

Mjøstårnet – Construction of an 81 m tall timber building

Rune Abrahamsen, CEO, Moelven Limtre AS

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This is Moelven



- One of Scandinavia's largest wood-processing groups
- 3,500 employees in 50 business units in Norway, Sweden and Denmark
- Production facilities in Norway and Sweden
- 2016: Turnover of more than 1 billion Euros
- Three divisions: Timber, Wood and Building Systems
- Moelven Limtre is part of Building Systems

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Moelven Limtre (Limtre = Glulam)

Established in 1959. 135 employees

Produces about 26 000 m³ per year in Norway and 35 000 m³ per year in Sweden. *No CLT production!*

Two factories in Norway. One in Sweden



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Moelven projects



96 m roof span



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Treet in Bergen



Completed 2015

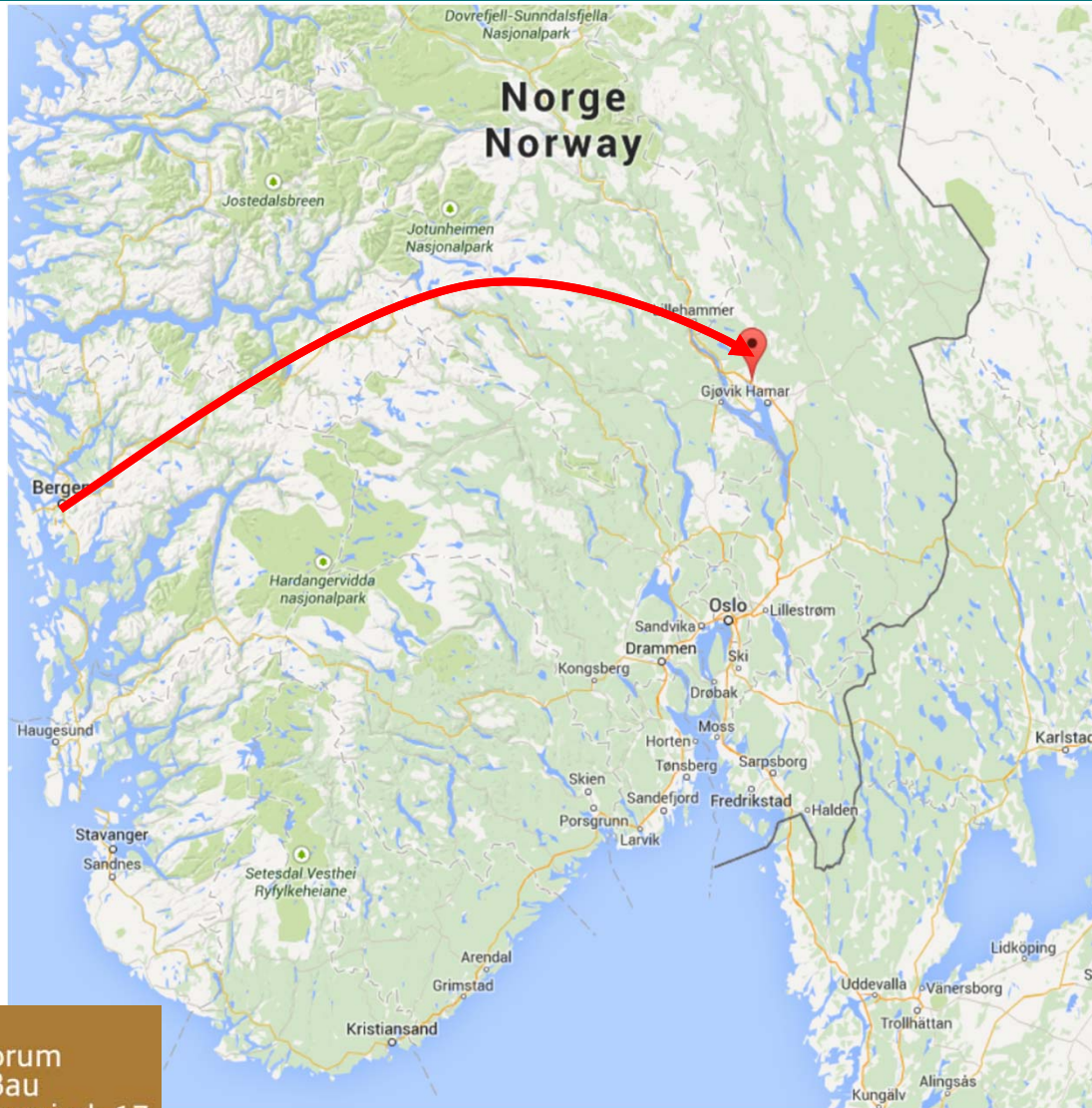
51 m tall

Combination of
glulam trusses,
