

Glulam beams and columns after 5 years exposure to outdoor climate

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Field tests started 2007

Measurements every summer in 2008-2012

Studies:

- Cracks and moisture contents
- Different materials and surface treatments

This paper:

Moisture contents and cracks in long beams and columns



Bygdsiljum



Borås

Surface treatments: wood oil or paint system



Beams 140 mm x 450 mm with length 9 meters, Bygdsiljum

Beam type	Glulam	Surface treatment
B1	Pine, pressure treated	Wood oil
B2	Pine, pressure treated	White Paint system
B3	Spruce	Red Paint system
B4	Pine, pressure treated	Red Paint system



Columns, length two 2 meter, Bygdsiljum

Column type	Wood	Dimension (mm ²)	Surface treatment
S1	Glulam, pine, pressure treated	90 x 135	Wood oil
S2	Glulam, spruce	90 x 135	White Paint system
S3-1	Glulam, spruce	90 x 135	Red Paint system
S4	Glulam, spruce (hollow)	90 x 135	Red Paint system
S5	Comwood, spruce	Diam. 400	Red Paint system
S6	Quattrolit, spruce	110 x 110	Red Paint system
S7	Solid wood, spruce	100 x 100	Red Paint system
S3-2	Glulam, spruce	90 x 135	Red Paint system



Cracks

Visual inspections included cracks and other defects

Measured cracks: area on the surface = width x length

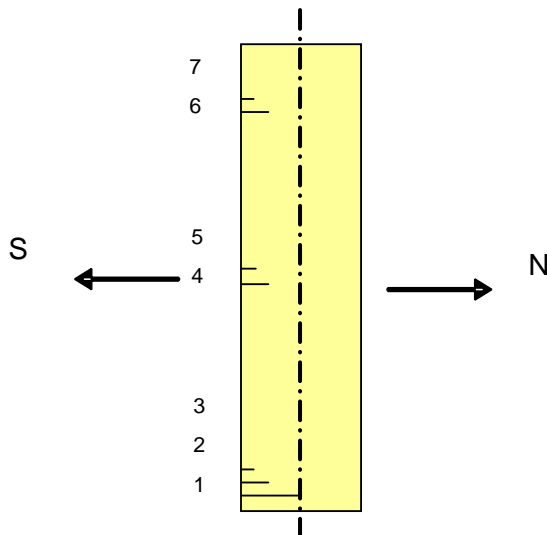


- Width, length and depth of the cracks were measured manually.
- Width = at widest point of the crack.
- Length = straight distance between start and end point.
- Depth = at deepest point of the crack.

Moisture contents

- Manual measurement with fixed pins in the wood and resistive moisture meter.
- Pins in beams at different locations and depths.
- Pins in columns at the bottom and the top on the south side.

