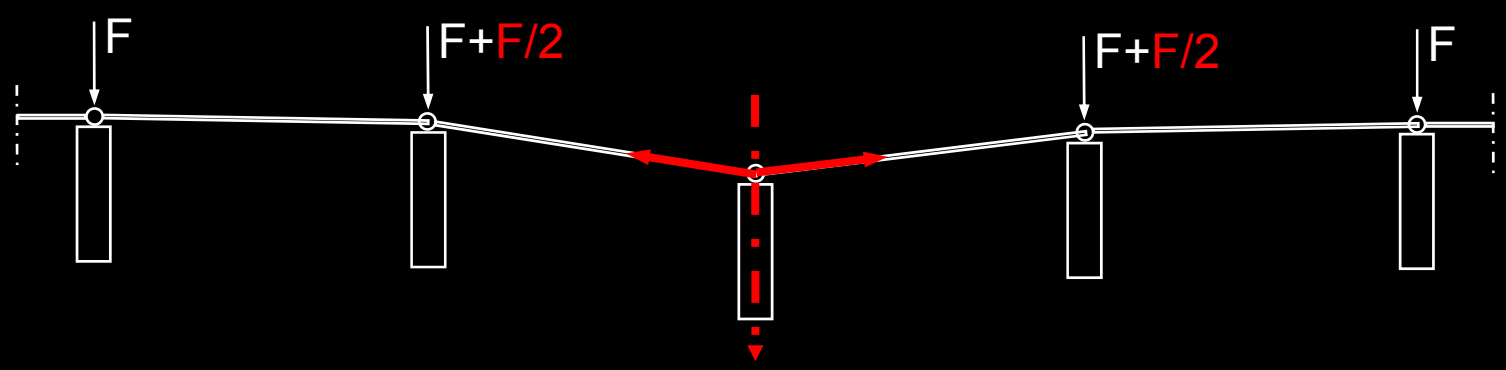
COST E55 – WG 3
Details for Robust Timber Structures

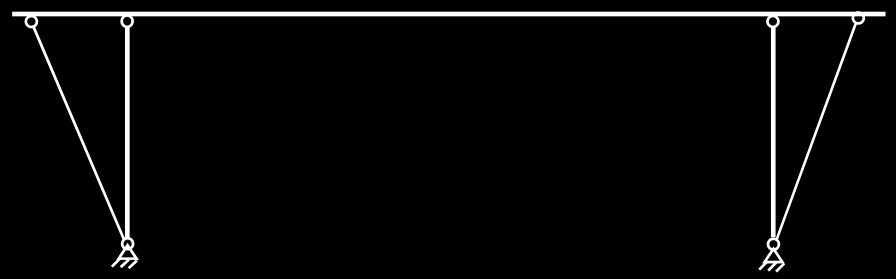
March 25th – 26th 2010
Coimbra, Portugal



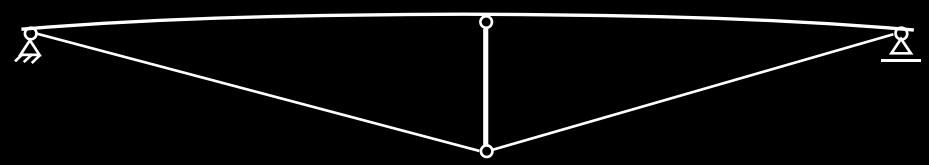
Primary Systems – Robustness Considerations

- Increase redundancy in primary structures
- Possibilities to increase redundancy of primary systems in wide-span timber structures

a) Indeterminate Structural System (e.g. frame-systems, here: V-shaped frame corner)



b) Internal Indeterminacy (e.g. beam trussed with sag rod)



