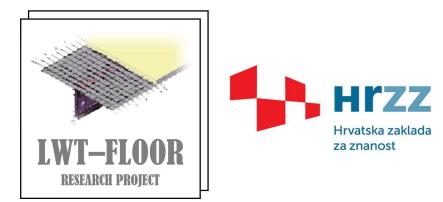
Project title: Innovative lightweight cold-formed steel-concrete composite floor system Acronym: LWT-FLOOR Project ID: UIP-2020-02-2964 1st LWT-FLOOR Workshop

Numerical Analysis of Lightweight Cold-Formed Steel-Concrete Composite Floor System

Andrea Rajić, Vlaho Žuvelek

andrea.rajic@grad.unizg.hr vlaho.zuvelek@grad.unizg.hr

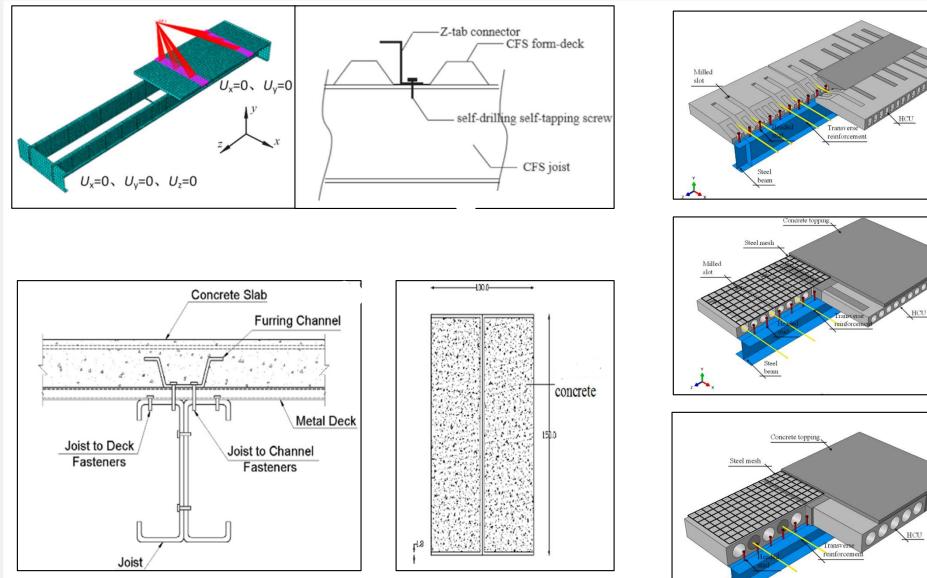




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Steel-concrete composite beams



