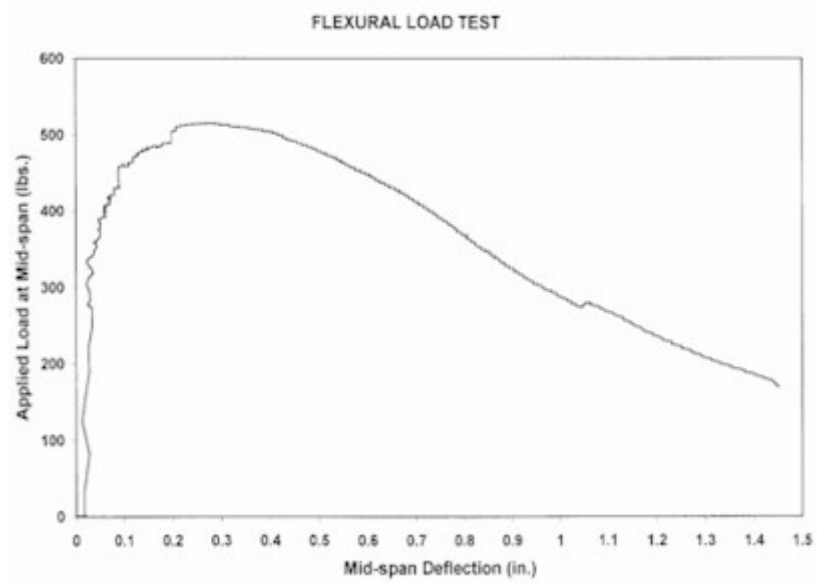
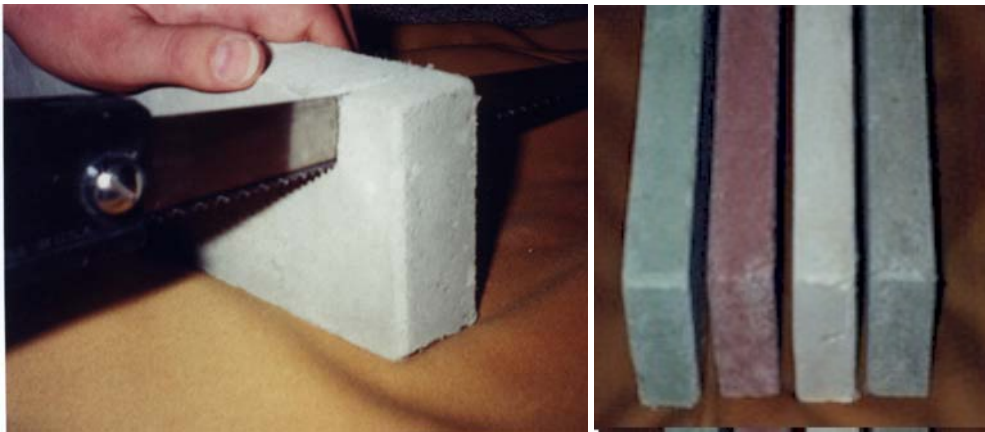




M-Wood 2			
Category: Wood composite	Country: Japan	Consultant: Ota	ID: 405
Description: M-Wood 2 is a new ecologically sustainable material which is made from 100% recycled materials - e.g. waste timbers from building sites, factories and other places - including plaster boards, other wastes, recycling plastics and others. Pulverizing recycling plastics and waste timbers etc, then heating and mixing together with thermoplastic resin to make the extruded form as M-Wood 2. 51% to 55% of product weight ratio is woody material so that the surface of M-Wood 2 looks like natural timber.			
Benefits: The essential advantage of the M- Wood 2 is that it is made from waste timber & plastics etc. The surface of M - Wood looks like natural timber and any kind of profile can be made. M - Wood was developed not only for using recycled materials positively but also it has a lot of other positive characteristics. 1) Decay and termite resistant 2) Saving natural resources 3) Recycled 4) Weather durability, 5) Water durability 6) easy to maintain - reduced management & maintenance cost 7) long term stability			
Limitations: This product is combustible and has limitation of use where Fire Regulations may prevail			
Building Type: all	Application Point: external	Construction Type: all	
Material Types: wood, plastic, recyclables	Innovation Type: product & its production technology	Development Maturity: mature	
Current Availability: Yes - refer to contact details below			
Experience in Use: owners are very happy especially the owners of department stores & kindergarten (preschool). Because M-Wood 2 is very safe for kids.			
Experience in Service: It occurs the expansion and contraction by heat, so that the expansion joints must be designed at the stage of design.			
Example Projects: Expo 2005 Aichi Japan (The 2005 World Exposition Aichi, Japan) - West Entrance decking and Corridor - Total approx 19,000m ² ; Kansai Airport - Observation Deck - approx 7000m ²			
IP & Commercial Issues: Some parts of this product or its production technology have got the Patent / Trademark/ Design Registration or has applied to get these. Must get the permission from this company before opening all information in this sheet & others to the public.			
Company Contact Details: Misawa Home Co., Ltd LAC Bldg 3-19-11 Hamadayama Suginami-ku Tokyo Japan Phone : 81-3-5306-5838 Fax: 81-3-5305-7320 Email: Yuichi_Sakaguchi@home.misawa.co.jp		Contact: 1) Mr. Yuichi Sakaguchi 2) Mr. Osamu Tanaka 3) Mr. Toru Murayama Phone: 1)2) 81-3-5306-5838 3) 81-3-3349-8088 Email: Yuichi_Sakaguchi@home.misawa.co.jp Osamu_Tanaka@home.misawa.co.jp Toru_Murayama@home.misawa.co.jp	
Comments: Similar products (Modwood) are already available in Australia and are gaining market share as replacements for solid timber. Advances in recycling technology may be applicable.			
Include in Assessment: Yes			
Web Links: http://www.misawa.co.jp/misawa/kankyoe_gizyutu/kaihatu/shoshi.html#mwood2 http://www.m-wood.net/english/			

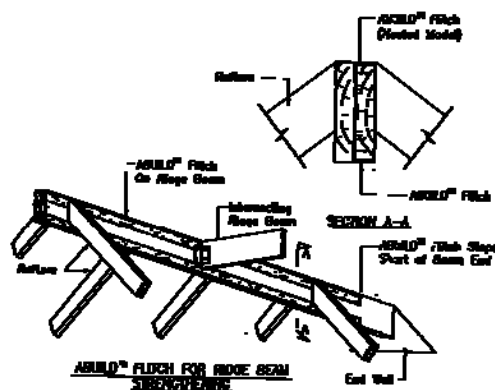
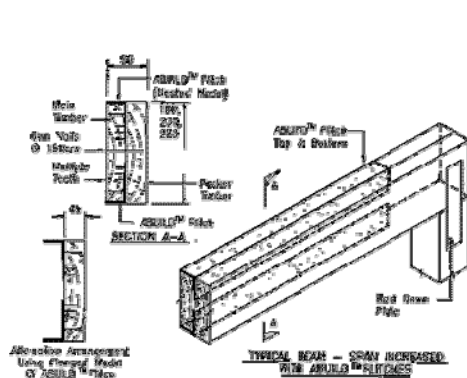


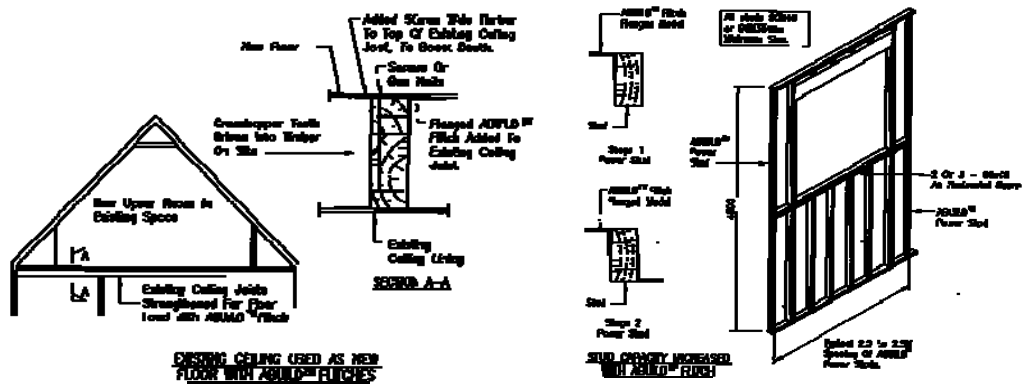
Substiwood			
Category: Wood composite	Country: USA	Consultant: Svensson	ID: 406
Description: Substiwood™ products can best be described as "concrete lumber". These new and revolutionary "concrete lumber" products are lightweight and are manufactured from recycled wood fibres/particles etc in combination with cement to form products similar to masonry blocks etc.			
Benefits: Strong, durable, nailable, and sawable. There are a great variety of applications Not affected by common wood defects such as knots, bowing, etc. Not susceptible to termites or rotting.			
Limitations:			
Building Type: all	Application Point: wall/ lawn edgings	Construction Type: all	
Material Types: wood, concrete	Innovation Type: product	Development Maturity: mature	
Current Availability: Yes, widespread in US			
Experience in Use: Yes			
Experience in Service: unknown			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: Substiwood, Inc. 816 W. National Avenue, Milwaukee, WI 53204 Phone : (414) 688-7581 Fax: (414) 304-1505 Email: sales@substiwood.com		Contact: Phone: Email:	
Comments: Potentially, a good development for utilizing wood waste			
Include in Assessment: Yes			
Web Links: www.substiwood.com http://www.new-technologies.org/ECT/Civil/swood.htm			



KARTRO LÄTTREGEL				
Category: <i>Engineered wood product</i>		Country: <i>Sweden</i>	Consultant: <i>Ascheim</i>	ID: <i>501</i>
Description: Kartro Lättregel is a wall stud where two timber flanges are connected by Kartros special punched metal plate fastener to form a kind of I-beam cross section. The flanges are solid wood or laminated wood graded into strength classes corresponding to C30, C24 or C18. The cross section might be reinforced at points or areas where local high forces are applied e.g. at the end of the studs. Kerto Lättregel is type approved.				
Benefits: The product is type approved. It is a light-weight product. It is easy to obtain a strong and thick wall i.e. good heat insulation, without using much/expensive building materials.				
Limitations: The product is not as flexible regarding notches etc as a solid wood cross section. Because of reduced lateral stability it is important to pay attention at the bracing of the compression flanges.				
Building Type: All		Application Point: Wall		Construction Type: New/renovation
Material Types: wood, steel		Innovation Type: product		Development Maturity: mature
Current Availability: Yes				
Experience in Use: unknown				
Experience in Service: unknown				
Example Projects:				
IP & Commercial Issues: unknown				
Company Contact Details: Nordisk Kartro AB Munkforsplan 33, SE-123 22 Farsta, Sweden Phone : +46 8 578 930 00 Fax: +46 8 578 930 45 Email: info@kartro.se			Contact: Phone: Email:	
Comments: Applications for this system within the Australian market would be very limited, as wall thickness is an issue.				
Include in Assessment: Yes				
Web Links: http://www.kartro.se/Godkannanden/Projektanv.KLattreg.pdf http://www.byggfaktadocu.se/10/company/00/65/51/company_10.html http://www.kartro.se/				

ABUILD Flitches				
Category: <i>Engineered wood product</i>		Country: <i>NZ</i>	Consultant: <i>Bayne</i>	ID: <i>502</i>
Description: ABUILD™ Flitches* are an innovative way of reinforcing timber to increase the span of timber beams. ABUILD™ Flitches comprise of a 50 mm x 50 mm x 2.4 mm thick or 3.8 mm or 6.0mm thick steel angles, spot welded on to a standard toothed nail plate extending most or all of the length of the angle. Self install models using "grasshopper teeth" driven in with a hammer on site or factory models with "claw nails" be pressed in in the factory are both available. The steel angles are attached to the top and bottom of a timber beam and substantially boost the flexural strength as well as reducing the deflections. The main difference from many previous efforts is that a substantial amount of steel is added to the top and bottom flanges where it is most effective.				
Benefits: A interesting solution to modify the structure and save money				
Limitations: Structural limitation, too long span or too heavy load				
Building Type: all		Application Point: Essentially beams, for use in floor and ceiling		Construction Type: all, particularly good for renovation
Material Types: wood, steel		Innovation Type: product		Development Maturity: mature
Current Availability: Yes - online services				
Experience in Use: not available				
Experience in Service: not available				
Example Projects: not available				
IP & Commercial Issues: unknown				
Company Contact Details: ABUILD Consulting Engineers Limited Level 2, 21-29 Broderick Rd P.O. Box 13 273 Johnsonville Wellington New Zealand Phone : +64 4 478 3929 Fax: +64 4 478 3424 Email: info@abuild.co.nz			Contact: Dr Roy G Taylor Phone: Email:	
Comments: Some potential for their uptake in Australia for specific applications such as in high wind areas				
Include in Assessment: Yes				
Web Links: http://www.abuild.co.nz/index.htm				





TECBEAM				
Category: <i>Engineered wood product</i>		Country: <i>Australia</i>	Consultant: <i>Svensson</i>	ID: <i>503</i>
Description: TECBEAM joists are an all-Australian innovation that has been extensively tested and proven to perform as a structural beam for use in all types of floor and flat roof construction.TECBEAM “I”-beam joists use plantation-grown softwood timber flanges, nailed to both sides of a patented steel web.The web is formed from 100% recyclable galvanized coil steel and has regularly spaced holes, with stiffening ribs formed between each hole. The edges of the holes are formed into a stiffening rim that also eliminates sharp edges, with the folded rim flattening out where it meets the timber flanges.				
Benefits: Minimal vibration. Can be cut to any length. Fast delivery and fast installation.Eliminates steel beam, posts and concrete pads.				
Limitations: none, australian made				
Building Type: residential		Application Point: roof/ wall/ floor		Construction Type: new
Material Types: wood, steel		Innovation Type: product		Development Maturity: mature
Current Availability: very good				
Experience in Use: Yes				
Experience in Service: unknown				
Example Projects:				
IP & Commercial Issues: TECBEAM products have Australian and International design protection. TECBEAM is the registered trademark of TECBEAM Pty Ltd.				
Company Contact Details: TECBEAM pty Ltd 58 Dandenong Street Dandenong Victoria 3175 Phone : (03) 9794 8155 Fax: (03) 9794 7621 Email: info@tecbeam.com.au			Contact: Russell Nankin Phone: 0414 877 155 Email: rusell@techbeam.co.au	
Comments: P				
Include in Assessment: No - is just another 'I' joist. Structural system				
Web Links: www.tecbeam.com.au				





A 190x4577 strongback passes through T30 double joists, to share upper level tile roof & non-masonry parallel wall loads with the stud wall below on one side, and with the adjoining TECBEAM joists on the other.



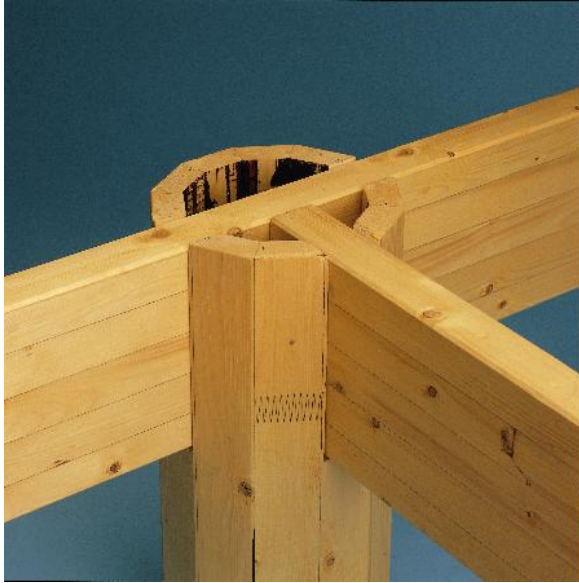
An LVL strongback has been run through the web holes of these cantilevered T30 joists that form a curved stairway void, to dampen live load vibration. Note the double web stiffeners fitted to the end of a joist that finishes at a web hole.



T30-P910 joists at 450crs. spanning 5.8m easily support over four tonnes of sheet flooring during construction. These joists will spring back perfectly straight and undamaged once this flooring load is removed. TECBEAM's exceptionally high ductility means the joists can be relied on to take short term overloading up to double design load, without risk of collapse.

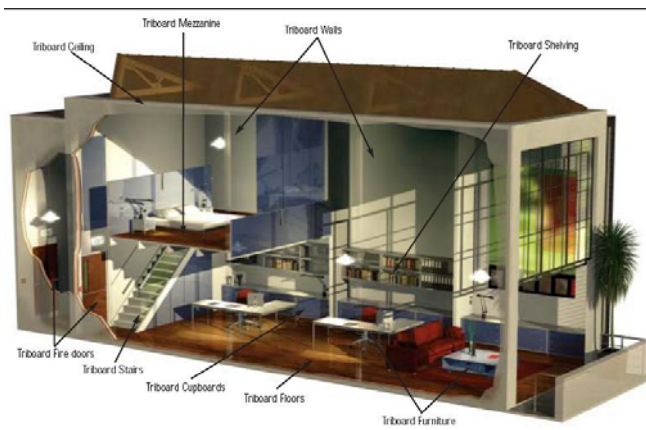
Comwood				
Category: Engineered wood product / Structural system		Country: Sweden	Consultant: Ascheim	ID: 504
Description: Comwood is a pole produced by Martinsons Såg in Sweden. It is a hollow 12-sided glulam construction manufactured by gluing together trapezoidal lamellae. The poles can be cylindrical or conical/tapered. The special production procedure, including vacuum, gives large flexibility regarding dimensions. The standard products in stock have outer diameter from 150 to 300 mm and a wall thickness from 32 to 44 mm.				
Benefits: The product is strong, and can be used for many applications. It can easily be used together with "normal" glulam elements. The center opening can be utilized for technical installations such as cables and pipes. The poles/posts are regarded as a material with high aesthetic qualities. Comwood is widely used for "street furniture" like lighting poles. Tests show that Comwood poles splinter when in collision with a vehicle and the lightweight hollow section reduces damages to drivers.				
Limitations: The cross section shape may create complicated joints. The fire resistance of the post will be limited by the thickness of the wall. Durability and weathering resistance may be an issue in Australia.				
Building Type: All		Application Point: Structural element		Construction Type: All
Material Types: wood		Innovation Type: product		Development Maturity: mature
Current Availability: Yes, Martinsons				
Experience in Use: unknown				
Experience in Service: unknown				
Example Projects:				
IP & Commercial Issues: unknown				
Company Contact Details: Martinsons Såg AB SE-937 80 Bygdsiljum, Sweden Phone :0047 914 207 00 Fax: Email: info@martinsons.se			Contact: Phone: Email:	
Comments: These products would have potential limited/niche markets in Australia, and durability would need to be considered.				
Include in Assessment: Yes				
Web Links: www.martinsons.se/default.asp?id=13600 www.martinsons.se/default.asp?id=14192&PTID=&refid=14195 www.martinsons.se/default.asp?id=12977&PTID=&refid=12373				





Triboard			
Category: <i>Engineered wood product</i>	Country: <i>NZ</i>	Consultant: <i>Bayne</i>	ID: <i>505</i>
Description: Triboard is a 3-layer sandwich panel product which uses a inner core of OSB between two surface layers of MDF. As a panel it has excellent screw holding abilities due to a strong core, and MDF surface allows immediate gibstopping and painting due to a smooth finish.			
Benefits: Essential advantages include the ability to use panels as wall system, and cut out door/ window cavities; the robustness and screw holding properties; dimensional stability. It is also available as a fire door, up to 1 hr rating.			
Limitations: Thermal insulation properties; heavy weight; acoustics trouble if used as dividing wall			
Building Type: all	Application Point: whole house, wall, ceiling, floor, door	Construction Type: all	
Material Types: wood	Innovation Type: product	Development Maturity: mature	
Current Availability: Yes. Made by Juken Nissho at Triboard plant in Kaitaia.			
Experience in Use: accepted in marketplace, export product			
Experience in Service: not available			
Example Projects: not available			
IP & Commercial Issues: unknown			
Company Contact Details: Juken Nissho (NZ) Ltd PO Box 1450, Auckland (head office) or PO Box 153 Kaitaia (mill) Phone :+64 9 408 9167 Fax: +64 9 408 2979 Email:		Contact: Mike Fischer Phone: +64 9 408 9167 Email:	
Comments: Old technology. Uptake in Australia has not occurred in 15 years, so suspect it does not fit our context at this stage.			
Include in Assessment: No - old technology			
Web Links: www.triboard.com http://www.triboard.com/triboard_aust_manual_%20aug02.pdf			

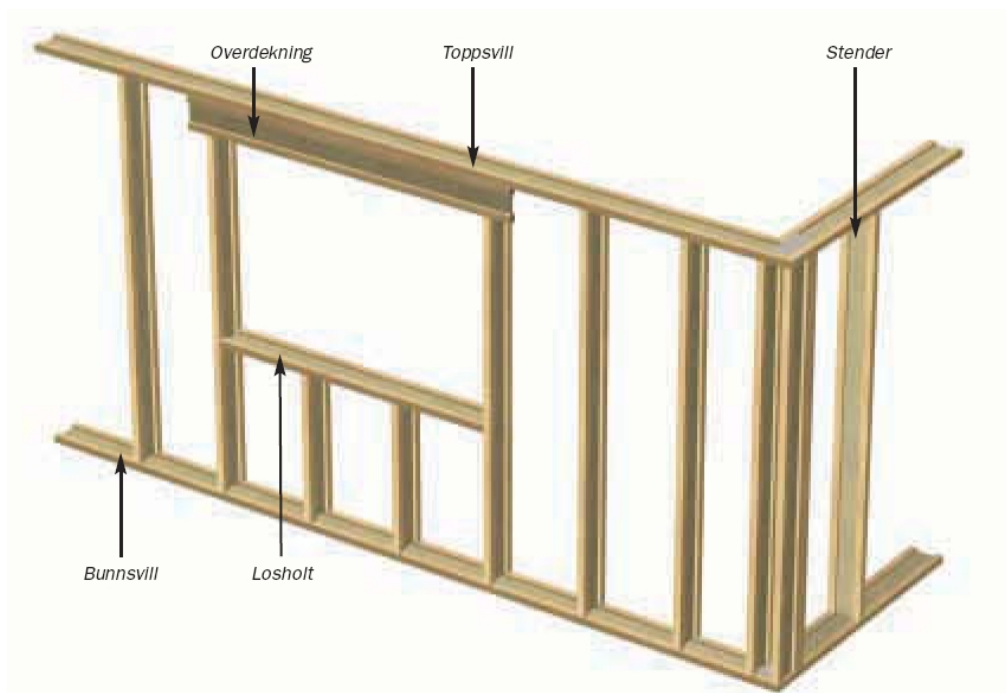




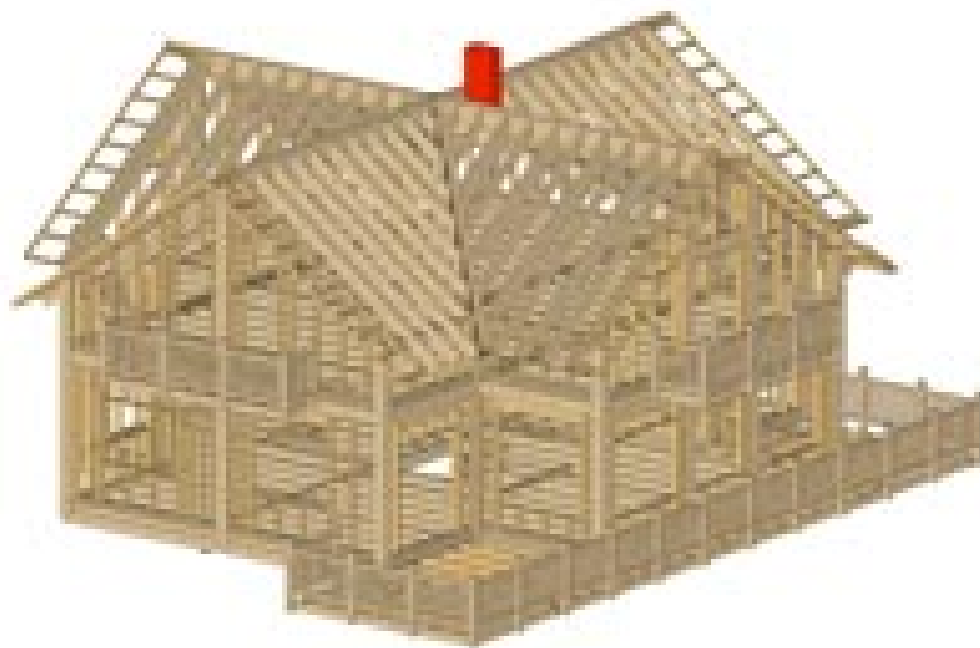
Gitterbjelke			
Category: Engineered wood product	Country: Norway	Consultant: Ascheim	ID: 506
Description: The Norwegian Gitterbjelke is a lattice beam made of structural timber members with joints made with punched metal plate fasteners. The type of lattice used is Howe, Pratt, Warren or combinations. The beams are special purpose products design and produced for each single project. The dimension of the timber members are therefore determined in each case, but a normal dimension is (flatwise) 148 mm x 48 mm. Competetive depths of the beams are the interval from 400 mm up to 1200 mm. The beam itself is not a new invention, but the Gitterbjelke beam system with tested and approved details and performance regarding fire prootection and sound properties increase the product from a standard beam system up to a high quality floor unit.			
Benefits: This product gives you the possibility to have light weighted wood based floors with long span and good sound insulation. The recommended design will achieve a fire resistant class of REI 60. The beam system with an "open web" makes it possible to place hidden water tubes, sewer conduits, power lines etc. without extra work regarding making holes in the structural part of the floor construction. The beam system with an "open web" also makes it possible to place hidden support beams instead of using columns. Prefabricated as floor elements the assembly of the floor structure is easy, fast and can be done with help from a small mobile crane.			
Limitations: The Gitterbjelke system will not be produced in standard lengths and/or depths but must be designed and produced to each single project. The Gitterbjelke system will be too expensive when the span is $L < 5,0$ m. The minimum depth is $h > 350$ mm.			
Building Type: All - but especially where the structure requires long unsupported span i.e. multistorey buildings, institutions (schools, kindergarten, hospitals etc), commercial and/or industrial buildings.	Application Point: Floor / roof	Construction Type: all - but mainly new	
Material Types: wood, metal	Innovation Type: product	Development Maturity: developing / mature	
Current Availability: Yes - refer contact details below			
Experience in Use: Yes - refer contact details below			
Experience in Service: Yes - refer contact details below			
Example Projects: Yes - refer contact details below			
IP & Commercial Issues: unknown			
Company Contact Details: Norske Takstolprodusenters Forening c/o Norges Byggscole, Postboks 293,NO-2001 Lillestrøm, Norway Phone :47 63 89 25 60 Fax: 47 63 80 35 00 Email: post@byggskolen.no		Contact: Arnold Sagen Phone: 47 63 89 25 64 Email: arnold.sagen@byggskolen.no	
Comments: Not new technology in Australian context			
Include in Assessment: No - just parallel chord floor trusses etc, not new!			
Web Links: http://www.takstol.com/index.html?&m=produkter&i=http://www.takstol.com/gitterbjelke.htm			



RANTI-bjelken			
Category: Engineered wood product	Country: Norway	Consultant: Ascheim	ID: 507
Description: Ranti-bjelken is defined as a light composite wood-based beam (see ETAG 011, Guideline for European Technical Approval of Light composite wood-based beams and columns). Ranti-bjelken is an I-beam where both the width and the depth of the flanges are 47 mm. The flanges are finger jointed (PRF) Nordic spruce (Picea abies) machine strength graded to a strength class corresponding to a modified C30 (the requirements of MOE and tensile strength are higher than corresponding C30). The web consist of structural particle board with thicness 10 mm. The web boards are jointed by glued wedge joints (PRF). The web are continuous glued (PRF) to the flanges in a furrow with thickness 10 mm (web thickness) and depth 16 mm. Ranti-bjelken is produced in depths from 200 mm up to 600 mm and a standard length up to 12,4 m. Ranti-bjelken is also produced as an "industry profile" (flange width 72 mm, beyond that the same as the standard beam) and a stud profile (same dimension as standard profile, but flange properties correspond to C18).			
Benefits: Ranti-bjelken is a dimension stable structural member with good strength properties. The production is subjected to an independant third part control where the beams are full scale tested (bending strength and MOE) twice a year. Ranti-bjelken has both national and European Technical Approval. Ranti-bjelken can be handled/tooled/machined with ordinary carpenter equipment. Ranti-bjelken are approved in the same class regarding reaction to fire as strength graded structural timber of Nordic quality, i.e. D-s2, d0 (EN 13501-1). The properties regarding sound insulation and thermal conductivity are also corresponding to the Nordic structural timber. Detail specifications regarding almost all imaginable building details are given by the producer, most of them are based on full scale testing.			
Limitations: Ranti-bjelken is not approved in Service class 3, i.e. RH > 85 % because of the particle board web material. Because of the I-profile relative slenderness Ranti-bjelken is sensitive where moment and/or compressive forces exist and this must be taken into account in the design process.			
Building Type: All	Application Point: wall /floor/ roof	Construction Type: All	
Material Types: wood	Innovation Type: product	Development Maturity: mature	
Current Availability: Yes - refer contact details below			
Experience in Use: A list can be produced if of interest			
Experience in Service: A list can be produced if of interest			
Example Projects: Yes - refer contact details below			
IP & Commercial Issues: unknown			
Company Contact Details: Forestia AS, Grubhei NO-8607 Mo i Rana Phone :+47 62 42 82 00 Fax: +47 75 14 67 51 Email: Ranti@Forestia.com		Contact: Andreas Bergin Phone: 47 75 14 67 57 Email: andreasb@forestia.com	
Comments: Old technology in Australian context			
Include in Assessment: No - is just 'I' joist. Structural system			
Web Links: http://www.forestia.com/index.php/forestia/produktinfo/ranti_bjelken/ranti_bjelken http://www.pre-tre.no/pdf-dok/Rantibjelkenhoved.pdf			



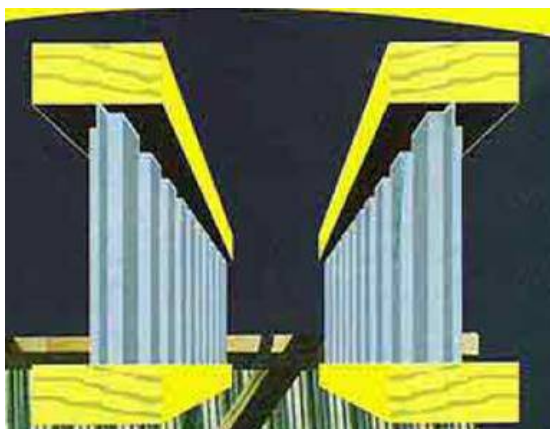
K-bjelken			
Category: Engineered wood product	Country: Norway	Consultant: Ascheim	ID: 508
Description: Glulam beam glued with PUR's (isocyanates). Top and bottom laminates are square and middle laminates use thinner boards from outer part of logs. K-bjelken is defined as a light composite wood-based beam (see ETAG 011, Guideline for European Technical Approval of Light composite wood-based beams and columns). K-bjelken has a rectangular cross section where the width of the flanges is the same as the width of the web. The flanges are finger jointed (PRF) Nordic spruce (Picea abies) machine strength graded to a strength class corresponding to C24. The web is assembled by gluing 17 mm thick spruce lamellae together by EPI. The web lamellae are finger jointed by using EPI. The web and flanges are also glued together by EPI. K-bjelken is produced in 3 different widths, 36 mm (stud), 48 mm and 70 mm. The depths are 200 mm, 250 mm or 300 mm. K-bjelken are produced in lengths from 3 m up to 6 m. When finger jointing (PRF) the whole cross section (large finger joints) K-bjelken can be delivered in lengths up to 12 m. The web lamellae are taken from the outer part of the log which give tangential annual rings. The effect of this is a dimension stable cross section with small effects from shrinkage.			
Benefits: K-bjelken is dimensionally stable structural member with good strength properties, i.e. bending strength = 24 N/mm ² , MOE = 11000 N/mm ² and a mean density of 500 kg/m ³ . The production is subjected to an independent third part control. K-bjelken has both national and European Technical Approval. K-bjelken can be handled/tooled/machined with ordinary carpenter equipment. K-bjelken are approved in the same class regarding reaction to fire as strength graded structural timber of Nordic quality, i.e. D-s2, d0 (EN 13501-1). The properties regarding sound insulation and thermal conductivity are also corresponding to the Nordic structural timber. K-bjelken utilises the outer parts of the log (boards).			
Limitations: K-bjelken is not approved in Service class 3, i.e. RH > 85 %. The EPI hardener contains isocyanate, however the final product is not considered to have emissions with any known negative health effects.			
Building Type: All	Application Point: Wall /floor/ roof	Construction Type: All	
Material Types: wood	Innovation Type: product	Development Maturity: mature	
Current Availability: Yes - refer contact details below			
Experience in Use: A list of builders/homeowners can be produced if interested			
Experience in Service: Not any known experience with reported in-service issues.			
Example Projects: Yes - refer contact details below			
IP & Commercial Issues: unknown			
Company Contact Details: Kjeldstad Sagbruk & Høvleri NO-7580 Selbu Phone :+47 73 81 01 00 Fax :+47 73 81 01 01 Email : selbu@kjeldstad.no		Contact: Åge Kjeldstad Phone : +47 73 81 01 00 Email : Aage.Kjeldstad@kjeldstad.no	
Comments: Old technology in Australian context			
Include in Assessment: No - glulam. Structural System (product)			
Web Links: http://www.kjeldstad.no/K-bjelken.html http://www.byggforsk.no/prodok/ntg/dok/2365/2365g.pdf			