Secondary Systems - Problem Statement

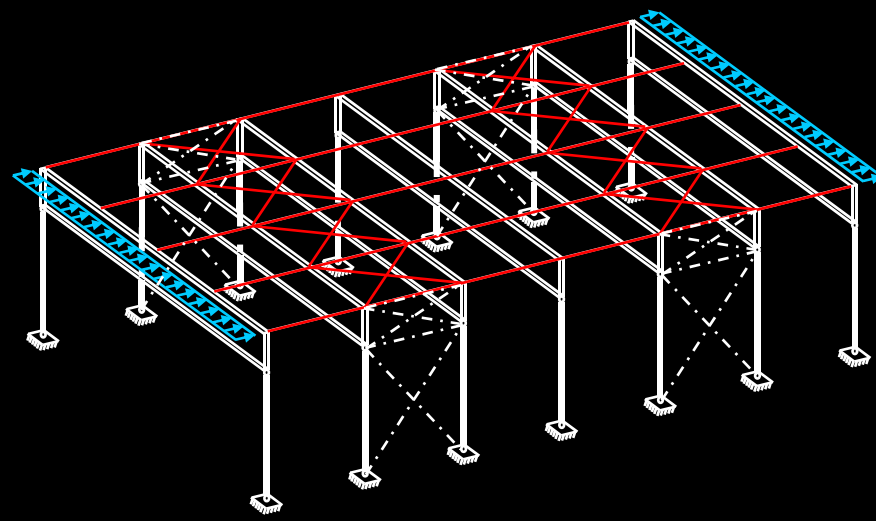
- Two requirements for typical purlin systems:

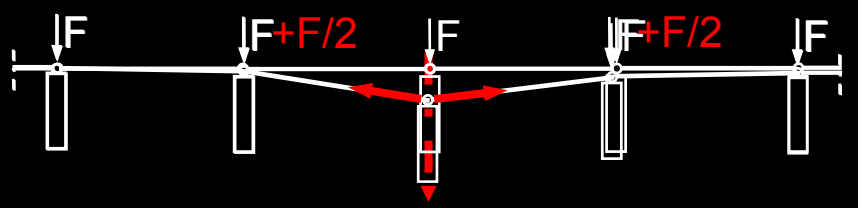
  a) carry and transfer vertical loads from the roof structure

  b) perform as part of the bracing system, transferring horizontal loads and laterally stabilizing main members

→ purlins have to transfer horizontal (axial) loads in tension and compression

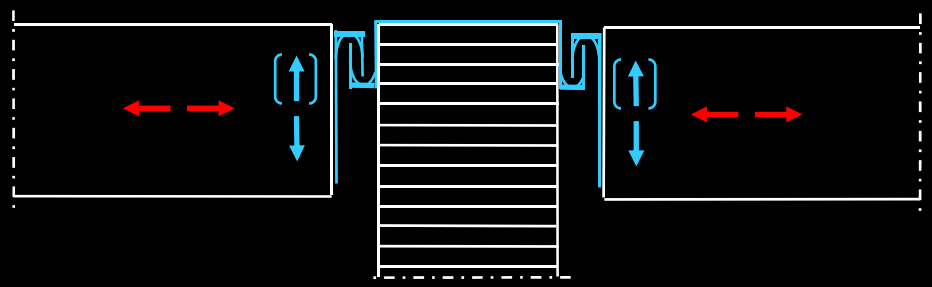
→ if one main member fails, the purlin systems will develop into a tie member, transferring the vertical loads from the failing member to the adjacent members



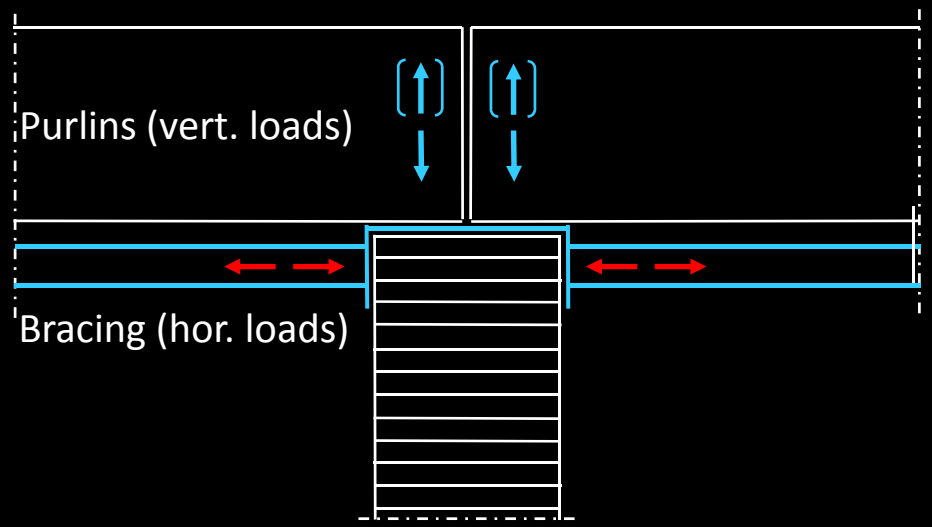


Secondary Systems – Possible Details?