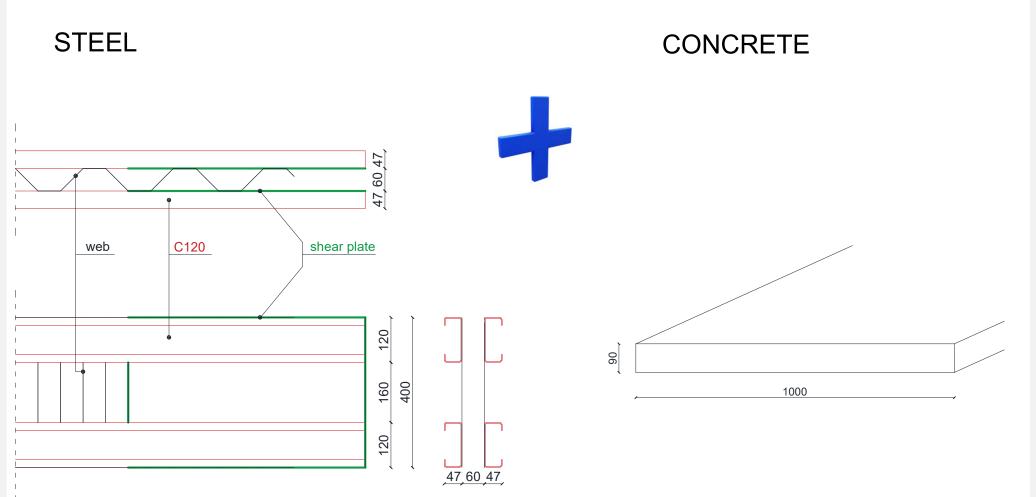




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Analysed composite beam



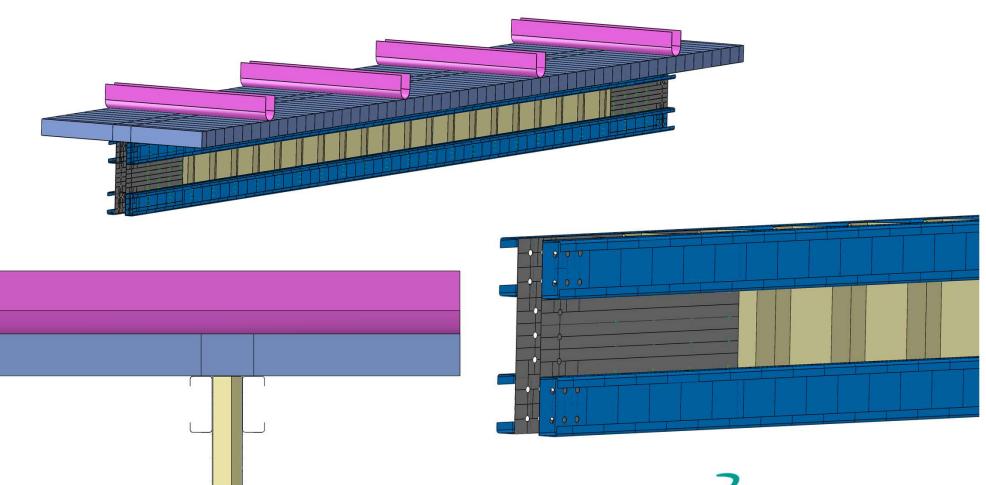




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Numerical models





ZS SIMULIA ABAQUS



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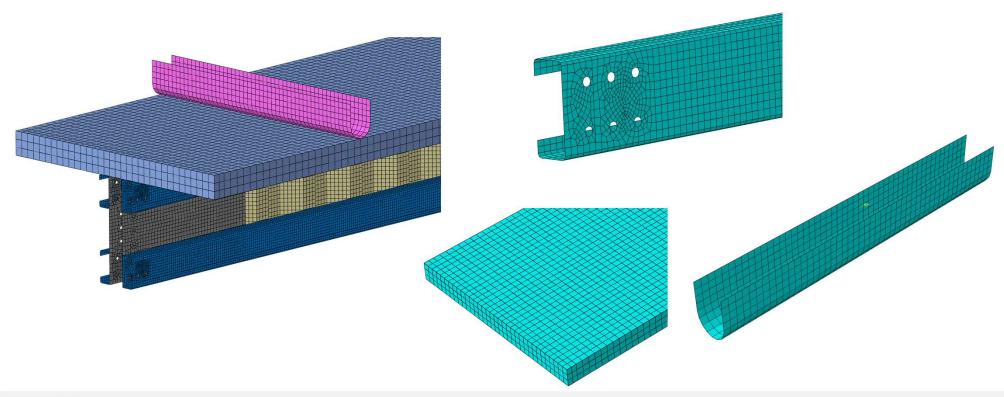
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Numerical models

- FE mesh density:
 - Steel section: 10 mm
 - Loadings: 20 mm
 - Concrete slab: 30 mm