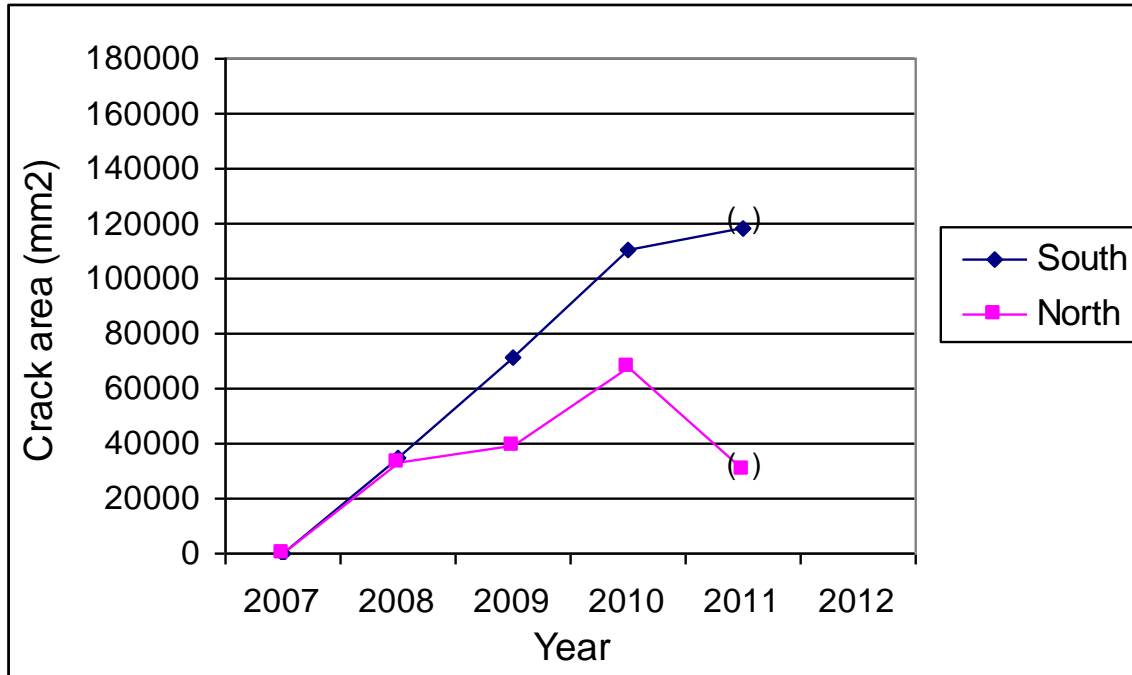
*Moisture contents in
beams, pins at depths
10 mm, 35 mm and 70 mm*



*Moisture contents in
columns, pins at depths
10 mm and 45 mm.*



Crack area (mm²) in beam type B1, (wood oil) on south and north side, average of five beams (2011 only one beam)



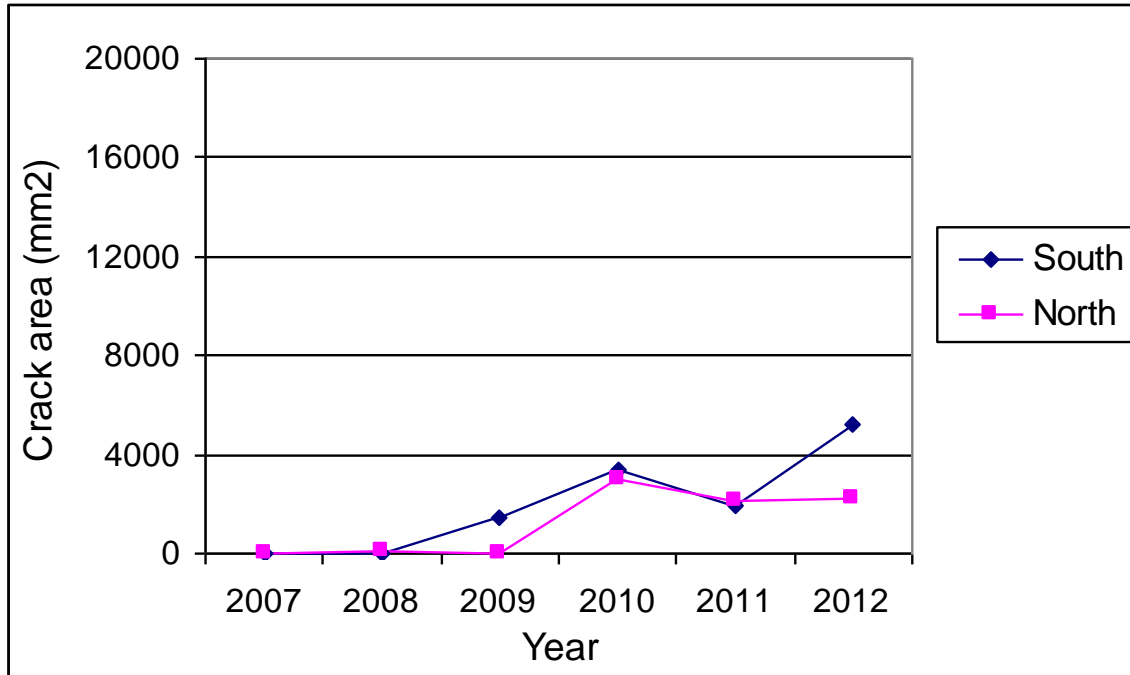
South side



North side



Crack area (mm²) in beam type B2, (white paint)
on south and north side,
average of five beams