Swelite-balken			
Category: Engineered wood product	Country: Sweden	Consultant: Ascheim	ID: 509
Description: Swelite-balken is defined as a light composite wood-based beam (see ETAG 011, Guideline for European Technical Approval of Light composite wood-based beams and columns). Swelite-balken is an I-beam where both the width and the depth of the flanges are 47 mm. The flanges are finger jointed Nordic spruce (Picea abies) machine strength graded to a strength class corresponding to C30 or to C24. The web consist of structural fibre board with thicness 8mm or OSB with thickness 15 mm. The web boards are jointed by glued wedge joints. The web are continuous glued to the flanges in a furrow with thickness equal to the web thickness. The standard Swelite-balken is produced in depths from 200 mm up to 400 mm and a standard length up to 12 m.			
Benefits: Swelite-balken is a dimension stable structural member with good strength properties. The production is subjected to an independant third part control where the beams are full scale tested (bending strength and MOE) twice a year. Swelite-balken has both national and European Technical Approval. Swelite-balken can be handled/tooled/machined with ordinary carpenter equipment. Swelite-balken are approved in the same class regarding reaction to fire as strength graded structural timber of Nordic quality, i.e. D-s2, d0 (EN 13501-1). The properties regarding sound insulation and thermal conductivity are also corresponding to the Nordic structural timber. Detailed specifications regarding almost all imaginable building details are given by the producer, most of them are based on full scale testing.			
Limitations: Swelite-balken is not approved in Service class 3, i.e. RH > 85 % because of the particle board web material. Because of the I-profile relative slenderness, Swelite-balken is sensitive where moment and/or compressive forces exist and this must be taken into account in the design process.			
Building Type: All	Application Point: Wall/floor/roof	Construction Type: New/renovation	
Material Types: wood	Innovation Type: product	Development Maturity: mature	
Current Availability: Yes - refer contact details below			
Experience in Use: A list can be produced if of interest			
Experience in Service: A list can be produced if of interest			
Example Projects: Yes - refer contact details below			
IP & Commercial Issues: unknown			
Company Contact Details: Swelite AB Box 5, SE-914 29 Rundvik, Sweden Phone : +46 93 01 42 00 Fax: +46 93 03 07 86 Email: info@swelite.com		Contact: Hans Åkesson Phone: +46 930 142 06 Email: hans.akesson@swelite.com	
Comments: Old technology in Australian context			
Include in Assessment: No - is just 'I' joist. Structural system			
Web Links: http://www.swelite.com/ http://www.byggforsk.no/prodok/ntg/dok/2169/2169g.pdf			



Twinaplate			
Category: <i>Engineered wood product</i>	Country: <i>NZ</i>	Consultant: <i>Bayne</i>	ID: <i>510</i>
Description: A structural beam similar to an I-beam, but using corrugated steel as the flange material. "Twinaplate® is a prefabricated I beam manufactured using kiln dried, No 1 framing grade, H1 treated, pinus radiata timber flanges and corrugated, hot-dipped galvanised steel webs. The timber flanges are finger jointed to the lengths required. (Reference to "Single Chord" or "Double Chord" Twinaplate® beams indicates the thickness of both the top and bottom timber elements. "Single Chord" beams having each flange 45 mm thick, and "Double Chord" beams having each flange two thicknesses of timber ie 90 mm thick.) "Double Chord" Twinaplate® beams have top and bottom flanges consisting of two elements that are glue-laminated with Resorcinol resin and nailed at regular centres. Double web Twinaplate® beams have two continuous corrugated steel webs. The teeth of the steel web, or webs, are embedded in the timber using a continuous cold pressing operation, forming an "I" cross-sectional shape ."			
Benefits:			
Limitations: Must not be exposed to the weather for more than six weeks, or in situations where the moisture content of the timber flanges will exceed 18%, or when the steel webs could become wet either through internally or externally generated moisture			
Building Type:	Application Point:	Construction Type:	
Material Types: wood, metal	Innovation Type: product	Development Maturity: mature	
Current Availability: Yes. Twinaplate (NZ) Ltd			
Experience in Use: not available			
Experience in Service: not avaiable			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: 361 West Coast Rd, Glen Eden; postal = Private Bag 93000, New Lynn, Auckland, NZ Phone :09 813 4007 Fax: 09 813 4114 Email:		Contact: Phone: Email:	
Comments: Old technology in Australian context			
Include in Assessment: No - is just 'I' joist. Structural system			
Web Links: http://www.twinaplate.co.nz/ http://twinaplate.co.nz/final.pdf			



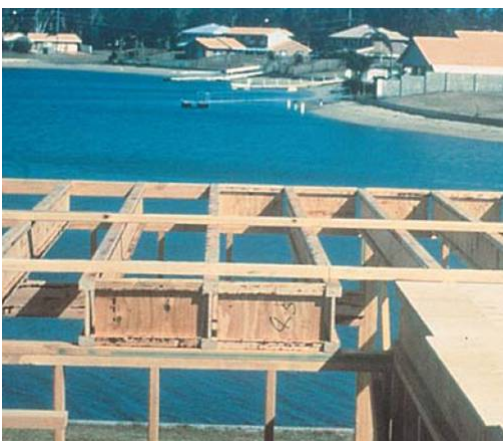
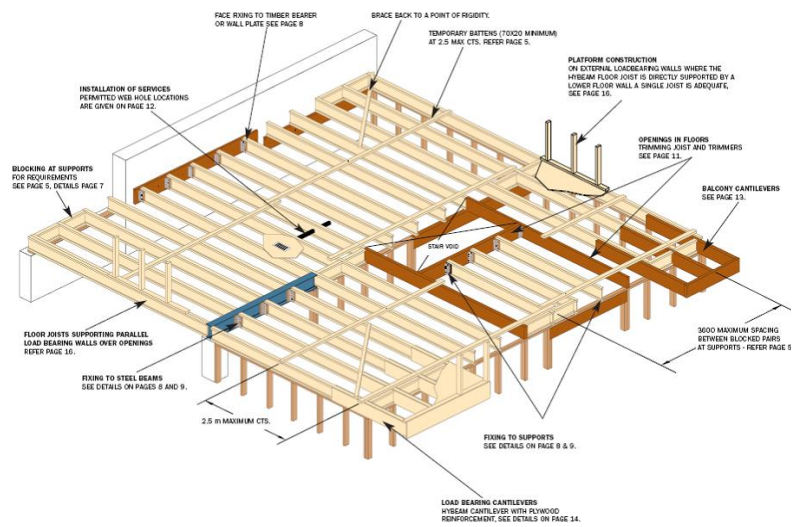
HySpan I Beams				
Category: Engineered wood product		Country: NZ	Consultant: Bayne	ID: 511
Description: Web and flange joist for flooring. In NZ, Usually made from solid timber or LVL (Flange) with a plywood web. Carter Holt Harvey brands are Hybeam and HySpan.				
Benefits: Lightweight - 60% weight reduction for load capacity. Straight and dimensionally stable - less risk of squeaking floors. Allows holes through web to fit pipes and ducts etc. without loss of structural performance.				
Limitations:				
Building Type: all		Application Point: floor		Construction Type: all
Material Types: wood		Innovation Type: product		Development Maturity: mature
Current Availability: Yes. Supplied by CHH futurebuild				
Experience in Use: accepted				
Experience in Service: not available				
Example Projects: http://www.chhfuturebuild.com/WSMApage/0,1565,18777-1,00.html				
IP & Commercial Issues: unknown				
Company Contact Details: CHH Futurebuild 321 Great South Road, Greenlane, Auckland. Postal: PO Box 8551 Auckland Phone :09 525 8440 Fax: 09 526 6518 Email: Hank.Bier@chh.co.nz			Contact: Hank Bier Phone: 07 350 1728 Email: Hank.Bier@chh.co.nz	
Comments: Old technology in Australian context				
Include in Assessment: No				
Web Links: http://www.chhfuturebuild.com/WSMApage/0,1565,18733-0-article-46695,00.html				



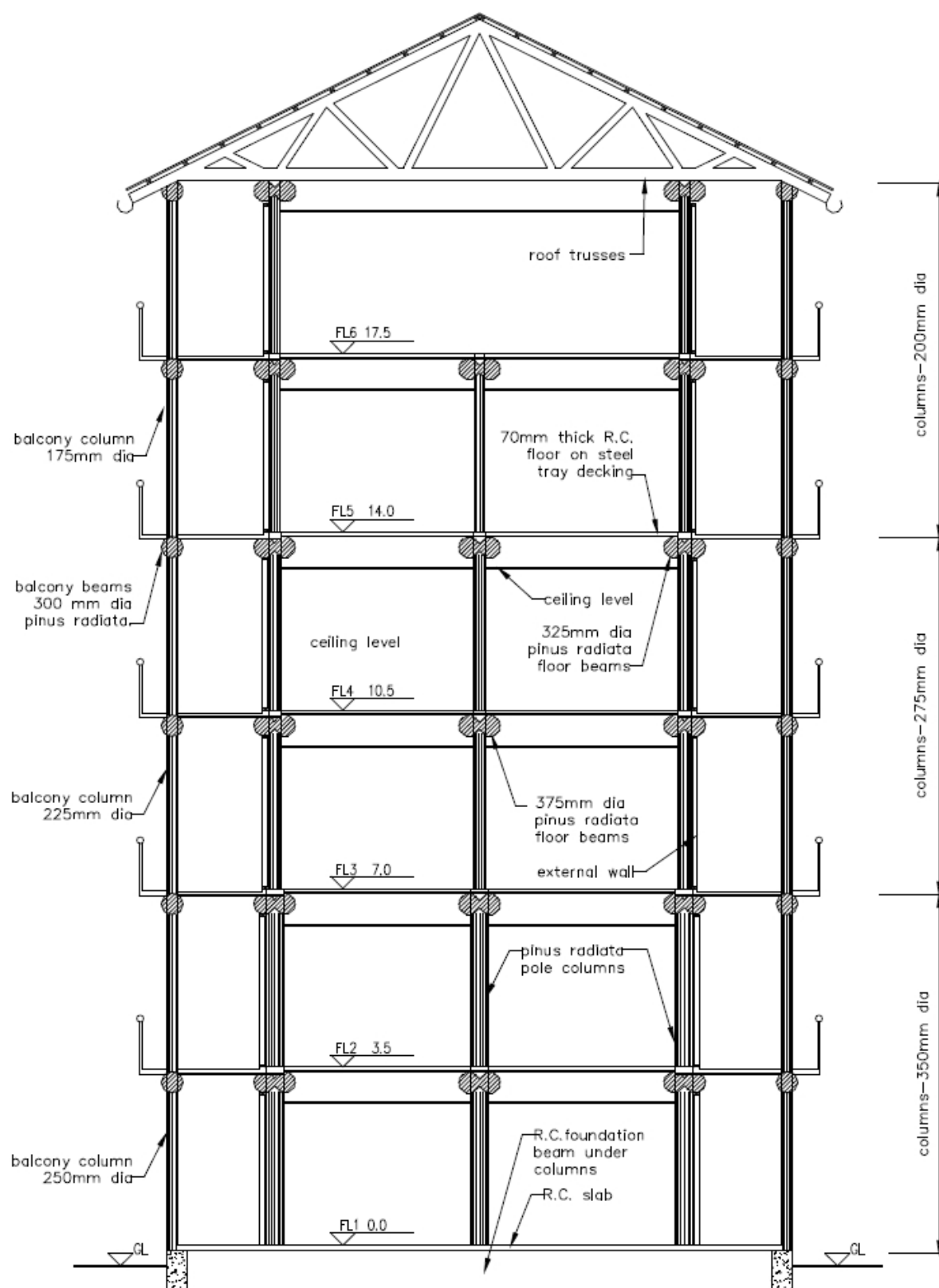
Hybeam engineered timber joists
can be readily docked to length on site.



Easier installation of plumbing and
electrical services within the floor depth.

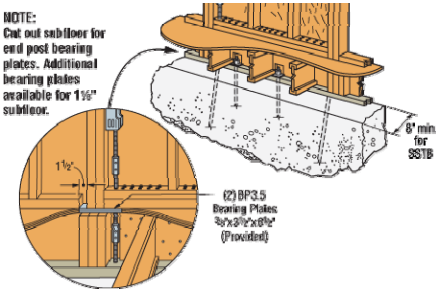


Unilogs			
Category: Structural system	Country: NZ	Consultant: Paevere	ID: 601
Description: A New Zealand company has developed a lathe to turn poles to uniform diameters up to 300mm in lengths up to 27m. These are marketed as “Unilogs”. The uniform diameter simplifies jointing details because it permits the use of standard sizes of steel pipe for connectors . A suggested use for these poles is as the structural framework of multistorey buildings or portal-frame industrial buildings			
Benefits: Wooden column type construction can be an economically and enviromentally superior alternative to steel and concrete. Lighter weaight can reduce foundation loads and reduce crane requirements. Uniform poles make for simple joining.			
Limitations: There is not much industru experience in this type of construction. Detailis for connecting other components may need to be developed			
Building Type: Multi res and Indsutrial	Application Point: Whole building	Construction Type: New	
Material Types: wood	Innovation Type: product / process	Development Maturity: developing	
Current Availability: Yes			
Experience in Use: Yes - some			
Experience in Service: No			
Example Projects: some			
IP & Commercial Issues: unknown			
Company Contact Details: UniLog Buildings Phone :0800 864564 Fax: Fax 09 2368663 Email: sales@unilogbuildings.co.nz		Contact: Phone: Email:	
Comments: A simple concept which could make the use of small diameter round logs (plantation hardwoods and softwoods) feasible in a range of applications, including industrial, niche commercial and multi-storey multi-residential construction.			
Include in Assessment: Yes			
Web Links: http://www.unilog.co.nz http://www.unilog.co.nz/building.htm			

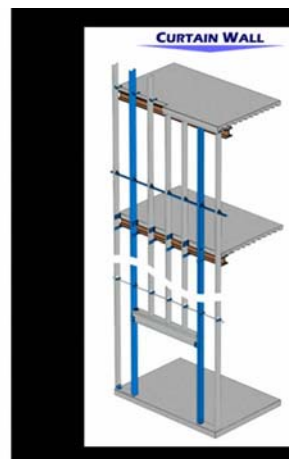
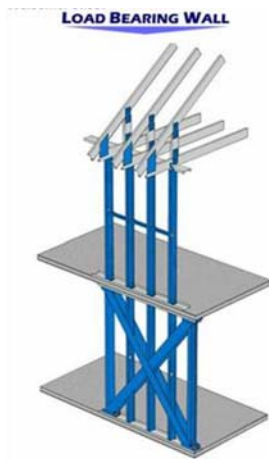




SIMPSON Strong Tie Walls			
Category: Structural system	Country: USA	Consultant: Kasal	ID: 602
Description: Simpson Strong Tie produces a wood panel called the Strong-Wall Shearwall, made with ½" Oriented Strand Board (OSB) sheathing and 3" glue-lam studs. Metal strips and connecting hardware secure the panel to the building's structural framing, creating a continuously secured rigid unit in areas where shear walls are specified. Frames are available in various common heights and widths, with a 4' wide, 8' high sheathed panel weighing around 130 lbs. When framing homes or other structures, builders leave openings required for the shear wall panels. The panels are then inserted into the openings and attached. For the wood system, hold-downs are attached, and each frame comes with an anchor bolting template. For the steel system, sheathing and finishes are affixed with self-tapping screws. Each frame comes with a sized template for sole plate or foundation anchor bolting. Additional structural coordination will be required between foundation and wall framing.			
Benefits: High resistance to in-plane loads (wind or earthquake). This may be especially needed in narrow walls (such as garage door areas) where there is no space to transfer lateral forces using traditional wood-panel based shear walls.			
Limitations: costs; panels are manufactured in the shop - need for transportation; thermal bridging if steel framing is used			
Building Type: all	Application Point: wall	Construction Type: new	
Material Types: metal, wood	Innovation Type: product	Development Maturity: developing	
Current Availability: Yes; Simpson String Tie, CA			
Experience in Use: Yes; The systems are listed by ICBO for wood or steel house-frame construction, by the state of California, and by the City of Los Angeles. Knowledge of these products is increasing in other areas with stringent seismic and wind-load shear wall requiremen			
Experience in Service: Yes			
Example Projects: none			
IP & Commercial Issues: unknown			
Company Contact Details: Simpson Strong Tie, Inc. 4120 Dublin Blvd., Suite 400 Dublin, CA 94568 Phone : (925) 560-9000 Fax: (925) 833-1496 Email: see weblinks		Contact: N/A Phone: Email:	
Comments: May have limited application in Australia in high wind areas or where housing designs have limited external wall space for bracing.			
Include in Assessment: Yes			
Web Links: http://www.strongtie.com			



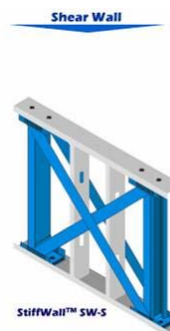
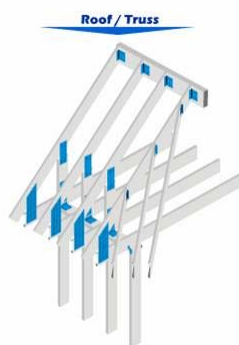
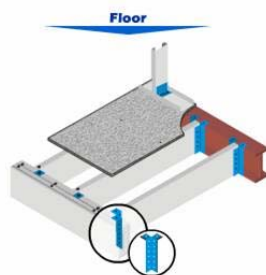
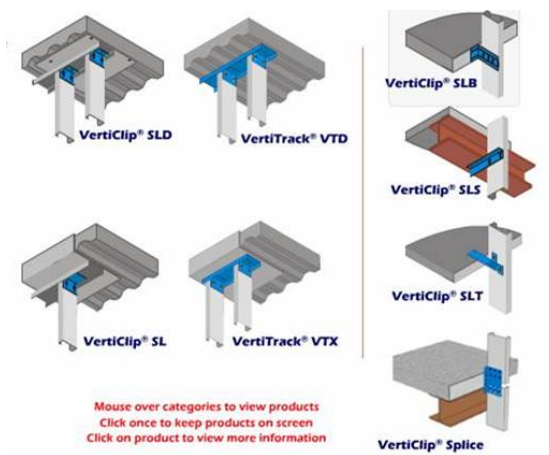
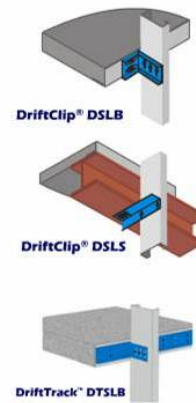
Steel Stud System - TSN			
Category: Structural system		Country: USA	Consultant: Kasal
ID: 603			
Description: Typical light gauge steel studs with special connections and bracing systems. Buckle Bridge system permits stud bridging without elaborate connections.			
Benefits: The specialized connection hardware permits fast erection with minimum requirements on additional operations such as drilling or welding.			
Limitations: Relatively large number of different connection parts.			
Building Type: All	Application Point: wall - external, partition walls, non-bearing, bearing walls	Construction Type: All	
Material Types: metal	Innovation Type: product	Development Maturity: developing/mature	
Current Availability: Yes - see contact below			
Experience in Use: design guide and specs available			
Experience in Service: not available			
Example Projects: not available			
IP & Commercial Issues: Yes			
Company Contact Details: The steel network, Inc. 3221 Wellington Court, Raleigh, NC 27615 Phone : (888)474-4876 Fax: (919) 845-1028 Email:		Contact: John Eberdt Phone: (888)474-4876 Email:	
Comments: Potential composite timber steel, may have some limited application in high wind areas for bracing/tie-down			
Include in Assessment: Yes			
Web Links: http://www.steelnetwork.com/			



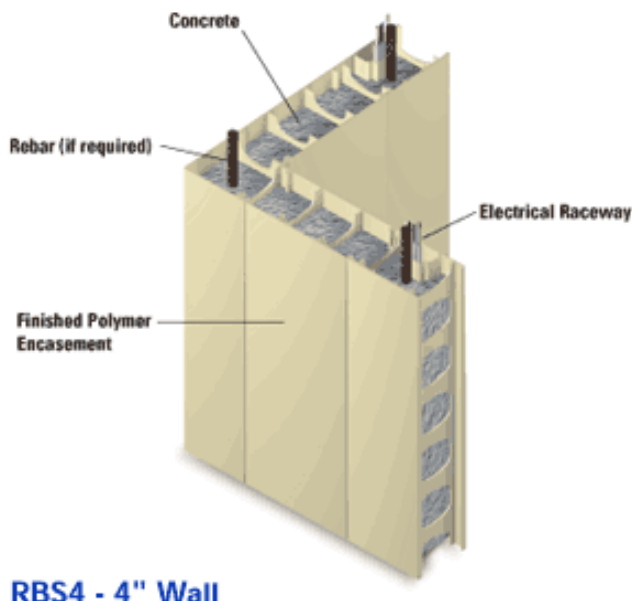
Head of Wall



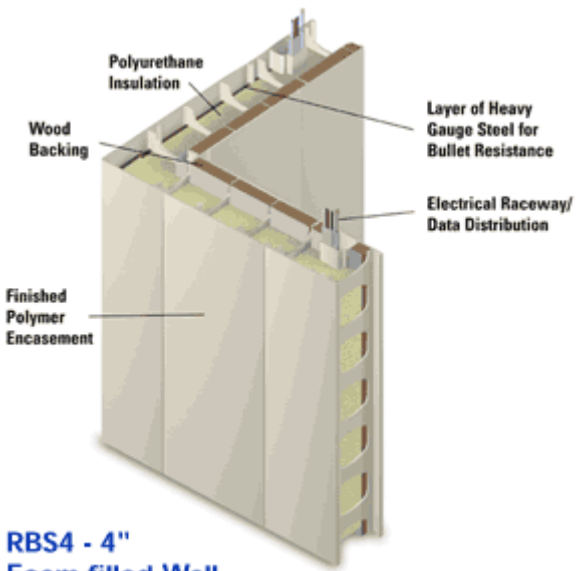
Bypass



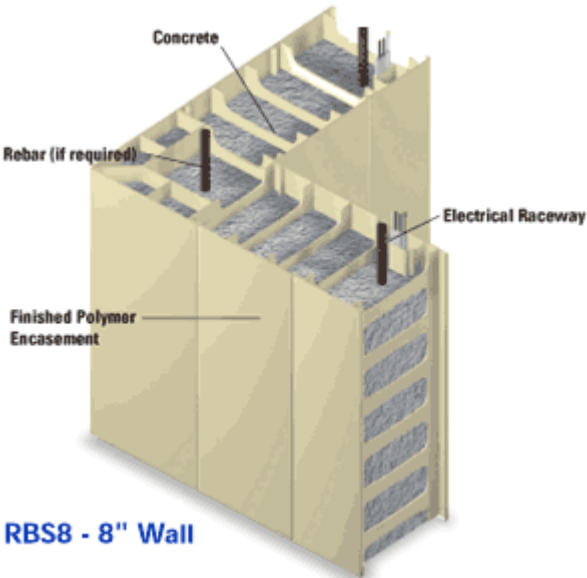
RBS Encapsulated building system			
Category: Structural system		Country: Canada	Consultant: Kasal
ID: 604			
Description: Royal Building Systems™ consist of rigid extruded polymer components that serve as the finished formwork for a variety of concrete walls including bearing, non-bearing, retaining, and foundation wall applications. This patented wall system is available in a variety of sizes, shapes and colors to meet every building need, from the simplest enclosure to complex architectural designs. Window and door openings and jambs are easily incorporated. Insulation and electrical raceways can be built-in. Assembly is simple, and finished interior and exterior walls are ready for immediate use			
Benefits: Speed of Construction, Finished inside and out, Modular, washable, etc.			
Limitations: First cost			
Building Type: all	Application Point: Whole house	Construction Type: new	
Material Types: PVC form, multi-cell	Innovation Type: product, process and business model	Development Maturity: developing	
Current Availability: Brampton ,Ont. But plants in S. America, Europe and China			
Experience in Use: Homes, warehouse, industrial bldgs.,etc.			
Experience in Service: Environmental (PVC)			
Example Projects:			
IP & Commercial Issues: no			
Company Contact Details: Royal Building Systems 1 Royal Gate Blvd., Woodbridge, Ont., Canada, L4L 8Z7 Phone : 905 264 0698 Fax: Email:		Contact: Arjan Arenga Phone: 905 622 2850 Email:	
Comments: Similar to polystyrene/block concrete core filled construction, except formwork has advantage of external and internal final finish.			
Include in Assessment: Yes			
Web Links: http://www.rbsdirect.com/build.htm			



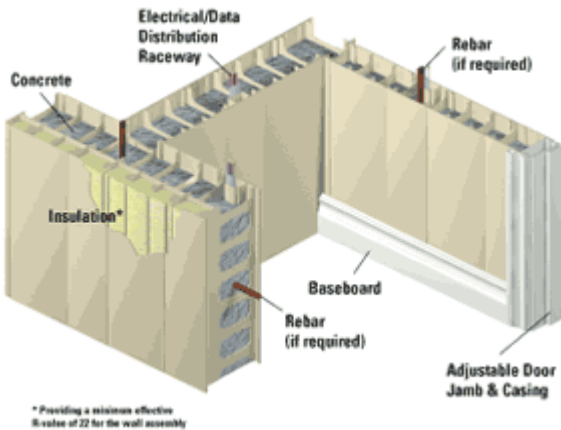
RBS4 - 4" Wall



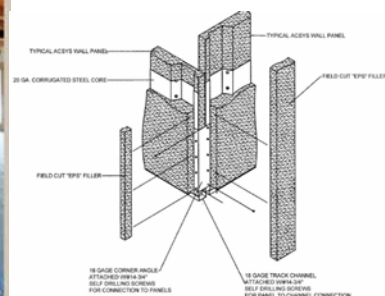
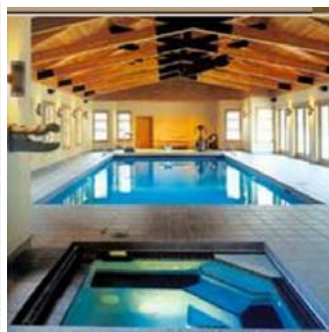
**RBS4 - 4"
Foam-filled Wall**



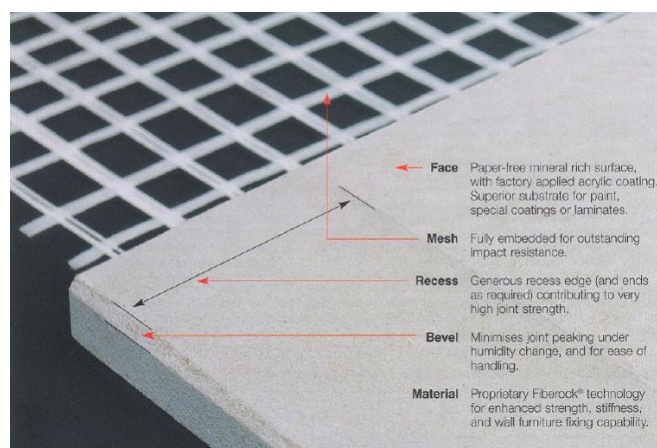
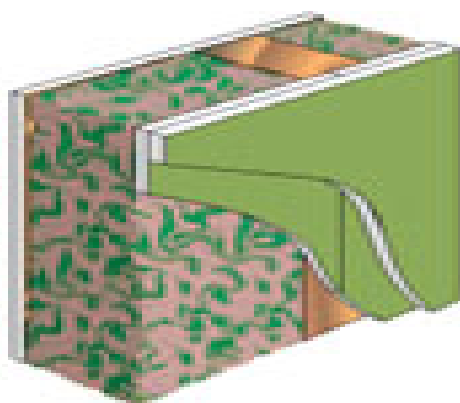
RBS8 - 8" Wall



Steel-expanded polystyrene system			
Category: Structural system	Country: USA	Consultant: Kasal	ID: 605
Description: The patented panel system utilizes a 16-20 gauge galvanized corrugated structural core with welded top and bottom 18 gauge galvanized steel tracks. The core is embedded in expanded polystyrene using a specialized molding process. The strength of the panel can be increased by incorporating one or more steel columns in the core prior to molding. The product is supplied with the mounting track, and corner connectors			
Benefits: rapid construction; fire resistance; quality control in factory conditions; decay and insect resistance			
Limitations: workforce training; environmental load			
Building Type: all	Application Point: whole house	Construction Type: new	
Material Types: steel, plastic	Innovation Type: product and process	Development Maturity: developing	
Current Availability: Yes see the link to the company web site			
Experience in Use: limited examples from residential construction exist - see the web link			
Experience in Service: limited; no issues reported yet			
Example Projects: see listed web links			
IP & Commercial Issues: no			
Company Contact Details: ACSYS, Inc. 1677 E Miles Ave. Suite 101 Hayden, ID 83835 Phone : (208) 772-6422 Fax: 208-772-5942 Email:		Contact: Werner Nenecker Phone: 208 772 6422 Email: wernern@adelphia.net	
Comments: This structural steel/polystyrene system could be a competitive replacement for timber framed construction.			
Include in Assessment: Yes			
Web Links: http://www.acsys.net/product_overview.htm			



GIB Braceline			
Category: Structural system	Country: NZ	Consultant: Bayne	ID: 606
Description: GIB Braceline® is an effective wall bracing sheet for light timber framed buildings. It allows continuity to be maintained between wall bracing and wall lining sheets. GIB Braceline®, like all GIB products, has been thoroughly tested by independent authorities.			
Benefits: Plasterboard is not only used as a wall lining, but is suitable to resist wind and earthquake forces. Other than sheathing, there are noise and fire resistant benefits. A stand-alone guide to wall bracing of buildings in accordance with NZ Standard is published.			
Limitations: Must not be exposed to water			
Building Type: all	Application Point: Wall and Ceiling	Construction Type: all	
Material Types: gypsum	Innovation Type: product	Development Maturity: mature	
Current Availability: Yes - from local GIB agent - see website			
Experience in Use: accepted			
Experience in Service: not available			
Example Projects: not available			
IP & Commercial Issues: Yes			
Company Contact Details: Winstone Wallboards Limited 37 Felix Street, P O Box 12256, Penrose, Auckland, New Zealand Phone :+ 64 9 633 0100 Fax: + 64 9 633 0101 Email: info@gib.co.nz		Contact: Kevin Golding Phone: + 64 9 633 0105 Email: keving@gib.co.nz	
Comments: Local plasterboard manufacturers have withdrawn their bracing products and this would be a suitable alternative replacement. It would however be a competitor to some wood based bracing systems as well as fibre cement.			
Include in Assessment: Yes			
Web Links: www.gib.co.nz www.gib.co.nz/literature/attachments/Bracing_Mar2002.pdf			

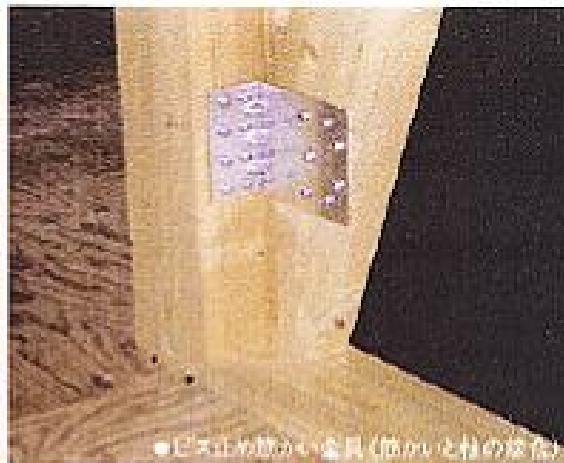
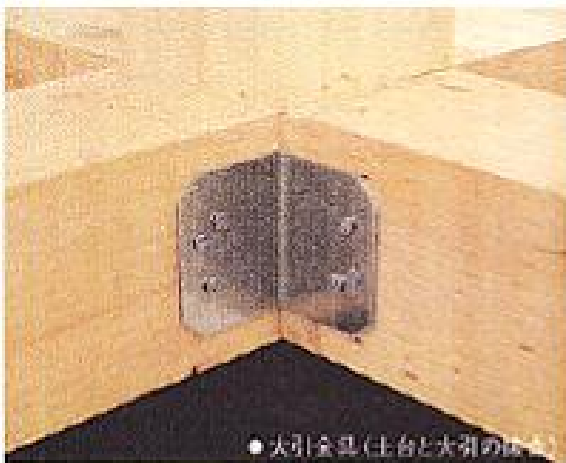


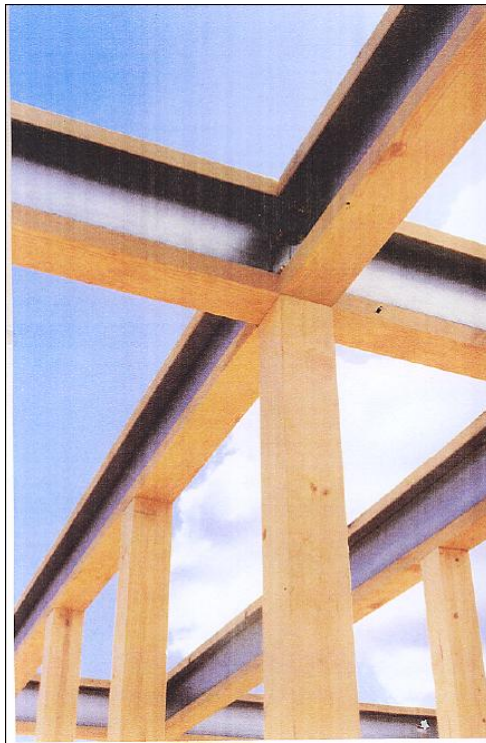
TECHNOSTRUCTURE			
Category: Structural system	Country: Japan	Consultant: Ota	ID: 607
Description: Technostructure is a new method of construction for the whole house resulting in high earthquake-resistance, high durability and a comfortable living environment. The Technostructure method has a structural frame comprising laminated-timber and metal. The beams are made of steel with laminated timber both sides of steel, and posts are made of laminated timber. Metal connectors are used to join beams & posts. The following materials and technologies also adopted with this method. a) earthquake resistant load-bearing walls are made of KENAF boards. (KENAF=Hibiscus cannabinus=eco product) b) stronger reinforced concrete foundation is provided. c) stronger floor panels - shear strength is 15.3kN. d) special ventilation system for roof & under floor e) special wall system - there is 15mm airway between the external wall and structural frame. f) and more.			
Benefits: The essential advantage of the Technostructure Method is ; - it provides not only the structural system but also a construction system of the whole house. A house adopting this construction method has high earthquake-resistance, high durability, high insulation, comfort to live in, safety and high fire resistance. It also enables less energy consumption. Furthermore, the structural frame - steel+laminated timber beams & post - enables more flexible & larger internal space.			
Limitations: Proprietary system requiring sophisticated computer design			
Building Type: detach res	Application Point: whole house - Technostructure is a construction system of the whole house.	Construction Type: new	
Material Types: wood, combination	Innovation Type: product / process	Development Maturity: mature	
Current Availability: Yes - refer contact details below			
Experience in Use: builders & homeowners are satisfied with this system - easy for builders to build			
Experience in Service: not available			
Example Projects: Approx. 15,000 houses has been build since 1995. There are display houses inside of the site of company.			
IP & Commercial Issues: Yes - This company owns the Patent and Trademark for this system. Must get the permission from this company before opening all information in this sheet & others to the public.			
Company Contact Details: Matsushita Electric Works Ltd 1048 Oaza Kadoma Kadoma-shi Osaka, Japan 571-8686 Phone :81-6-6907-4949 Fax: 81-6-6906-2838 Email: ishinuki@jkn.mew.co.jp		Contact: Ms. Fusako Ishinuki Phone: 81-6-6907-4949 Email: ishinuki@jkn.mew.co.jp	
Comments: Again, this seems that it would be quite an expensive system in the Australian context. However, the system may have some atributes that would be worth exploring. It uses a plenum floor system.			
Include in Assessment: Yes			
Web Links: http://www.techno-st.com/			