- Element type:
 - Steel section: S4R
 - Loadings: S4R
 - Concrete slab: C3D8R

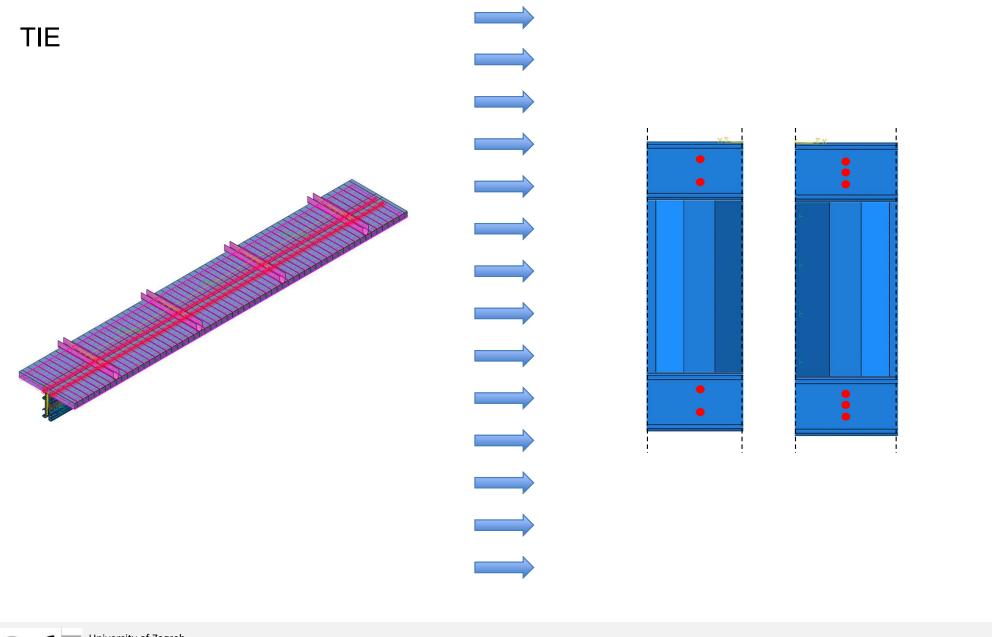




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Connection between elements

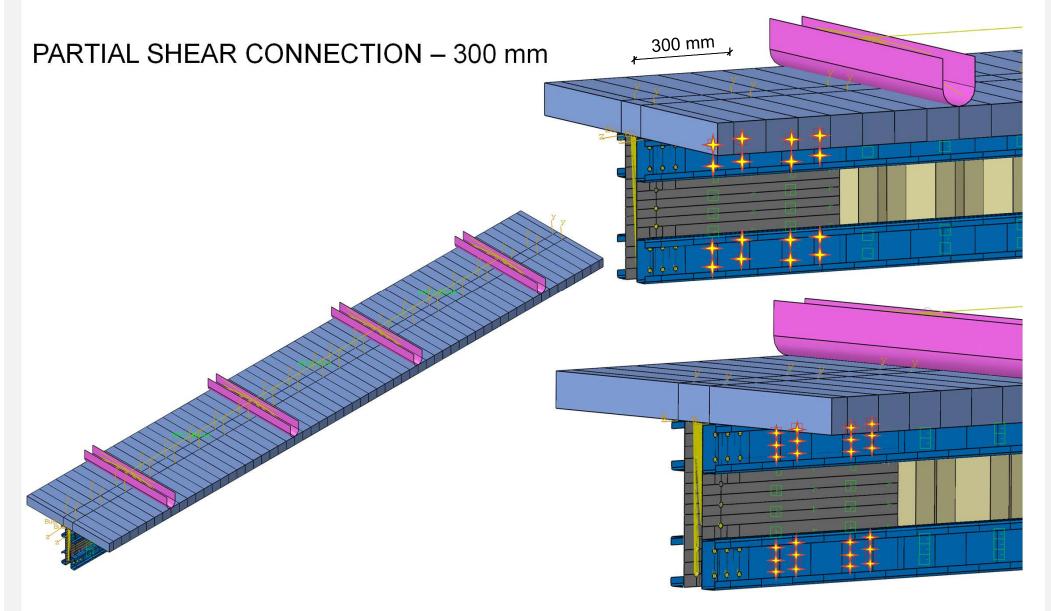




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Connection between elements