CLT staircases and
prefabricated
building modules

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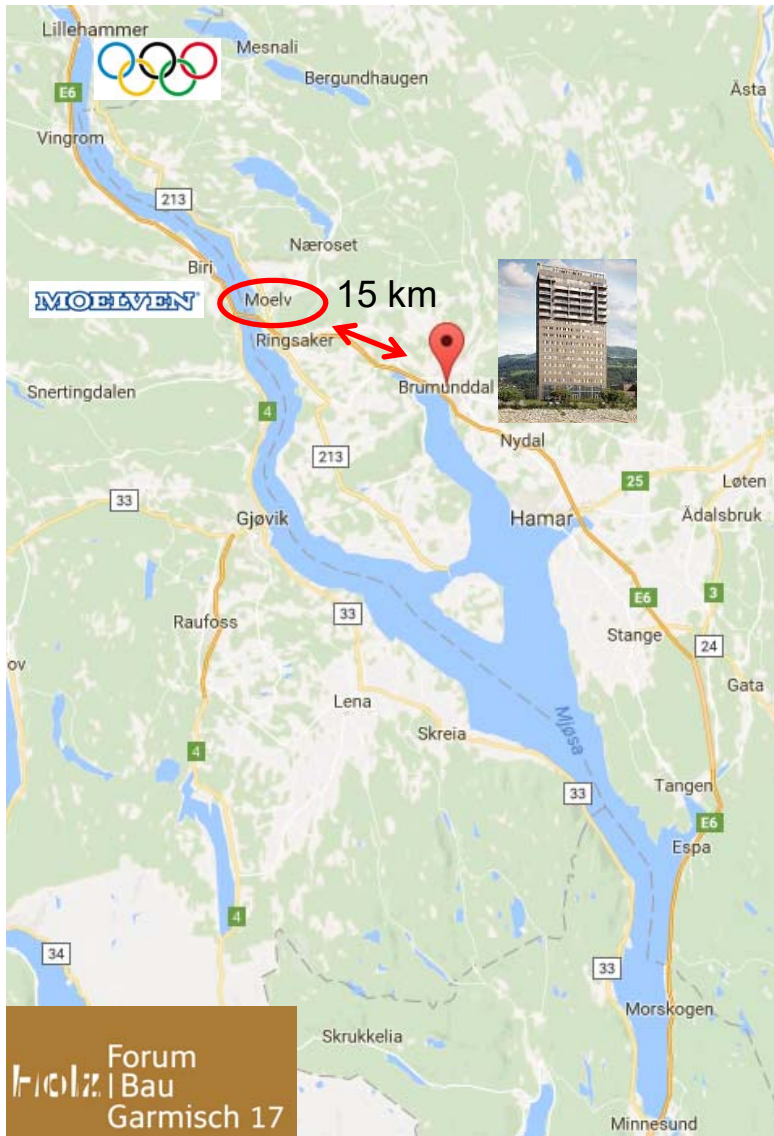
Mjøstårnet – where is it?



140 km and 90 mins drive north of Oslo

60 mins drive north of OSL Airport

Location – Brumunddal



Located next to highway E6 and Mjøsa – Norway's largest lake (120 km)

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Mjøstårnet (The tower of lake Mjøsa)

Building owner: AB Invest AS. Arthur and Anders Buchardt.

- The Norwegian contractor HENT builds Mjøstårnet for AB Invest as a turnkey contract
- Moelven Limtre is HENT's sub-contractor for structural timber components

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Visionary client

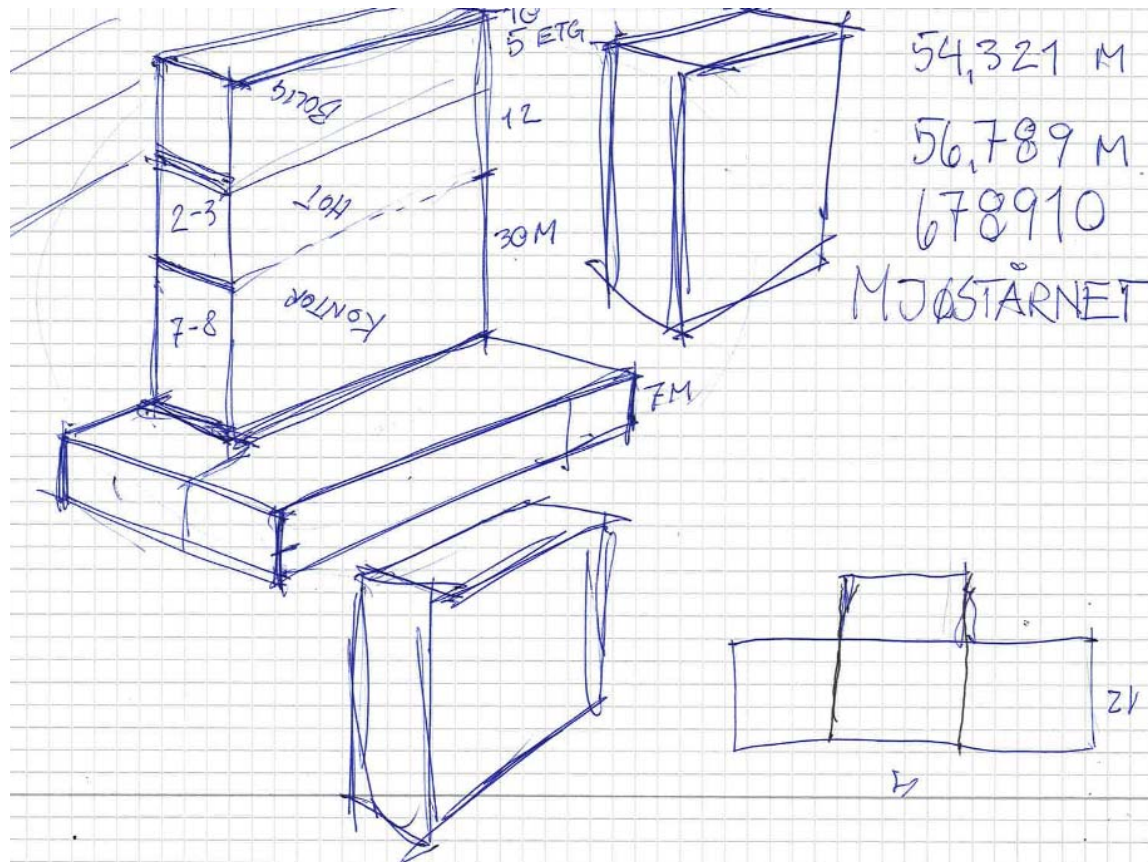


The initiative to build Mjøstårnet comes from Arthur Buchardt.

His vision is that the project will be a symbol of the green shift, and a proof that tall buildings can be built using local resources, local suppliers and sustainable wooden materials.