2階建ベタ基礎仕様

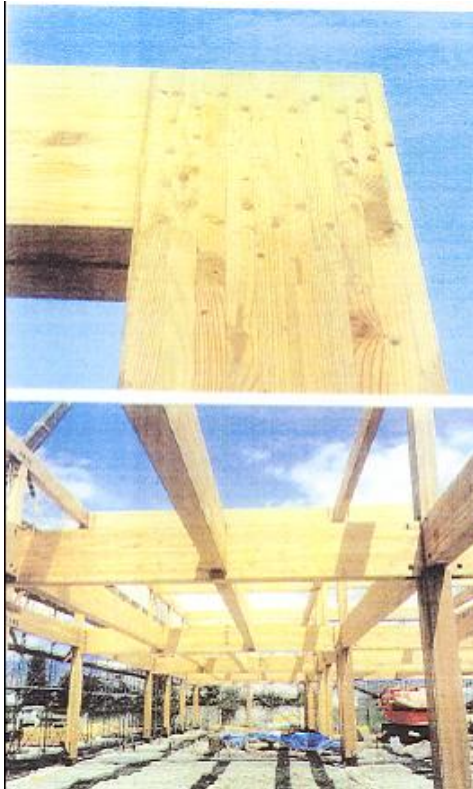
になる場合が有り得ます。地蔵によって仕様が異なる場合があります。
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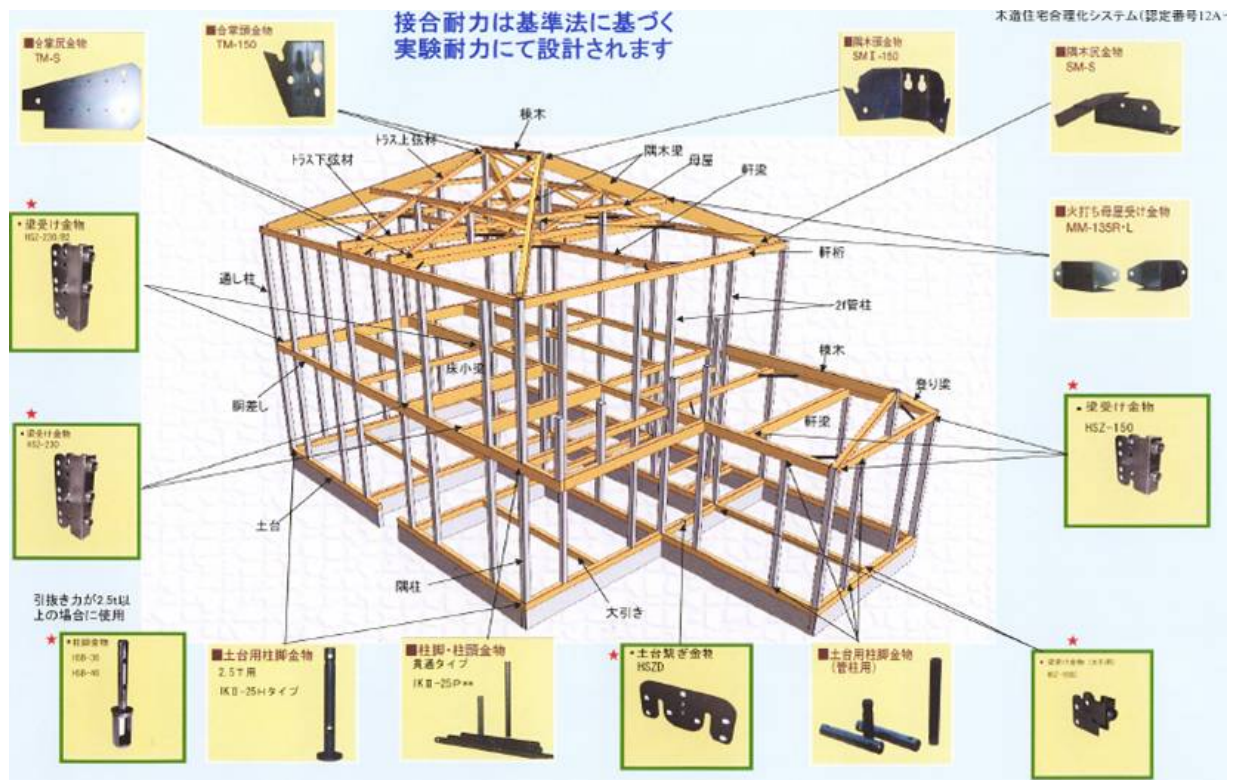


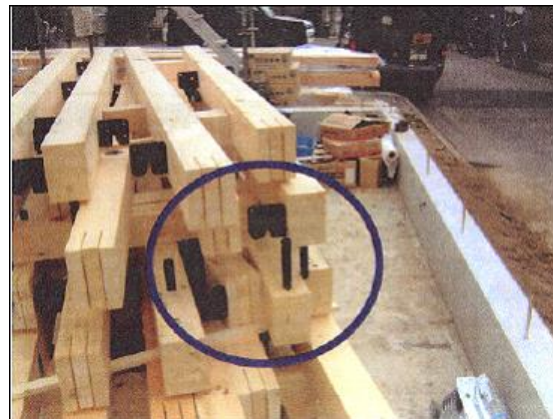
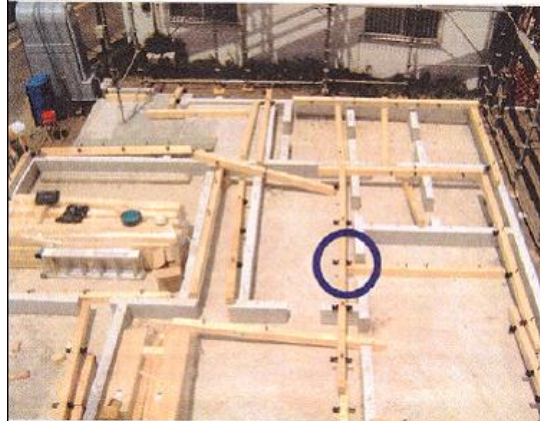
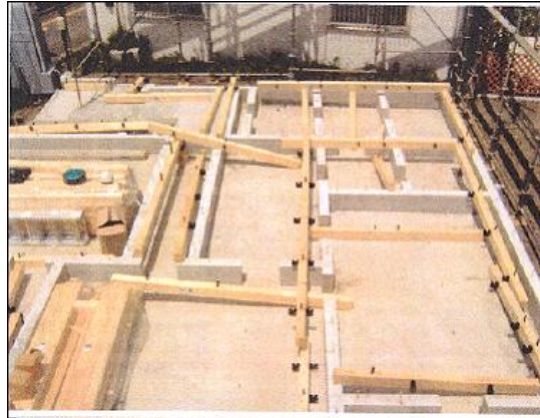
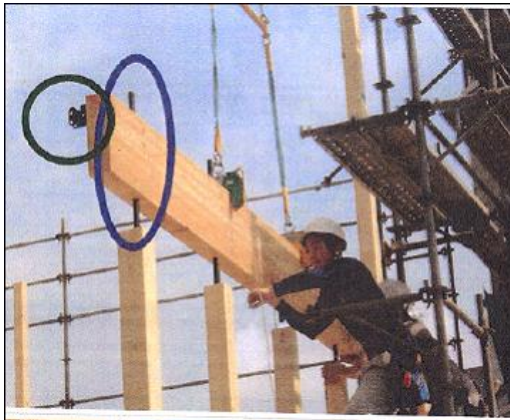
G-Frame Construction			
Category: Structural system	Country: Japan	Consultant: Ota	ID: 608
Description: G-Frame Construction is a construction method using G-Frame in conjunction with 2x4 infill timber framing . The G-Frame is formed by large section laminated-timber (it is called heavy timber - total section area is more than 300cm2) beams & posts. The joint between the beams & posts is moment resisting (the Rahmen (= rigid frame) structure). It enables realization of extremely strong structures (the allowable compression strength is 1.5 times more than general timber). The structural frame is simple, and the quality of construction is excellent. G-Frame Construction is ideal for buildings with high ceilings and large internal space. It is also ideal for small sites of city centres. This construction method is utilized for commercial buildings & public buildings as well.			
Benefits: The essential advantage of the G-Frame construction is that it is ideal for buildings with high ceilings, large internal spaces and big-openings e.g.) garage. It is also ideal for small sites of city centres. The large-section laminated-timber has high fire resistance as well.			
Limitations: Extra time required for design work - e.g.) Need structural calculations etc.			
Building Type: detach res / attach res	Application Point: whole house - this is a new structure system / construction method	Construction Type: new	
Material Types: wood, metal	Innovation Type: product / process	Development Maturity: mature	
Current Availability: Yes - refer to contact details below			
Experience in Use: builders and homeowners are satisfied with this construction method			
Experience in Service: not available			
Example Projects: more than 400 houses have been build using this construction method.			
IP & Commercial Issues: Yes - Mitsui Home Co., Ltd has the Patent. However, must get permission from this company before opening all information in this sheet & others to the public.			
Company Contact Details: Mitsui Home Co., Ltd 18F Nishi-Shinjuku Mitsui Bldg. 6-24-1, Nishi-Shinjuku Shinjuku-ku Tokyo, Japan 160-0023 Phone :81-3-3346-4827 Fax: 81-3-3346-4842 Email:		Contact: Mr. Kazuma Matsuo Phone: 81-3-3346-4827 Email: k-matsuo@mitsuihome.co.jp	
Comments: This construction method using rigid moment resisting frames would probably add significant costs to housing and may only have potential application in commercial style construction.			
Include in Assessment: Yes			
Web Links:			



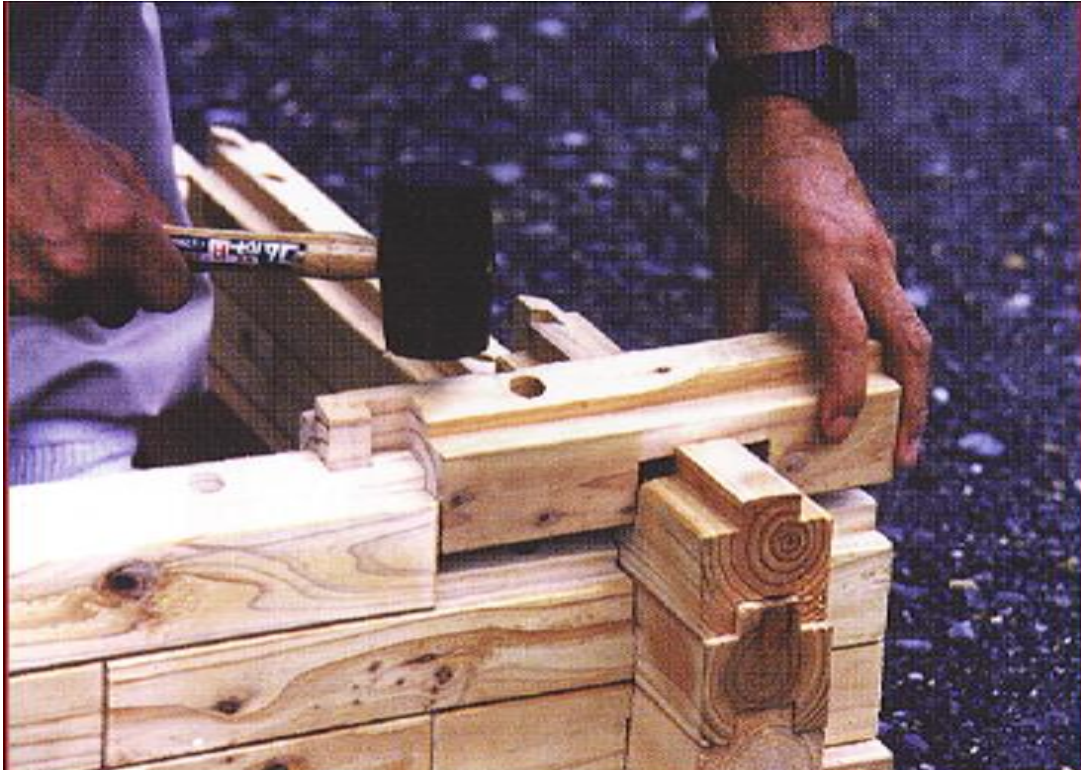


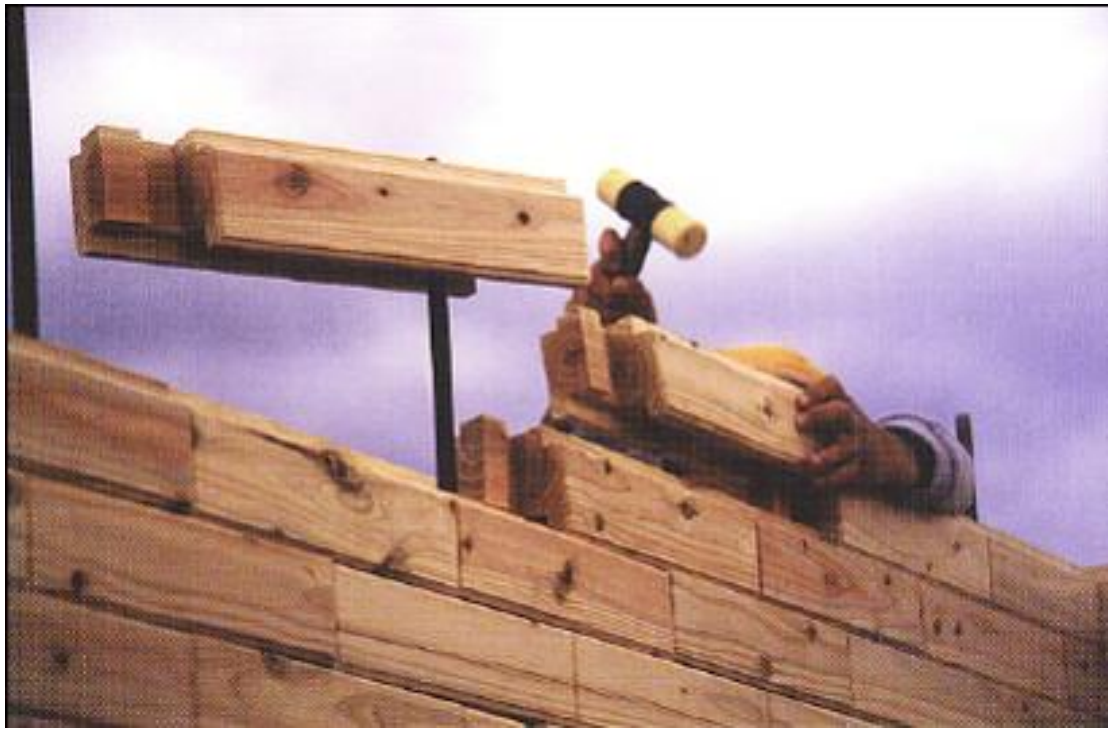
IK METHOD - new structure system / construction method			
Category: Structural system	Country: Japan	Consultant: Ota	ID: 609
Description: This is a new method of construction using laminated timber & metal connections to form what appears to be a 'heavy' 3 dimensional moment resisting frame. The Rahmen (rigid-frame) structure is a framework that strongly links beams and posts, and is often used for steel frame and reinforced concrete structures for commercial buildings. IK Method of the Rahmen (rigid-frame) structure uses laminated timber & metal which is stronger than traditional Japanese timber structures. The IK Method is a simple, flexible, high-durability and long-lasting construction method. The high-precision and high-speed construction features of this method it to provide highly functional wooden housing at a low cost in Japan. Note: The Rahmen (rigid-frame) structure has 2 different forms. One is " Continuous column structure with the same column position required on each floor. The other type is "Continuous beam structure with different column placement possible per floor. IK method is " Continuous column type "			
Benefits: The essential advantage of the IK Method is more simple, flexible, high-durability and long-lasting construction method that allows us to generate value even under harsh conditions. The high-precision and high-speed construction features of this method thus enable us to provide highly functional wooden housing at a low cost. earthquake-resistant			
Limitations: must use laminated timber			
Building Type: mainly detach res / there were some experiences to build residence with shop, shop, preschool(kinder) and aged care house	Application Point: whole house - new structure system/construction method	Construction Type: new	
Material Types: wood, metal	Innovation Type: product / process	Development Maturity: mature	
Current Availability: Yes - refer contact details below			
Experience in Use: builders are happy to use this new construction method/structure			
Experience in Service: not available			
Example Projects: There are more than 3000 residential building projects in the past 6 years.			
IP & Commercial Issues: Yes - This company dose not have any Patent etc, however need to get the permission from this company before opening the information in this sheet to the public.			
Company Contact Details: ITOCHU KENZAI CORPORATION Itopia Nihonbashi Honcho Bldg, 2-7-1 Nihonbashi-Honcho Chuo-ku, Tokyo, Japan 103-8419 Phone :81-3-3661-3281 Fax: 81-3-5695-7582 Email: fujikura-m@itochu.co.jp makoto.fujikura@ick.co.jp		Contact: Mr. Makoto Fujikura (Itochu Kenzai Corporation) C.I Wood Corporation - Mr. Masaaki Shiino Phone: 81-3-3661-1341 (Itochu Kenzai Co.,) 81-3-3497-7622 (Itochu Corporation) 81-297-27-1021 (C.I Wood) Email: fujikura-m@itochu.co.jp makoto.fujikura@ick.co.jp shiino@ciwood.co.jp	
Comments: This construction method using rigid moment resisting frames would probably add significant costs to housing and may only have potential application in commercial style construction. Skills required to install would be similar to a 'heavy' steel framed building			
Include in Assessment: Yes			
Web Links:			





Tumiki House - Timber Block House			
Category: Structural system	Country: Japan	Consultant: Ota	ID: 610
Description: Tumiki House is a new structural wall system using timber blocks. The system is the same concept as brick laying. The size of one timber block is 300mm x 60mm x 75mm and the type of timber is Japanese cedar. The timber is dried to contain moisture 15%. The blocks can be impregnated with fire retardents to enable use where fire regulations may dictate. The system is very simple and the products are recognised as being Eco friendly.			
Benefits: Owners can build their houses by themselves. Timber blocks are made from waste wood forestry thinnings. Using waste wood forestry thinnings makes a positive contibution to the environment and reduces greenhouse gasses. The cost is lower than typical timber houses.			
Limitations: Wall height is limited to 2700mm or less in Japan as above this requires full structural strength testing etc. Fire regulations may also need to be addressed for some situations.			
Building Type: detached residential, commercial and indoor	Application Point: whole house - new and easy structural system	Construction Type: all	
Material Types: wood, metal	Innovation Type: product / process	Development Maturity: mature	
Current Availability: Yes - refer to contact details below			
Experience in Use: builders and homeowners are very happy to use this system and products			
Experience in Service: Every 5 years, it has to be re-painted.			
Example Projects: Mizumakimachi Jidou Shonen Soudan Centre (Counsel Centre for Children) - 2-5-8 Koga Mizumakimachi Onga-gun Fukuoka Japan			
IP & Commercial Issues: Yes - this system has Patent in Japan, China, USA, Russia and Australia. And it also has Trademark. Patent No. Japan3637442, China157421, USA6298628B1, Rossia2206677, Australia762932 However, need to get the permission from this company before openin			
Company Contact Details: Tumiki House Co., Ltd 36-2 Oaza Iwato Takachiho-cho Nishiusuki-gun Miyagi, Japan 882-1621 Phone :81-982-74-8768 Fax: 81-982-74-8855 Email: tumiki@fat.coara.or.jp		Contact: Mr. Shigeo Nakao Phone: 81-982-74-8768 Email: tumiki@fat.coara.or.jp	
Comments: A very simple system that utilises 'low' grade softwood. Potential for this system in niche markets such as holiday cabins, kit cubby houses etc. System may suit 'business profile' of some existing Australian timber furniture component manufacturers.			
Include in Assessment: Yes			
Web Links: http://www.coara.or.jp/~tumiki/			

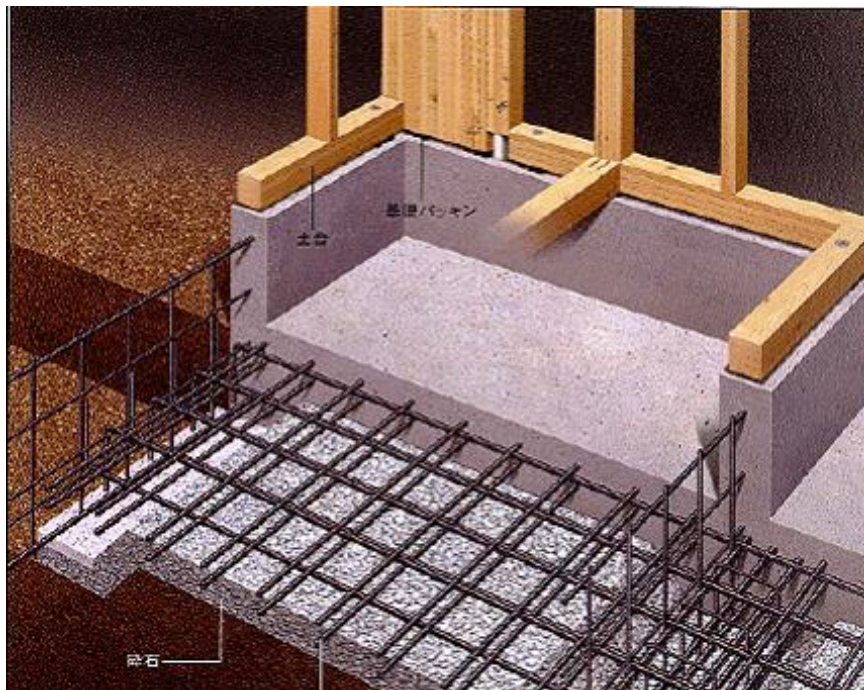
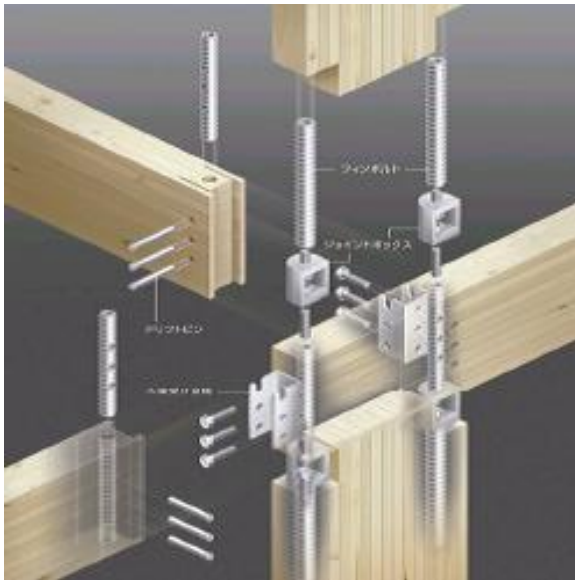






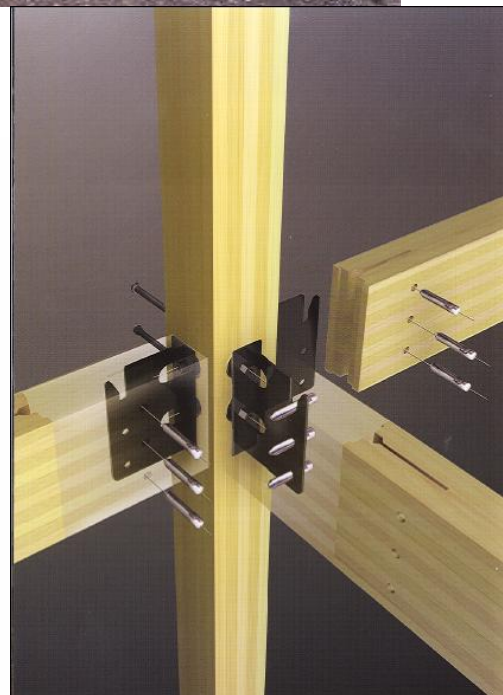
Big Frame & ProudioBF			
Category: Structural system	Country: Japan	Consultant: Ota	ID: 611
Description: Big-Frame is a new timber structural system developed by Sumitomo Forestry Co.in an effort to increase the design life of Japanese housing which has been relatively short compared to other developed nations. The system comprises heavy laminated posts and beams inter-connected with sophisticated metal joints to form a 3 dimensional rigid frame. It is suitable for houses up to three stories house. These houses, designed to support generation to generation living, are conceived to be quality assets for their owners. ProudioBF is providing safe housing environments. Sumitomo Forestry Co., makes every effort to use materials and resources with lower environmental impact. Using the structural merits of this system, Sumitomo Forestry is seeking to provide homes with a larger component of design freedom that can be lived in over the long term. Compared with conventional homes, this approach not only permits fewer load-bearing walls and enhances freedom of layout, but also opens the way for major future changes in the internal layout of the house.			
Benefits: The essential advantage of the "Big-Frame" is that it enables long lifecycle houses to be built with high strength. The wooden beam Rahmen (rigid-frame) structure enables a skeleton/infill concept and high fluidity to reflect the likelihood of future renovations.			
Limitations: This is a timber structure so that there are some limitations under the Fire Regulation in Japan.			
Building Type: all	Application Point: whole house - new structural system/method	Construction Type: new	
Material Types: wood, metal	Innovation Type: product / process	Development Maturity: mature	
Current Availability: Yes - refer to contact details below			
Experience in Use: once builders are used to this structural system, they are satisfied. This structural system has higher precision than other timber structures and is easy to build.			
Experience in Service: not available			
Example Projects: Display House in Yokohama Minato Mirai Display Centre - refer to attached website & photos - 3 stories detached house, Total floor area = 286.54m2			
IP & Commercial Issues: Yes - very strict - This company has the Patent of this structure system. Must get the permission from this company before opening the all information about this system to the public including this Survey & Assessment Sheet, all attachment and others. Ple			
Company Contact Details: Sumitomo Forestry Co., Ltd Marunouchi Trust Tower North 1-8-1, Marunouchi, Chiyoda-ku Tokyo, Japan Phone :81-3-6730-3368 (Direct) 81-3-6730-3501 (Division) Fax: 81-3-6730-3504 Email: NAKAGAITO_jun@star.sfc.co.jp		Contact: Mr Jun Nakagaito Phone: 81-3-6730-3368(Direct) 81-3-6730-3501 Email: NAKAGAITO_jun@star.sfc.co.jp	
Comments: This construction method using rigid moment resisting frames would probably add significant costs to housing and may only have potential application in commercial style construction. Skills required to install would be similar to a 'heavy' steel framed building			
Include in Assessment: Yes			
Web Links: http://www.yokohama-hc.com/maker/sumitomo2.htm http://sfc.co.jp/lineup/proudioBF/html/index.html http://sfc.co.jp/lineup/proudioBF/html/skel/index.html			



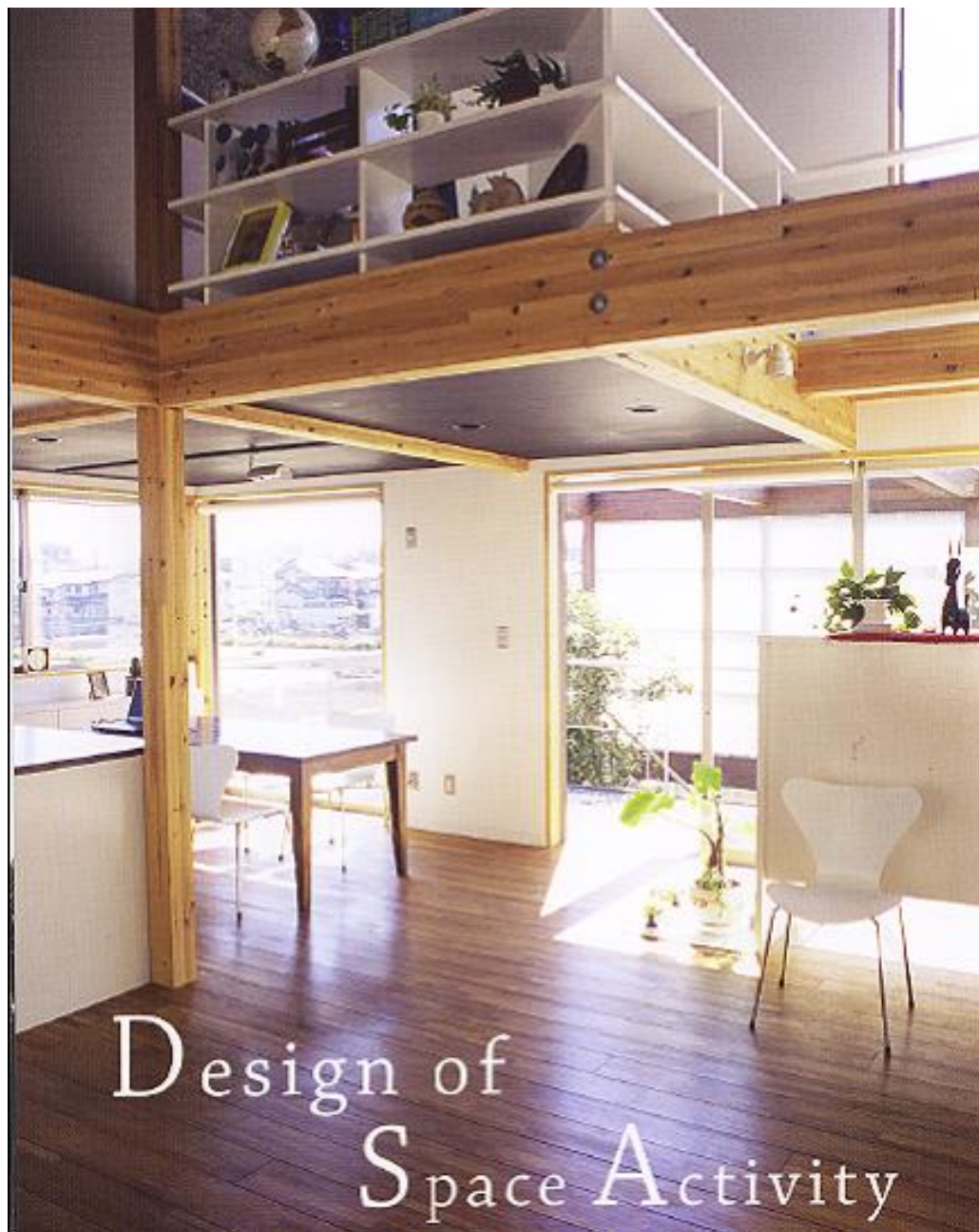




SE Structure Method			
Category: Structural system	Country: Japan	Consultant: Ota	ID: 612
Description: The SE system comprises laminated posts and beams inter-connected with sophisticated metal joints to form a 3 dimensional rigid frame. SE Structural Method is a simple, flexible, high-durability and long-lasting construction method that allows design even under harsh conditions. SE Structural Method enables a concept of skeleton infill. It also enables construction of large-sized buildings e.g. Gymnasium etc. SE Structural Method is approved by Japanese Ministry of Land Infrastructure and Transport. SE structural method is " continuous column type "			
Benefits: The essential advantage of the SE Structural Method is that it is stronger than existing timber structural systems, and more simple, flexible, high-durability and long-lasting construction that allows us to design even under harsh conditions. There is high earthquake-resistant and safety. It enables large-size buildings using timber. NCN has special CAD systems to manage from design - structural calculations / preparing structural drawings - to the production of structural materials. Also NCN has special systems to manage builders and the quality of buildings.			
Limitations: Up to 3 stories. Joints require slits on both ends of laminated members for metal connectors at pre-cut stage, so that it is unable to produce very short lengths of beams & posts. The function of Engineering Wood is similar to steel so detailing needs to be kept simple. Need to have specific training and have to get the certificate from NCN, also need registration as a construction company. Contact NCN.			
Building Type: all	Application Point: whole house / large-size buildings e.g. Gymnasium etc	Construction Type: new	
Material Types: wood, metal	Innovation Type: product / process	Development Maturity: mature	
Current Availability: Yes - refer contact details below			
Experience in Use: builders judge SE Structure Method to be good, and owners are satisfied with SE Method.			
Experience in Service: not available			
Example Projects: Approx. 6000 buildings(mainly houses) have been built using SE Method. refer to the followings			
IP & Commercial Issues: Yes - SE Structure Method/structure method has some patents/design registration/trademark. - However, this company dose not open the details about these to the public. Must get the permission from this company before opening all information in this sheet			
Company Contact Details: NCN Co., Ltd 8F Akasaka Bando Bldg, 4-8-14 Akasaka Minato-ku Tokyo, Japan Phone :81-3-5775-7353 Fax: 81-3-5775-7350 Email: sueyasu@ncn-se.co.jp takusari@ncn-se.co.jp		Contact: Mr. Hiroaki Sueyasu / Mr Ikuo Takusari Phone: 81-3-5775-7353 Email: sueyasu@ncn-se.co.jp takusari@ncn-se.co.jp	
Comments: This construction method using rigid moment resisting frames would probably add significant costs to housing and may only have potential application in commercial style construction. Skills required to install would be similar to a 'heavy' steel framed building			
Include in Assessment: Yes			
Web Links: http://www.ncn-se.co.jp/wse/index.html			