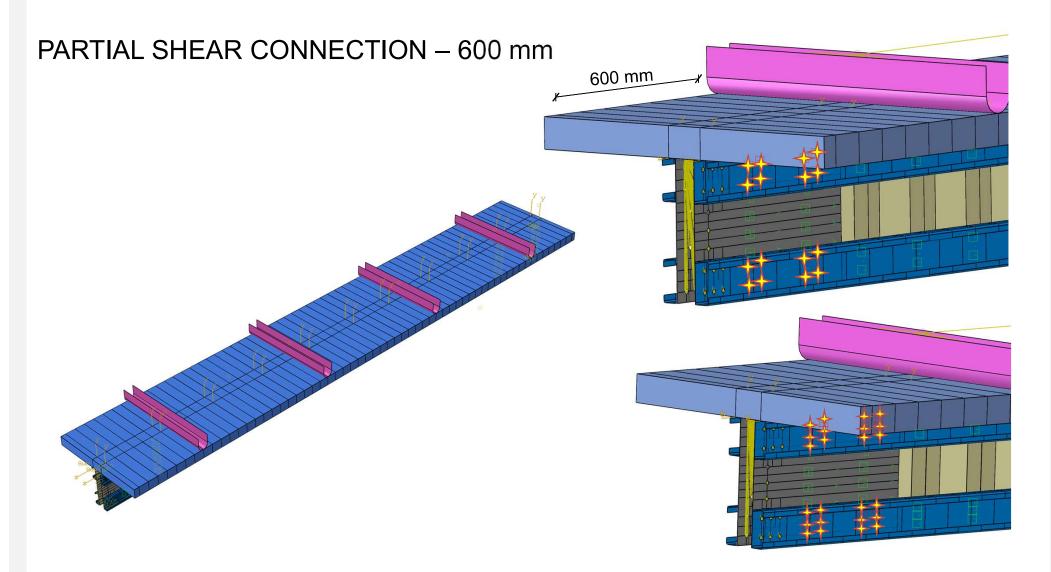




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Connection between elements



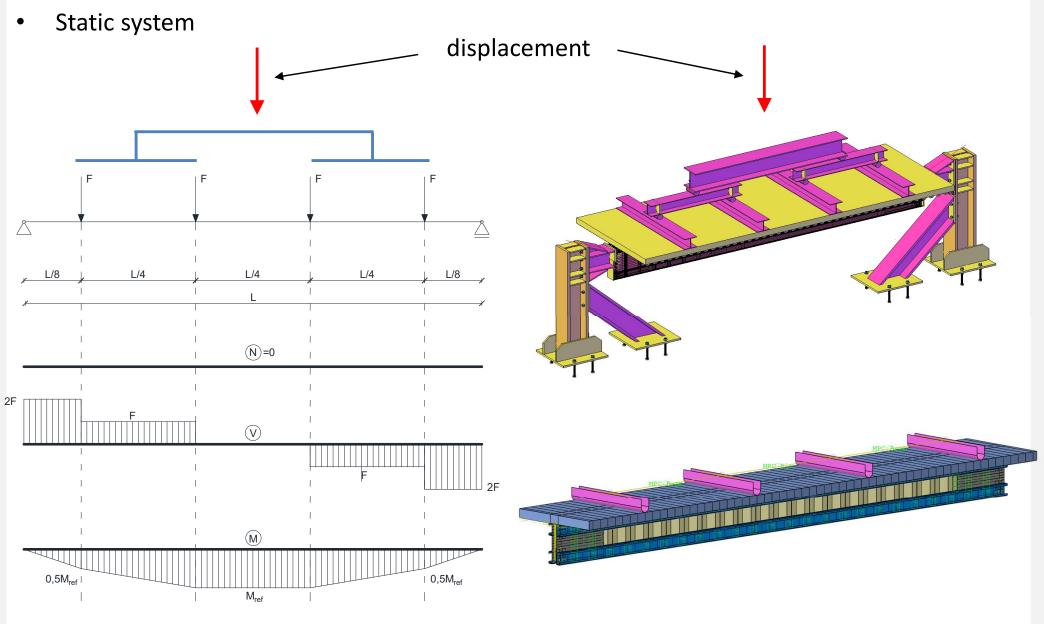




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Analytical and nummerical models