a) Enable easy detachment between members (no over-design of connections for horizontal (axial) forces)



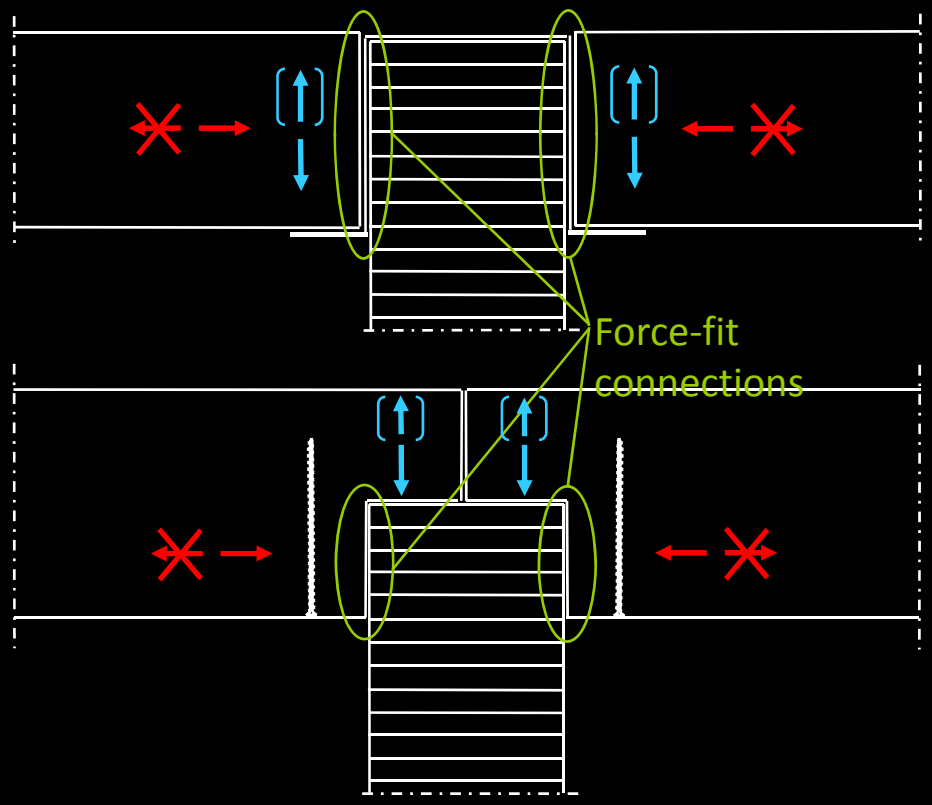
b) Separate both functions
- purlin system for vertical loads
- bracing system for horizontal loads

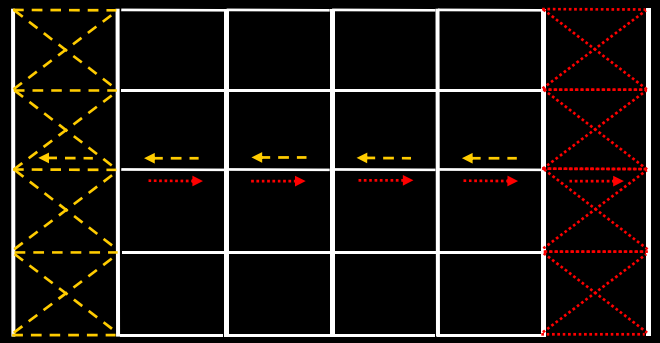


Secondary Systems – Possible Details?