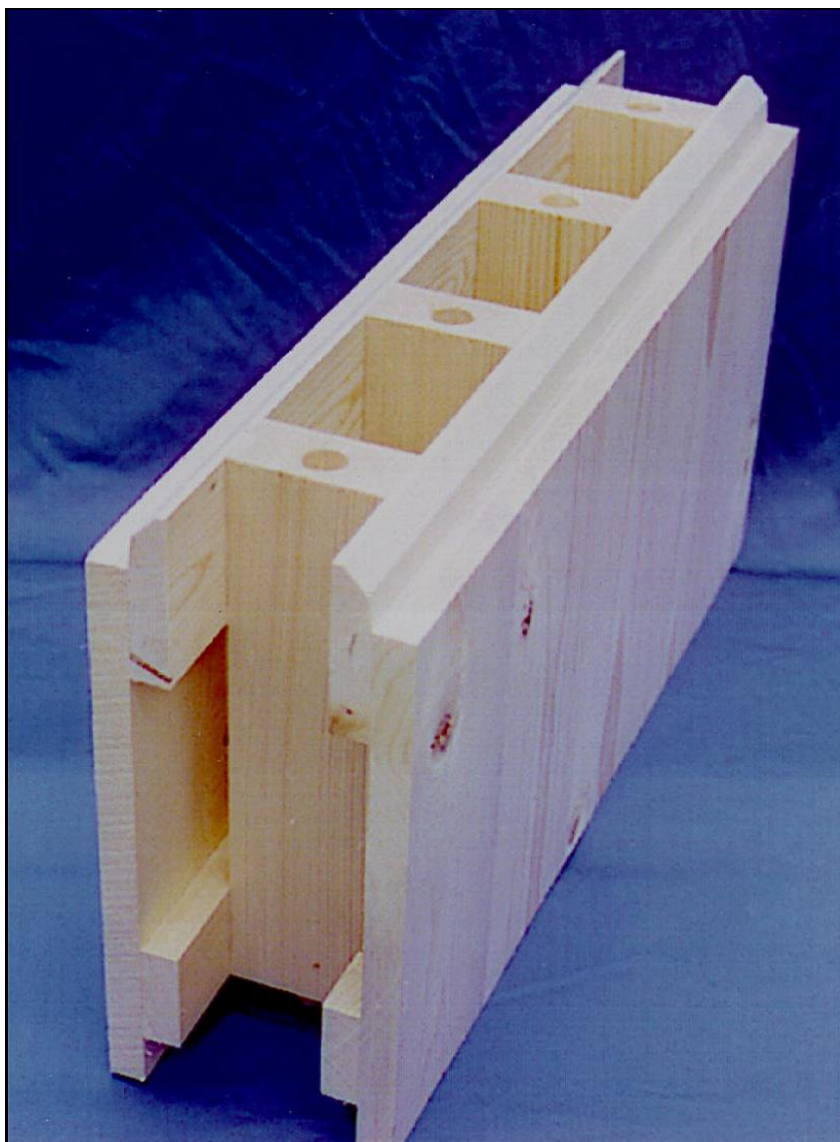
j.Pod - Recurrent light-frame building system			
Category: Structural system	Country: Japan	Consultant: Ota	ID: 613
Description: The j.Pod is a Recurrent Building System that is land-efficient, energy-efficient in manufacture, erection and operation, and composed of sustainable materials. The j.Pod is a self-supporting, pre-fabricated timber "space" that can be manufactured in different lengths and widths and stacked and combined in a wide variety of ways. The j.Pod unit is a new type of sustainable building, a semi-monocoque structure composed of rib-framed timber and variuos steel connectors. The pods are ideally suited to cellular-type buildings such as housing, apartments, hotels, etc. But can also be combined with a beam system to create open-plan spaces suitable for office buildings and the like. Structurally, each pod is a semi-monocoque; the underlying principle in many aircraft and boat design. This makes j.Pod light but extremely strong, rigid and self-supporting. Being self-supporting the pods can be manufactured off-site, then brought to the site and quickly assembled in many different combinations. The j.Pod is a timber system, using timber or timber-based composites from renewable sources. Each pod can be highly insulated, leading to a reduction in energy needed for heating and cooling. Whilst the design of the j.Pod is sophisticated, the materials and technology required to manufacture and erect the pods are simple, meaning that local fabrication plants can be set up almost anywhere, reducing transport distances.			
Benefits: Totally new concept of construction system that is land-efficient, energy-efficient in manufacture, erection and operation, and composed of sustainable materials. The j.Pod is a self-supporting, pre-fabricated timber "space" that can be manufactured in different lengths and widths and stacked and combined in a wide variety of ways.			
Limitations: 1) The flexibility of design - the j.Pod is a self-supporting and pre-fabricated timber unit that limits design freedom to some extent. However, j.Pod development group believe they can resolve this issue and it is one of the points continuing to be developed. 2) Need some know-how to fix nails to rib-frame.			
Building Type: all	Application Point: whole house	Construction Type: new	
Material Types: wood, metal	Innovation Type: product / process	Development Maturity: developing -practical model buildings are being constructed at this stage	
Current Availability: Yes & no - practical model buildings and houses are now being constructed.			
Experience in Use: acceptable - It is easy for builders to use this system if used.			
Experience in Service: not available - still developing stage			
Example Projects: 1) display buildings in Kyoto & Wakayama as display buildings 2) practical model project - Hyogo multi-residential Project: 5 blocks of 2 stories buildings (timber houses) in Hyogo, Site area=6,600m2 Total Floor Area=1,323.03m2 Total No. of houses=20 ho			
IP & Commercial Issues: Yes. j.Pod has the trademark and some patents - j.Pod :Trademark (No. 4843820) / Patent: 1) rib-frame - how to build this rib-frame & this structural system (No. 3548172) 2) rib-frame - how to build this rib-frame & this structural system (No.2005			
Company Contact Details: Kyoto University, Konoike-gumi Co., Ltd (general construction & design company), Torisha Ltd, Torisumi Co.,Ltd and John Barr Architect c/o Kyoto University, Yoshida - Honmachi Sakyo-ku Kyoto, Japan 606-8501 Phone :81-75-753-4806 Fax : 81-75-753-4806 Email : kobahiro@archi.kyoto-u.ac.jp		Contact: Mr. Hirohide Kobayashi - Kyoto University (Global Environmental Architecture) Phone : 81-75-753-4806 Email : kobahiro@archi.kyoto-u.ac.jp	
Comments: This construction method may be suited to repetitious multi residential construction in it's current form, but design flexibility may limit applications elsewhere. If this issue can be overcome with clever design software such as used by the nailplate industry, then this could have much greater application, as it would allow for the current wall, roof and floor truss fabrication industries to expand applications, and possibly integrate for whole house framing.			
Include in Assessment: Yes			
Web Links: http://www.konoike.co.jp/topics/jpodinspection.html			

http://www.konoike.co.jp/et/403/403_3.html
<http://www.konoike.co.jp/tec/gk-jpod.html>





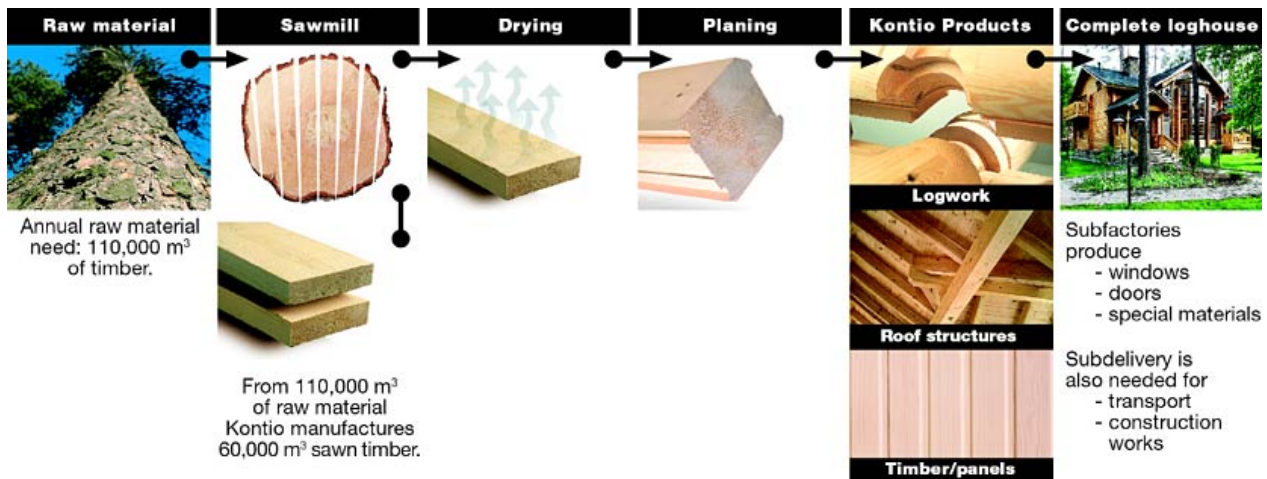
Steko-blocks			
Category: Structural system	Country: Switzerland	Consultant: Paevere	ID: 614
Description: Steko Blocks is a building system that can be used for load bearing walls. It is made of blocks in a similar way to Japans Tumiki House. Steko blocks are made from cross-glued boards and have horizontal and vertical interlocking parts. Starting from a level timber base plate, the blocks are simply stacked on top of each other row by row, each block locating accurately onto the block below by means of integral locating dowels. A Steko top plate finishes the wall construction. The system is much faster to construct than ordinary timber frame buildings.			
Benefits: Very fast construction - High quality building every time - Faster to construct than conventional timber-frame buildings - No glue or other fixings are needed - Uses off-cuts of timber from rapidly renewable sources.			
Limitations: only in uk and switzerland so far			
Building Type: all	Application Point: walls	Construction Type: new	
Material Types: wood	Innovation Type: product / process	Development Maturity: mature	
Current Availability: see limitations			
Experience in Use: Yes			
Experience in Service: unknown			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: STEKO available via Construction resources UK 16 Great Guildford Street London SE1 0HS Phone :0044 20 74502211 Fax: 0044 20 74 502 212 Email: info@ecoconstruct.com info@constructionresources.com		Contact: Steko international Phone: 00 41 71 466 72 22 Email: info@steko.ch	
Comments: Similar to Tumiki, except that Steko blocks have the added advantage of cavity for services etc. The cost will be an issue and also wall thickness would need to be reduced to fit Australian housing context. Need to address tie-down and also racking issues but these should be easily accomodated.			
Include in Assessment: Yes			
Web Links: http://www.steko.ch http://www.greenspec.co.uk/pdf/(34)%20Steko%20blocks.pdf			

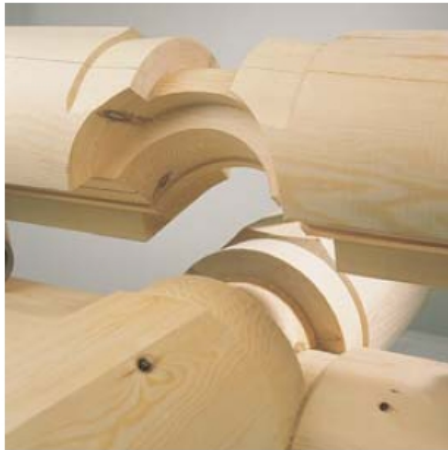






Kontio Loghouses			
Category: Structural System	Country: Finland	Consultant: Ascheim	ID: 615
Description: Kontio Loghouses is probably the greatest producer of log houses in the world (ca 1800 per year). Kontio Loghouses produces several different models of loghouses both as residences and vacation homes. There are options for 4 different wall designs. 1) Uninsulated round timber (210 or 230 mm), 2) Uninsulated laminated square timer (180 or 205 mm) 3) Log wall with insulation on the inside of the wall 4) Log wall with insulation on the outer side of the wall, including log-like cladding, ventilation space and an air proof layer.			
Benefits: The producer is very experienced. Solid and established structures. Consume a high timber volume, a renewable resource which accumulates carbon dioxide.			
Limitations: The standard structures are based on the Nordic climate and corresponding loads, but can be modified accordingly. The design fits in to the Nordic nature and culture, but might meet resistance in other climates.			
Building Type: Detached residence (and cottages/vacation homes)	Application Point: Whole house	Construction Type: New	
Material Types: wood	Innovation Type: product / process	Development Maturity: mature	
Current Availability: Yes			
Experience in Use: unknown			
Experience in Service: unknown			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: Kontiotuote OY Pb. 64, FI-93101 Pudasjärvi, Finland Phone :+358 20 770 7400 Fax: +358 20 770 7516 Email:		Contact: Raimo Louhimaa Phone: Email: raimo.louhimaa@kontio.fi	
Comments: There are a number of existing log structures/systems already in Australia that have established small niche markets for holiday cabins etc. This system seems quite sophisticated compared to Australian methods and could probably only be justified here if much greater numbers were built.			
Include in Assessment: Yes			
Web Links: http://www.kontio.com/eng.php			





Locked corner joint for round logs protects the home against the cold and shelters it from wind and rain.

Round Log, pine



230 mm

200 mm

170 mm

150 mm



A log house creates a homely atmosphere.

Rectangular log, Pine Laminated log, Pine



120mm

95 mm

205mm

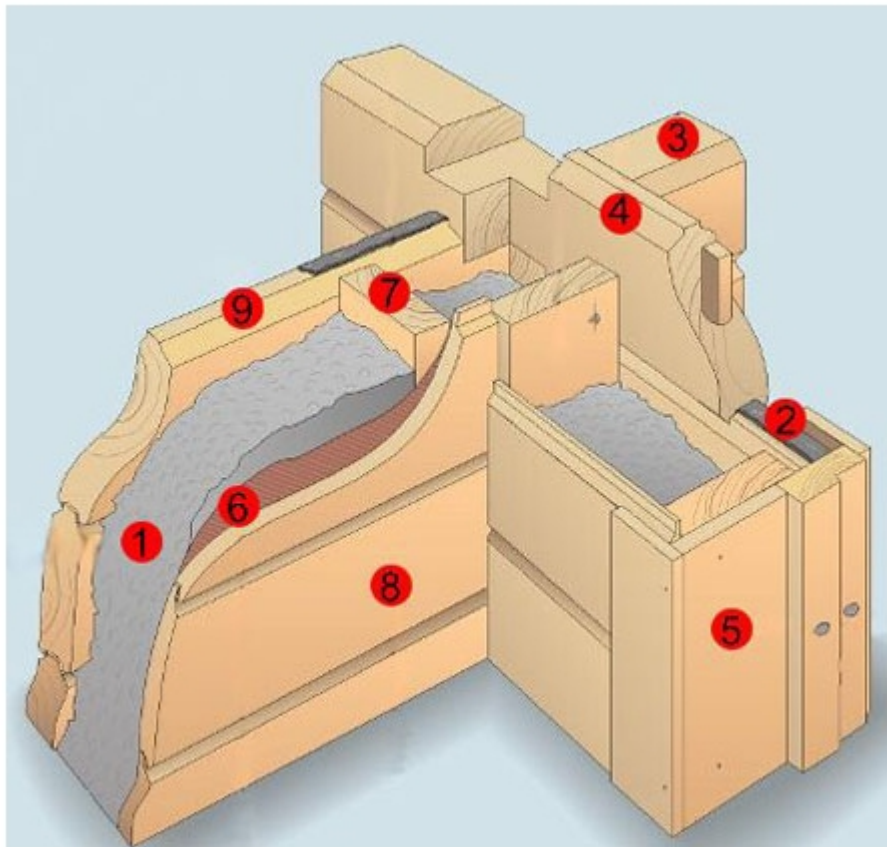
180mm

135mm

95mm



Rantasalmi Oy			
Category: Structural System	Country: Finland	Consultant: Ascheim	ID: 616
<p>Description: Rantasalmi Oy manufactures pine log houses. In addition to residential buildings Rantasalmi Oy has participated in several projects involving the construction of hotels, holiday vilages, golf clubs and log churches. The Ekorex log structure is a result of long term product development where traditional logs and recycled wood fibre are combined. The outer walls of Ekorex structures are made of timber with few knots. The structure insulation and the air-proof paper are completely made of wood fibre and acts like natural wood. The Ekorex structure is well-suited for multi-storey houses made of logs. Ekorex wall structure is based on a solid vertical frame. As a result, there is no sagging/shrinkage that is typical of traditional log buildings. The structure makes it possible to build varied log houses with multiple shapes and looks. Rantasalmi Oy is about to become one of the first Finnish house manufacturers to be awarded CE marking. CE marking awarded by the European Union certifies that all properties of the product comply with the European standards for technical quality.</p>			
<p>Benefits: Rantasalmi Oy is about to become one of the first Finnish house manufacturers to be awarded CE marking. CE marking awarded by the European Union certifies that all properties of the product comply with the European standards for technical quality. Fire resistance and air permeability of Ekorex log structures has been studied and found to be excellent. This is due to the respiratory nature of the structure, the indoor air stays good.</p>			
<p>Limitations: This special log house system is developed on Finish materials (timber, insulation etc.) and the building system might not be directly transfereable to Australian materials keeping all the same properties intact.</p>			
Building Type: All	Application Point: Whole house	Construction Type: new	
Material Types: wood	Innovation Type: product / process	Development Maturity: mature	
Current Availability: Yes - refer contact details			
Experience in Use: unknown			
Experience in Service: unknown			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: Rantasalmi Oy FIN-58910 Rantasalmi as, Finland Phone :+358 (0) 15 730 020 Fax: Email: rantasalmi@rantasalmi.com		Contact: Phone: Email:	
<p>Comments: There are a number of existing log structures/systems already in Australia that have established small niche markets for holiday cabins etc. This system seems very sophisticated compared to Australian methods and could probably only be justified here if much greater numbers were built.</p>			
Include in Assessment: Yes			
Web Links: www.rantasalmi.com			



Natural solution for healthy living.



The Ekorex log structure is the result of long-term product development. It combines traditional logs and recycled wood fibre Ekovilla in a unique way.

The Ekorex structure breathes freely, insulates effectively, and does not sag. It's a perfect solution for healthy living in log houses around the year.

Completely plastic-free structure.

The Ekorex log structure contains air-proof paper instead of plastic. The structure that is completely made of wood fibre acts like natural wood. It keeps the humidity of indoor air steady. It is good to live and easy to breathe in an Ekorex house.

Genuine logs in outer wall.

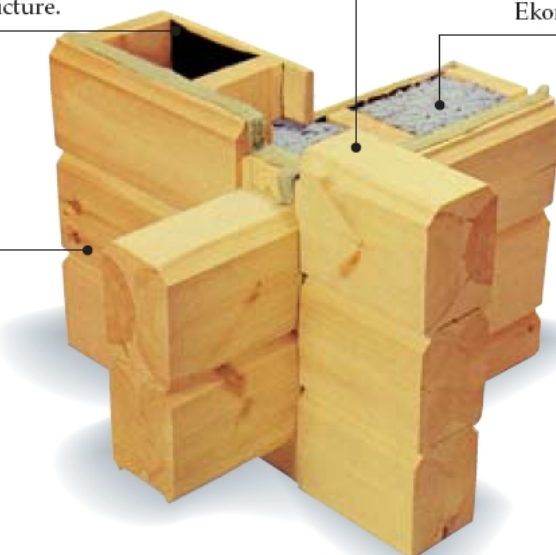
Outer walls of Ekorex structures are made of carefully selected, Finnish timber with few knots. They will last through the heat of the summer and the cold of the winter. Year in, year out.

Freedom of choice with interior materials.

Ekorex offers full freedom in material choices inside the house. As much or little wood can be visible inside the house as the homeowners like.

Ekorex breathes right.

Not only people with allergies will enjoy the clean, natural indoor air of an Ekorex house. Thanks to the respiring structure, the quality of indoor air stays good, also at night. There is less need for air-conditioning. People and animals feel well – as do all interior materials.



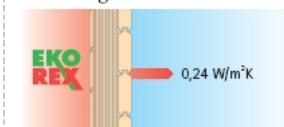
Ekorex does not sag.

The Ekorex wall structure has a strong vertical frame. Due to the frame, sagging that is typical to wall structures does not occur. The structure enables realisation of versatile log houses of many looks.

Ekorex provides efficient insulation.

Manufactured of natural materials, the Ekorex wall structure meets the highest requirements of thermal insulation even as such. Heat is not wasted and the air remains naturally humid. The fine-grained Ekovilla insulation fills all the gaps and sticks to the structures. The wall surfaces remain warm, and there is no draught. Furthermore, the structure insulates sound very effectively.

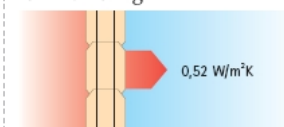
Ekorex log wall 235mm



Stone wall 950mm



Laminated log 210mm



Also with, e.g., round logs with diameter of 230mm, the heat loss is $0.6 \text{ W/m}^2\text{K}$.

Ekorex is suitable also for towns.

The corners of an Ekorex log house are most often built with traditional, massive joint ends. When built without the joint ends, an Ekorex house is also excellent for an urban environment.

Ekorex, a solution with a multitude of options.

Windows and doors can be fixed firmly and tightly to the frame of the house. It is easy to add various steps both to the upper and lower part of the building. Other materials can also be easily combined with the Ekorex structure.



Aus dem Schlafraum zum Frühstück auf den Balkon.



Der Specksteinofen sorgt für wohlige Wärme.



Hell und geräumig: Die Wohnraum-Wintergarten-Kombination.



Spielen in gesunder Umgebung. Das Raumklima in unseren Holzhäusern spielt besonders für Allergiker eine große Rolle.



Harmonisch passt sich dieses Sampo-Modell der natürlich gewachsenen Umgebung an.



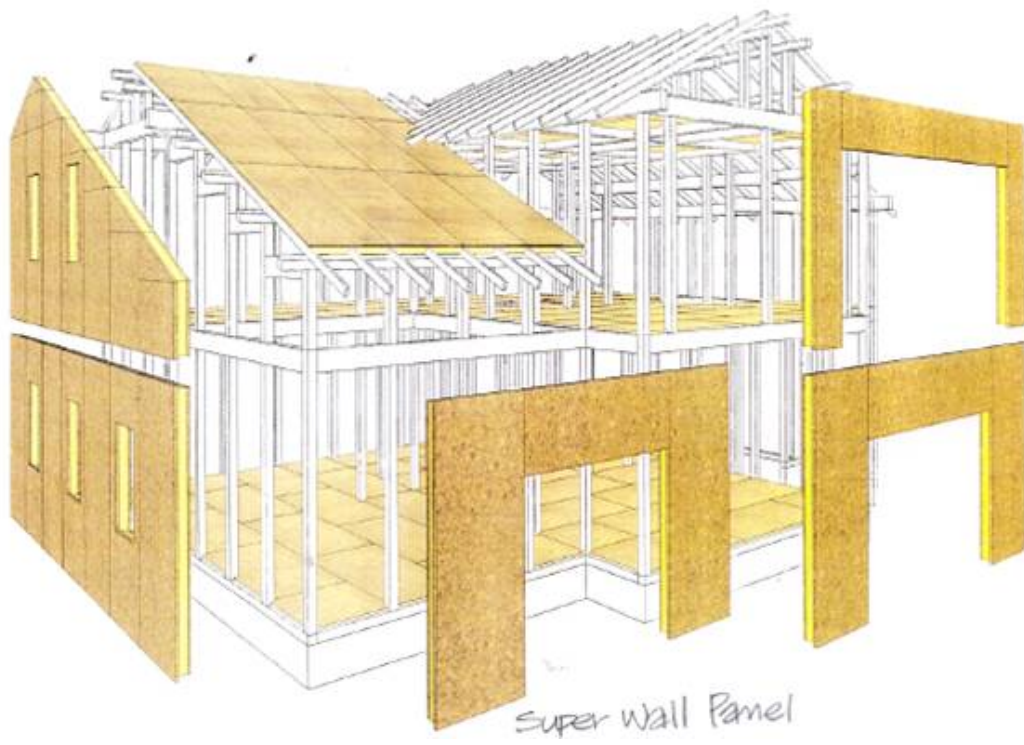
Die schräge Decke des Wintergartens sorgt für viel Flair.

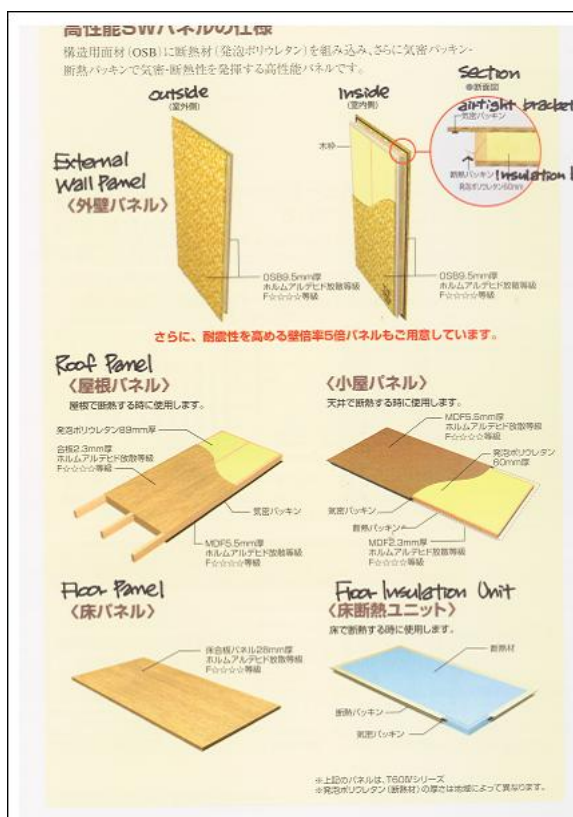
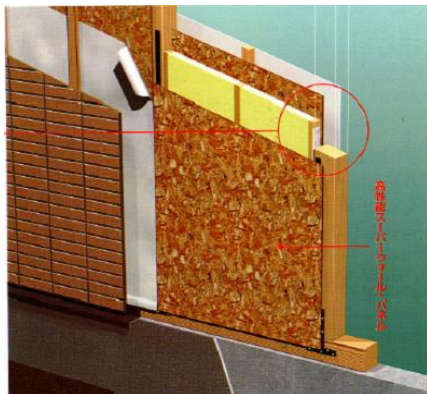
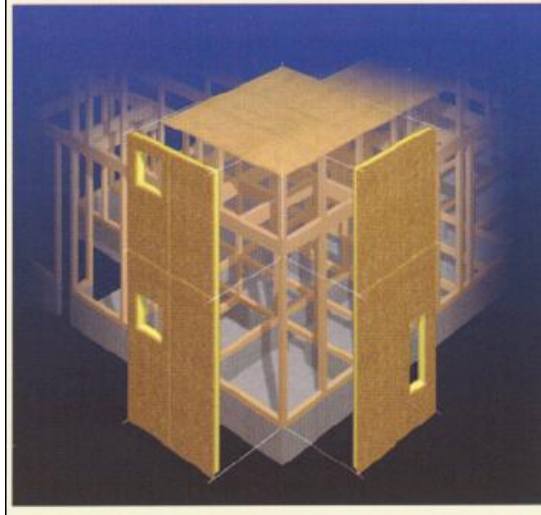


Eine wohnliche Küche ist das Herz eines jeden Hauses. Nicht nur zu den Mahlzeiten wichtigster Treffpunkt für die Familie.

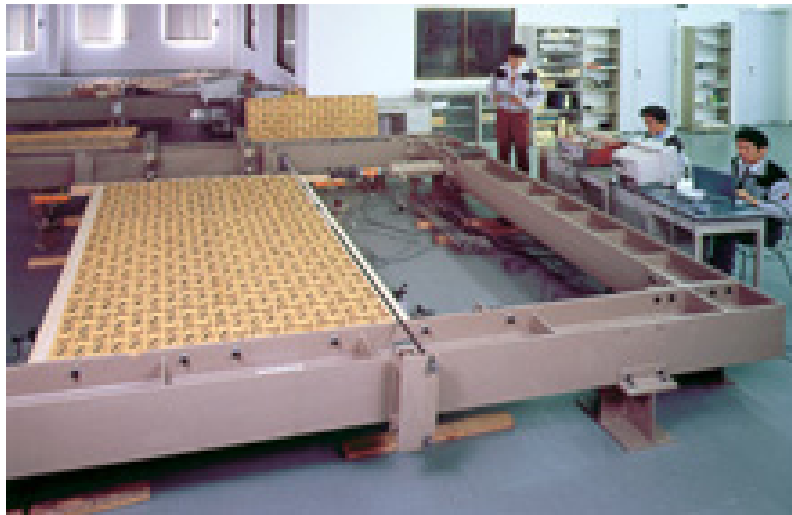


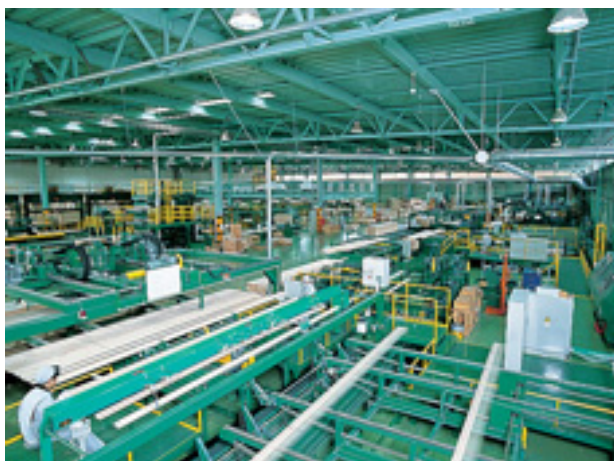
Super Wall Construction Method			
Category: Structural system / Panelised construction	Country: Japan	Consultant: Ota	ID: 617
Description: Super Wall Construction Method is a new construction method (a construction system of the whole house) using Super Wall panels. Super Wall (SW) construction methods and SW panels realise high levels of air tightness, thermal insulation and earthquake resistance. Delivering more uniform air temperature among rooms, cleaner air within homes, and stronger resistance to earthquakes and typhoons. The SW construction method offers a preview of how house will be built in the future. SW Construction Method = Super Air Tightness, Thermal Insulation, and Earthquake Resistance. 1) High performance SW panels have superior air tightness and thermal insulation characteristics. 2)Ventilation layer to prevent internal condition 3) High performance windows and doors with superior air tightness and thermal insulation characteristics 4) Floor insulating units to keep flooring warm. 5) Concrete panels and anti-humidity sheets to shield against the humidity of the ground (plenam floor void). This method also enables to reduce greenhouse gas emissions & residential energy consumption. This system adds much more value to timber structure.			
Benefits: The essential advantage of the Super Wall construction method & SW panels are; - Super Air Tightness, Thermal Insulation, and Earthquake Resistance. Eco-friendly and Safety			
Limitations: The internal layout of houses using this system might be less flexible than other new structure methods. / Up to 3 stories / no commercial buildings			
Building Type: detach res	Application Point: whole house	Construction Type: new	
Material Types: wood, metal, others	Innovation Type: product / process	Development Maturity: mature	
Current Availability: Yes - refer contact details below			
Experience in Use: builders & homeowners are satisfied with this system - easy for builders and comfortable for homeowners			
Experience in Service: not available			
Example Projects: This company has more than 30,000 houses building experience using this system			
IP & Commercial Issues: Yes - This company owns a lot of Patents for this system. e.g.) Double Packing System = special airtight bracket &special insulation bracket. However, must get the permission from this company before opening any information in this sheet & others to the p			
Company Contact Details: TOSTEM Co., Ltd 2-1-1 Oshima Koto-ku Tokyo, Japan Phone :81-3-3638-8362 Fax: 81-3-3638-8345 Email:		Contact: 1) Mr. Masahiko Shimizu / 2) Mr Hiroyuki Kimura Phone: 81-3-3638-8362 / 81-3-3638-8371 Email: shimizum3@exc.tostem.co.jp kimurah1@exc.tostem.co.jp	
Comments: Post and beam and insulated panel system seems to be quite an expensive system in the Australian context. Possible applications in multi-storey multi-family units.			
Include in Assessment: Yes			
Web Links: http://www.tostem.co.jp/corporate/english/prefabricated.htm			