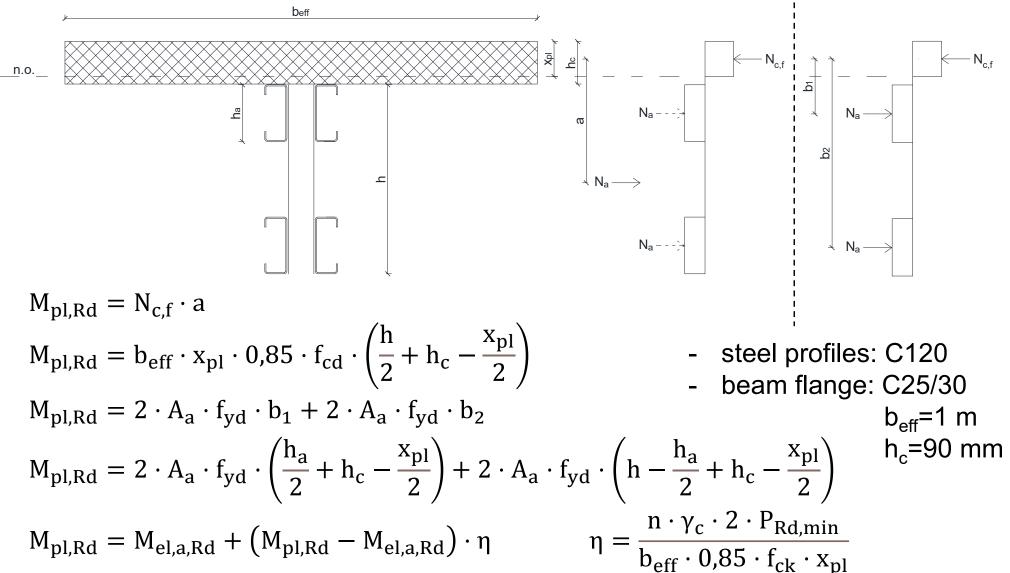


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4. Analytical and nummerical models



