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Best practices in wooden public buildings' design and construction

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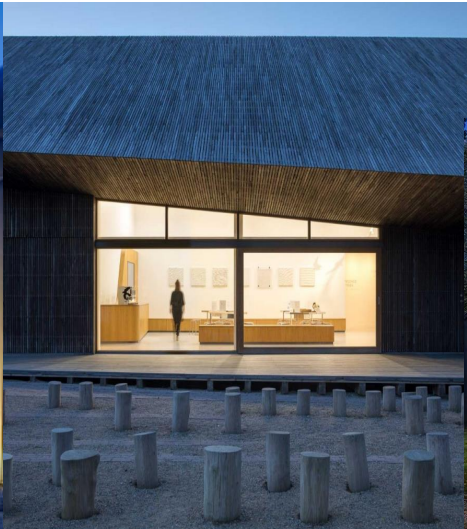


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AIM

- Study contains analysis of best practices on implemented public wooden buildings' projects and will be used for development of the contents of new study module/elective element (O5), will be included as material into e-learning course (O6), some of the information will be used for handbook (O7).

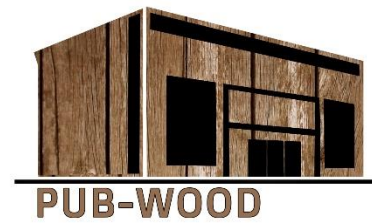


CONTRIBUTIONS

	LITHUANIA	Vilnius Gediminas Technical University, Centre of Registers, Study and Consulting Center,
	DENMARK	VIA University College
	UNITED KINGDOM	Coventry University
	FINLAND	Hame University of Applied Science LTD
	LATVIA	Riga Technical University



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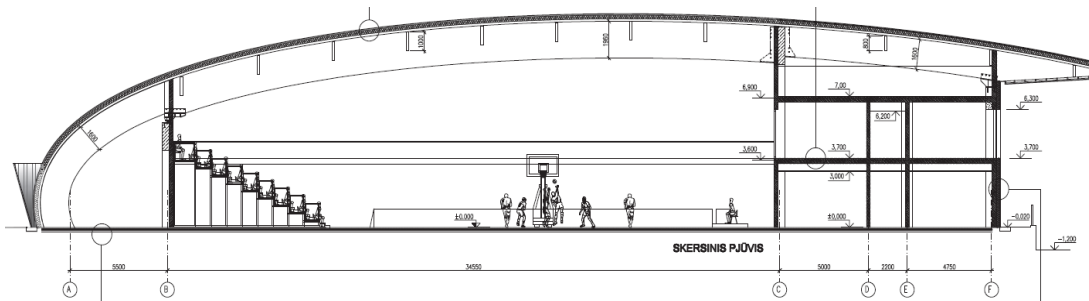
National examples of public wooden buildings



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LITHUANIA



The cross section of the multifunctional sports hall in Palanga, Lithuania



Title	Universal sports complex in Palanga
Description	Public building
Client	Palanga city Municipality
Location	Sports street 3, Palanga, Lithuania
Year of construction	2014
Structures	<i>The load bearing structure of the multifunctional sports hall is reinforced concrete columns and curves axis glulam beams and arches. The maximum span (the maximum distance between supports) is 34.55 meters. This span is overlaid using the entire glued laminated timber beam.</i>
Number of stories	2



Restaurant in Banana Island, Doha, Qatar

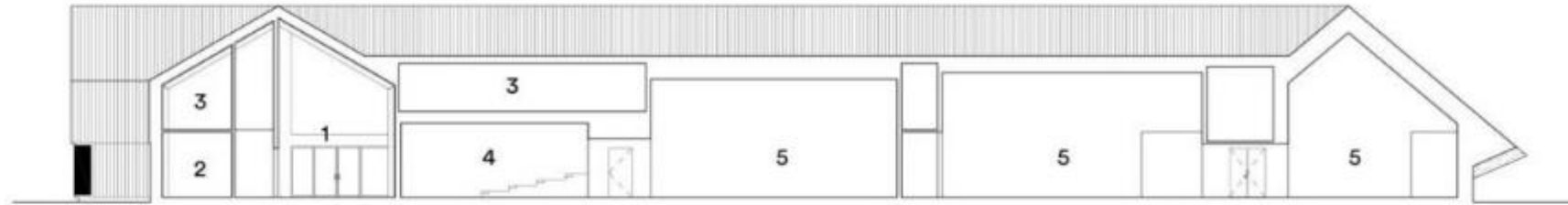
Title	Wadden Sea Centre
Description	Public building
Client/	Private Engineering Office, Doha, Qatar/
Architects	Project Management and Supervision Consultants Hill International
Location	Banana Island, Doha, Qatar
Year of construction	2014
Structures	<i>The dimensions in plan are 43 m in length and 25.6 m in width. The load bearing structure consists of: rectangular and circular cross section reinforced concrete columns; circular hollow steel supporting struts and the load bearing curved glued laminated timber arches. The reinforced concrete columns are rigidly supported to the foundation and struts are flexibly connected to the top of reinforced concrete columns. The load bearing glulam arches are supported on the steel struts. The whole roof structure is supported only on 8 reinforced concrete columns. The cantilever of glulam arches are up to 7-8 meters.</i>
Number of stories	1