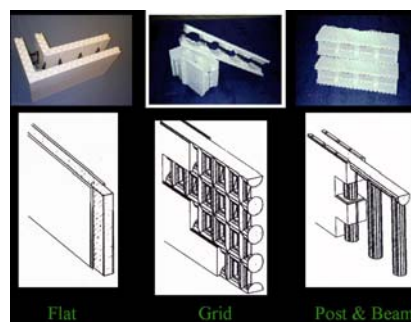
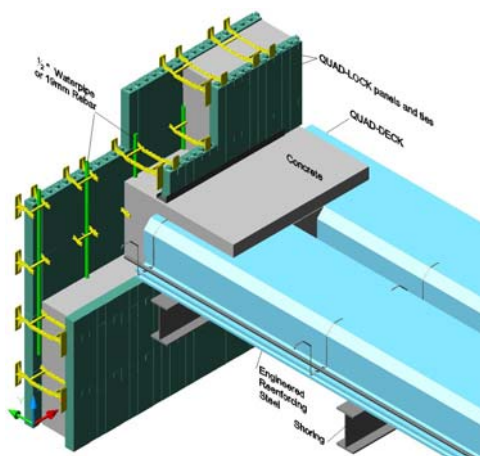
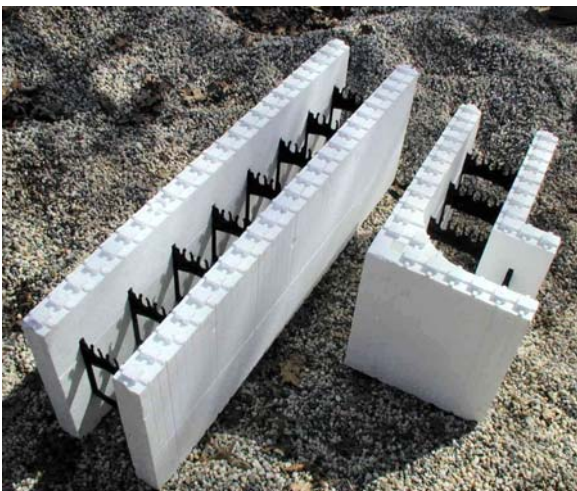
HSTPU - High Strength Timber Panel Unit			
Category: Structural system / Prefabricated factory housing	Country: Japan	Consultant: Ota	ID: 618
Description: High Strength Timber Panel Unit (HSTPU) is a new construction method - a construction system of the whole house - to build a house which has high earthquake-resistance and high durability. The structure is different from Traditional Japanese Timber Structure which is formed by posts & beams. The concept of this structure is to unify a floor and walls with a special panel (SxL Panel=Stressed Skin Panel) as one unit. This unit is made of laminated-timber and metal connectors. This structure system makes a building stronger. The houses which adopt this method also provide comfortable environment to live in. HSTPU construction method has the following features. a) special ventilation system for roof & under floor b) special wall system - there is airway between external wall and structural frame c) high fire resistance d) high insulation e) high airtightness f) high sound insulation efficiency g) stronger reinforcement concrete foundation. h)others			
Benefits: The essential advantage of the High Strength Timber Panel Unit is ; - A house adopting this construction method has high earthquake-resistance, high durability, high insulation, comfort to live in, high fire resistance, high airtightness and high sound insulation efficiency. It also enables less energy consumption etc.			
Limitations: Less window opening area may be available than with the Rahmen (rigid-frame) structure.			
Building Type: detach res	Application Point: whole house - High Strength Timber Panel Unit is a construction system of the whole house.	Construction Type: new	
Material Types: wood, metal, others	Innovation Type: product / process	Development Maturity: mature	
Current Availability: Yes - refer to contact details below			
Experience in Use: builders & homeowners are satisfied with this system - easy for builders and comfortable for homeowners			
Experience in Service: not available			
Example Projects: 16,797 houses were built by using this system for the past 5 years - between 2000 to 2005			
IP & Commercial Issues: Yes - This company owns the Patent for this system. Must get the permission from this company before opening any information in this sheet and others to the public.			
Company Contact Details: S x L Corporation 2-12-1, Sonezaki Kita-ku Osaka-shi Osaka, Japan 530-8558 Phone : 81-6-6315-1133 Fax: 81-6-6361-6072 Email: n-nishinaka@sxl.co.jp		Contact: Mr. Naoyuki Nishinaka Phone: 81-6-6315-1133 Email: n-nishinaka@sxl.co.jp	
Comments: This panelised/post and beam system appears similar to the Super Wall system. It also includes a plenum floor space which may have advantages in Australia to address 5 star energy issues in cold climates. Again, this seems that it would be quite an expensive system in the Australian context. Need more information on what the actual panels are.			
Include in Assessment: Yes			
Web Links: http://www.sxl.co.jp/technology/index.html			







ICF - Insulated Concrete Forms			
Category: Structural system	Country: USA	Consultant: Kasal	ID: 619
Description: Expanded polystyrene forming and concrete with rebars used to create a wall system. The system is gaining attention in the US due to its durability, structural performance and construction efficiency.			
Benefits: The polystyrene concrete forming with plastic spacers is light, easy to manipulate and erect. The external polystyrene shell delivers desired insulation parameters, the concrete with rebar deliver the structural performance and add to insulation and acoustical parameters.			
Limitations: So far no issues regarding the fire performance has been reported. The system is currently used only for walls (mostly exterior).			
Building Type: new	Application Point: walls (predominantly)/floor/roof	Construction Type: new	
Material Types: plastic, concrete	Innovation Type: product / process	Development Maturity: mature to developing	
Current Availability: Yes; numerous companies in the US deliver the forming			
Experience in Use: the products has been used in the US market and is slowly gaining popularity			
Experience in Service: no in-service issues; limited experience exists			
Example Projects: http://www.amvicsystem.com/PhotoGallery.aspx			
IP & Commercial Issues: no			
Company Contact Details: Number of manufacturers exists Phone : 806 356-7203 Fax: 806 358-3006 Email: mking@amaonline.com		Contact: Pat Boeshart Phone: 1 800 551 3313 Email: pboeahart@icform.com	
Comments: Insulated block constrction is not new to Australia and already in market etc.			
Include in Assessment: No - already available in Australia			
Web Links: http://www.amvicsystem.com/ http://www.quadlock.com/ http://www.icfdirect.com/ http://www.insulatedconcrete-forms.com/ http://www.premereforms.com/ http://www.superformproducts.com/ http://www.concrete4u.com/insulated_concrete_forms_h.html http://www.ther			





The SoundBar System				
Category: <i>Flooring / Structural system</i>		Country: <i>Finland</i>	Consultant: <i>Ascheim</i>	ID: <i>701</i>
Description: The SoundBar system is a acoustic floor system. The system is built up by three main components. The Finnforest I-joist (FinnJoist) is the structural load-bearing part of the system. On the I-joists the Finnforest SoundBar board is placed. This board acts as a sound-deadening material, minimising sound transfer between floors. The boards are specially profiled for easy fitting. On the top of the floor a anhydrite pumpable screed is placed. The screed is quick drying and gives the floor a smooth finish. The screed is self-levelling and gives the total floor system similar performance to a solid concrete floor.				
Benefits: Improved accoustic performance. Reduce the building time by up to two thirds.				
Limitations: The I-joist can not be used in service class 3 (high humidity/exposed to weather).				
Building Type: All		Application Point: Floor		Construction Type: Mainly New
Material Types: wood		Innovation Type: product		Development Maturity: developing
Current Availability:				
Experience in Use: unknown				
Experience in Service: unknown				
Example Projects:				
IP & Commercial Issues: unknown				
Company Contact Details: Finnforest P.O.Box 50, FI-02020 Metsä, Finland Phone :00358 1046 05 Fax: Email: uk@finnforest.com			Contact: Phone: Email:	
Comments: There are some similar systems available in Australia , but not offered as a total package. This type of system would help address the noise issues timber has in multi-residential construction. Introduction of a wet trade (self levelling compound) is a bit of a drawback.				
Include in Assessment: Yes				
Web Links: http://www.thesoundbarsystem.com/				

Home

The Benefits...

The System...

THE
soundBar[®]
 SYSTEM

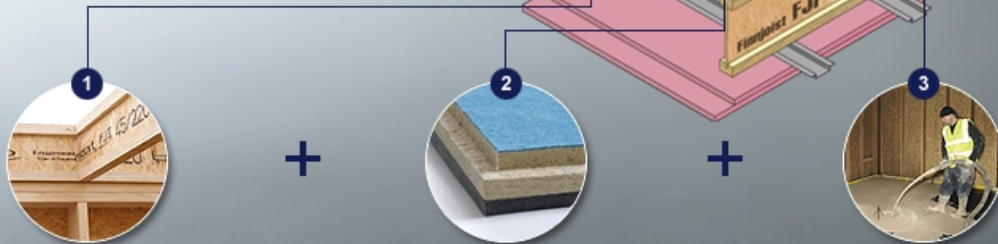
The Savings...

The Partnership...

Contact Us...

Revolutionary Performance...

The complete system is unique and combines the following **3 key components** which, when added together, create a simple yet winning formula...



Finnjoist (FJI)...

...the market-leading I-Joist from Finnforest

The UK's only fully engineered I-Joist - the first to carry the BM Trada Q Mark, the first to be CE marked and the first to carry full PEFC environmental certification.

SoundBar® board...

...the key to revolutionary acoustic performance

Exclusive to Finnforest, the new **SoundBar®** board acts as sound-deadening material, minimising sound transfer between floors. Specially profiled for easy fitting.

Gyvlon screed...

...a tried and tested anhydrite screed from Lafarge

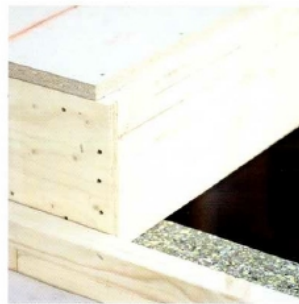
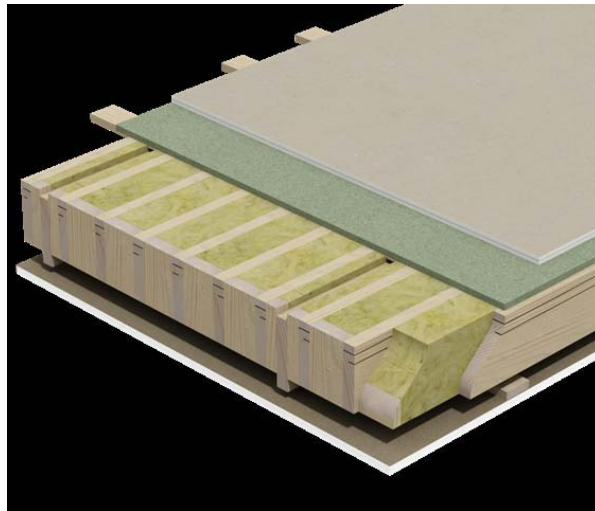
Pumpable and quick drying with a super smooth finish, the Gyvlon self-levelling screed delivers the performance of a solid concrete floor.



A REVOLUTION IN ACOUSTIC FLOORING

finnforest

SemiBjälklaget				
Category: Flooring / Panelised construction		Country: Sweden	Consultant: Ascheim	ID: 702
Description: Semibjälklaget is a patented prefabricated floor element system. The patent is owned by Södra Timber AB, but the elements are produced on licence by Moelven ByggModul AB. The element system exists in different categories e.g. Housing and Office. The main load-bearing part of the element system is grooved beams with centre distance of 200 mm (maximum span of the element is 4,8 m) or 100 mm (maximum span of the element is 5.8 m). The space between the grooved beams is filled with compressed rockwool. 22 mm moisture resistant particle board is glued and screwed to the upper and lower side of the element. During assembling at building site, the upper surface is covered with a cement or gypsum levelling course. The underside gets a complete lattice wainscot and further two layers of gypsum board. Elements for bathrooms (etc) also have prefabricated drainage pipes etc.				
Benefits: Low weight, short construction periode at building site and good properties regarding sound and fire (REI 60).				
Limitations: The beam element system is patented.				
Building Type: All		Application Point: Floor		Construction Type: All
Material Types: wood		Innovation Type: product		Development Maturity: mature
Current Availability:				
Experience in Use: unknown				
Experience in Service: unknown				
Example Projects:				
IP & Commercial Issues: unknown				
Company Contact Details: Moelven ByggModul AB Brovägen 27, SE-661 93 Säffle, Sweden Phone :+46 533 461 30 Fax : +46 533 461 66 Email : post.saffle@moelven.com			Contact: Einar Lundmark Phone : +46 070 315 32 61 Email : einar.lundmark@moelven.com	
Comments: This panelised floor system would have potential application in multi-residential/commercial construction, but the maximum spans given would be a limiting factor in Australian markets where 6.0m seems to be a typical minimum sought. Cost of this system would also be a consideration.				
Include in Assessment: Yes				
Web Links: http://www.moelvenbyggmodul.com/index.asp?menuitem=L188 http://se.moelvenbyggmodul.com/index.asp?menuitem=L115 http://se.moelvenbyggmodul.com/docs/broschyr%20semibjälklaget.pdf				



Lignatur floor systems			
Category: <i>Flooring / Panelised construction</i>	Country: <i>Switzerland / Germany</i>	Consultant: <i>Scheublin</i>	ID: <i>703</i>
Description: With the market loss of timber floor systems since WW11, German timber manufacturers have tried to develop timber floor systems for which comfort (mainly noise control) and the integration of installations are the main requirements. These developments have lead to: Lenotec systems (described at the Massive timber systems), Lignotrend (combination of hollow sections), Lignatur (combination of hollow sections), "Brettstapelbau" (boards nailed together) and glulam plates. LIGNATUR elements are pre-fabricated load bearing timber elements with hollow sections. The elements can be used in roofing and flooring.			
Benefits: Because of the hollow cell structure of the elements an effective use of timber is achieved. The hollow sections also provide space for plumbing, water and drainage facilities.			
Limitations: The system is less massive than concrete and therefore the acoustic and insulation performance is lower			
Building Type: all	Application Point: floor / roof	Construction Type: new / floor renovation	
Material Types: wood	Innovation Type: product / process	Development Maturity: mature	
Current Availability: Yes, refer to contact details below			
Experience in Use: unknown			
Experience in Service: unknown			
Example Projects: several dwellings in Austria, Germany and Italy			
IP & Commercial Issues: unknown			
Company Contact Details: Lignatur AG Mooshalde 785 CH-9104 Waldstadt Phone : +41 71 3530410 Fax: +41 71 3530411 Email: info@lignatur.ch		Contact: Raph Schlaepfer Phone: Email: r.schlaepfer@lignatur.ch	
Comments: Cost of this system may be an issue in single family dwellings where acoustic etc performance is less of a criteria. Also, ability to locate air-conditioning and heating ducts would need to be addressed.			
Include in Assessment: Yes			
Web Links: www.lignatur.ch			

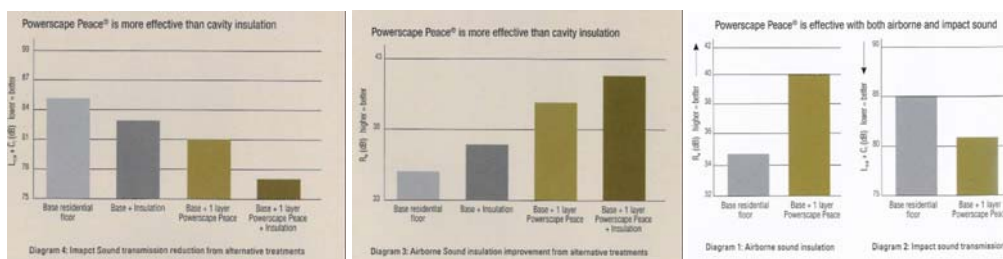
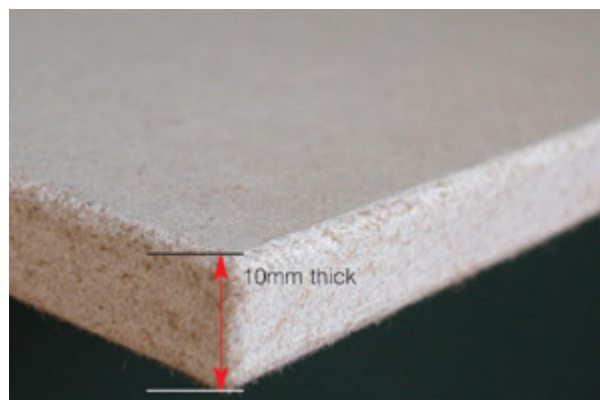




Timberbond flooring				
Category: Flooring / Engineered wood product		Country: NZ	Consultant: Bayne	ID: 704
Description: Timberbond's structural flooring is a floor and a ceiling forming an attractive exposed surface area while also serving as a structural component, eliminating the need for floor joists. This flooring system is manufactured from selected laminations, of kiln dried and finger jointed (if necessary) timber. The combination of laminated timber and the tongue and groove system that joins the boards together creates a strength that enables Timberbond's structural flooring to span up to 8 metres unsupported. This is especially beneficial in situations where height restraints dictate the need to maximise headroom.				
Benefits: Aesthetics, mezzanine floors; simple to assemble; floor and ceiling in on.				
Limitations: May require the addition of a suspended ceiling to improve acoutic insulation and hide services				
Building Type: multi-res; commercial		Application Point: floor		Construction Type: all
Material Types: wood		Innovation Type: product		Development Maturity: mature
Current Availability: Yes - Through Timberbond				
Experience in Use: not available				
Experience in Service: not available				
Example Projects: Grey Lynn Community Centre, Auckland				
IP & Commercial Issues: unknown				
Company Contact Details: Timberbond Laminators PO Box 72501 Papakura Auckland New Zealand Phone :+64 9 298 2149 Fax: +64 9 298 2148 Email: enquires@timberbond.co.nz			Contact: Ian McCallum Phone: Email:	
Comments: Laminated timber flooring slabs are not really new and would appear to have limited market uptake in Australia.				
Include in Assessment: Yes				
Web Links: http://www.timberbond.co.nz/Flooring/Overview.htm				



Powerscape Peace			
Category: Flooring	Country: NZ	Consultant: Svensson	ID: 705
Description: transforms a basic floor into a quality living platform for a peaceful comfort. Multi-function floor underlay.			
Benefits: quiet, solid, safe and secure.			
Limitations:			
Building Type: residential mostly	Application Point: floor	Construction Type: new	
Material Types: wood	Innovation Type: product	Development Maturity: mature	
Current Availability:			
Experience in Use: australia new zealand			
Experience in Service: unknown			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: powerscape peace PO Box 12256, Penrose,Auckland, New Zealand Phone :+64 9 633 0138 Fax: +64 9 633 0988 Email: Information@powerscape.com		Contact: Steve Marlor, National Sales Manager Phone: 0408 278 606 Mobile Email: Steve.Marlor@powerscape.com	
Comments: Technology and product already exists in Australia			
Include in Assessment: No - available and in use in Australia, mainly in multi-res.			
Web Links: www.powerscape.com			

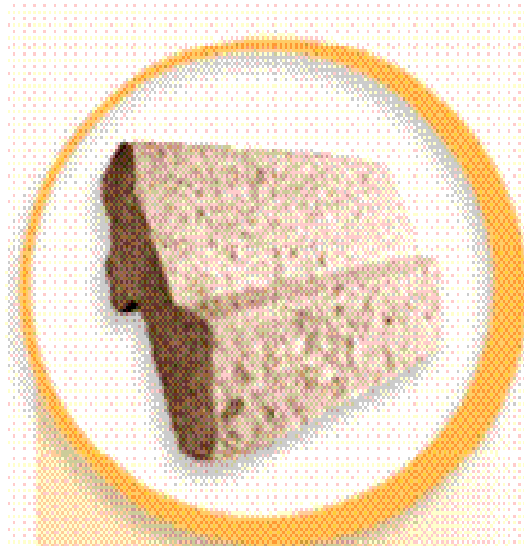


Bamboo floors			
Category: Flooring	Country: USA/Australia	Consultant: Svensson	ID: 706
Description: Bamboo is the fastest growing plant. It produces greater biomass and 30% more oxygen than a hardwood forest on the same area, while improving watersheds, preventing erosion, restoring soil, providing sweet edible shoots and removing toxins from contaminated soil.			
Benefits: Bamboo is quick-growing, high, straight, very strong, and evergreen. Therefore, the Chinese have compared "fair, straightforward, sincere people of high spiritual qualities" to bamboo since the ancient times. Environmental friendly, could provide jobs for U-countries			
Limitations:			
Building Type: residential or commercial	Application Point: floor	Construction Type: new	
Material Types: bamboo	Innovation Type: products	Development Maturity: mature	
Current Availability: method available			
Experience in Use: Yes			
Experience in Service: unknown			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: Solidgrass- bamboo flooring 8382 Tweed Valley Way, Tumbulgum NSW 2490, Australia Phone : (617)5535 9613 office (612)6676 6340 warehouse Fax: Email: daver@solidgrass.com		Contact: more contacts visit the webpages listed Phone: Email:	
Comments: The good quality bamboo flooring is a very good product, but the poor stuff is 'crap'.			
Include in Assessment: No - already well established in Australia taking hardwood flooring markets.			
Web Links: http://www.solidgrass.com/experience.html http://www.bamboohardwoods.com/ http://www.duro-design.com/			

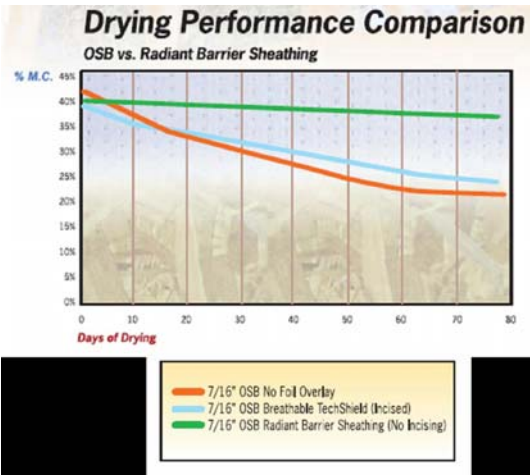
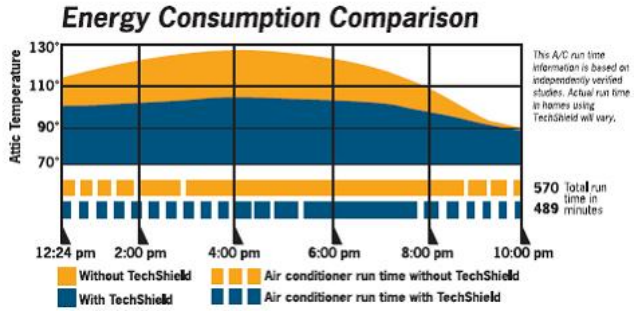
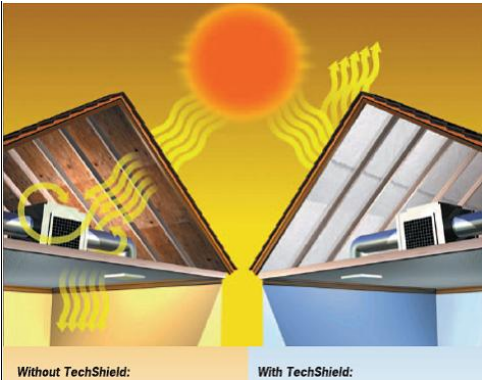


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Mortarless Brick Veneer				
Category: Cladding / Insulation		Country: USA	Consultant: Paevere	ID: 801
Description: A new exterior wall system uses concrete bricks cast in special shapes which require no mortar and can be installed by anyone with basic carpentry skills. In most applications, the existing wall framing structure supports the weight of the bricks, so foundation ledges are not required, and the system is suitable for retrofitting existing walls. The manufacturer states that the system provides homeowners with the luxury look of real brick exteriors at a more affordable cost. Thermal insulation characteristics are about the same as common face brick (R-0.11) and each unit weighs just over 4 lbs.				
Benefits: Because the system can be installed by workers without masonry skills, the installed cost of the mortarless brick system is less than that of conventional brick walls. System is strong and durable and will not dent, chip, or fade in color. It avoids some of the pointing (i.e., patching up mortar) and moisture problems that can occur over time when conventional mortar deteriorates. The mortarless character of the system also limits damage that might occur from movement and cracking during settling or seismic activity. The system resists seasonal freeze thaw cycles and water penetration by providing an interior drainage plain from the barrier wrap.				
Limitations:				
Building Type: All		Application Point: walls		Construction Type: new
Material Types: Concrete		Innovation Type: product		Development Maturity: mature
Current Availability: Yes, available in Australia				
Experience in Use: unknown				
Experience in Service: unknown				
Example Projects: http://www.novabrik.com/html/en/photos_album/index.php3?sectionnum=1				
IP & Commercial Issues: unknown				
Company Contact Details: Novabrik International Inc 8138, Metropolitain East Montreal QC H1K 1A1 CANADA Phone : 1 (514) 354-1555 Fax: 1 (514) 354-6980 Email: info@novabrik.com			Contact: Australian Nova Brik: Julian Kosmina Phone: 02 6024 3155 Email: info@novabrikaustralia.com.au	
Comments: There would be an issue with the weight of this as it exceeds the assumed wall masses used for the timber framing code span tables wall frame tables. New tables that took account of the extra mass would need to be developed. Also cost may also be an issue. I was quoted about \$150/m sq. from an industry competitor with a similar system.				
Include in Assessment: Yes				
Web Links: http://www.novabrik.com				

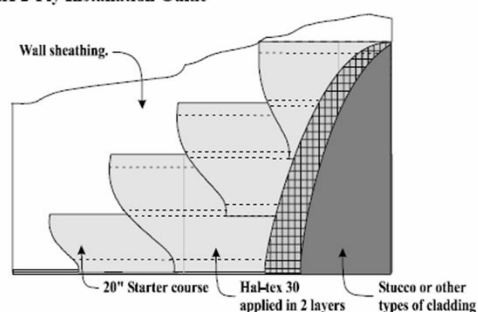


Radiant Barrier Sheathing - Plywood or OSB				
Category: Cladding / Insulation		Country: USA	Consultant: Kasal	ID: 802
Description: Radiant Barrier Sheathing is a Rated Sheathing plywood panel with an aluminum foil/kraft paper laminate layer (GP: Plytanium Thermostat® , LP is using OSB). It is designed especially to increase reflectivity of solar heat waves and decrease their transmission. In other words, it limits the transfer of heat between the exterior (i.e. through roof and walls) into the attic space and interior living space. Reflectivity is a measure of how much of the energy is not absorbed by the barrier and is instead reflected. Emissivity (E) is a measure of the amount of solar heat energy that is transmitted through a barrier material. The bright aluminum foil is highly reflective; up to 97 percent of the radiant heat can be reflected. Only 3 percent of the radiant heat is transmitted for an E value of 0.03. A mirror surface may reflect 98 percent of the energy, while absorbing 2 percent of it. A good blackbody surface will reverse the ratio, absorbing 98 percent of the energy and reflecting only 2 percent.				
Benefits: Radiant Barrier Sheathing can lower attic temperatures by up to 30 F in the peak summer cooling season. Possible additional benefits include: Decrease in Energy Consumption: the cooling system can work more efficiently since there is lower radiant-heat transfer into the attic and into the living space during all the cooling season. Studies have show that radiant barriers can reduce peak cooling-energy consumption by up to 20 percent. Increase in Operational Efficiency of Appliances: the lower the temperature in the attic can enable the attic mounted air-conditioning equipment and duct systems to operate more efficiently, helping to extend the operating life of the system.				
Limitations: Combination of the plywood/OSB with a radiant barrier increases costs. The metallic radiant barriers increases environmental load and decreases recyclability.				
Building Type: all		Application Point: wall/roof		Construction Type: new
Material Types: wood, metal		Innovation Type: product		Development Maturity: mature
Current Availability: Yes				
Experience in Use: see additional documentation				
Experience in Service: none				
Example Projects:				
IP & Commercial Issues: unknown				
Company Contact Details: Georgia-Pacific Corporation 55 Park Place Atlanta, GA 30303 LP Engineered Wood Products 2706 Highway 421 North Wilmington, NC 28401 Phone :1-800 648 6893			Contact: Barry Reid Phone: 404 652 3277 Email: bsreid@gapac.com	
Comments: This type of technology has already been tried and may still be available in Australia on plasterboard. May have some application now as reflective wall bracing, now that the plasterboard suppliers have pulled out of the bracing market.				
Include in Assessment: Yes				
Web Links: http://www.lpcorp.com/ www.gplytanium.com				

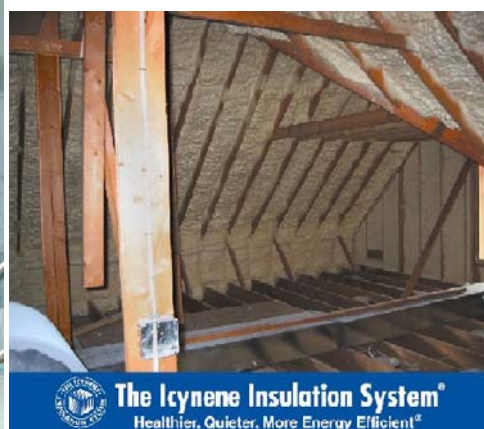


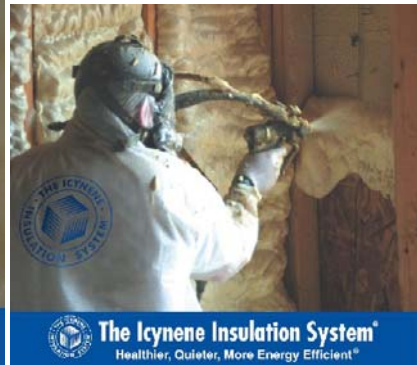
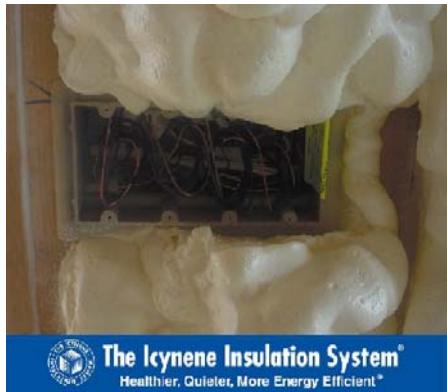
HAL Industries INC.			
Category: Cladding / Insulation	Country: Canada	Consultant: Kasal	ID: 803
Description: An asphaltic board made up of fiberglass coated in strips with high-melt asphalt and then faced each side with asphalt-kraft building paper.			
Benefits: Specially developed for stucco cladding on frame construction			
Limitations: For stucco and EIFs in moist climates			
Building Type: Detached and multi-unit residential	Application Point: Walls	Construction Type: all	
Material Types: combination	Innovation Type: product	Development Maturity: developing	
Current Availability: Canada			
Experience in Use: Considerable in British Columbia			
Experience in Service: unknown			
Example Projects: Many buildings			
IP & Commercial Issues: Yes- they do not permit viewing of their production facilities			
Company Contact Details: Hal Industries Inc. 9681 – 187th Street, Surry, BC, Canada, V4N 3N3 Phone :604 888 0777 Fax: Email: bob@halind.com		Contact: R.P. (Bob) Woykin Phone: Email: bob@halind.com	
Comments: This cladding system is designed as a base for stucco type finishes which are gaining market share in Australia. If using a wood based panel as the base, it has the potential to increase timber use in competition to fibre cement/masonry rendered/stucco wall claddings.			
Include in Assessment: Yes			
Web Links: www.halind.com			

Figure 1: HAL-TEX 2-Ply Installation Guide

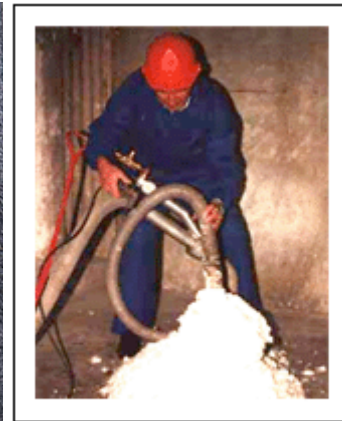
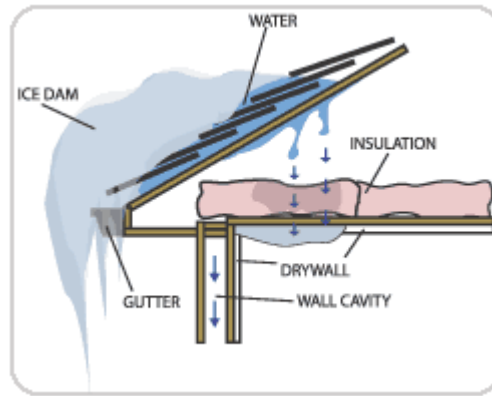


Icynene Spray Insulation Foam			
Category: Cladding / Insulation	Country: Canada	Consultant: Kasal	ID: 804
Description: The expandable water-born insulation system based on the polyisocyanates. Water is used the transportation agent.			
Benefits: Insulation system that can be quickly applied. Spray insulation will fill less accesible spaces. Has well-defined insulation properties and provides fast and uniform insulation layer.			
Limitations: Costs. The fire performance, although tested, may result in toxic fumes emission. No long-term performance and durability data available.			
Building Type: all	Application Point: whole house	Construction Type: all	
Material Types: plastic	Innovation Type: product	Development Maturity: mature	
Current Availability: Available in the US.			
Experience in Use: Product is used but not widely accepted by the building industry probably due to increased costs. The product complies with major US building codes.			
Experience in Service: Used. No long-term performance data available.			
Example Projects: http://www.icynene.com/CaseStudies.aspx			
IP & Commercial Issues: No			
Company Contact Details: Icynene, Inc. 6747 Campobello Road Mississauga ON L5N 2L7 Canada Phone : 1-905-363-4040 Fax: 905-363-0102 Email: sporemski@icynene.com		Contact: Sue Sporemski Phone: 1-905-363-4040 Email: sporemski@icynene.com	
Comments: Spray on insulations etc are not new in Australia			
Include in Assessment: No			
Web Links: http://www.icynene.com/			

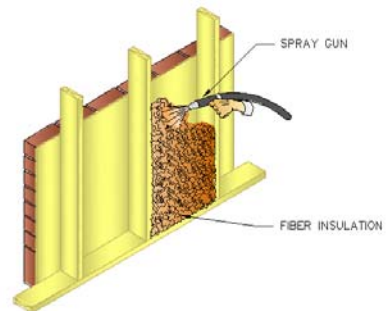




Spray Fiber Insulation			
Category: Cladding / Insulation	Country: USA	Consultant: Kasal	ID: 805
Description: Cellulose, fiberglass, or mineral wool (rock wool and slag wool) is sprayed in a moist state into an open stud cavity. Moist cellulose creates its own glue, but some manufacturers add adhesive. Both mineral wool and fiberglass need added adhesive. After application, stud edges are scraped clean with a special milling tool made for that purpose. As long as the "salvaged" insulation is free of debris it can be sent back to a mixing machine for reuse. Properly installed, it completely fills the cavity, suppressing air leakage. Sprayed-on cellulose is a mature technology. The chief concern with its use is to carefully monitor the water content of the material, and to refrain from closing in the cavity until its moisture content has dropped to a stable level, typically around 10 percent. Cellulose is treated with borate fire-retardant for fire and vermin resistance. Fiberglass, sprayed on with some water and adhesive, can also be sprayed into wall cavities. Though having a slightly lower R-value than cellulose, it also fills the cavity and suppresses air movement. It is sprayed at 24% moisture content, but because the fiberglass does not absorb moisture, it dries quickly.			
Benefits: Blown, fiber-based insulation containing disperse adhesive systems. Application is fast and adheres to the structural elements. Products with various R-ratings and fire ratings are available. The application speed is probably the largest benefit.			
Limitations: Probably higher costs of the material.			
Building Type: all	Application Point: wall; attics	Construction Type: all	
Material Types: cellulose/fiberglass/mineral wool	Innovation Type: product / process	Development Maturity: mature	
Current Availability: Yes; used in the US			
Experience in Use: builders			
Experience in Service: Yes; used in the US			
Example Projects: see listed web links			
IP & Commercial Issues: unknown			
Company Contact Details: Multiple companies Phone : Fax: Email:		Contact: PHRC - http://www.engr.psu.edu/phrc/ Phone: Email:	
Comments: These products already in Australia and in use.			
Include in Assessment: No			
Web Links: http://www.us-gf.com/ http://www.thermafiber.com/ http://www.guardianfiberglass.com/ http://www.spray-on.com/default1.asp http://www.nuwool.com/ http://www.fiberiffic.com/			