Video about the Mjøstårnet project

From sketch to reality



February 2015:
Arthur Buchardt's sketch



October 2017:
Moelven Limtre AS

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Companies involved in timber construction

Main contractor:



Project architects:



Timber structures:



Engineering:



CLT subcontractor:



LVL in timber floors:



Prefabricated elements:



Cladding:



Project support:



Trä8 building system



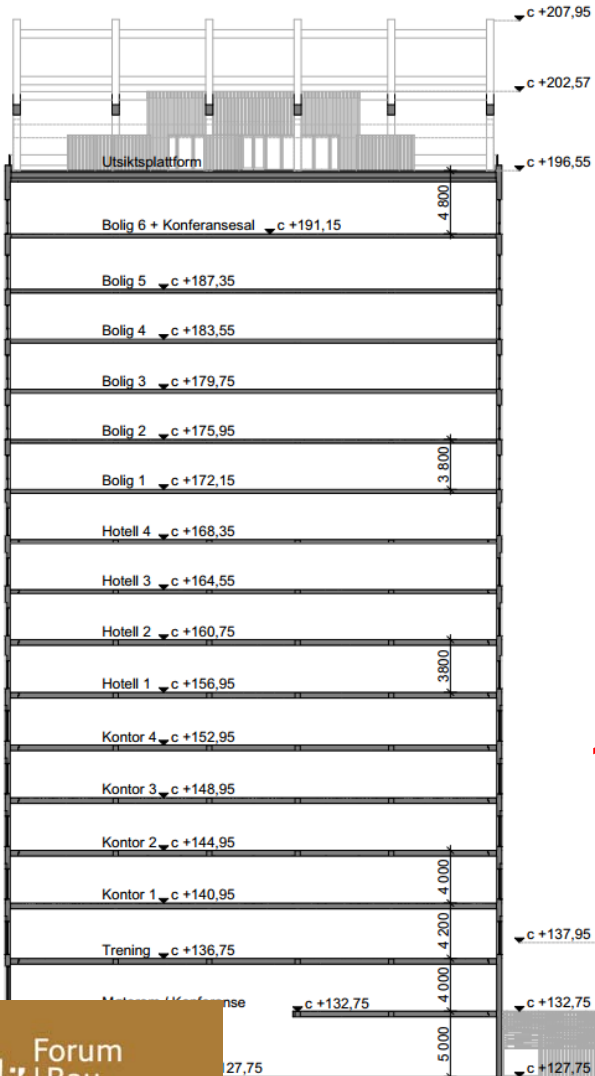
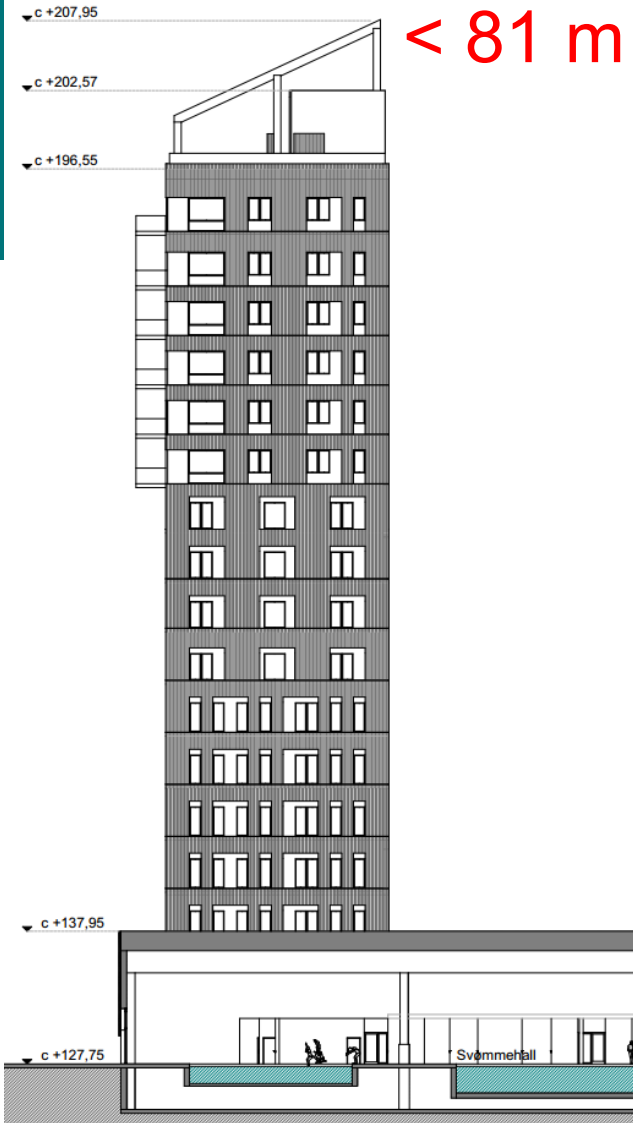
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Trä8 building system – optimized material use