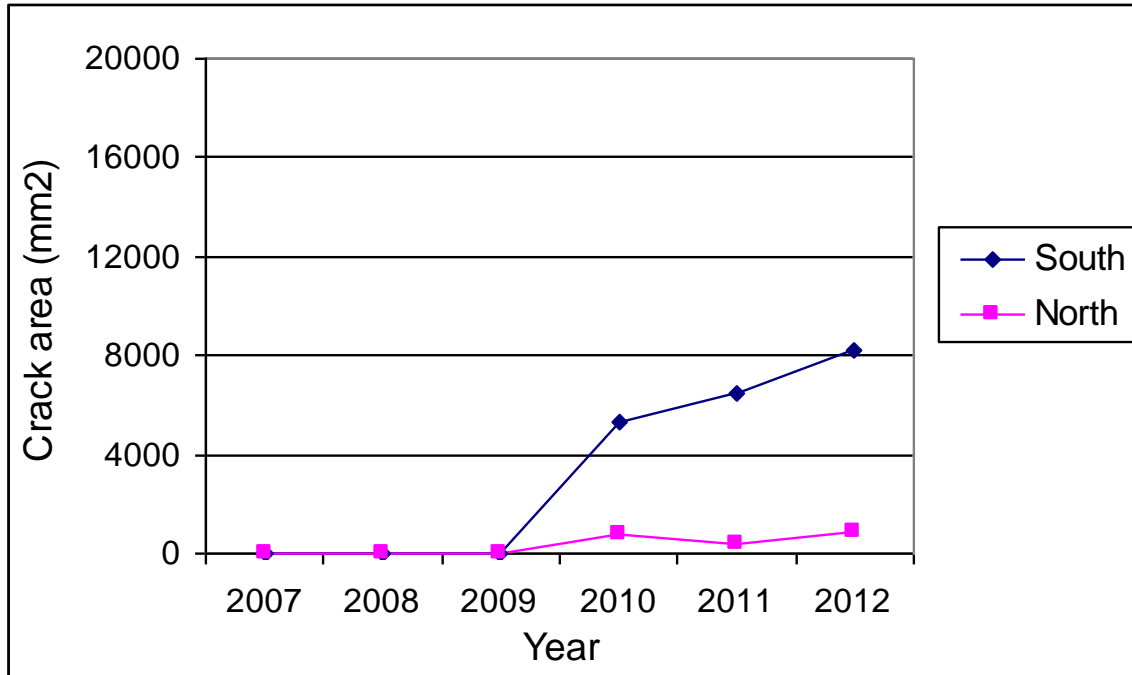
South side



North side



Crack area (mm²) in beam type B3, (red paint)
on south and north side,
average of five beams