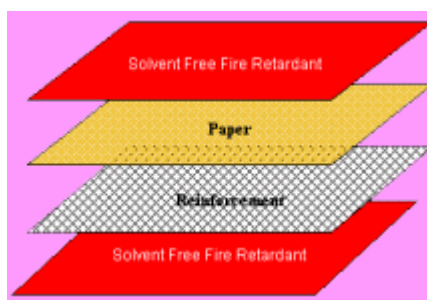
Fiberiffic



Shadowclad				
Category: Cladding / Insulation		Country: NZ	Consultant: Bayne	ID: 806
Description: Shadowclad is a 12mm thick exterior plywood sheet wall cladding which provides a 1200mm cover width and comes in sheet lengths of 2440mm/2745mm/scarf jointed 3050mm. Shadowclad is H3 LOSP treated available with two bandsaw face options and natural for a stained finish or Climate primed if a paint finish is desired.				
Benefits: Robust and durable cladding looks like battens or groove according to the option, without the expense. Panel system means quick to install and regular gaps.				
Limitations: Rough surface can trap surface dirt, debris or mold and require more paint. Not advisable to paint with dark colours				
Building Type: all		Application Point: wall		Construction Type: all
Material Types: wood		Innovation Type: product		Development Maturity: mature
Current Availability: Yes, from CHH woodproducts, manufactured in Kinleith, Tokoroa				
Experience in Use: accepted				
Experience in Service: not available				
Example Projects: http://www.shadowclad.co.nz/pdf/shadowcladconsumer.pdf				
IP & Commercial Issues: unknown				
Company Contact Details: CHH Woodproducts 640 Great South Road Manukau City Private Bag 92-106 Auckland New Zealand Phone :0800 326 759 Fax: 0800 746 400 Email: info@shadowclad.co.nz			Contact: Tim Nash Phone: +64 7 3902 7412 Email:	
Comments: Already established in Australia				
Include in Assessment: No - not new and established markets				
Web Links: http://www.shadowclad.co.nz/product.htm http://www.shadowclad.co.nz/pdf/shadowcladtechnical.pdf				

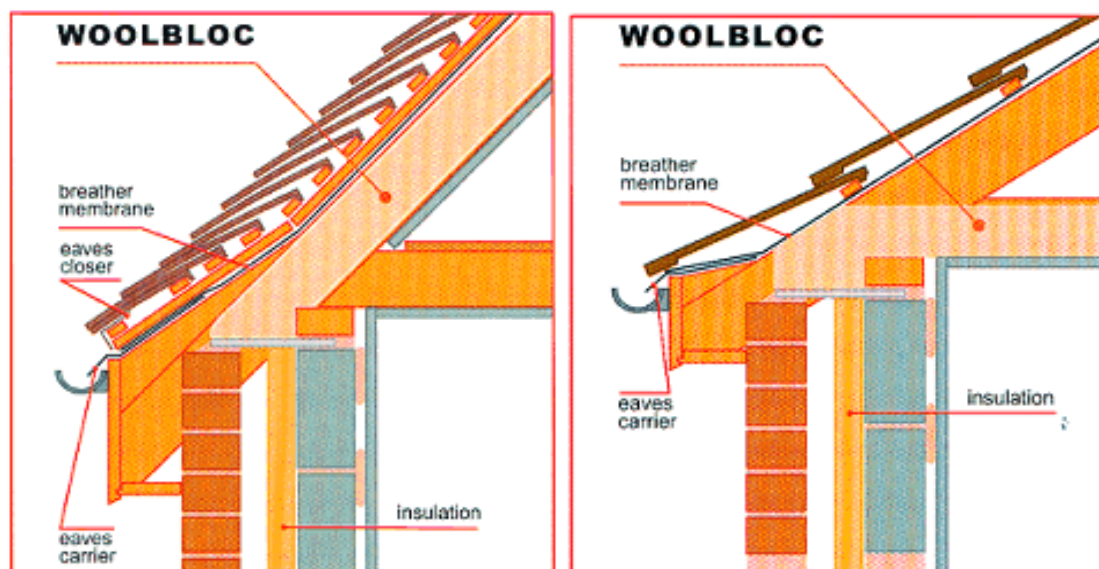


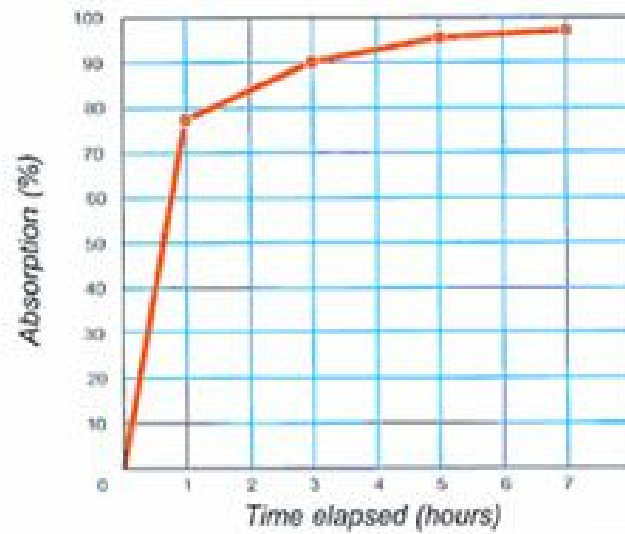
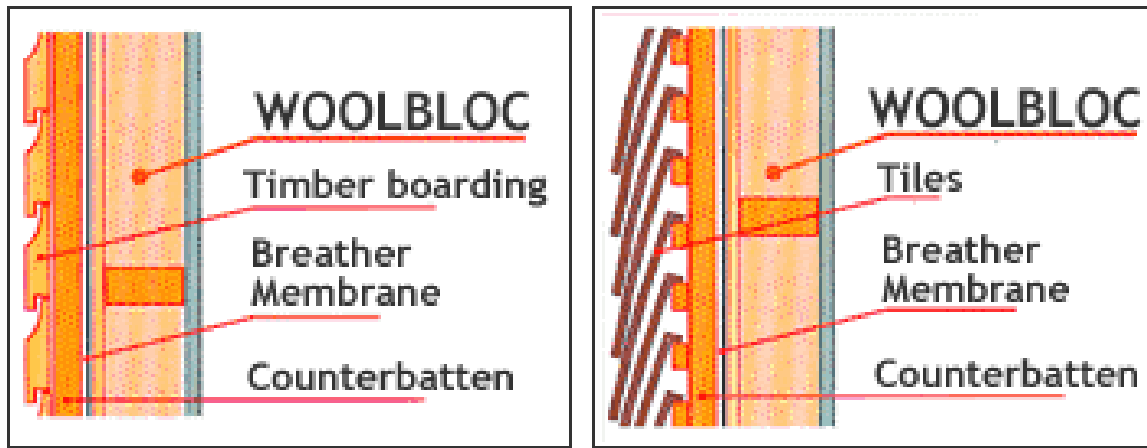
Thermakraft Cover-up			
Category: Cladding / Insulation	Country: NZ	Consultant: Bayne	ID: 807
Description: Breathable building wraps and films for use with timber framing as a breathing membrane on exterior walls. Thermakraft Cover-up is applied to all exterior walls from below the bearers or wall plates up to the top plate. The membrane protects frames from weathering during construction, and flame resistant. THERMAKRAFT COVER-UP is a coated polyolefin (polyethylene) woven into sheet form with micro-sized pores that allows the membrane to breathe. It is specifically designed for use in domestic & commercial type buildings & is manufactured with extremely high tensile strength in both directions & increased burst & puncture resistance.			
Benefits: Breathable membrane, tougher and stronger than kraft bituminous paper. Doesn't require strapping. Speeds up exterior lining. Reduces draughts, especially in high wind areas.			
Limitations: No long term track record			
Building Type: all	Application Point: wall	Construction Type: new	
Material Types: plastic	Innovation Type: product	Development Maturity: mature	
Current Availability: Yes - Thermakraft Industries Ltd; all major hardware stores in NZ			
Experience in Use: accepted			
Experience in Service: not available			
Example Projects: not available			
IP & Commercial Issues: unknown			
Company Contact Details: Thermakraft Industries (NZ) Ltd 11 Turin Place, P.O. Box 58-112, Greenmount, Auckland Phone : +64 9 273 3727 Fax: +64 9 273 3726 Email: David@thermakraft.co.nz		Contact: David Eccles-Hall Phone: Email:	
Comments: Already available in Australia			
Include in Assessment: No - existing technology and not new			
Web Links: http://www.thermakraft.co.nz/			



Wool Bloc insulation

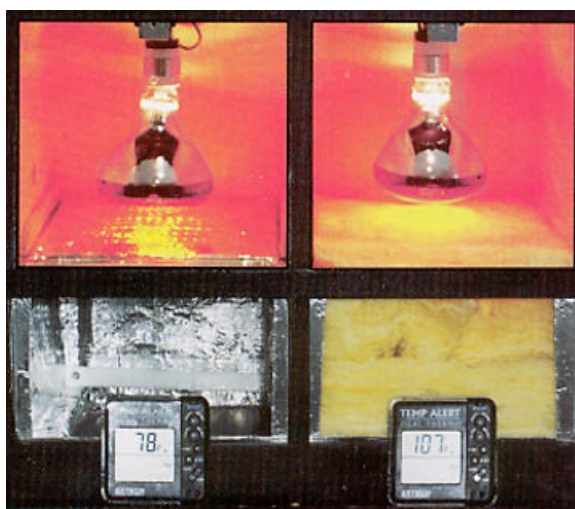
Category: Cladding / Insulation	Country: NZ	Consultant: Bayne	ID: 808
Description: Woolbloc sheep wool insulation is a thermal & acoustic building insulation alternative made from NZ pure virgin or recycled sheep's wool.			
Benefits: Healthy and Environmentally friendly product to improve thermal & acoustic insulation of Timber Frame Construction. As a natural fibre, the wool is able to absorb formaldehyde commonly found in building timber products and has a high fire resistance.			
Limitations: Risk of settling claimed by manufacturer has having been overcome- verification needed			
Building Type: all	Application Point: Wall, roof, floor	Construction Type: all	
Material Types: wool, binder	Innovation Type: product	Development Maturity: mature	
Current Availability: Yes - supplies NZ and export orders direct from the factory			
Experience in Use: Yes - see website			
Experience in Service: Yes - see website			
Example Projects: Milbrook Resort in Queenstown, Ichijo Hall at Tokyo University, Japan			
IP & Commercial Issues: unknown			
Company Contact Details: New Wool Products Ltd PO Box 3158, Richmond, Nelson, New Zealand Phone :+ 64 3 546 4387 Fax: + 64 3 546 4707 Email: lindsay@woolbloc.com		Contact: Lindsay Newton Phone: + 64 3 546 4387 Email: lindsay@woolbloc.com	
Comments: Already available in Australian market			
Include in Assessment: No - existing product in Australian market			
Web Links: http://www.woolbloc.co.nz/			





Formaldehyde reduction rate

Steelbuilding			
Category: Cladding / Insulation		Country: Denmark	Consultant: Svensson
		ID: 809	
Description: Has an insulation product made of aluminium. They call it reflective foil insulation, rFOIL.			
Benefits: rFOIL™ uses various combinations of foil and polyetheylene bubbles in their Single Bubble and Double Bubble series insulation. The aluminium layer reflects 97% of radiating heat waves to keep your building cool in the summer and warm in the winter. Polyethylene bubbles provide the necessary thermal break to eliminate condensation.			
Limitations: widespreed			
Building Type: all	Application Point: roof	Construction Type: new	
Material Types: aluminium/ steel	Innovation Type: product	Development Maturity: mature	
Current Availability:			
Experience in Use: Yes			
Experience in Service: unknown			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: steelbuilding Nejedevej 12, DK-3400 Hillerød Phone :+45 70 27 72 05 Fax: +45 70 27 72 06 Email: info@steelbuilding-danmark.dk		Contact: Phone: US: 1-800 945 6572 Email:	
Comments: Similar products already available in Australia			
Include in Assessment: No as insulation already in common use			
Web Links: http://www.steelbuilding-danmark.dk/isolering.php http://www.steelbuilding.com/buildings/accessories_foil.htm			





Radiant barriers -Innovative Insulations, Inc.

Category: Insulation	Country: USA	Consultant: Kasal	ID: 814
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Description: Radiant barrier insulation systems reflect radiant heat energy. A thin layer of reflective material (such as aluminum) is used for this purpose. The foil is facing an airspace and is installed in the envelope of a building.

Benefits: Reflection of the radiant heat resulting in increased insulation efficiency. See enclosed charts below..

Limitations: Takes care only for radiation heat loss/gain. Only effective with large temperature differential. Will also reflect the radiation in the winter. The surface quality of the reflective layer may change with time (dust deposit) and the reflective properties may change (change in emissivity). The layer acts effectively as moisture barrier (unless resolved) and condensation may occur on the surface at certain conditions.

Building Type: all	Application Point: roof	Construction Type: all
Material Types: metal	Innovation Type: product	Development Maturity: mature

Current Availability: Yes - see the company web site

Experience in Use: limited experience

Experience in Service: none; acts as water vapor barrier

Example Projects:

IP & Commercial Issues: no

Company Contact Details:

Innovative Insulation, Inc.

6200 W. Pioneer Parkway

Arlington, TX 76013

Phone : 1-800-825-0123

Fax: 1-817-446-6222

Email: info@radiantbarrier.com

Contact:

Bill Tomlinson

Phone: 800 825 0123

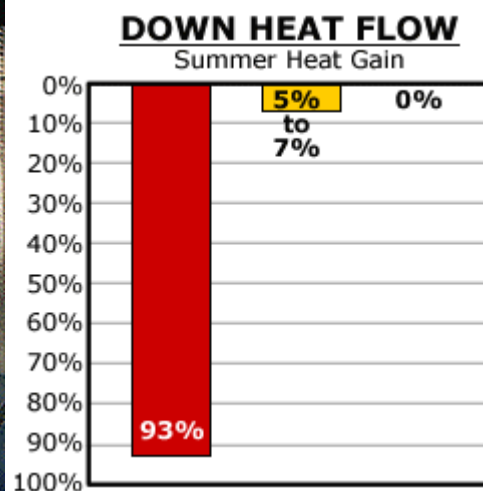
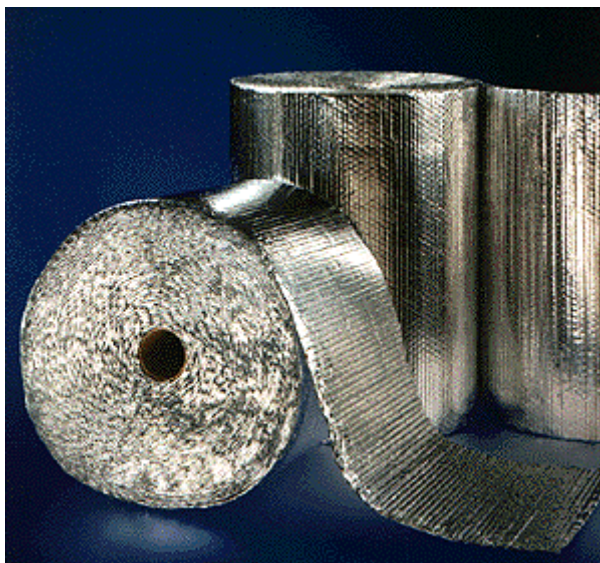
Email: bill@radiantbarrier.com

Comments: These products already in Australia and in use.

Include in Assessment: No

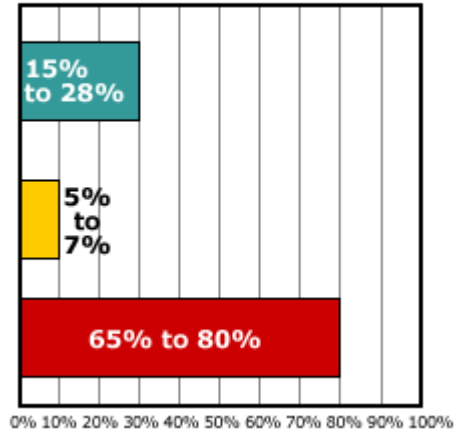
Web Links:

<http://www.radiantbarrier.com/products.htm>



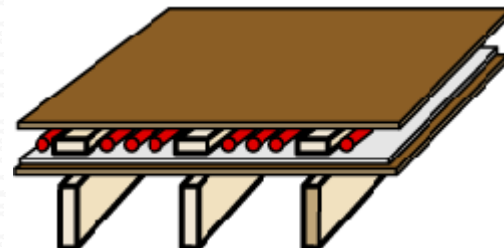
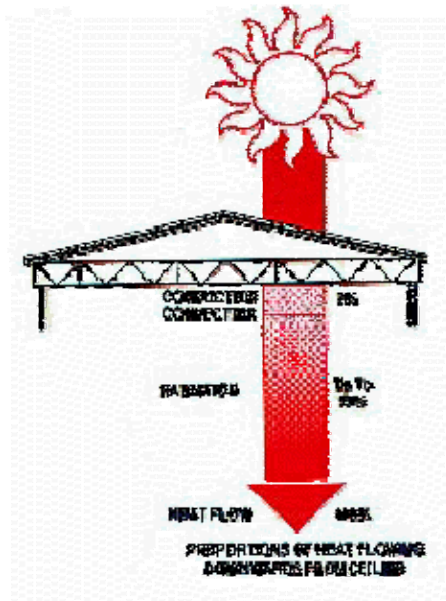
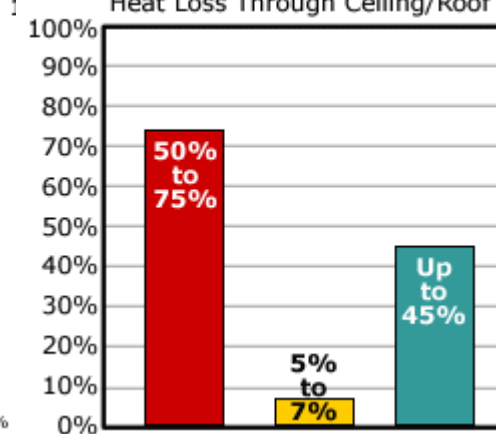
SIDE HEAT FLOW

Heat Loss Through Walls



UP HEAT FLOW

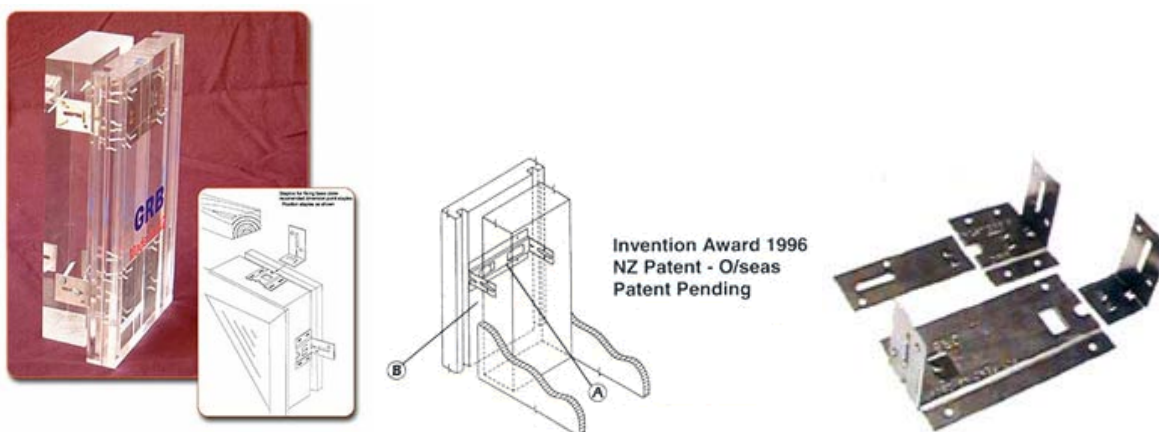
Heat Loss Through Ceiling/Roof



Wintec modern window technology			
Category: Misc	Country: NZ	Consultant: Bayne	ID: 901
Description: A German Turn-tilt window system made from 3-ply laminated radiata pine. More stable product.			
Benefits: Waterproof, air tight, and can withstand hurricane force winds. UV resistant coating			
Limitations:			
Building Type: all	Application Point: window	Construction Type: all	
Material Types: wood, metal	Innovation Type: product	Development Maturity: mature	
Current Availability:			
Experience in Use: unknown			
Experience in Service: unknown			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: Wintec Takou Bay Rd R.D.2 Kerikeri Phone :09 407 4080 Fax: 09 4074081 Email: wintec@ihug.co.nz		Contact: Detlef Kaluza Phone: Email:	
Comments: May already be available in Australia, but full potential may not have been realised. Consider this type of window joinery would have good potential if the advantages of the 'turn/tilt' to capture breezes were recognised as potential energy savings under our building regulations, particularly for warm/hot climate zones.			
Include in Assessment: Yes			
Web Links: http://www.yellow.co.nz/site/wintec/			



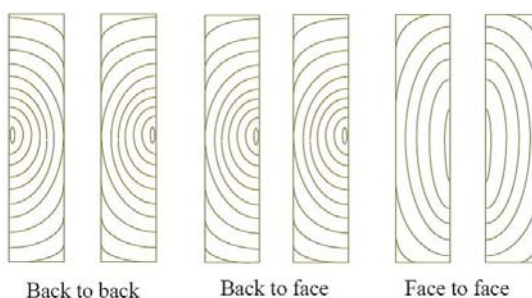
GRB Jamb Tie			
Category: <i>Misc</i>	Country: <i>NZ</i>	Consultant: <i>Bayne</i>	ID: <i>902</i>
Description: A click locking L-plate and base plate that allows easy alignment and fixing of jambs.			
Benefits: Correct allignment and fixing, no damage, no wedging and packing needed, doesn't need face nailing. Easy to plumb and nail. Can allow doors and windows to be held in place without permanent fixing.			
Limitations: Small company- one man band distributor			
Building Type: all	Application Point: door and window jambs	Construction Type: all	
Material Types: metal	Innovation Type: product	Development Maturity: mature	
Current Availability: Yes. Available in NZ from Albany outlet			
Experience in Use: relatively new to market			
Experience in Service: not available			
Example Projects: not available			
IP & Commercial Issues: Yes - There is a New Zealand patent in place, and an Overseas Patent pending			
Company Contact Details: GRB Jamb tie (NZ) Ltd PO Box 300 511 Albany Phone :09 415 7636 Fax: 09 415 7616 Email: grbjambtie@xtra.co.nz		Contact: Gordon Hewlett Phone: 025 730041 Email:	
Comments: Fairly insignificant development			
Include in Assessment: Yes			
Web Links: http://www.yellow.co.nz/site/grbjambtie/ http://www.yellow.co.nz/site/grbjambtie/Products.html			



Greenweld			
Category: Misc	Country: NZ	Consultant: Bayne	ID: 903
Description: Greenweld is a gluing process that can join pieces of sawn timber while still green (ie before drying and planing). The advantage is that the joined product only has to be dried and planed once. Any movement during drying is corrected during planing. Dried and dressed timber previously required a second pass through the planer to correct any imperfections created in the drying process.			
Benefits: Do not need to dry timber before gluing.			
Limitations: not available			
Building Type: all	Application Point: other - pole housing, green lumber processing of timber	Construction Type: new	
Material Types: wood	Innovation Type: process	Development Maturity: developing - Being introduced into US sawmilling operations	
Current Availability: technology licenced to mills			
Experience in Use: probably unknown to them			
Experience in Service: not available			
Example Projects: not available			
IP & Commercial Issues: unknown			
Company Contact Details: Phone : Fax: Email:		Contact: Phone: Email:	
Comments: Potential is obvious, although not completely relevant to the goals of this project. Should be included in study however to flag interest. some Australian companies have already looked at it.			
Include in Assessment: Yes			
Web Links:			



Lay-up options



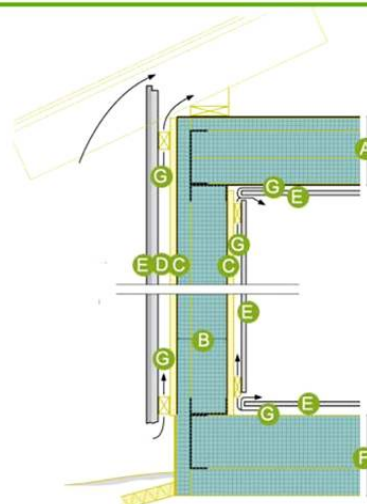
DuroWell				
Category: <i>Misc</i>		Country: <i>Switzerland</i>	Consultant: <i>Scheublin</i>	ID: <i>904</i>
Description: Welding of wood using the Linear Vibration Welding Technology (LVWT), which is widely used in the plastic and car industry, for bonding of wood with both thermoplastic and duroplastic adhesives.				
Benefits: DuroWell is able to produce high quality multi-layer parquet with a manufacturing cost reduction of 12% (note from COST E24 Symposium - Florence - 2004)				
Limitations: Up to now only application in the parquet industry (snowboards etc see WCTE 2006?)				
Building Type: all		Application Point: elements		Construction Type: all
Material Types: wood		Innovation Type: process		Development Maturity: developing
Current Availability: - no - Information from University of applied sciences, Bern.				
Experience in Use: The acceptance of the process for use in housing is not yet proven.				
Experience in Service: unknown Experiences in practice is limited. See ID ??? Paevere				
Example Projects: parquet				
IP & Commercial Issues: unknown				
Company Contact Details: Phone : Fax: Email:			Contact: Milena properzi Phone: Email: milena.properzi@hsb.bfh.ch	
Comments: Commercial application of the developing generic ‘wood welding technology’				
Include in Assessment: Yes				
Web Links: Proceedings of the COST E29 Symposium - Florence - 2004, pages 151 - 157.				

Koljern			
Category: Misc	Country: Sweeden	Consultant: Svensson	ID: 905
Description: The company has developed a new type of insulation product called foamglass that is used in building on the ground of house. FOAMGLASS is made of pure glass, and is therefore resistant to solvents, acids, petrol, diesel and oils etc.			
Benefits: Water proof, moist proof. Non organic. Life time lasting. Non combustible, produces no poisonous gases. Can be formed as desired.			
Limitations:			
Building Type: residential	Application Point: wall, floor, roof beams	Construction Type: new	
Material Types: glass	Innovation Type: Product	Development Maturity: mature	
Current Availability: available in sweden			
Experience in Use: unknown			
Experience in Service: unknown			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: MRD salj och bygg AB Juniskarvagen 190, 86291 Kvissleby Phone :+4660–51 30 65 Fax: +4660–56 14 10 Email: mrdab@telia.com		Contact: Phone: Email:	
Comments: A novel idea in the sense that it is a 'pre-manufactured' foundation system with high insulation properties, although would appear to be expensive compared to existing systems.			
Include in Assessment: Yes			
Web Links: www.koljern.se			

THE CONCEPT

Koljern Climatic Barrier

- **A** – Climatic barrier
- **B** – Climatic barrier
- **C** – Distance
- **D** – Nailing batten
- **E** – Cladding
- **F** – Basement slab
- **G** – Airing

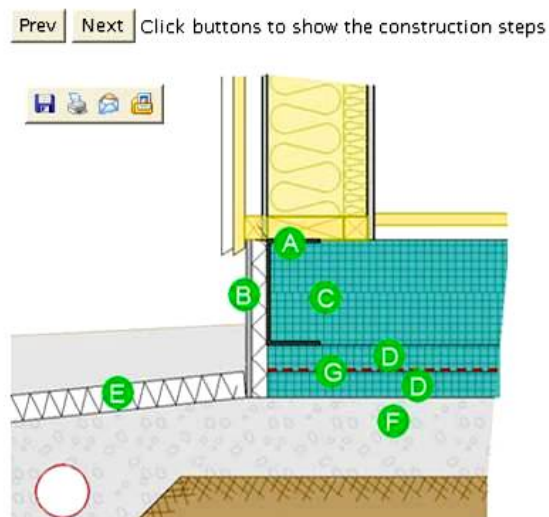


BASEMENT SLAB

A warm and moistproof basement slab with no drying time

- **A** – U-profile thin plate
- **B** – Cladding
- **C** – 2x100 Foamglass
- **D** – One layer Foamglass
- **E** – Insulation from earth
- **F** – Gravel
- **G** – Aluminiumsheet

[See technical data](#)



INROOM VENTILATED SUSPENDED FOUNDATION

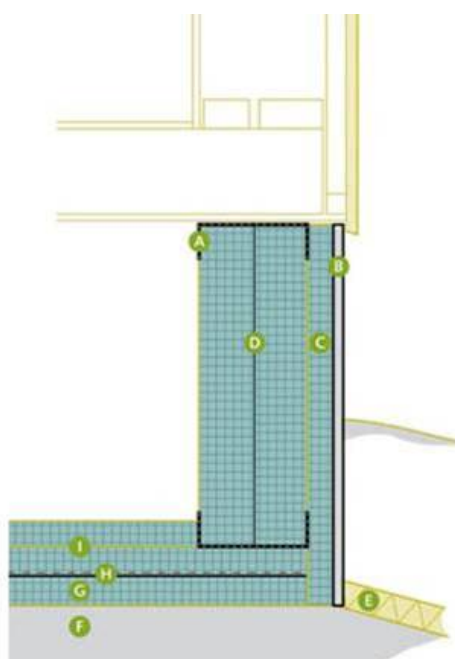
A moist proof ground

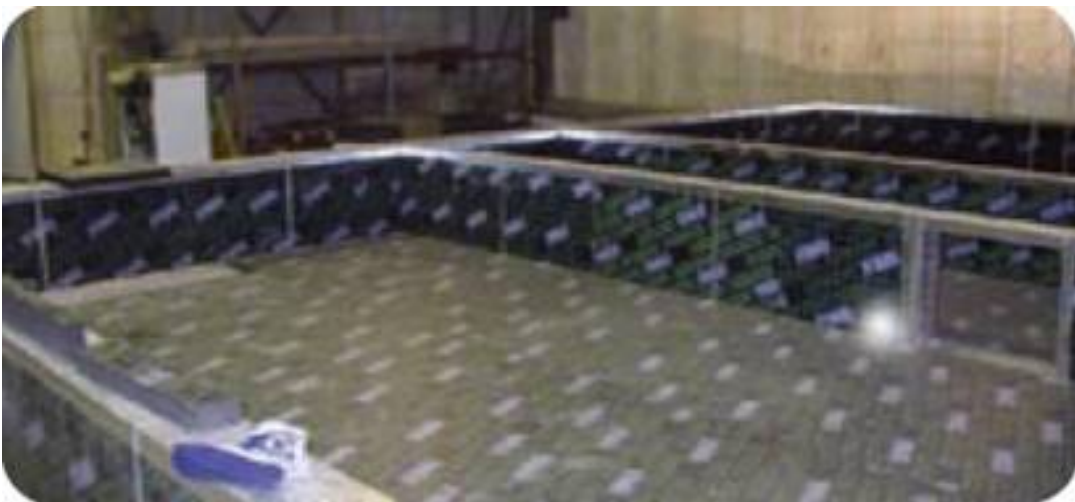
Koljern suspended foundation

- **A** – U-section sheet metal
- **B** – Panelling
- **C** – Foamglass
- **D** – 2x100 Foamglass
- **E** – groundinsulation
- **F** – Gravel
- **G** – Foamglass
- **H** – Aluminiumplate
- **I** – Two layer Foamglass

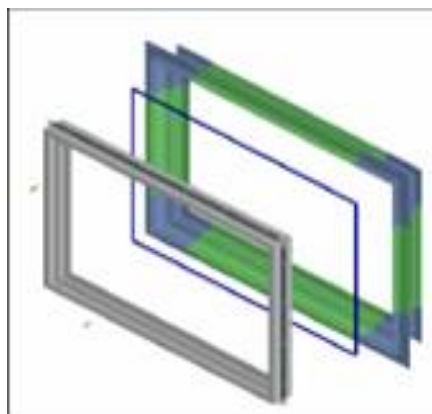
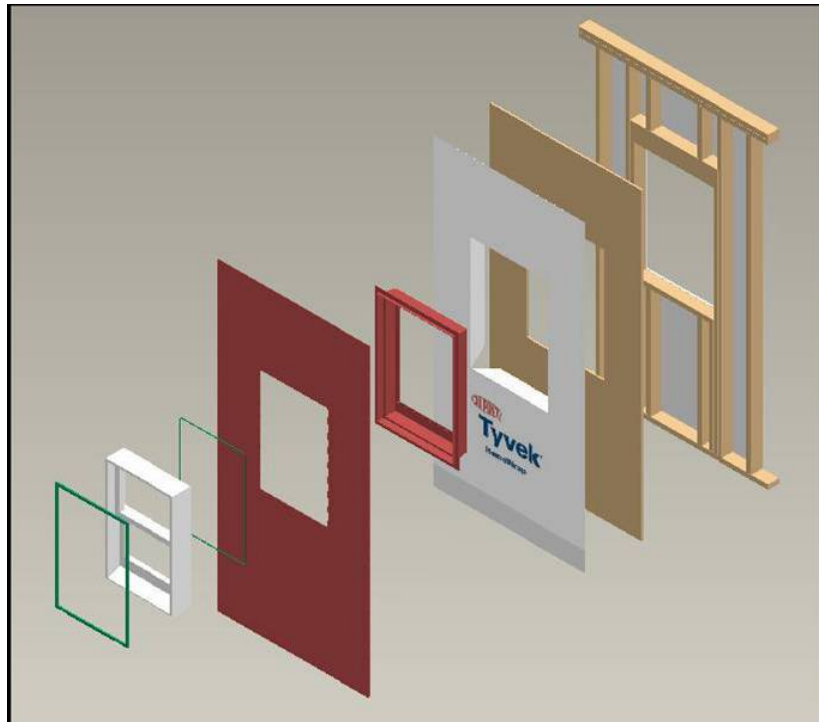
[Se technical data](#)