Section



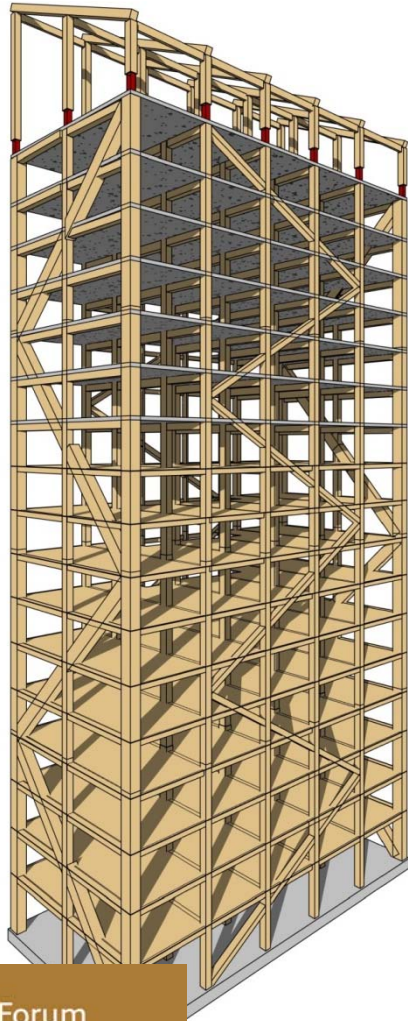
18
floors

11300 m²

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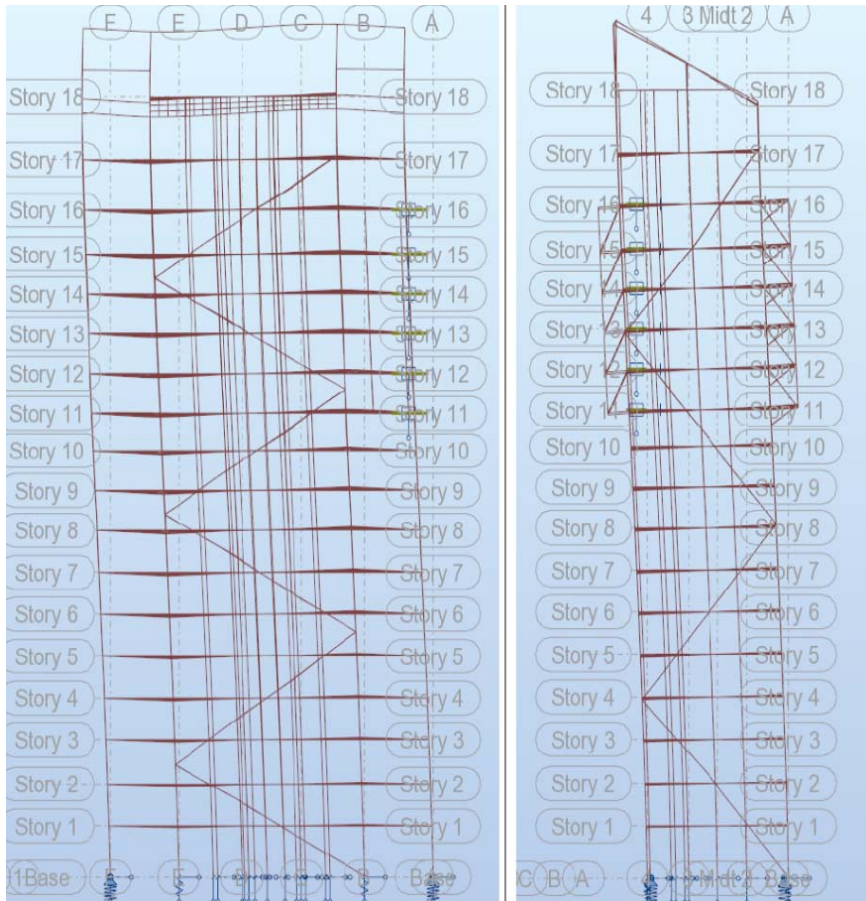
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The structure at a glance



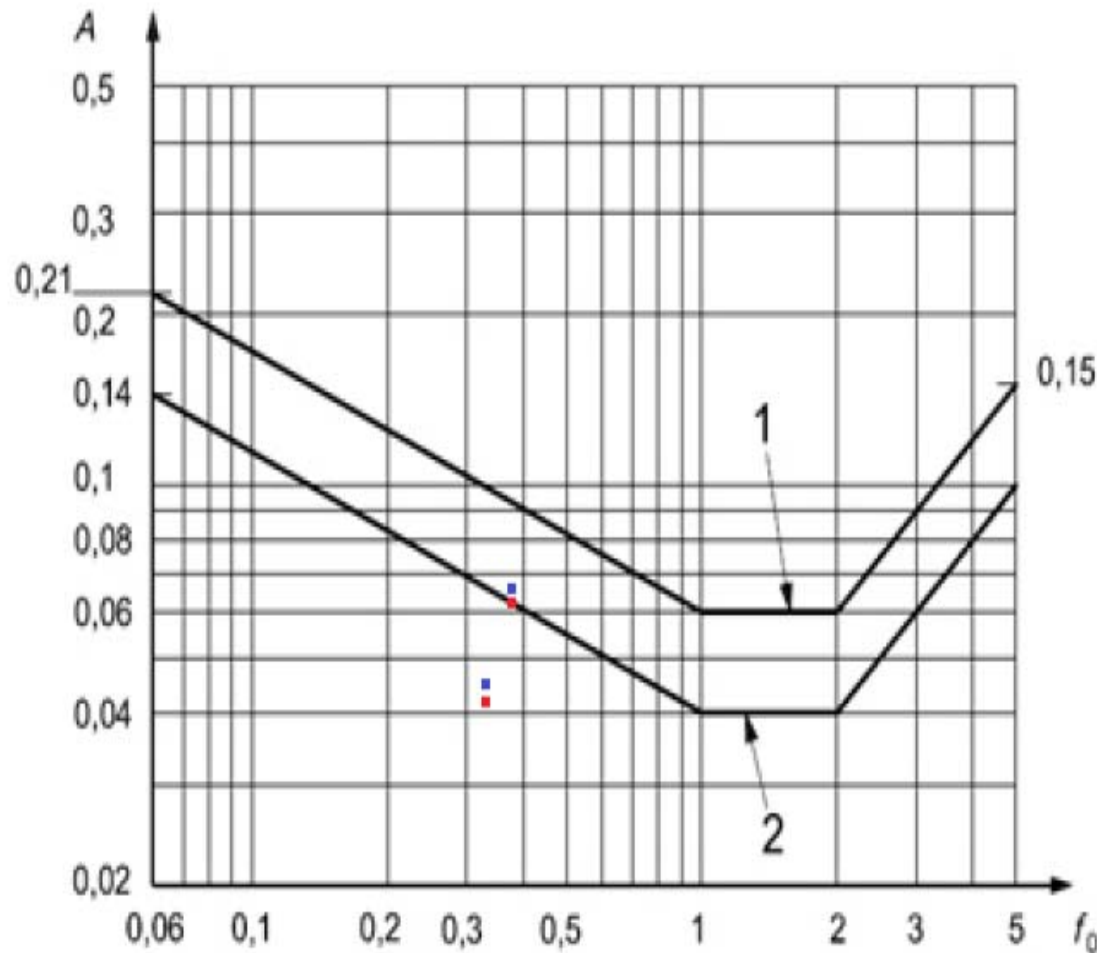
- 30 m taller than Treet in Bergen, similar glulam structure but without building modules
- Glulam columns, beams and diagonals
- CLT shafts for elevators and stairs
- Wooden prefabricated façade elements make up the building envelope
- Wooden slabs in the first ten floors. MoelvenTrä8-elements
- Concrete decks in the upper floors for apartments
- 2600 m³ timber structures