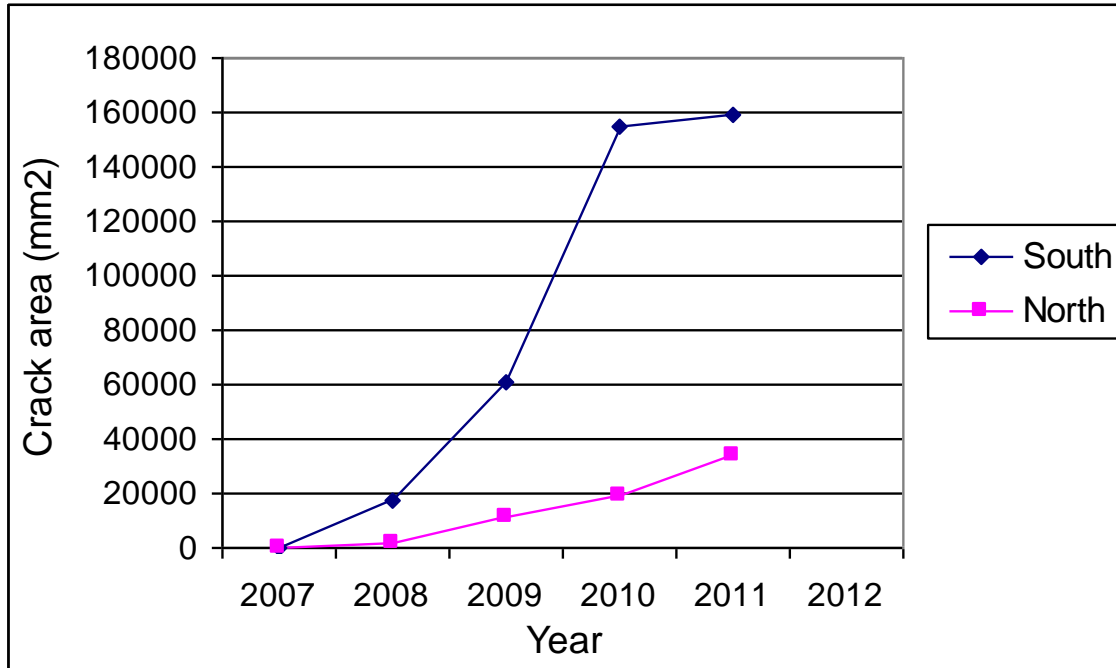
South side



North side



Crack area (mm²) in beam type B4, (red paint)
on south and north side,
average of five beams



South side

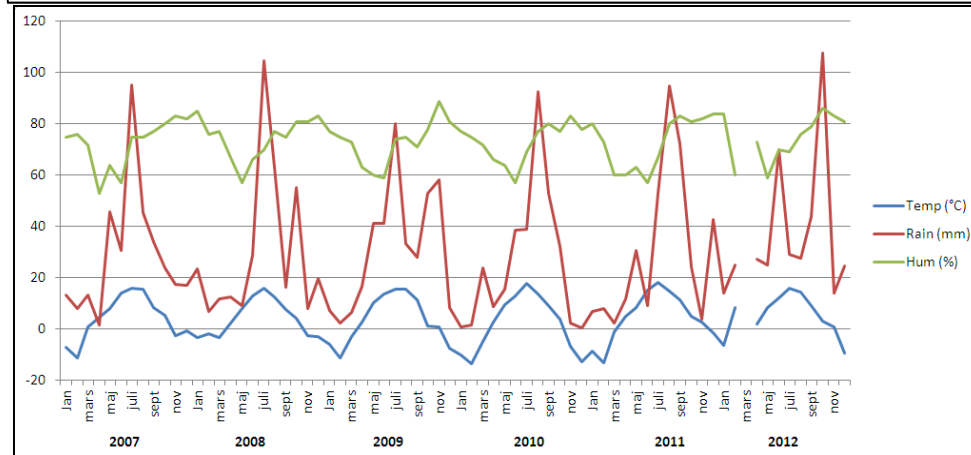
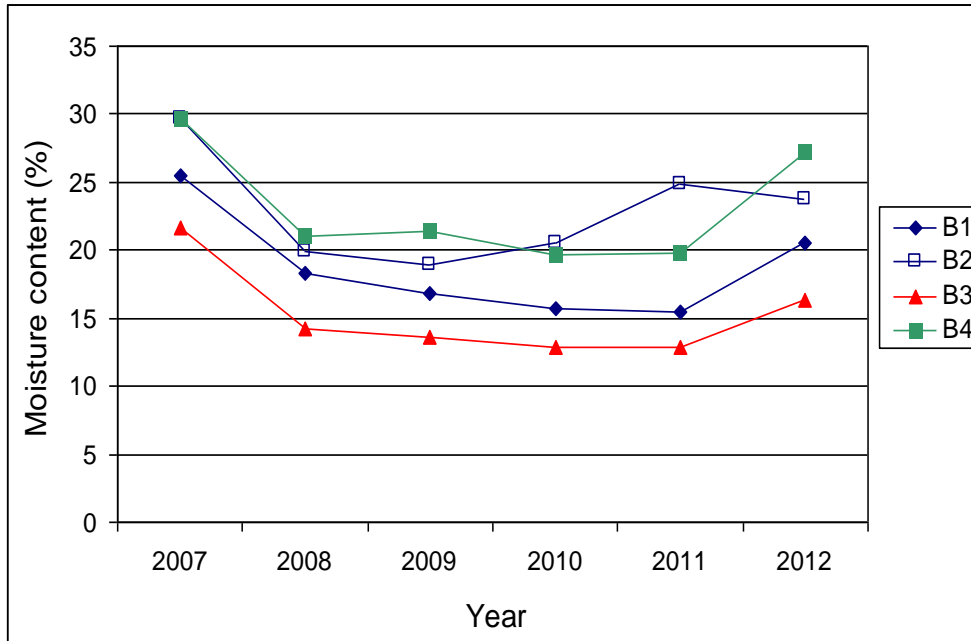