DENMARK



Title	Wadden Sea Centre
Description	Public building
Client/Architects	City of Esbjerg/Dorte Mandrup A/S
Location	Okholmvej 5, Vester Vedsted, 6760 Ribe, Denmark
Year of construction	2017
Structures	<p>The building is an interpretation of the local building tradition and the rural farmhouse typology significant in the area.</p> <p>The centre is erected with pre-paginated robin wood and thatched roofs and facades, hereby underlining the tactile qualities and robustness that can be found in traditional crafts and materials of the region.</p> <p>The combination that gives a unique experience that gives the impression of a building that falls into nature.</p>
Number of stories	2

Wadden Sea Centre, Denmark



LONGITUDINAL SECTION



- 1 Entrance
- 2 Wardrobe
- 3 Service area

- 4 Cinema
- 5 Exhibition



- 1 Entrance
- 2 Café
- 3 Cinema
- 4 Exhibition
- 5 Office
- 6 Covered terrace
- 7 Education
- 8 Storage/waders



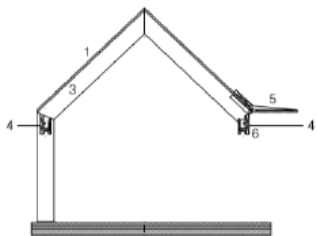


Title	"Næste Skur"
Description	Public building
Client/Architects	Københavns Komune / Krydsrum A/S
Location	Holbergskolen KBH N, Denmark
Year of construction	2019
Structures	<p>The idea is to unite the traditional Danish building custom - timberwork and large roofs with overhangs that protect the facade, with prefabrication and fast assembly.</p> <p>It is attractive to recycle the large quantities of rafters, laths, floorboards and roof tiles that today are thrown out as building waste during renovations in Denmark. The sheds are durable, functional and should inspire increased resource awareness when building.</p>
Number of stories	1

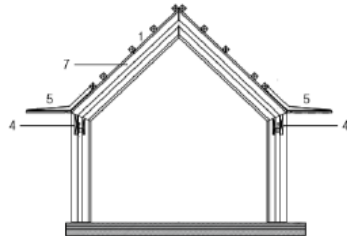
UNITED KINGDOM

Title	Rievaulx Abbey Visitor Centre
Description	Public building
Client/	English Heritage/
Architect	Simpson & Brown
Location	Helmsley, U.K.
Year of construction	2016
Structures	The hall contains a series of engineered glulam timber arches . These spruce glulam columns and rafters are joined with epoxy bonded-in rods and steel fitch plates conceal the join. Structurally the engineered glulam frames are joined at roof level with CLT sheeting
Number of stories	1

Elevation of glulam arch at glazed screen



Elevation of splayed glulam arch at east gable



Isometric of typical glulam arch

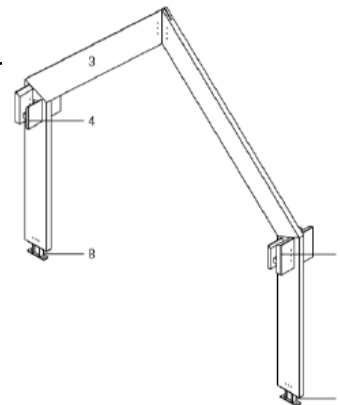
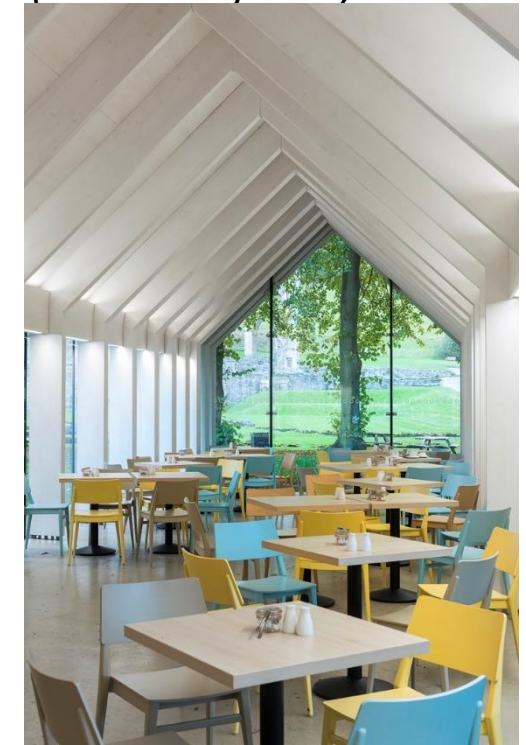


Figure 1 - External appearance
(www.ribaj.com)





UNITED KINGDOM



Title Children Village, boarding school

Description Public building

Client/ Architect Fundação Bradesco/
Aleph Zero, Rosenbaum

Location Formoso do Araguaia, TO, Brazil.

