

Execution of timber structures

DEVELOPMENT OF A NEW NORWEGIAN STANDARD

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Content



- Background
- Working process and mandate
- Issues under discussion

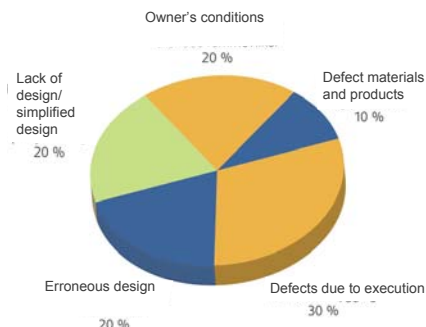
2

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Background

BUILDING DEFECTS

- Estimated costs of building defects (percent of total investment costs):
 - before delivery: 5 %
 - after delivery: 2 – 6 %
- Sources of process induced defects after delivery is shown in the figure



Source: SINTEF Building and Infrastructure

3

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Background

ADVANTAGES WITH AN EXECUTION STANDARD

- Adequate technical quality (good/sufficient) through provisions for planning, execution and control
- More effective building process and reduced amount of building defects
- Increased structural safety and durability



4

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Background

HOW CAN AN EXECUTION STANDARD SOLVE THE PROBLEMS

- Quality control of materials, products and execution
- Require sufficient competence level of personnel
- Ease the communication between the parts in the building process (owner, designer, constructor)
- Satisfy design assumptions
- Specify minimum requirements
- Check list for designers



5

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NEW NORWEGIAN STANDARDISATION PROJECT

- National standardisation project
- Project start: April 2014
Estimated project end: August 2016
- Financial support from Innovation Norway
- Working group with 14 members with varying background
- Initial discussions – few decisions taken
- Inspiration documents:
 - European execution standards for concrete and steel structures
 - New Finnish execution standard



6

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Mandate (1 of 2)

- Development of standard with general rules for execution of timber structures
- Included:
 - structures according to EN 1995
 - structures of solid timber, wood-based materials and timber in combination with other materials
 - structures built on site and use of prefabricated structures
 - permanent and temporary timber structures



7

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Mandate (2 of 2)

- Excluded:
 - manufacturing of prefabricated timber structures with product standard
 - use of special technology and innovative solutions
 - specification, production and conformity assessment of materials
 - safety and health aspects
 - contractual- or responsibility issues
- The draft should be basis for an European execution standard
- Provisions with requirements for competence level, quality assessment and quality control shall be included



8

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Superior issues under discussion



- Who is the typical user of the new execution standard?
 - responsible constructor
 - important that the designer know the standard
- How can the new standard solve/reduce the problem with lack of design? How can the constructor be aware of lacking design?

Geometrical tolerances (1 of 2)



Geometrical tolerances shall prevent detrimental effects in terms of:

- mechanical resistance and stability (also in transient phases)
- service performance during use
- placing compatibility during erection (also according to non-bearing components)

[EN 13670]

Geometric tolerances (2 of 2)

- Separate provisions for production tolerances and erection tolerances
- Several tolerance classes – is three classes sufficient?
- Tolerances for structural components – how can we combine it with high requirements to surface deviations?
- Tolerances at the border to other building materials should be included (for instance concrete foundations)
- Tolerances for edge distances in connections should be included



Quality control



- The quality control shall verify that the construction is according to the execution specifications
- Difficult to write detailed provisions due to the large variation in complexity
- Draft provisions will be based on the European execution standard for concrete structures
- For prefabricated products it should be required documentation of the factory control
- Important to control the execution of connections, especially for complex building projects

Connections

- Should require detailing and precise assembling instructions of each load-bearing connection
- Is it possible to include provisions for future connection types, for instance new screw types
- How can the constructor control that the connection is designed (design quality problem)



13

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Moisture control



- Many building defects is caused by moisture (leading to reduced durability)
- Critical moisture content should be specified
- Requirement dependent on product types, application area of structure or relative humidity in surrounding air
- Moisture content in delivered timber products is essential and should be specified
- How can we deal with moisture movements due to unintended moisture absorption on site?
- Different protection levels when storing materials or products, important that the designer's choice is not too conservative

14

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Moisture control



- How to handle high moisture content in built-in materials
- Shrinkage effects in pre-stressed construction elements
- High-rise buildings
 - increased number of floors and use of double sills give large total shrinkage effects
 - plan to prevent swelling and shrinkage movements i buildings with more than 3 – 4 floors
- Consequences of one-sided surface treatment
- Sealing the edge of openings

15

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Other issues under discussion

- Guidelines should be given for
 - making holes and openings and cutting in wood on site
 - corrosion protection of fasteners
 - surface treatment of wood and negative effects on fasteners
 - tightness of building envelope, significance for durability



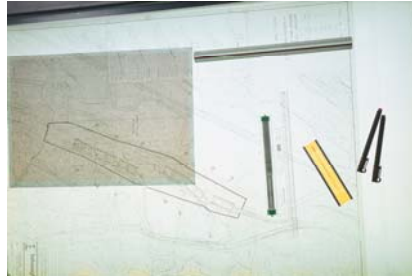
16

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Conclusions

- Many issues under discussion – few decisions taken
- Lack of design – the execution standard should have superior provisions demanding design of all load-bearing structures
- Some problems have to be solved other places, for instance in guidelines



Takk for oppmerksomheten!

Mer informasjon?

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