North side



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Moisture contents in beam types B1-B4, average of all pins 1-7 in middle of beam.



B1



B2



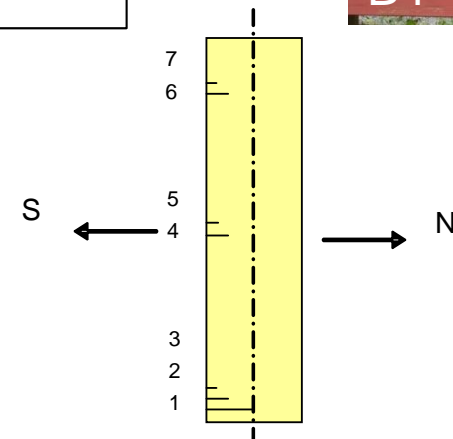
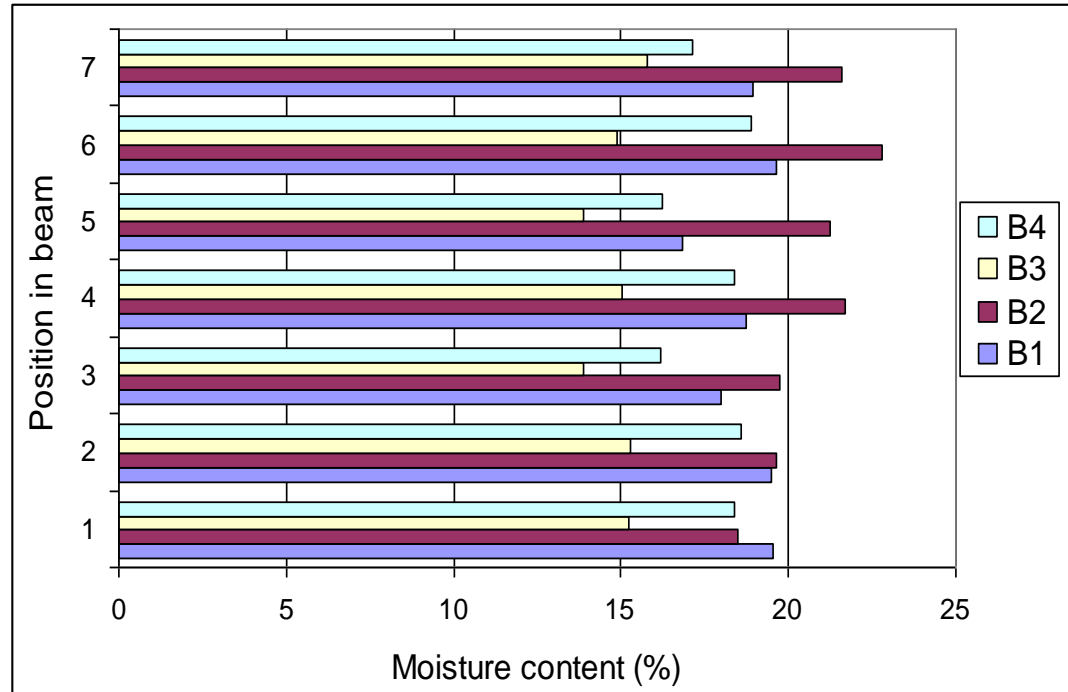
B3