c) Design purlin system to only carry horizontal loads in compression

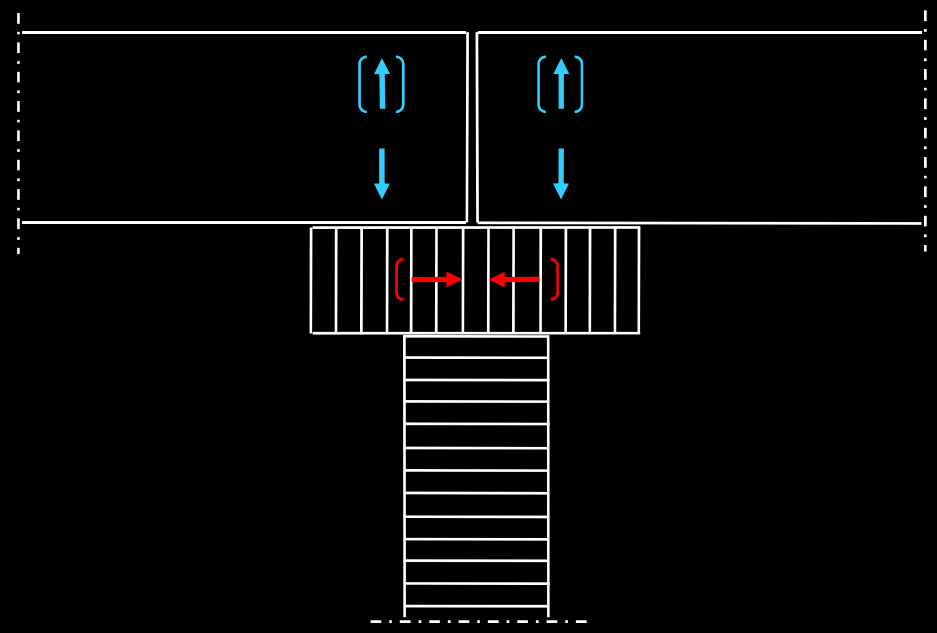
→ at least two cross-bracings necessary since loads can only be transferred uni-directional





Secondary Systems – Possible Details?

d) Design primary elements to be internally stable against lateral torsional buckling, in addition being able to transfer external horizontal loads (e.g. wind loads) around its “weak” axis



- Roof Cladding:
  - support failing purlin?
  - shall not support load transfer in the case of a failing main member!

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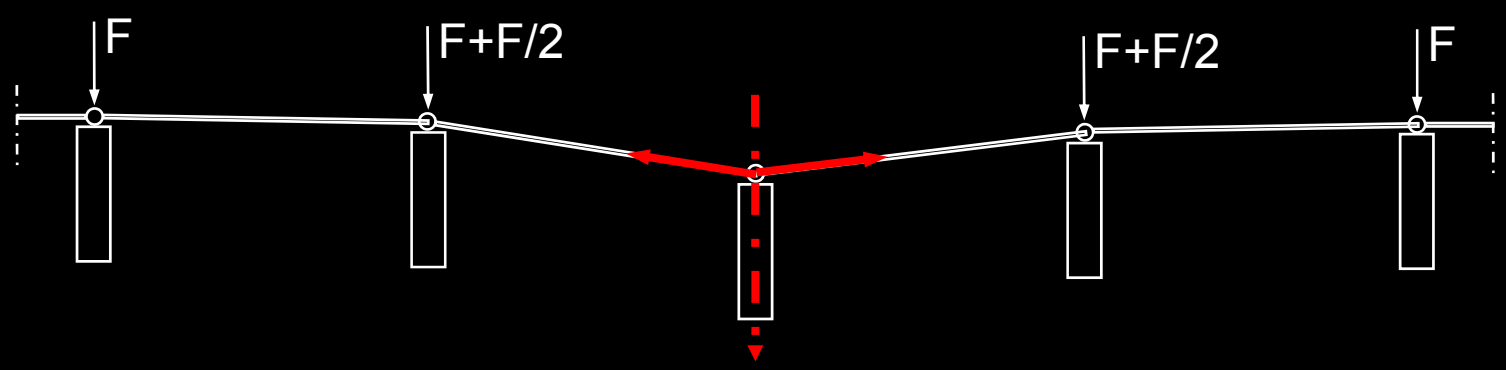
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