Analytical Model – full/partial shear connection

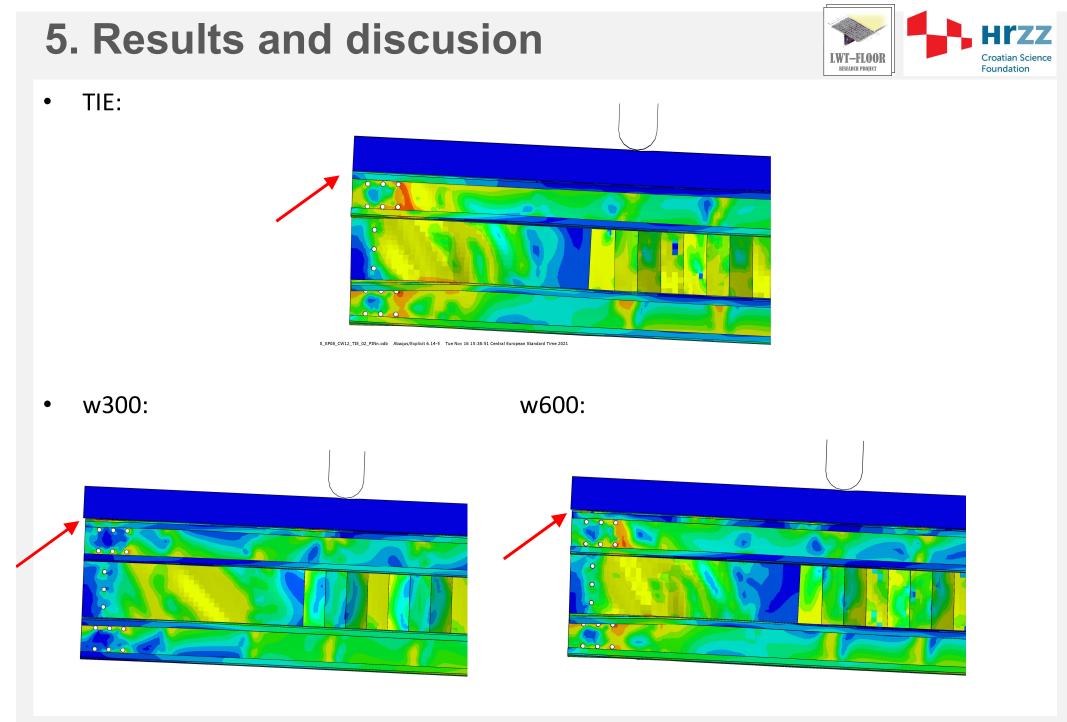




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1st LWT-FLOOR Workshop

17th November 2021, Online, Presenters: Andrea Rajić, Vlaho Žuvelek

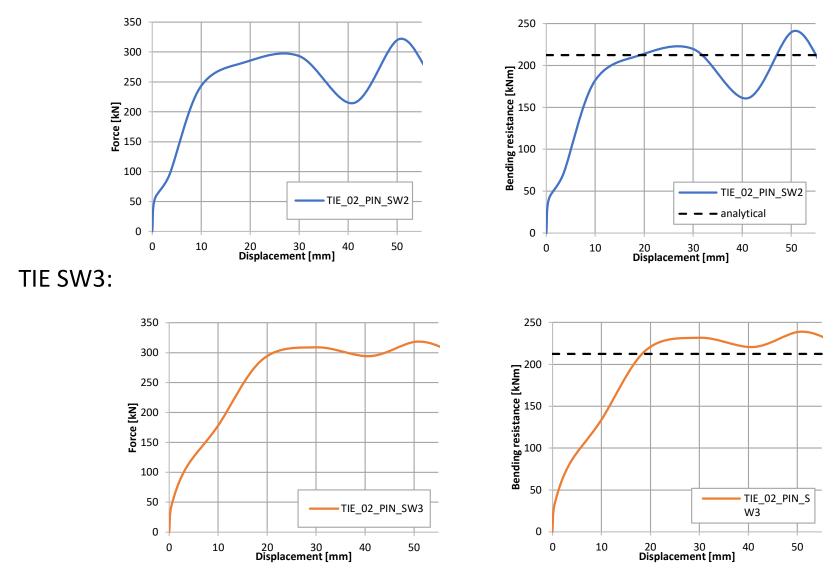




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• TIE SW2:



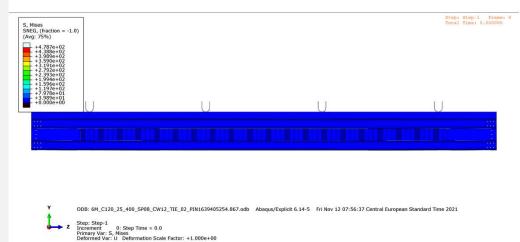


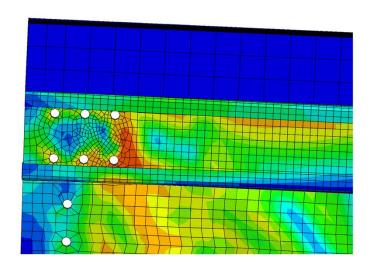
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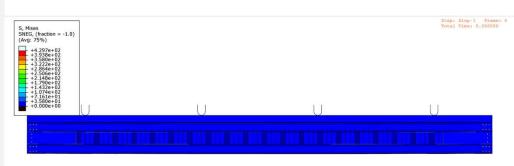