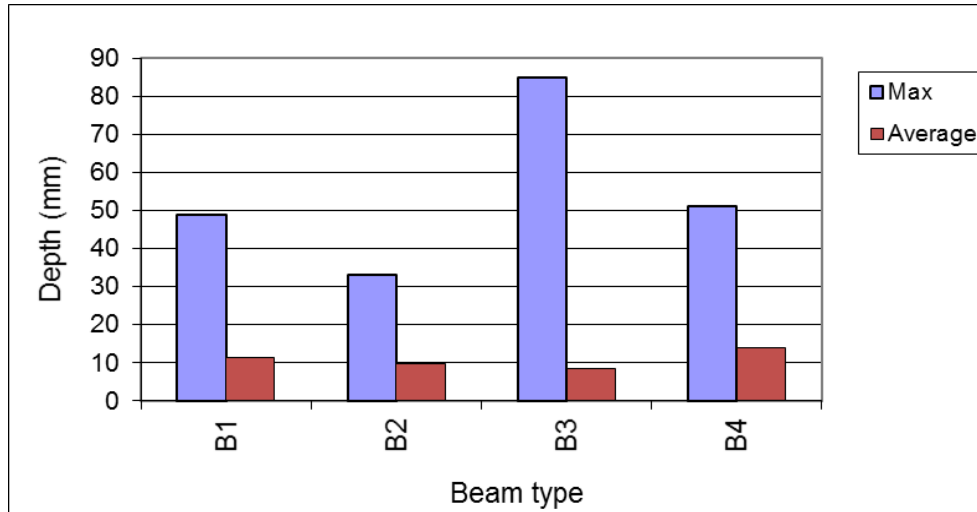
B4



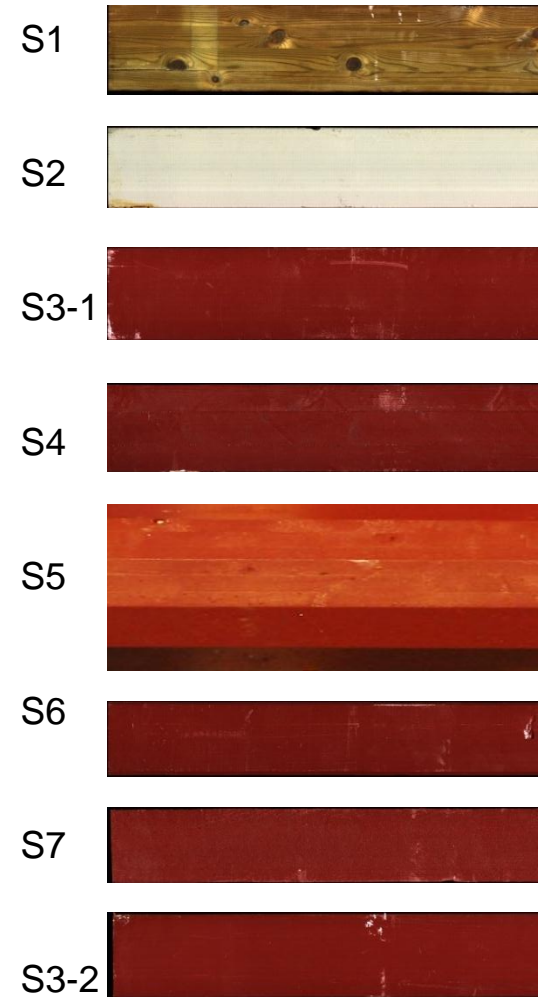