Click on the picture for further picture

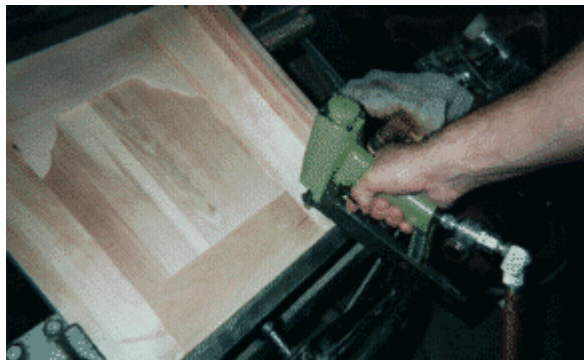


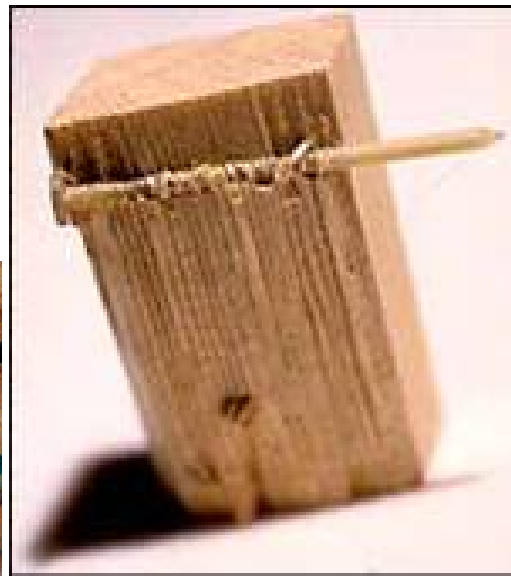


MIFS Window socket flashing system			
Category: Misc	Country: USA	Consultant: Paevere	ID: 906
Description: Modular Insert Fenestration System (MIFS)consists of two key parts: <ul style="list-style-type: none">• A 'receptacle', which is a rigid or semi-rigid frame that is sealed to a rough opening of a building structure, to create a moisture-proof part of the building envelope , and• A 'fenestration product', such as a window, door, or any other object to be inserted into a building structure, which is designed to connect to the receptacle, yet providing for easy installation and removal of the fenestration product			
Benefits: Isolates the window from the wall.– Protects the wall from window leakage.Other purported advantages are that it will assist with thermal, acoustical, and hygrothermal performance because of the isolation of the fenestration from the wall. It is also said to improve installation by virtue of simplification and standardisation of the process.			
Limitations:			
Building Type: residential	Application Point: windows	Construction Type: new	
Material Types: wood	Innovation Type: product	Development Maturity: developing / mature	
Current Availability: made for american market			
Experience in Use: unknown			
Experience in Service: unknown			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: National Building Science Corp. 32244 Corte Chatada Temecula, CA 92592-6320 Phone : 1 (951) 699-0116 Fax: 1 (951) 699-0876 Email: info@section08.com		Contact: barry G Hardman Phone: Email: barrygh@section08.com	
Comments: an Innovative idea/product. It addresses a number of issues associated with openings. Cost may be an issue. In bushfire prone areas fire may be an issue if plastic. May have advantages for single skin masonry walls.			
Include in Assessment: Yes			
Web Links: http://www.section08.com/ http://www.section08.com/aboutus.htm			



Plastic Composite Nails			
Category: <i>Misc</i>	Country: <i>USA</i>	Consultant: <i>Paevere</i>	ID: <i>907</i>
Description: Plastic composite nails that can be substituted for traditional metal nails for non-structural uses. They are made from an ultra high-strength plastic composite that does not corrode, rust, or stain wood surfaces when exposed to the weather or harsh environments. The polymer products are ideal for softwood, most plastic, and some aluminum and hardwood applications.			
Benefits: the fasteners have greater withdrawal resistance than metal nails and are compatible with some existing pneumatic fastening tools. Plastic nails do not need to be removed when cutting or shaping wood because they will not damage the cutting tool. Their resistance to corrosion makes them useful for cedar, redwood, and other wood exterior finishes where stainless or copper nails are specified.			
Limitations: The manufacturer clearly states that these nails are not meant for structural use. Shear strength is only about half that of an equivalent metal nail. The fasteners can only be used with certain pneumatic nailing tools, and require users to carefully follow tool operation directions.			
Building Type: all	Application Point: wall, floor, roof	Construction Type: new, renovation etc	
Material Types: plastic	Innovation Type: product	Development Maturity: mature	
Current Availability: available but do not meet any building code requirements			
Experience in Use: unknown			
Experience in Service: unknown			
Example Projects:			
IP & Commercial Issues: unknown			
Company Contact Details: Utility Composites, Inc 2704 A Meister Place Round Rock, TX 78664 Phone : 1 800 460 6933 Fax: 1 512 255 8709 Email: info@raptornails.com		Contact: Phone: Email:	
Comments: A specialist product for very specific applications, that are not structurally demanding.			
Include in Assessment: Yes			
Web Links: http://www.raptornails.com/raptornails.html			

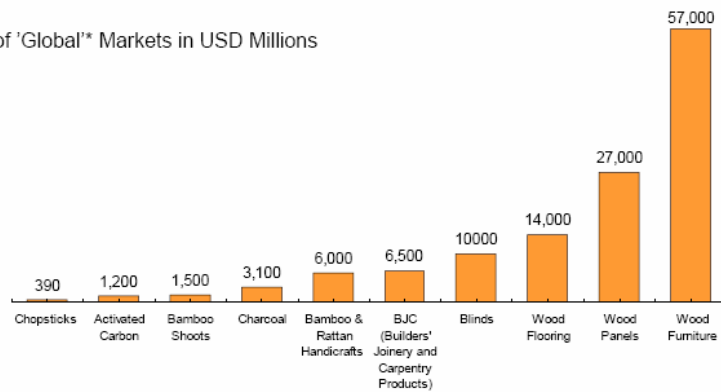




Bamboo Construction Products			
Category: Misc	Country: China	Consultant: Paevere	ID: 908
Description: Bamboo is the fastest growing plant. It produces greater biomass and 30% more oxygen than a hardwood forest on the same area, while improving watersheds, preventing erosion, restoring soil, providing sweet edible shoots and removing toxins from contaminated soil. Bamboo can be used to produce plywood, particleboard, joinery and carpentry products, laminated structural beams, flooring, fencing and many more sustainable by-products. Bamboo is very strong and can be made durable using various treatment options. It can also be used in a relatively unprocessed form (culms) as structural elements in housing and other applications such as scaffolding. A recent study by Oxfam Hong Kong and the Mekong Private Sector Development Facility has examined the potential global market for bamboo and estimates that there could be up to US\$50 billion global industry in flooring, panels and builders joinery and carpentry products.			
Benefits: Bamboo is quick-growing, high, straight, very strong, and evergreen. True triple-bottom line benefits can be achieved as products are environmentally friendly, and raw materials are sourced from some of the poorest regions of the world. Established markets exist for 'waste' from the production of bamboo-based construction products (e.g. handicrafts, furniture).			
Limitations: Durability for exposed applications can be an issue unless proper treatments applied			
Building Type: residential	Application Point: whole house	Construction Type: new	
Material Types: bamboo	Innovation Type: product / process	Development Maturity: emerging	
Current Availability: Chinese market is quite established for a range of construction products, elsewhere, flooring is the main market			
Experience in Use: Yes, partly			
Experience in Service: unknown			
Example Projects: http://www.bambooliving.com/homes.html			
IP & Commercial Issues: unknown			
Company Contact Details: bamboo technologies (among others) 120 Hana Highway #9, Suite 133, Paia HI 96779 USA Phone : 1-808.572.1007 Fax: 1-808.573.4855 Email: bamboo@bambootechnologies.com		Contact: more contacts visit the webpages listed Phone: Email:	
Comments: Possible replacement for some wood-based construction products such as panels, beams, mouldings and flooring. This could become a threat to wood if Chinese Bamboo industry continues to expand and price drops significantly. May also be niche markets for use of the raw culms in Eco-friendly developments, tourism etc. May need treatment as lyctine susceptible.			
Include in Assessment: Yes			
Web Links: http://www.bambooliving.com/ www.inbar.int http://www.linanwindow.com/craft/house.htm			

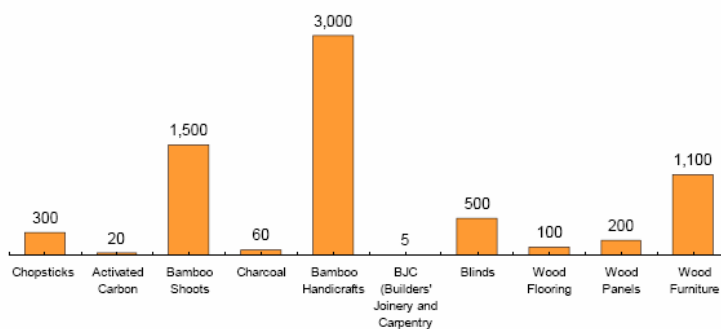
Summary - Total Value of Related Markets

Size of 'Global'* Markets in USD Millions



*: 'Global' Market refers to the overall product market in which the particular bamboo product competes and has the potential to be a substitute for alternative products in that market.

Estimated Size of Current Bamboo Markets in USD Millions



It takes an acre of trees to build the average



American home

Or, the size of the house itself

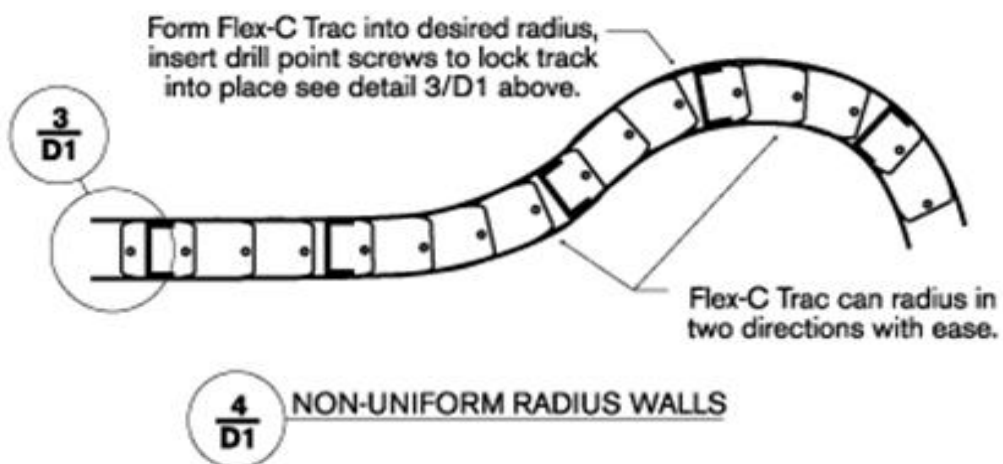
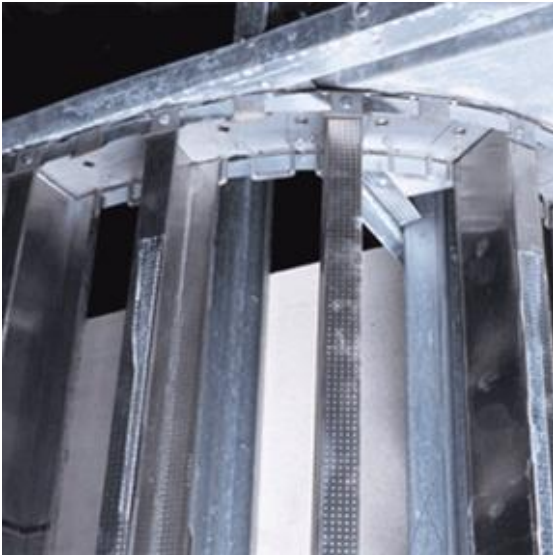

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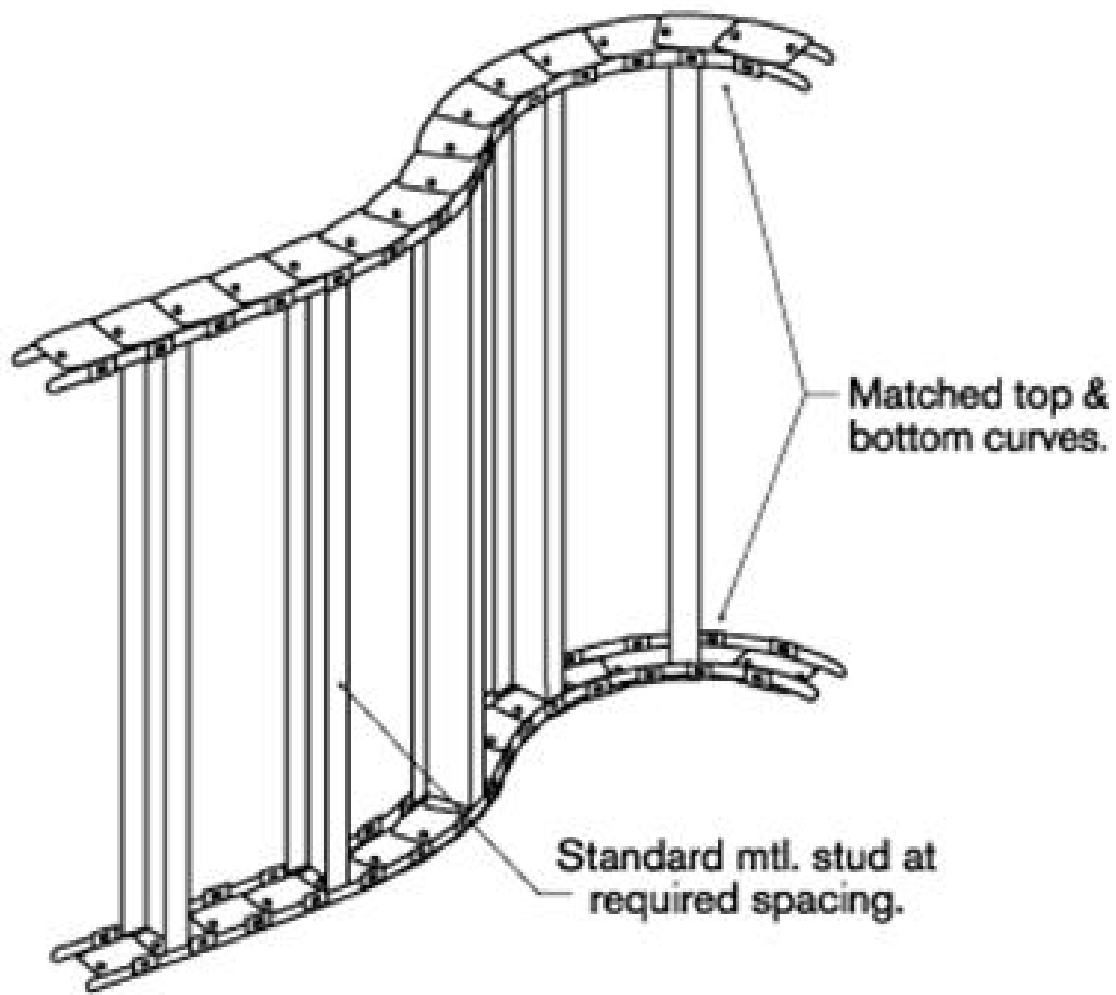

built in bamboo
because bamboo grows so fast and so dense



Flexible Framing Track			
Category: <i>Misc</i>	Country: <i>USA</i>	Consultant: <i>Paevere</i>	ID: <i>909</i>
Description: A new system called Flex-C Trac uses metal channel with vertebra-like sections that are easily shaped into a variety of curves or undulating patterns, providing a fast and simple technique for framers to design walls in virtually any configuration. Product is manufactured from 25-gauge G-40 galvanized sheet metal and is available in 3 5/8 in. x 10 ft long pieces. Each piece includes 20 pivotal sections that achieve 15 in. radius. Flex Lite can be formed by hand and secured by self-tapping or sharp point screws. Pre-punched holes in flanges and web plate facilitate installation.			
Benefits: Ease with which curved walls, arched ceilings, soffits, and other features can be created. The vertebrae-like flexion makes it simple to form perfect curves that lock into position with self-tapping screws. Flex- C track eliminates the need for carpenters to custom-fabricate complex forms to frame curved architectural elements which, in turn, can lower the cost of creating such features, especially in urban markets where labor costs are relatively high.			
Limitations: Cost. This system will be mainly used for high-end custom homes or commercial applications.			
Building Type: all	Application Point: walls- internal/external, ceiling/roof	Construction Type: new	
Material Types: steel, wood	Innovation Type: product	Development Maturity: mature	
Current Availability: available in Australia			
Experience in Use: Yes			
Experience in Service: unknown			
Example Projects: videos available at http://www.flexc.com/			
IP & Commercial Issues: Yes - Australian Patent #760162			
Company Contact Details: Flex-Ability Concepts Australian supplier: ProPlaster 29 Tradelink Browns Plains, QLD 4118 Phone :1800 652 267 Fax: 3390 3281 Email: info@proplaster.com.au		Contact: Phone: 1 405 996-5343 Email:	
Comments: Great idea that addresses a specific design issue. Similar (same) system reported to be already available in Australia as indicated by the patent No.			
Include in Assessment: Yes			
Web Links: http://www.flexc.com			







WALL OR SOFFIT ISOMETRIC

SödraSmart				
Category: <i>Misc</i>		Country: <i>Sweden</i>	Consultant: <i>Ascheim</i>	ID: <i>910</i>
Description: SödraSmart is a prefab stud for frame work structures for interior (not load-bearing) walls. The stud is made of 3 lamellas glued together which makes a dimensionally stable member. The end of the stud has a special design which purpose is to assemble it to the roof without nails or screws (turned into right position by a simple grip). The contact face towards the wall panel is designed as a flange which gives solid fastening. This property in conjunction with dimensional stability gives a very plane wall surface which is easy to process, e.g. paint, paper etc. The studs are prefabricated with holes and/or notches in the middle lamella. The purpose of these holes/notces is to simplify the running of services etc. SödraSmart is produced as 45 mm x 70 mm and 45 mm x 95 mm, both with a length of 2,5 m or 2,7 m. Combined with 2 layers of gypsum boards on each side and 70 mm mineral wool between, the final wall will meet R'W = 40 dB and a fire classification of EI 60. The corresponding values of a wall structure with just one gypsum board on each side and no mineral wool are 30 dB and EI 15.				
Benefits: SödraSmart is as dimensionally stable as competing steel studs, and correspondingly simple to install. The final interior walls will have good properties regarding fire safety and sound insulation.				
Limitations: SödraSmart is not a load-bearing element, and so not fit for structural walls.				
Building Type: All		Application Point: Wall - interior, not loead-bearing		Construction Type: All
Material Types: wood		Innovation Type: product		Development Maturity: Mature
Current Availability:				
Experience in Use: unknown				
Experience in Service: unknown				
Example Projects:				
IP & Commercial Issues: unknown				
Company Contact Details: Södra Timber AB Skogudden, SE-351 89 Växjö Sweden Phone : +46 470 890 00 Fax: +46 470 892 19 Email: building-systems@sodra.com			Contact: Peter Norrman Phone: Email:	
Comments: This system fits with the current industry desire to try and develop non-loadbearing systems for non-residential high rise buildings and would be worth further investigation in this light. Apparent ability to adjust for variations in floor/ceiling height variations seems a plus.				
Include in Assessment: Yes				
Web Links: http://www.wood-web.info/ http://www.sodra.com/ http://www.trainformation.se/pdfnews/2				



ggare.

Träbyggnadskonst på hög nivå

och funktion med ergonomi och parande krav. Trä är ett naturligt material som ger en känsla av att arbeta trygghetfullt.

uppfattas ofta som varma i en sådan enkel sak som i första en tavellåda eller regel ökar begåden.

Kortling

äggsystem gar i färdiga i kan också användas för infästning.

Tar

en även riktning i regeln.

En rak träregel



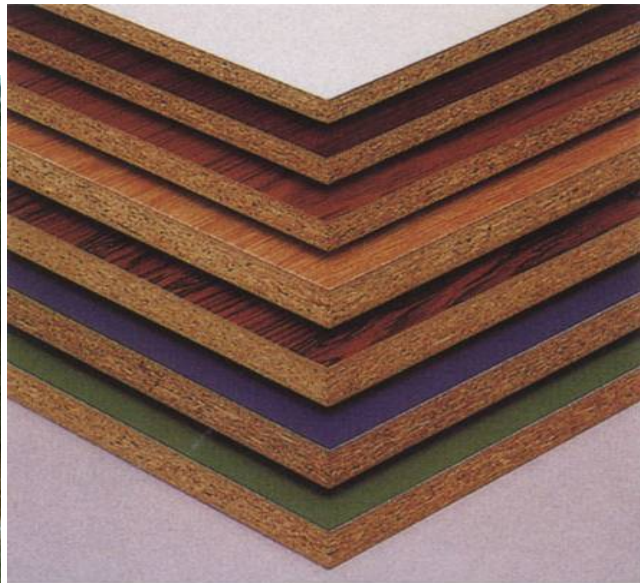
Boligprodusentenes Forening			
Category: Misc	Country: Norway	Consultant: Ascheim	ID: 911
Description: Boligprodusentenes Forening (i.e. The Norwegian Homebuilder Association) is an association of producers with direct connection to the housebuilding industry. It is about 75 members (producers) of the association. The Homebuilder Association do not have any product or production themselves, but will be a very good contact regarding what ever happens in Norway in the house and light-framed timber house construction marked. The Homebuilder Association do also work on the international area e.g. the "buildingSMART" project. The "buildingSMART"-project work through the IAI (International Alliance for Interoperability) regarding the IFC standard.			
Benefits: The benefits with the Homebuilder Association is an unsurpassable national and Nordic contact since they represent the whole Norwegian house and homebuilder industry. The members of Homebuilders Association represent more than 50 % of all new residences in Norway. Inclusive in the membership are master carpenters, precut systems, prefabricated element systems, architects, consulting firms etc.. The ambition of the Homebuilders Association is to be the leading trade organisation of the quality conscious Norwegian house suppliers. I.e. the Homebuilder Association shall act as a representative and guarantor of quality and safety for both customers and employees by the means of quality conscious and profitable membership.			
Limitations: The limitations of the Homebuilder Association are that they do not produce any thing, but is a kind of business and valuable contact system. Their members do not (by now) have any big export, but on the other hand they control a big amount of experience and both theoretical and practical knowledge.			
Building Type: (indirect) All	Application Point: (indirect) whole house	Construction Type: (indirect) All	
Material Types: combination	Innovation Type: product / process / business system	Development Maturity: (All, but mainly) mature	
Current Availability: Yes (see http://www.boligprodusentene.no/medlemmer/)			
Experience in Use: Years of positive experience			
Experience in Service: Years of positive experience			
Example Projects: Several potential project (please go through the contact name)			
IP & Commercial Issues: Yes - depend on the project/producer, mainly none sensitive IP.			
Company Contact Details: Boligprodusentenes Forening P.o. box 7186 Majorstua, NO-0307 Oslo Phone : (+47) 23 08 75 00 Fax: (+47) 23 08 76 01 Email: post@boligprodusentene.no		Contact: Jøns Sjøgren Phone: Email: jons.sjogren@boligprodusentene.no	
Comments: Not really a technology or product.			
Include in Assessment: No - is an association not a product or technology			
Web Links: http://www.boligprodusentene.no/			

Block Watne AS			
Category: <i>Misc</i>	Country: <i>Norway</i>	Consultant: <i>Ascheim</i>	ID: <i>912</i>
Description: Block Watne AS is one of the largest Norwegian producers of detached and semi-detached houses, row houses, terraced apartments and multistorey buildings (block of flats). Very much of their houses are builded as light timber framed constructions, mainly based on pre-cut and traditional site work (not prefab elements). The Block Watne group has built more than 80.000 homes, and annually completes more than 1000 new houses whereof 30 % is detached houses. Block Watne AS has more than 20 district offices from where the different projects are organized and administrated. The house models are designed by architects.			
Benefits: Block Watne AS has experience from many years. The building system is based on well established technical details and design regarding outdoor climate (wind, rain, snow loads detc.) and indoor environment. The different house models are flexible and can adjusted to personal variations/wishes.			
Limitations: Block Watne AS do not have any department in Australia. However they can contribute with very much know-how and experience regarding timber houses and projecting/designing/building timber houses.			
Building Type: All	Application Point: Whole house	Construction Type: New	
Material Types: wood	Innovation Type: product / process	Development Maturity: mature	
Current Availability: Yes - refer contact details below			
Experience in Use: Yes - refer contact details below			
Experience in Service: Yes - refer contact details below			
Example Projects: Yes - refer contact details below			
IP & Commercial Issues: unknown			
Company Contact Details: Block Watne AS PO Box 1817 Vika, 0123 Oslo, Norway Phone : +47 23 24 60 00 Fax: +47 23 24 60 01 Email: post@blockwatne.no		Contact: Sverre Kirkevold Phone: Email: sverre.kirkevold@blockwatne.no	
Comments: Not a product or technology			
Include in Assessment: No -just builder of houses			
Web Links: http://www.blockwatne.no/page_omBlockWatne.asp?langid=538&side2=omblockwatne			

Origin retaining wall profile			
Category: <i>Misc</i>	Country: <i>NZ</i>	Consultant: <i>Bayne</i>	ID: <i>913</i>
Description: A profiled interlocking plank for easily constructing landscaping retaining walls.			
Benefits: easy to install and make a retaining wall with this system			
Limitations:			
Building Type: all	Application Point: other	Construction Type: all	
Material Types: wood	Innovation Type: product	Development Maturity: mature	
Current Availability: Yes - Placemakers			
Experience in Use: accepted			
Experience in Service: not available			
Example Projects: not available			
IP & Commercial Issues: unknown			
Company Contact Details: Origin CHH Woodproducts Private Bag 92 106 Auckland 1020 New Zealand Phone : Fax: Email:		Contact: Phone: Email:	
Comments: Not applicable to house construction			
Include in Assessment: No - not applicable to study			
Web Links: http://www.origin.co.nz/products/originoutdoor/Outdoor+Landscaping.htm			

Recycle Wood Chip Spraying - Civil Engineering Technology

Category: Misc		Country: Japan	Consultant: Ota	ID: 914
Description: This is a new civil engineering technology (construction technology) to spray recycled wood chip on paths in parks, for slope erosion control etc. This chip is made from recycled timber and waste from forestry thinnings etc as a material, and the technology making this materials from recycling materials is also innovative technology.				
Benefits: The essential advantages of this engineering technology are; 1) to use waste timber from forestry thinnings, 2) to use waste timber from building sites, 3) to use natural materials instead of mortar. 4) high water penetration 5) Eco friendly 6) suppressing weed growth				
Limitations: less durability than mortar based sprays / unable to use in areas which has earth pressure - e.g. landslip areas				
Building Type: not available	Application Point: path in a park / slope of a mountain(hill) / surface of cut earth		Construction Type: all	
Material Types: wood	Innovation Type: product		Development Maturity: almost mature but still developing	
Current Availability: Yes - refer to the contact details below				
Experience in Use: accept - they are happy to use this.				
Experience in Service: not available				
Example Projects: path in forest - 271m2 - address: Ouchi-cho Karatsu-shi Saga, Japan				
IP & Commercial Issues: Yes - this company is applying to get its patent at the moment. Must get the permission from this company before opening all information in this sheet & others to the public.				
Company Contact Details: Shinwa Techno Co., Ltd 1856-1 Oaza Tokuman Kubota-cho Saga-gun Saga, Japan 849-0201 Phone :81-952-68-5062 Fax: 81-952-68-5075 Email: kazuya-kuroda@shinwa-techno.jp syuhei-mochida@shinwa-techno.jp		Contact: Kazuya Kuroda / Syuhei Mochida Phone: 81-952-68-5062 Email: kazuya-kuroda@shinwa-techno.jp syuhei-mochida@shinwa-techno.jp		
Comments: No information is available on what the binder, if any, is. May also be susceptible to termite damage, but this may not necessarily be a negative thing. May also be susceptible to fire damage. Any uses that provide a means to profit add to utilize waste timber products is worth pursuing.				
Include in Assessment: Yes				
Web Links:				



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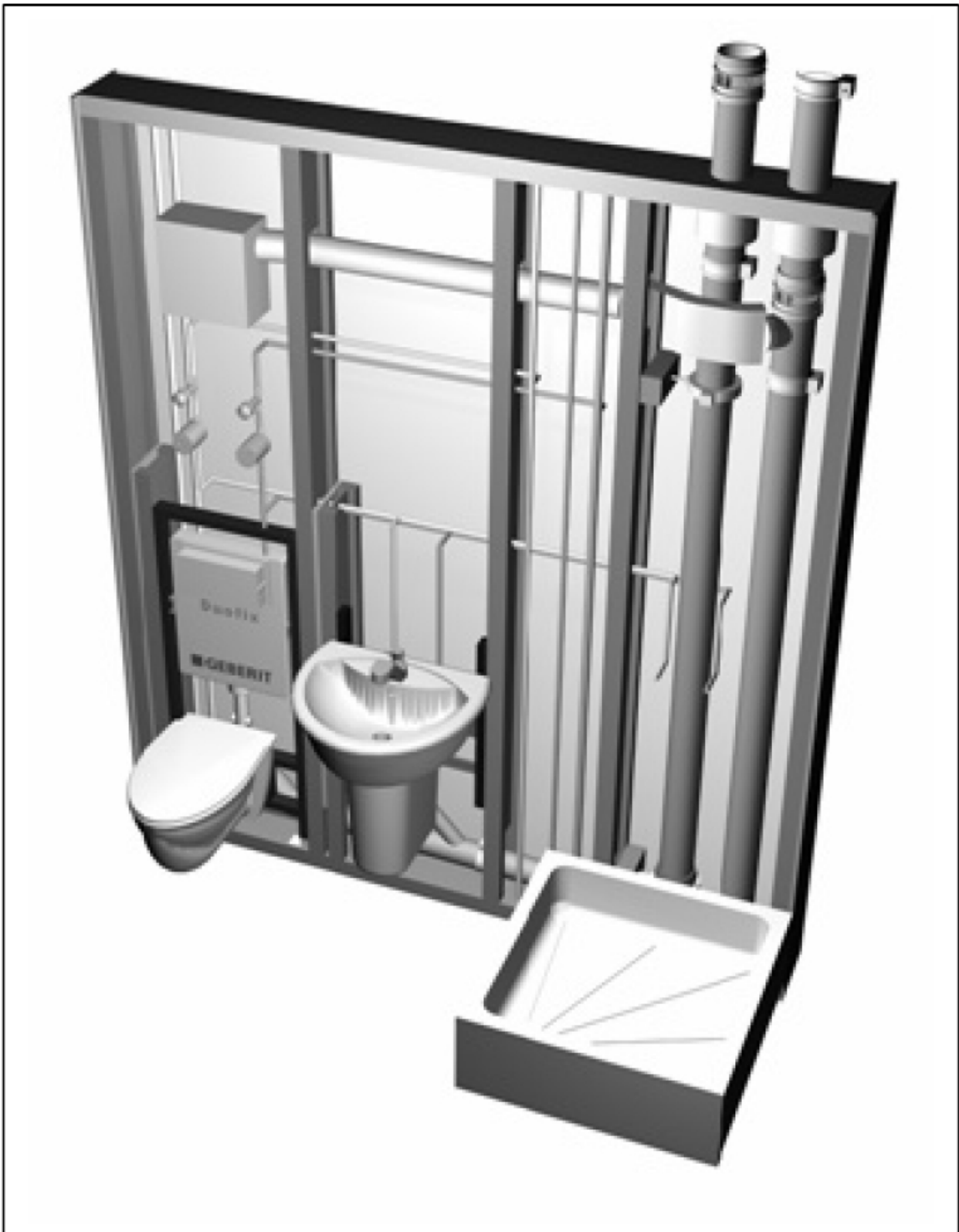