More info from structural design



- Timber engineering done by Sweco for Moelven Limtre
- Calculated using the software Robot
- Glulam is the primary load bearing for all vertical and horizontal loads
- CLT is used for secondary load bearing of staircases and elevator shafts, and is not structurally connected to the glulam
- 140 mm max horizontal deflection (Level 18)

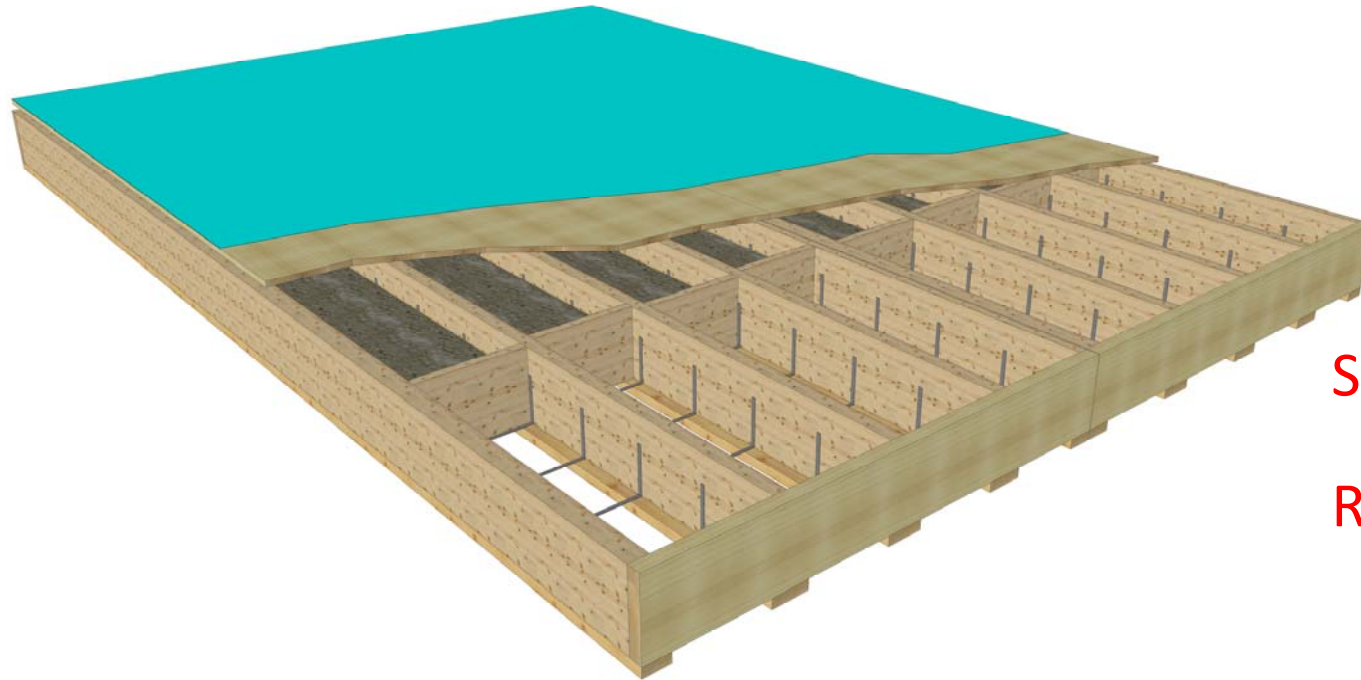
More info from structural design



Peak accelerations according to ISO 10137. The Red dots are for level 17 and the blue dots are for level 18.

We are on the limit on level 17, and slightly above on level 18. The client builds top apartment well aware of this

Floor elements in Mjøstårnet



Spanwidth: 7,5 m

R90 fire resistance

Prefabricated wooden slabs in the first ten floors.
MoelvenTrä8-elements: Combination of glulam and LVL

The weight from the concrete decks in the six upper floors is needed to handle comfort criteria and acoustics.