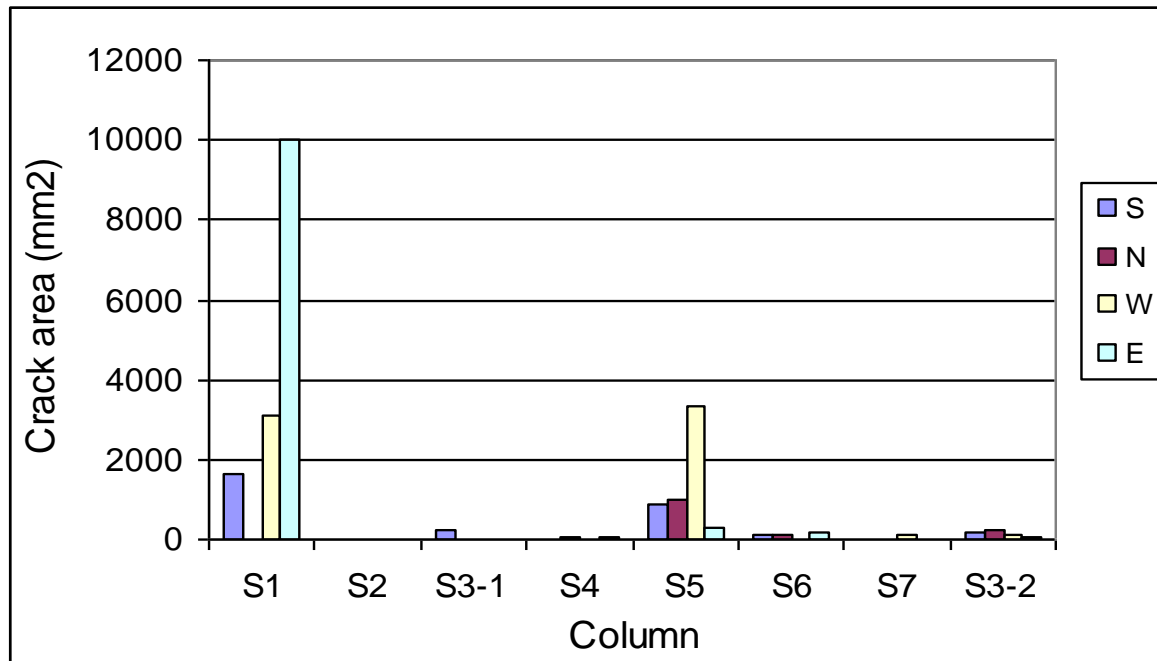
Average moisture contents at pins 1-7 in middle of beams, in beam types B1-B4