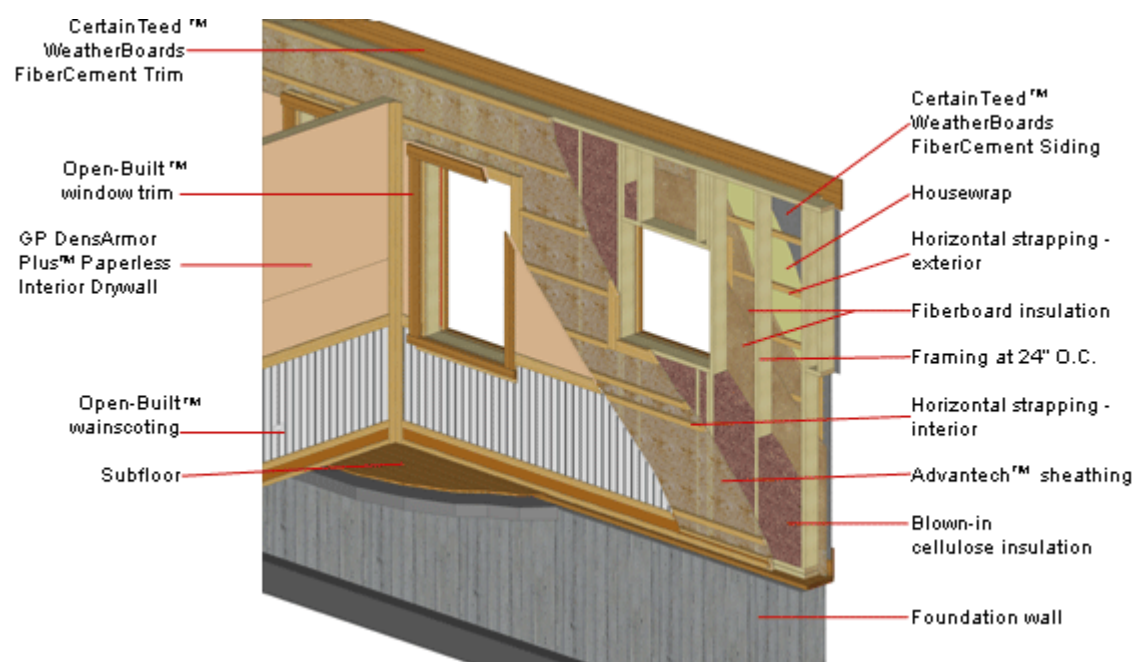
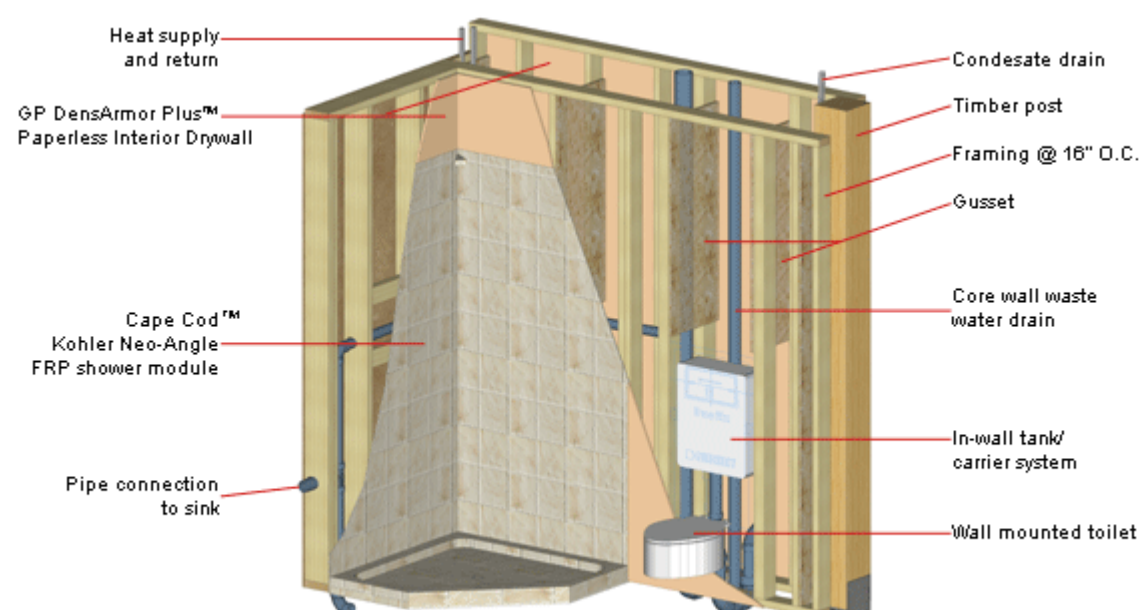
Open Prototype Initiative			
Category: <i>Research Project</i>	Country: <i>USA</i>	Consultant: <i>Paevere</i>	ID: <i>1001</i>
<p>Description: The Open Prototype Initiative is not a technology as such, but is a collaboration between the Massachusetts Institute of Technology House Research Consortium, Bensonwood Homes and other construction industry members to develop a series of four prototype homes, deploying advanced designs, materials, systems, and fabrication strategies, with a goal of showing how high-quality, sophisticated, and personalized homes can be built more cost-effectively and in less time. Many of the technologies used in this project may be applicable to this study as the houses are light frame timber construction.</p> <p>Overarching goals for the OPEN Prototype Initiative</p> <ul style="list-style-type: none">* To develop a better design and building process* To make high quality custom design more affordable* To create a new paradigm for managing the home construction process* To increase the predictability of cost, time and quality for the owner* To increase efficiency and control for builder* To reduce the amount of waste generated in the construction process* To create homes that are readily adaptable to changing needs over time* To develop energy-efficient systems and components using sustainably-produced materials* To provide a forum in which the construction industry can share in and improve upon these innovations <p>A varied collection of components will be developed that can be efficiently prefabricated and assembled to form unique structures . The structure will consist of distinct, disentangled and accessible layers that allow for both efficient assembly and for change over time . “Green” and energy-efficient strategies will be incorporated into the systems and components . Many of the systems will be prebuilt, including the floor, wall, and roof systems, and the mechanical core wall . Finishes on walls and ceilings will be demountable to allow for easy access to plumbing, heating, and wiring . A flexible interior partition wall system will be developed to allow the floor plan to be reconfigured with minimal disruption. The home will be designed for accessibility, and will function for occupants with a wide range of physical and cognitive abilities. The home will be built virtually in 3-D, to allow for issues to be addressed before any materials are cut or assembled . The building shell, with exterior finish, will be assembled in five working days. Mechanical, electrical, and plumbing systems will be installed in three working days . Interior fit-out will be completed in five working days . Interior finishes will be completed in five working days. A system of controls and sensors will allow for the performance of the building to be adjusted, monitored, and analyzed</p>			
<p>Benefits: If the project goals are realised then the main benefit will be the demonstration of the possibilities of significant improvements in light-frame construction systems across a range of areas including, cost, time, quality, sustainability, flexibility, reuse etc.</p>			
<p>Limitations: The project is only a demonstration of prototype technologies, systems and processes</p>			
Building Type: Detached Residential	Application Point: Whole house	Construction Type: New	
Material Types: wood	Innovation Type: product / process / business system	Development Maturity: emerging	
Current Availability: No			
Experience in Use: No			
Experience in Service: No			
Example Projects: Yes - refer to website for details			
IP & Commercial Issues: Not a commercial product			
Company Contact Details: The Open Prototype Initiative		Contact: Refer to website Email:	
<p>Comments: A very promising and ambitious initiative with the potential to drive uptake of new technologies, especially in the US. This project is aiming to explore prototype solutions to the long-term and ‘big-picture’ issues in construction. It addresses many of the issues raised in the Literature review. Website is well worth a look</p>			
Include in Assessment: Yes			
<p>Web Links: www.openprototype.com</p>			

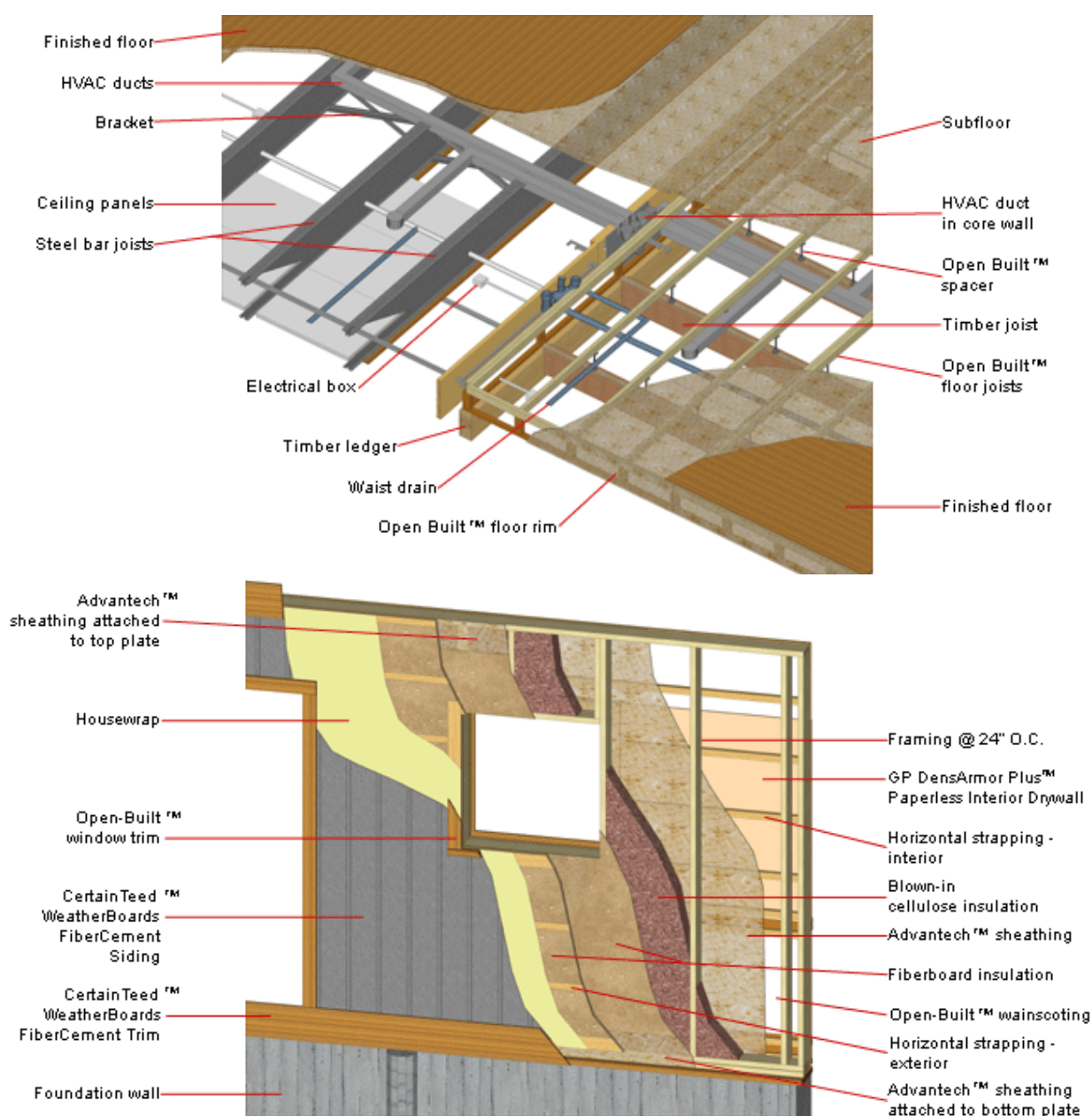


3D Image of Open_1

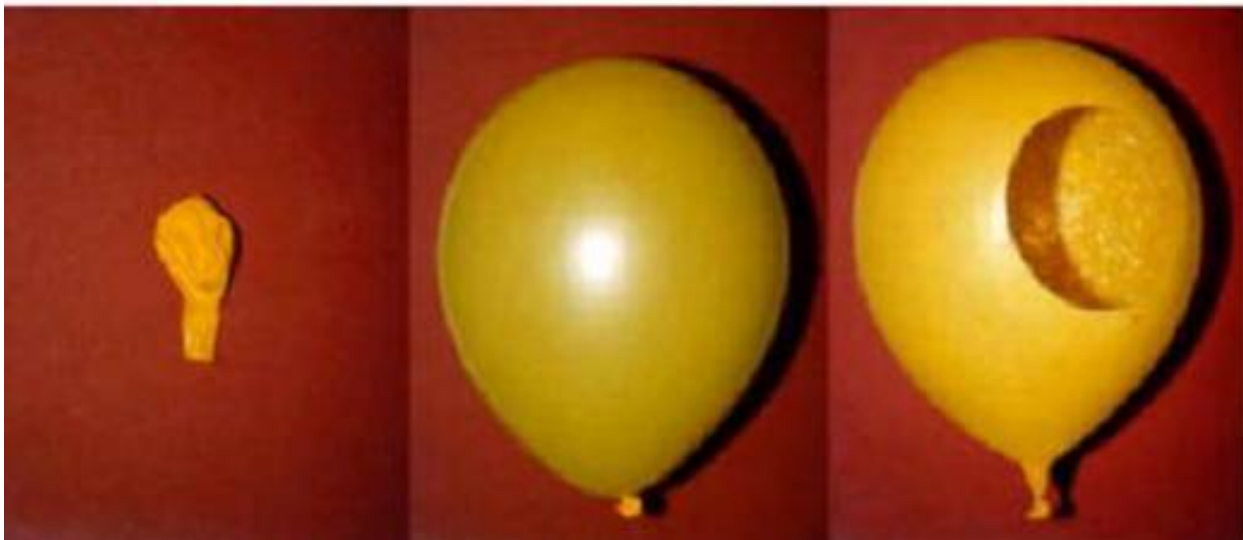


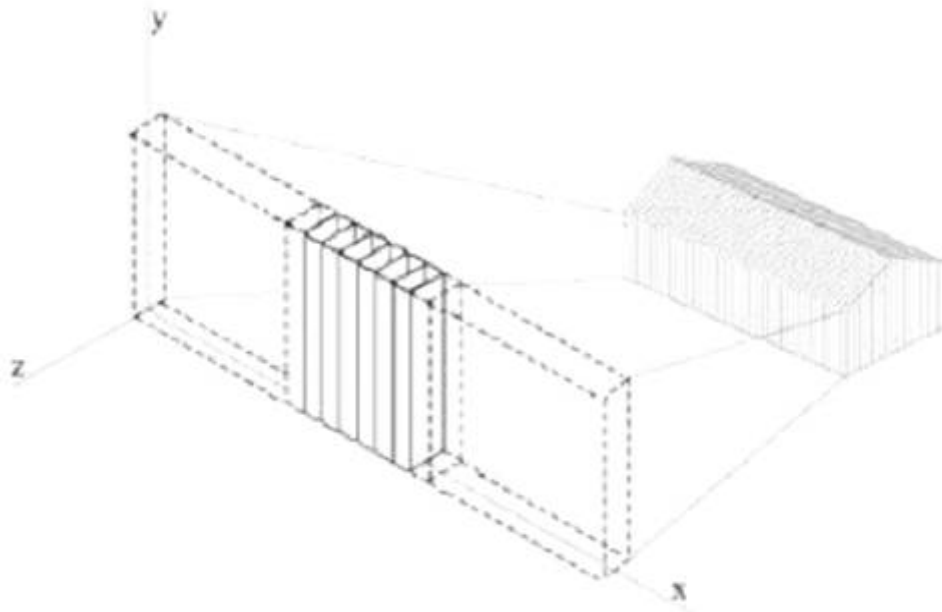




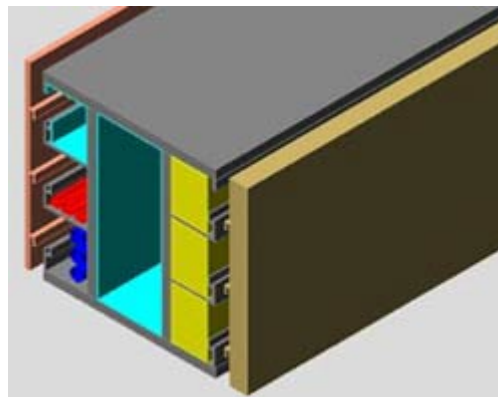
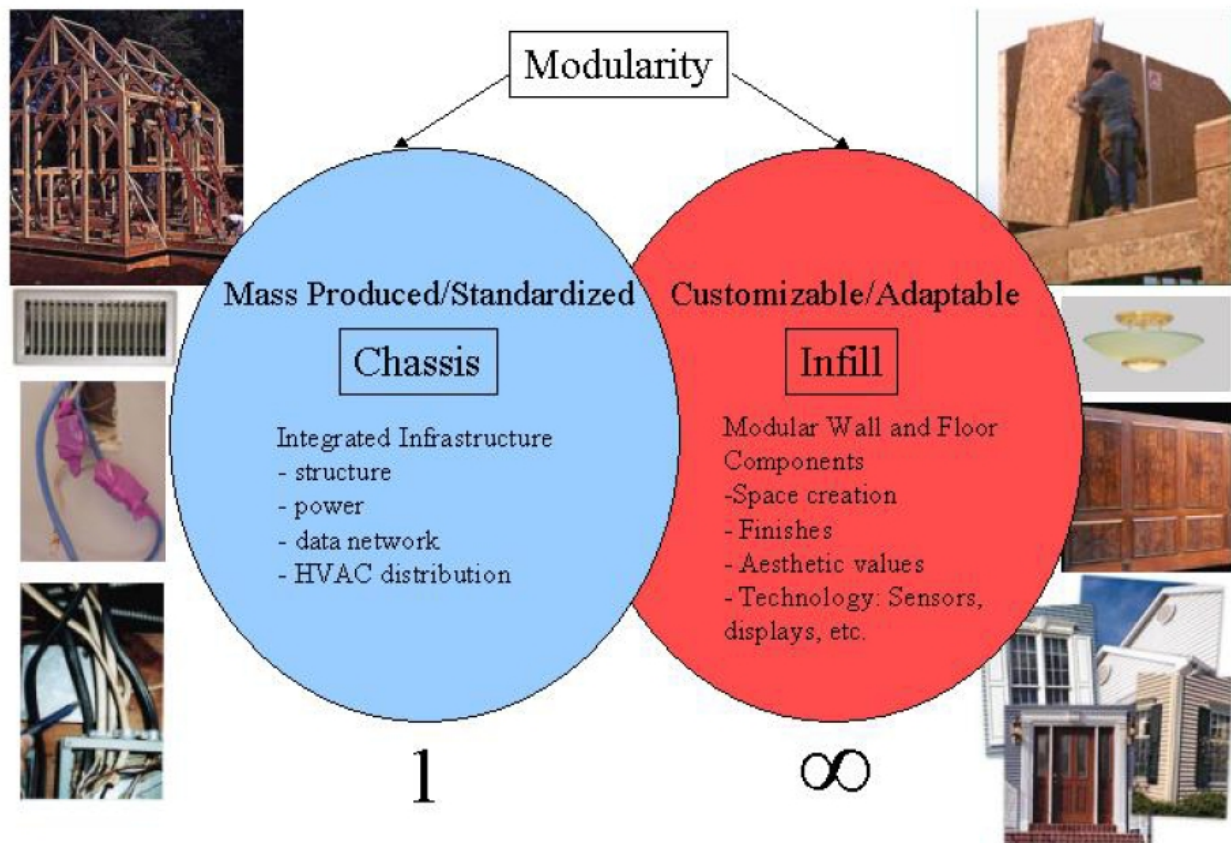


Ridgified inflatable structures				
Category: <i>Research Project</i>		Country: <i>USA</i>	Consultant: <i>Svensson</i>	ID: <i>1002</i>
Description: Rigidified inflatable structures (RIS) are thin, flexible membrane structures that are pneumatically deployed. After deployment, these structures harden because of chemical or physical change of the membrane. Because of this change, or rigidification, these structures no longer require pneumatic pressure to maintain their shape.				
Benefits: The study indicates that the cost of ownership in present day value for the RIS is approximately 35% less than the cost of a comparable wood light-frame structure. The study also indicates that significant environmental benefits exist with the use of RIS. These structures use significantly less in terms of resources than do wood frame structures.				
Limitations:				
Building Type: all		Application Point: walls/ whole house	Construction Type: new	
Material Types: plastic		Innovation Type: product / process	Development Maturity: emerging/ very new	
Current Availability: within space industry				
Experience in Use: none just emerging				
Experience in Service: unknown				
Example Projects:				
IP & Commercial Issues: Not a commercial product				
Company Contact Details: School of Architecture, Rensselaer Polytechnic Institute, Troy, NY 12180, Phone : (518) 276- 2011 Fax: (518) 276-3034 Email:			Contact: Steven Van Dessel Phone: Email: vandes2@rpi.edu	
Comments: Too early and insufficient information available yet to make any valued assessment, however if the claims regarding cost are correct and the technology to commercialise into producing housing is achieved, then could be a real threat to all existing conventional housing.				
Include in Assessment: Yes				
Web Links:				

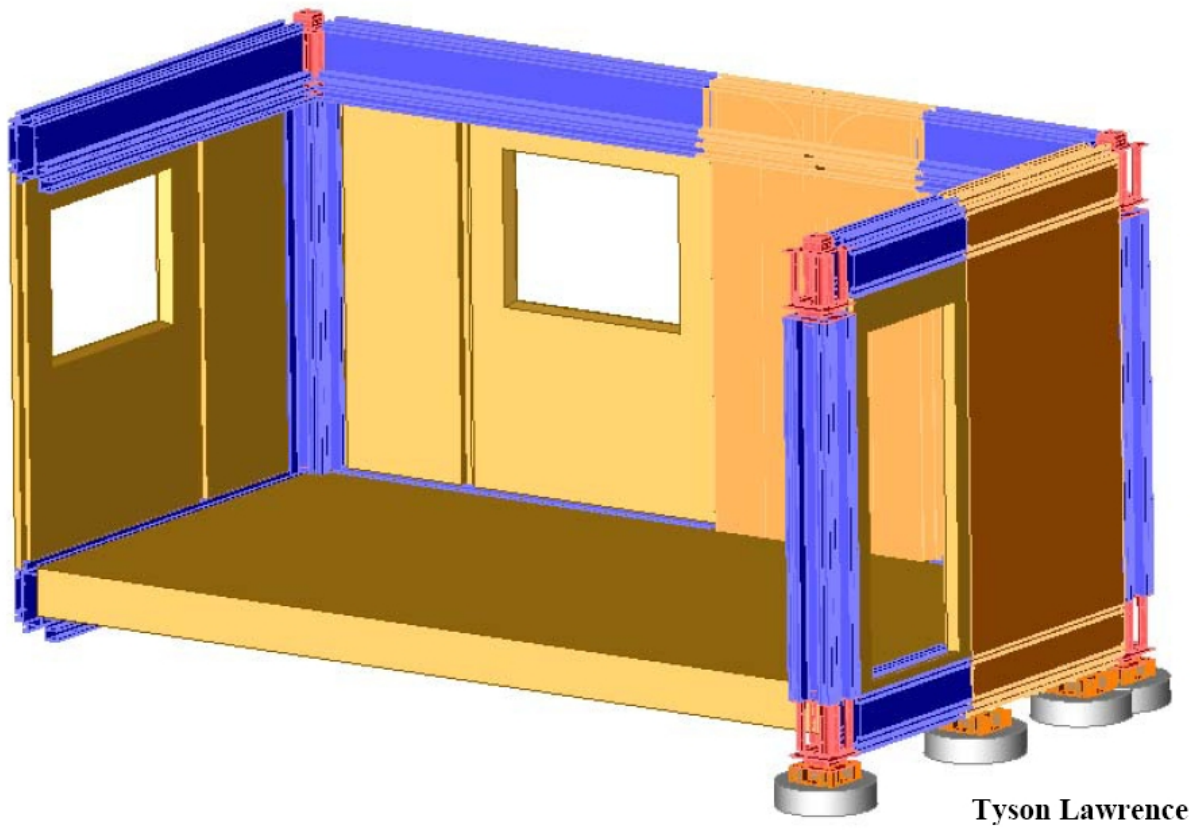




OSBA House Chassis			
Category: Research Project	Country: USA	Consultant: Paevere	ID: 1003
Description: Borrowing from recent innovations in the automobile, electronics, aviation, and ship building industries, researchers are developing concepts for creating buildings from an integrated "chassis" that can be rapidly and precisely installed with minimal field labor (reversing the 80% labor/ 20% material ratio). One integrated assembly provides structure, ductwork, power, signal, semsors, plumbing connections, mechanical attachments for infill, HVAC systems, floor finishes, and ceiling finishes. At the point of sale, demising walls are added to create the size unit required, and the buyer then engages in a design process to define the interior design, systems, and services. The chassis provides the necessary physical, power, and signal connections for mass customized infill components to be quickly installed, replaced and upgraded without disruption. Infill components may include integrated wall/floor assemblies, specialty millwork with transformable elements, display systems, networked appliances and devices, etc.			
Benefits: The concept (if realised) could potentially deliver sginifcant benefits in terms of sustainability, due to the incerased lifespan of the structure and reduced resource usage over the life cycle. There are significant benefits in terms of flexibility and adaptability of the building to meet different needs and uses over it's life.			
Limitations: The project is still in concept / research pahse, to date only limited prototype demonstrations have been developed			
Building Type: All	Application Point: Whole house	Construction Type: New	
Material Types: Chassis is non-wood but may have wood infill elements	Innovation Type: product / process / business system	Development Maturity: emerging	
Current Availability: No			
Experience in Use: No			
Experience in Service: No			
Example Projects: See website			
IP & Commercial Issues: Not a commercial product			
Company Contact Details: House_n research group Phone : (617) 452-5676 Fax: (617) 225-0027 Email: dpacik@media.mit.edu		Contact: Deenie Pacik Phone: Email:	
Comments: A very futuristic concept with some merit if it can be realised in a viable way int the construction industry of the future. Typically for MIT, this project is hugely ambitious, and way ahead of it's time. Houses and structures in general are becoming more and more about the embedded services that make a space functional, and are demanded by occupants. This concept could well be the most efficient way to meet this requirement in the future			
Include in Assessment: Yes			
Web Links: http://architecture.mit.edu/house_n/index.html http://architecture.mit.edu/house_n/projects.html			







Integrated Interior Infill Modules			
Category: Research Project	Country: USA	Consultant: Paevere	ID: 1004
Description: The basic objective of this research project is to scope the possible use of 'furniture' or cabinetry, as a replacement for infill walls within a structure. The concept is combined with prefabricated modular shells (such as the 'House Chassis' and web-based automated design/decision making tools, to create an agile and efficient methodology for mass customized multifamily housing. The furniture-making industry employs sophisticated, automated computerized numeric control (CNC) technologies capable of highly efficient "batch quantities of one," but currently most furniture companies limit their production to kitchen and bath cabinets installed into conventional construction. This research will extend the application of automated cabinetry fabrication to create concepts for a new integrated interior infill (I3) system that will replace conventional interior framing, drywall, and finish elements. Some research topics will include: a) Use of existing cabinetry fabrication technologies to create partitions, reconfigurable dividers, storage/organizing units, special purpose components for work, education, and entertainment, etc. b) Subcomponents for power, communication, and lighting systems with next generation environmental sensing and HVAC. c) The use of high performance, low maintenance, lightweight materials for interior components such as advanced polymers, composites, fabrics, and special-purpose metals d) Low field-labor connections (physical, power, signal, piping, etc.) between technology components and the infill components they are installed in, between adjacent infill components, and between infill components and the modular shell. Particular attention will be paid to the use of the I3 system to allow for the quick and seamless connection at the marriage line as modules are erected, and for the efficient and non-disruptive reconfiguration and upgrade of components. as the I3 modules arrive on site, they will be installed in modules, much as an interior automotive component is installed in an automobile chassis.			
Benefits: Increased flexibility and adaptability of use; potential for reusability of components; customer-driven design			
Limitations: The project is still in concept / research pahse, to date only limited prototype demonstrations have been developed			
Building Type: All	Application Point: Whole house	Construction Type: New	
Material Types: wood panels + new materials	Innovation Type: product / process / business system	Development Maturity: emerging	
Current Availability: No			
Experience in Use: No			
Experience in Service: No			
Example Projects: See website			
IP & Commercial Issues: Not a commercial product			
Company Contact Details: House_n research group Phone : (617) 452-5676 Fax: (617) 225-0027 Email: dpacik@media.mit.edu		Contact: Deenie Pacik Phone: Email:	
Comments: A very futuristic concept with some merit if it can be realised in a viable way in the construction industry of the future			
Include in Assessment: Yes			
Web Links: http://architecture.mit.edu/house_n/index.html http://architecture.mit.edu/house_n/projects.html			



Fig. 2. The floor plan of a conventional builders house has been duplicated using interior cabinet-like components (House_n study).

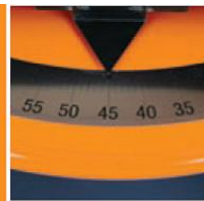
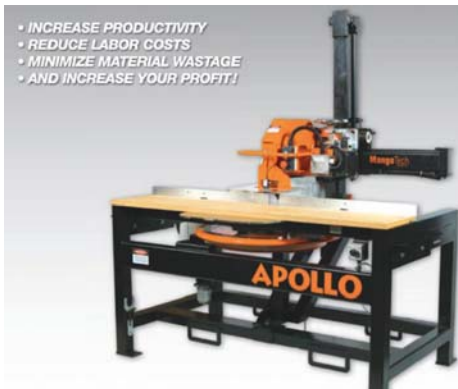


Fig. 3. Prototype plan with chassis/infill components (House_n study).

Wood Welding			
Category: <i>Research Project</i>	Country: <i>France</i>	Consultant: <i>Paevere</i>	ID: <i>1005</i>
<p>Description: Friction welding of wood or 'wood welding' is a technique in which two pieces of wood are joined by placing them together under pressure and rapidly displacing one piece relative to another. The heat generated by the resulting friction melts the protolignin in the wood, and allows the fibres at the interface to intertangle. When the friction-induced heat is removed, the protolignin solidifies and the pieces are bonded together. The rapid displacement required to generate the friction can be a 'vibration' (for planar-type joint) or a 'rotation' (for a dowel type joint).</p> <p>When this technique is applied to solid wood, several physical, chemical and mechanical processes are involved together: (1) the transverse compression of wood that is heated simultaneously while a rapid vibrating displacement is applied; (2) the moisture content reduction at the interface; (3) the variation in the coefficient of friction; (4) the chemical modification of the wood structure during heating; and (5) the solidification of the molten joint. The welding or bonding that occurs at the interface is probably explained mainly by the melting and solidification of the protolignin and partly by the physical entanglement of the fibres interconnected between them.</p>			
<p>Benefits: This jointing system opens up the possibility of manufacturing wood structural joints and beams without any adhesive as it has comparable performance to nails and PVA bonded wood dowels.</p>			
<p>Limitations: The present limitation is that the strong joints obtained do not satisfy specifications for exterior joints as they show very poor resistance to water. These joints can thus only be considered for indoor applications. At present the experiments have been conducted on relatively small size samples. In the future it will be necessary to test larger specimens and to investigate technology that could produce full-size standard products such as welded laminated panels.</p>			
Building Type: All	Application Point: Interior joints	Construction Type: New	
Material Types: wood	Innovation Type: process	Development Maturity: emerging	
Current Availability: No			
Experience in Use: No			
Experience in Service: No			
Example Projects: No			
IP & Commercial Issues: Not a commercial product			
Company Contact Details: Various research groups Phone : Fax: Email:		Contact: Phone: Email:	
<p>Comments: May have some application in manufactured housing applications, but perhaps is not economically viable except for specialised applications</p>			
Include in Assessment: Yes			
<p>Web Links: http://taylorandfrancis.metapress.com/media/eafy7be5rp1txpacrecn/contributions/x/8/1/4/x814231775736025.pdf</p>			

MangoTech automated saws

Category: Frame and Truss Manufacture	Country: NZ	Consultant: Bayne	ID: 1101
Description: Given a truss cutting order, with lengths, and angles, the saw optimises the cutting list and automatically feeds stock to the correct length, and turns saw to the correct cutting angle.			
Benefits: Increased productivity for frame and truss plants, increased accuracy and less waste of materials. For prefabrication of trusses and frames. Allows faster delivery of orders to building site.			
Limitations: More designed for precut operation			
Building Type: all	Application Point: truss and frame	Construction Type: new	
Material Types: wood	Innovation Type: process	Development Maturity: mature	
Current Availability: Yes - from local agent - see websites			
Experience in Use: accepted			
Experience in Service: not available			
Example Projects: not available			
IP & Commercial Issues: unknown			
Company Contact Details: MangoTech Office: 141 Herald St, Cheltenham, VIC, 3192; Postal: P.O Box 1103, Moorabbin, VIC, 3189 Phone :+64 3 9532 6072 Fax: +64 3 9532 6073 Email: nporter@mangotech.com.au		Contact: Nick Porter or Francis Voss Phone: Email: francisvoss@mangotech.com.au or nporter@mangotech.com.au	
Comments: Already in use in Australia			
Include in Assessment: No			
Web Links: http://www.mangotech.com/ http://www.mangotech.com.au/index.htm			



MangoTech automation			
Category: Frame and Truss Manufacture	Country: NZ	Consultant: Bayne	ID: 1102
Description: Automation kit can automate all of the settings necessary to operate a saw. Retro-fitted existing saws is less expensive than buying a new and keep all advantages of automated saws.			
Benefits: Increased productivity for frame and truss plants, increased accuracy and less waste of materials. For prefabrication of trusses and frames. Allows faster delivery of orders to building site. All that with a light investment			
Limitations: The existing saw model - The retrofits include saws such as Metra-cut Fenceline and Centreline, Spida, Bilda and Supasaws			
Building Type: all	Application Point: truss and frame	Construction Type: new	
Material Types: wood	Innovation Type: process	Development Maturity: mature	
Current Availability: Yes - from local agent - see websites			
Experience in Use: accepted			
Experience in Service: not available			
Example Projects: not available			
IP & Commercial Issues: unknown			
Company Contact Details: MangoTech Office: 141 Herald St, Cheltenham, VIC, 3192; Postal: P.O Box 1103, Moorabbin, VIC, 3189 Phone :+64 3 9532 6072 Fax: +64 3 9532 6073 Email: nporter@mangotech.com.au		Contact: Nick Porter or Francis Voss Phone: Email: francisvoss@mangotech.com.au or nporter@mangotech.com.au	
Comments: Already in – use in Australia			
Include in Assessment: No			
Web Links: http://www.mangotech.com/ http://www.mangotech.com.au/index.htm			



MODUL				
Category: <i>Frame and Truss Manufacture</i>		Country: <i>Norway</i>	Consultant: <i>Ascheim</i>	ID: <i>1103</i>
Description: Modul AS has an advanced production of prefabricated light frame work elements and roof trusses. Because of the Norwegian requirements regarding thermal insulation the studs (cc 600 mm) have a depth of 148 or 198 mm and a corresponding width of 36 mm. The elements and trusses are produced indoor at dry condition and then wrapped up. The elements are mainly wall elements built in an traditional process with traditional technical design. The trusses are also traditional prefabricated structures with punched metal plate fasteners. Modul AS supply master builders and contractors with elements and/trusses, and do not the building part themself.				
Benefits: The prefabricated elements and trusses are produced indoor at dry condition by skilled workmen. This gives products with constant high quality. The elements are delivered dry and wrapped up. This entail a short construction period onsite, fixed costs, cost reductions regarding equipment and employees, less construction waste and in this manner less need for clearance work at building site, and less need for building site administration and control.				
Limitations: Modul AS do not have any department in Australia. However they can contribute with very much know-how and experience regarding production of prefabricated structural timber elements.				
Building Type: Detach/comm-ind		Application Point: Wall (elements), roof (trusses) - but sometime also prefabricated roof and floor elements		Construction Type: New
Material Types: wood, combination		Innovation Type: product / process		Development Maturity: mature
Current Availability: Yes				
Experience in Use: Yes - refer contact details below (since products from Modul AS are directed to master builders and contractors, they consciously do not put their products or references officially out on internet)				
Experience in Service: Yes - refer contact details below (since products from Modul AS are directed to master builders and contractors, they consciously do not put their products or references officially out on internet)				
Example Projects: Yes - refer contact details below (since products from Modul AS are directed to master builders and contractors, they consciously do not put their products or references officially out on internet)				
IP & Commercial Issues: unknown				
Company Contact Details: Modul AS Sukkeskogen, NO-3158 Andebu, Norway Phone :+47 33 43 00 20 Fax: +47 33 43 00 29 Email: post@modul-as.no			Contact: Geir Frydenberg Phone: +47 33 43 00 20 Email: geir@modul-AS.no	
Comments: not really a new product or technology - just prefabricated trusses and walls very similar to Australian practice				
Include in Assessment: No				
Web Links:				

Disclaimer

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