Production of glulam components



Production of truss diagonals



Block gluing of columns

Corner column size:
1485 mm x 625 mm

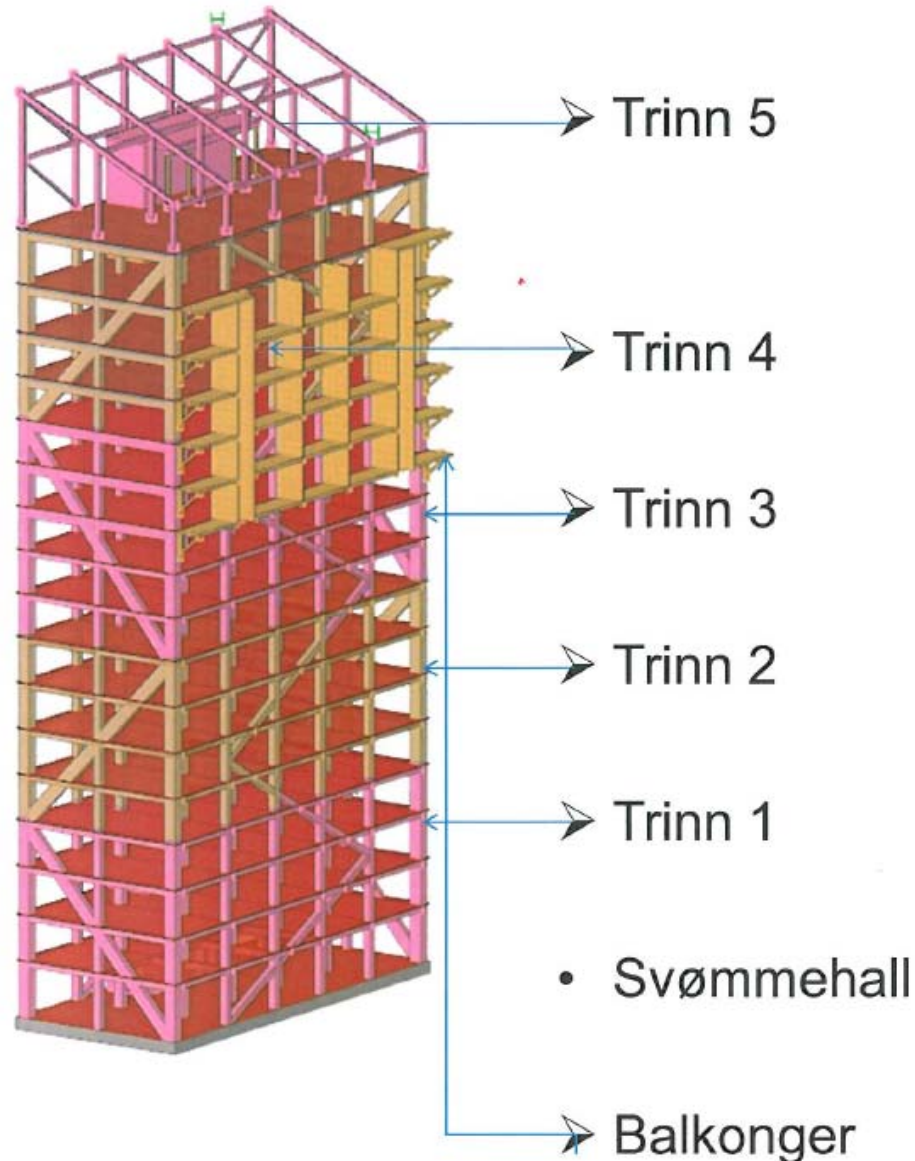
Webcam, videos, project info and more at
www.moelven.com/mjostarnet



Holz Forum
Bau Garmisch 17



Assembly of timber structures



- Installation of timber structures started September 2017
- The building will be topped out May 2018
- Completed March 2019. People can move in

**Timber skeleton:
Almost one floor per
week!**

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Installation of timber structures CLT shafts



Installation of glulam structures Preassembled frames. September 4



Installation of glulam structures

Status 18 september



Corner
columns:

Max
compression:
11500 kN

Max tension:
5500 kN

Installation of glulam structures

Status 18 september



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Installation of glulam structures Status September 18



Installation of glulam structures

Status October 26



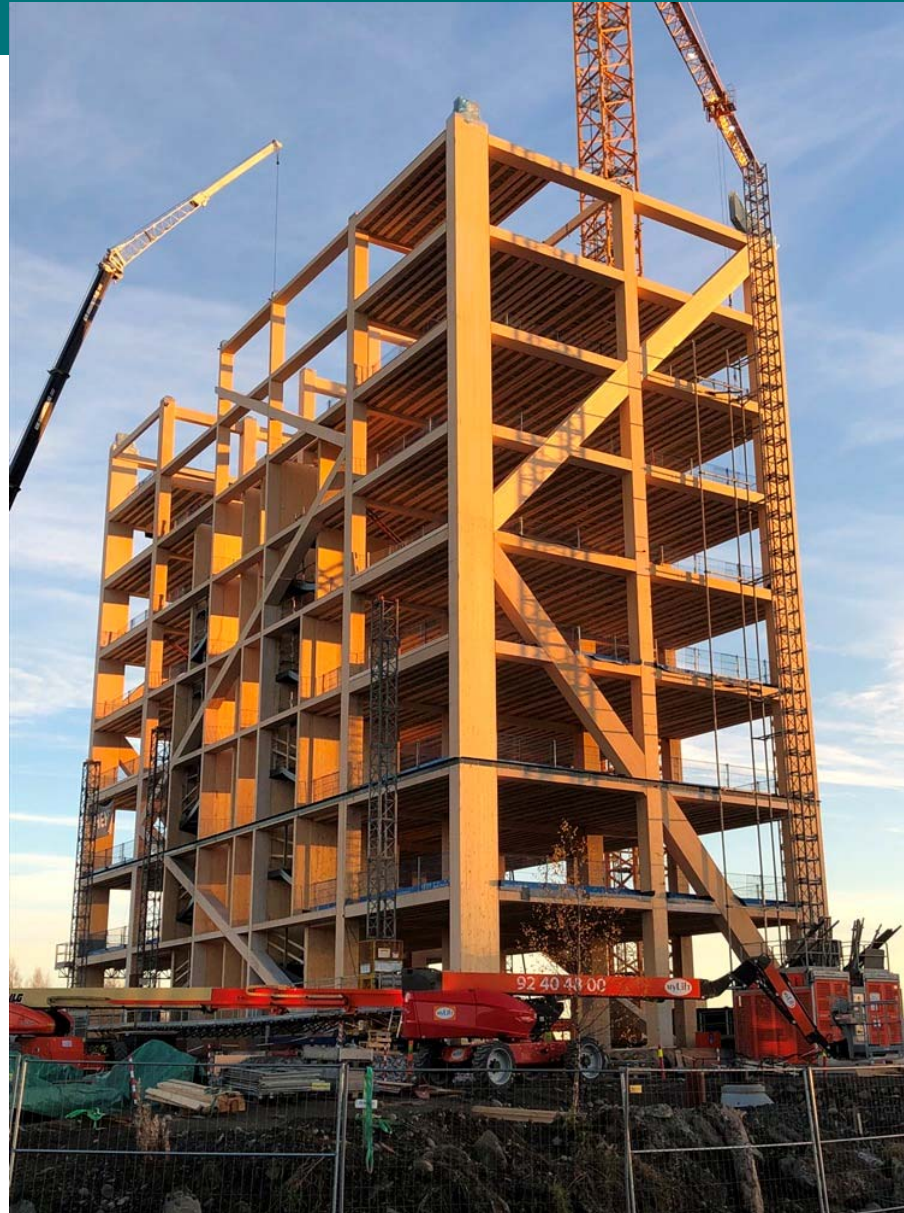
Corner column size:
1485 mm x 625 mm

Typical internal
columns:

725 mm x 810 mm
625 mm x 625 mm

Installation of glulam structures

Status November 8



Prefabricated facade elements



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Panel size 50-60 m².