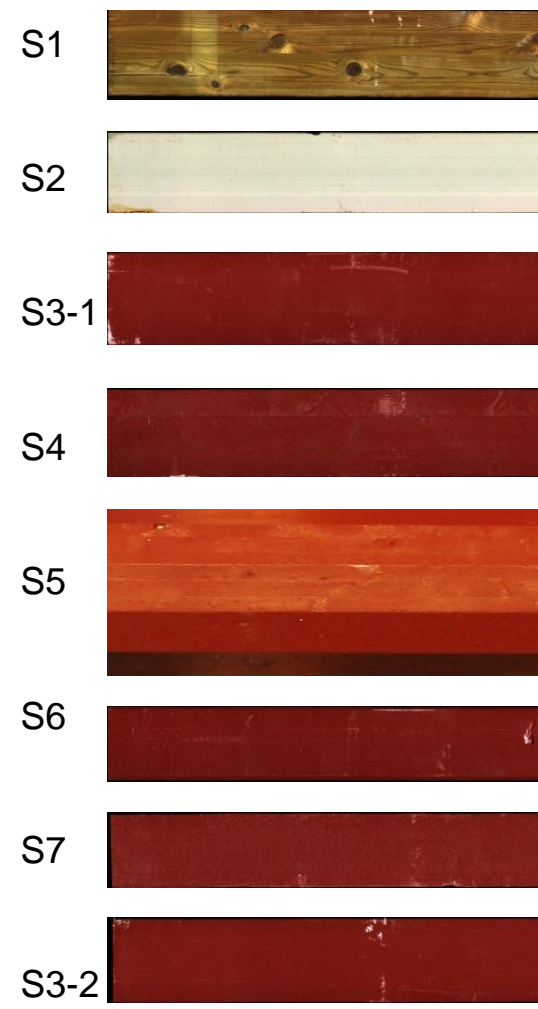
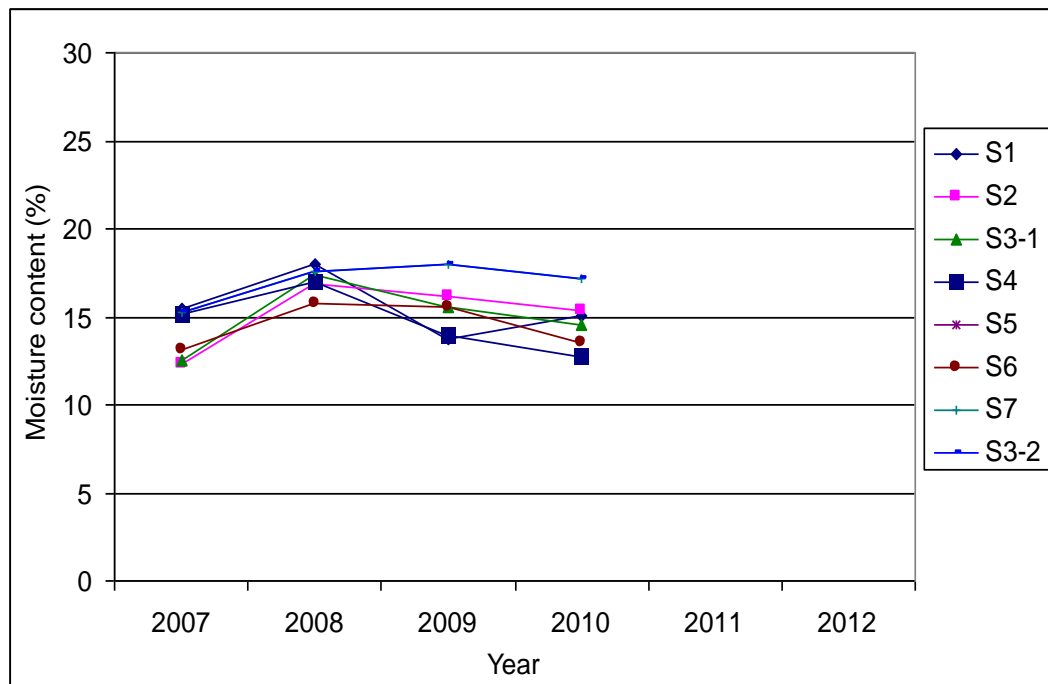
Maximum and average crack depths (mm) in beam types B1-B4



Crack area (mm²) for the different sides of columns south (S), north (N), west (W) and east (E)



Moisture contents in the different types of columns average of all pins 1-4



Summary

Data presented in this paper give an overview of the development of cracks and moisture contents in glulam beams and columns.

Beams after 5 years:

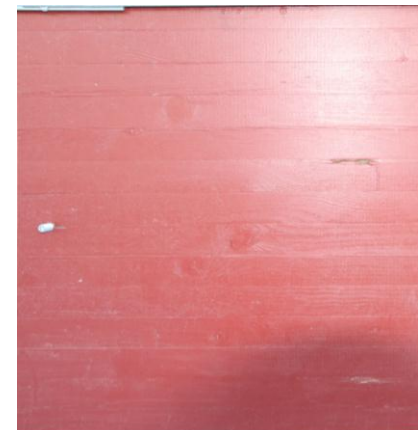
Beam type	Average crack area south (mm ²)	Average crack area north (mm ²)	Average crack depth (mm)	Maximum crack depth (mm)	Moisture content (%)
B1	110 270*	67 470*	11	49	20
B2	5 210	2 230	9	33	23
B3	8 192	830	8	85	16
B4	158 860*	33 530*	13	51	27

*2011 after 4 years

Columns after 5 years:

The moisture contents had not varied much and there were few cracks.

Beam H16, south side



2007



2012

Thank you!



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