Year of construction 2017

Structures Two identical structures (one for boys and the other for girls) are set each side of the main school buildings. A large timber roof sloping from west to east is supported by glulam columns and beams over sails the main independent timber accommodation units. Sculptural stairs rises above these units to walkways, recreational use space and balconies separated with slatted timber screens.

Number of stories 2

FINLAND



An elevation plan of Mjösa Tower. (Abrahamsen, 2017, p. 10)

Title	Mjösa Tower
Description	Public building
Client/	Arthur and Anders Buchardt, AB Invest AS/
Architect	Arthur and Anders Buchardt, AB Invest AS
Location	Brumunddal, Norway
Year of construction	2019
Structures	Both the structure and façade of Mjösa Tower are made of wood. The structure consists of columns, beams and diagonals, which are all made of glulam. The LVL is combined with glulam.
Number of stories	18

FINLAND



Title	Nature Center Haltia
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Description	Public building
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Client/	Timo Kukko, Nuuksiokeksus Oy/Rainer
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Architect	Mahlamäki, Lahdelma & Mahlamäki Architects
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Location	Nuuksio, Espoo, Finland
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Year of construction	2013
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Structures	<p>The CLT-elements have been supplied from Stora Enso's Austrian factories as raw plates. The board are made of Austrian spruce, because CLT was not produced in Finland during Haltia's construction. They are glued together with an emission free M1 grade urethane adhesive. They were finished in Pälkäne, where, for example, the insulations were added. (Haltia, 2019)</p> <p>The façade is made of pine saturated with quartz sand.</p> <p>Haltia is the first building in the world, where this material has been used for exterior trim. (Haltia, 2019)</p>
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Number of stories	2-3
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LATVIA



Title	Open-air stage in Krimuna
Description	Public building
Client/Architects	Dobele district Municipality / SIA "RBD"
Location	Krimunas, Krimuna parish, Dobele district
Year of construction	2017
Structures	<p>The load bearing structures of the stage are made using curved glue-laminated wood beams manufactured in Latvia.</p> <p>The arches are made using variable geometry to obtain the architectonical features of the structure. The load bearing structure consists of curved glue-laminated wood arches with a span of 13.72 m and a total building height of 7.20m.</p>
Number of stories	1

LATVIA

National cultural monument preserves rich history and is unique on the Baltic and European scale. The goal is to preserve the 1902 luggage barn for future generations



Title	Rebuilding the barn of Aluksne station
Description	Public building
Client/Architects	Aluksne district Municipality / SIA “Arhitektes Ināras Caunītes birojs”
Location	Jankalna Street 52, Aluksne, Aluksne district
Year of construction	2018
Structures	Non-load bearing exterior wall material: <i>Wooden stands, planking,</i> Partitions: <i>Wood frame, planking,</i> Stair construction: <i>Wooden staircase on concrete foundation,</i> Bearing external wall material: <i>Wood frame, planking.</i>
Number of stories	1



CONCLUSION

- 11 Public Buildings constructed in timber from 5 countries were picked. The buildings were constructed in the period from 2014 to 2019.
- The Public buildings ranged from a simple shed building, built in recycled timber to a renovated retrofit timber Barn. A hybrid timber multi-purpose tower.
- The floor areas ranged from 30 m² to over 3500 m². The buildings were from 1 to 18 stories.
- Most of the buildings are hybrid buildings which are constructed in timber, concrete and steel.
- Timber was used as a load bearing construction, external cladding and interior design.
- Some of the buildings implemented recycled timber
- Types of engineered timber implemented in the buildings are mostly Glulam beams and columns.
- Also there are few buildings with CLT panel construction (stairway enclosure, stairways, roof construction and floor/wall construction).
- In one case LVL was used as a stabilizing load bearing structure.
- Prefabricated timber modules were implemented in one building.



CONCLUSION

Concluding on the examples of existing public buildings designed and constructed in engineered timber it seems to be a lack of know-how, information, experience, education and national production of different types of engineered timber construction.



**ANY QUESTIONS/
COMMENTS ???**