Produced in a factory
close to the building site

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Installation of glulam structures

Status December 4



Installation of glulam structures Status December 4



Installation of glulam structures Status December 4



Installation of glulam structures Status December 4

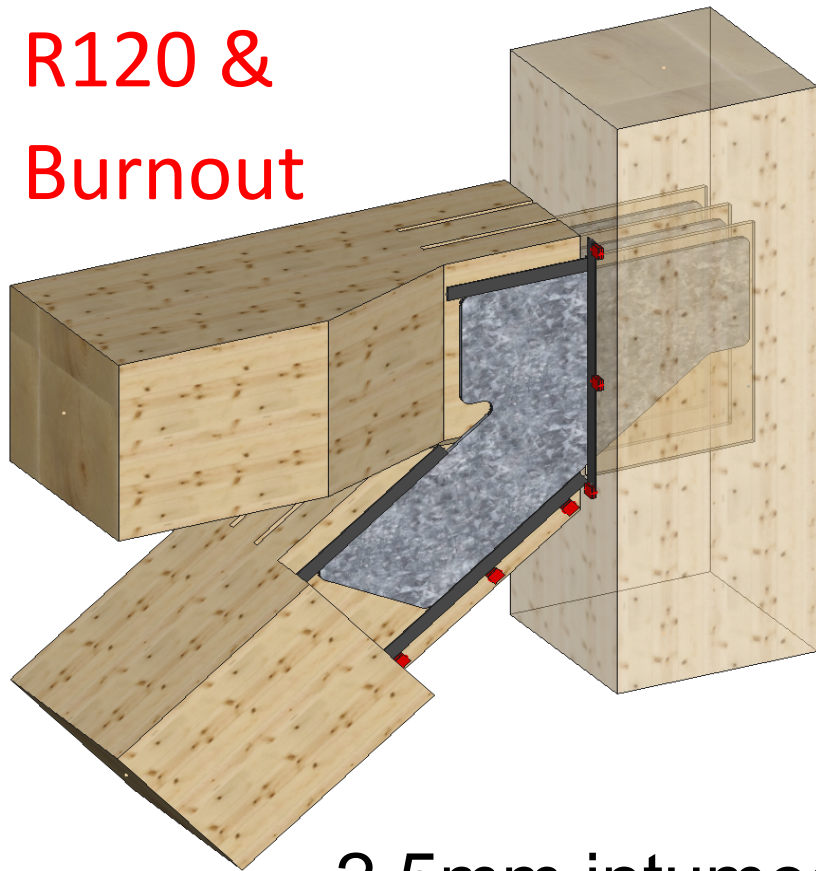


Installation of glulam structures Status December 4



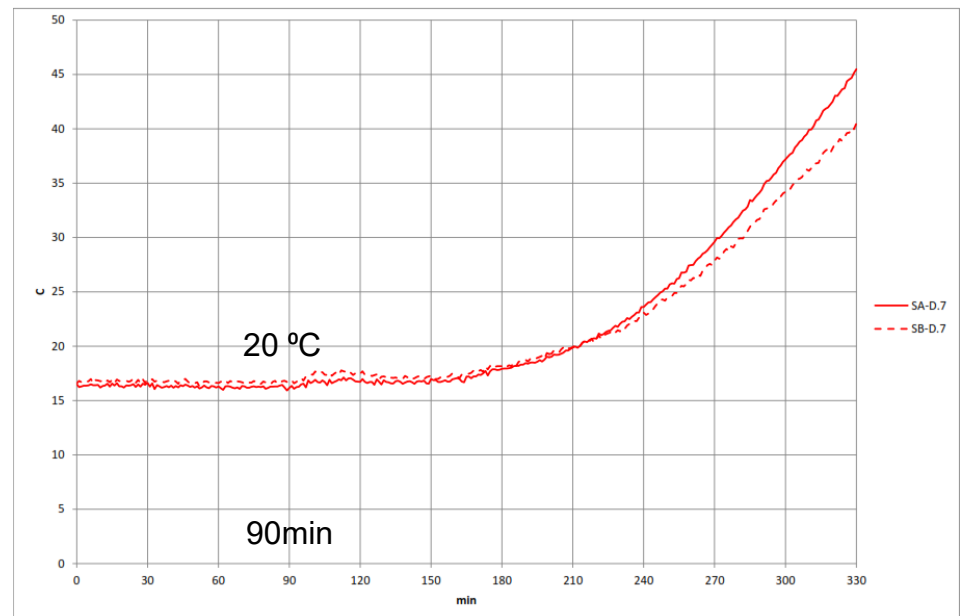
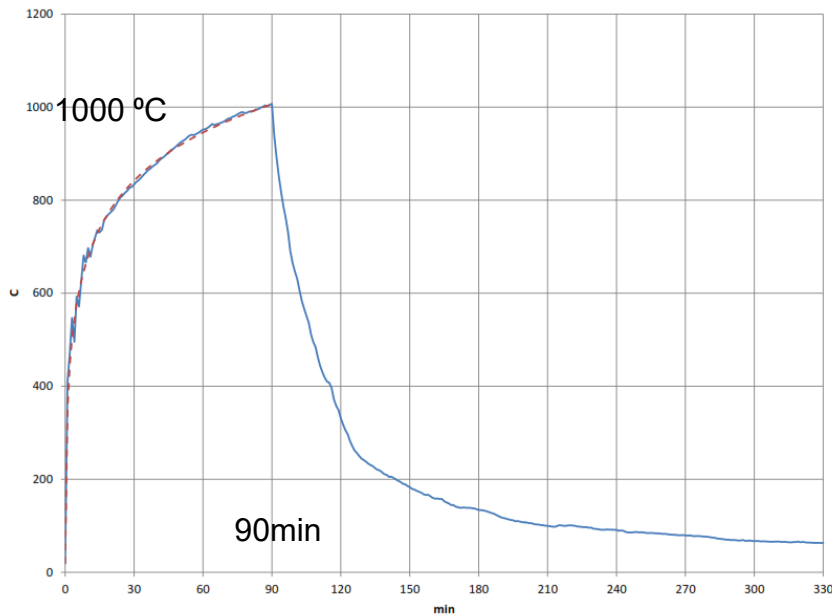
Fire protection of connections

R120 &
Burnout

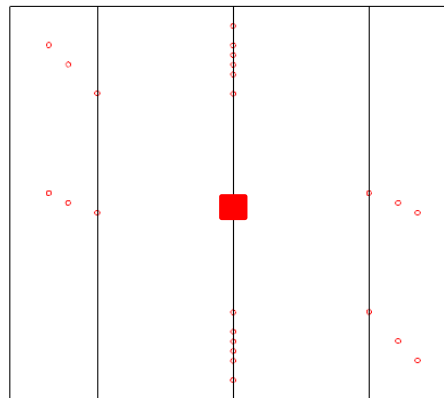


2.5mm intumescent strip -
Intumex L. Expands 20 times at
150 degrees Celsius

The temperature in the column centre after 90 minutes of fire



Temperature in the test oven



Cross-section
405 mm x 460 mm



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Tall Wood Gallery



Hypérion
Bordeaux, France
18 Stories
2020



Silva
Bordeaux, France
18 Stories
Under Construction



5 King
Australia
10 Stories
Under Construction



Mjøstårnet
Norway
18 Stories
Under Construction



HoHo Vienna
Vienna, Austria
24 Stories
Proposed



Haut
Amsterdam, Netherlands
21 Stories
Proposed



Framework
and, United States
12 Stories
Design Phase



Sanctuary
Glasgow, Scotland
7 Stories
2018



Sida Vid Sida
Skellefteå, Sweden
19 Stories
Announced

<http://www.rethinkwood.com/tall-wood-mass-timber/tall-wood-gallery>

Tall Timber: A global audit

http://global.ctbuh.org/resources/papers/3350-Journal2017_Issue1_TBIN.pdf

There is a race going on!

Tall Wood Gallery



**Brock Commons
Tallwood House**
Vancouver, Canada
18 Stories
2017



Origine Condos
Quebec City, Canada
13 Stories
2017



T3
Minnesota, United States
7 Stories
2016



Arbora
Montréal, Canada
8 Stories
2016



Moholt 50/50
Trondheim, Norway
9 Stories
2016



Banyan Wharf
London, UK
10 Stories
2015



Puukuokka
Jyväskylä, Finland
8 Stories
2015



TREET
Bergen, Norway
14 Stories
2015



Strandparken
Stockholm, Sweden
8 Stories
2014

<http://www.rethinkwood.com/tall-wood-mass-timber/tall-wood-gallery>

Tall Timber: A global audit

http://global.ctbuh.org/resources/papers/3350-Journal2017_Issue11_TBIN.pdf

CTBUH – Definition of timber buildings

The council for tall buildings and urban habitat had their international conference in Sydney in October 2017.

A proposal was put forward to categorize different construction approaches to tall timber buildings.

A single-material tall building is defined as one where the main vertical and lateral structural elements and floor systems are constructed from a single material.

If a tall building is of steel or timber construction with a floor system of concrete planks or slab supported on steel or timber beams, it is considered a steel or timber building.

CTBUH – Definition of timber buildings cont.

A composite tall building utilizes a combination of materials acting compositely in the main structural elements, thus including an otherwise steel or timber building with a concrete core.

This proposal has been put forward to the CTBUH Height and Data Committee for consideration

Based on this we believe that Mjøstårnet is likely to be the world's tallest timber building upon completion

Experiences and thoughts on tall timber

- Glulam is well suited for high rise buildings. The large cross sections can handle fire requirements
- Due to maintenance one should not expose timber main load bearing to weather
- Cost of structure is cost competitive
- Assembly is quick – everything prefabricated
- CO₂ footprint is considerably lowered
- Excess use of materials should be avoided, also when it comes to wood materials
- Using only the materials you need and combining wood, steel and concrete will result in “climate smart buildings”.

Picture taken yesterday

**Want to
visit?**

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contact
us!**



The image shows a screenshot of the Facebook page for 'Mjostårnet'. The page header includes the Facebook logo, the name 'Mjostårnet', a search bar, and navigation icons for 'Startside 1', a profile picture, and notification icons. The main content area features a large photograph of a modern building's interior, showing a long, open-plan space with a high ceiling and large windows overlooking a lake and mountains. Below the photo are interaction buttons: 'Likt', 'Følger', 'Del', and 'Kontakt oss'. A status update is visible, stating: 'Mjostårnet har lagt til 3 bilder og en video. 23. august kl. 17:24 · €'. The text of the update reads: 'The construction of timber structures is getting near. We're on schedule, which means that installation starts in the end of next week. More than'. On the right side, there is a 'Samfunn' section with statistics: '571 personer liker dette', '579 personer følger dette', and 'Anne Christina Müller og 167 andre venner liker eller har besøkt stedet'. The left sidebar contains navigation options: 'Startside', 'Om', 'Innlegg', 'Videoer', 'Bilder', 'Samfunn', and a green button 'Opprett en side'.

**Follow the Mjostarnet
facebookpage to get updates
from the construction!**