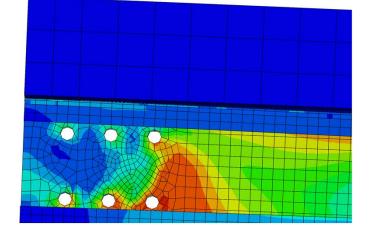
TIE SW2





TIE SW3





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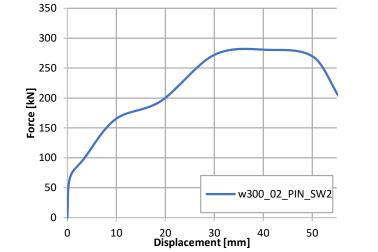
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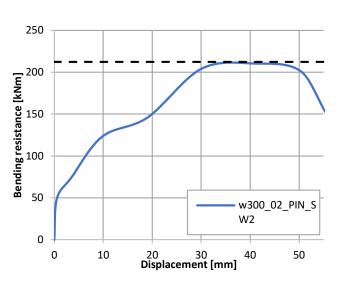


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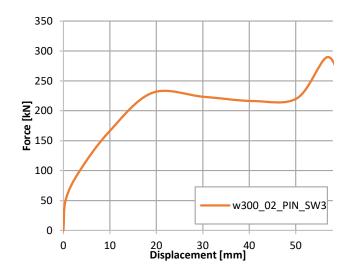


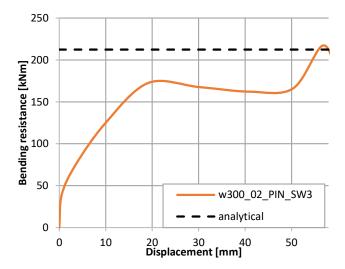
• w300 SW2:









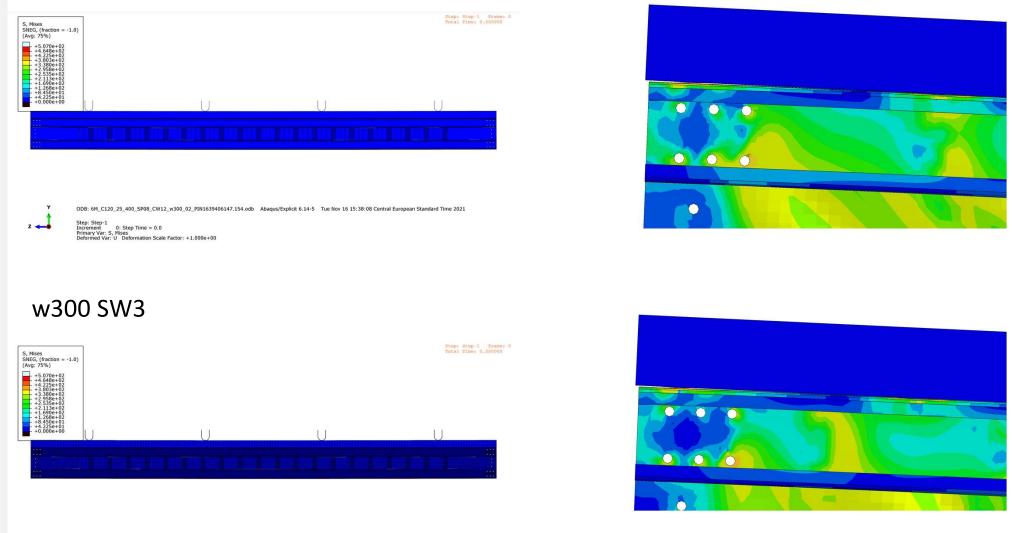




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w300 SW2



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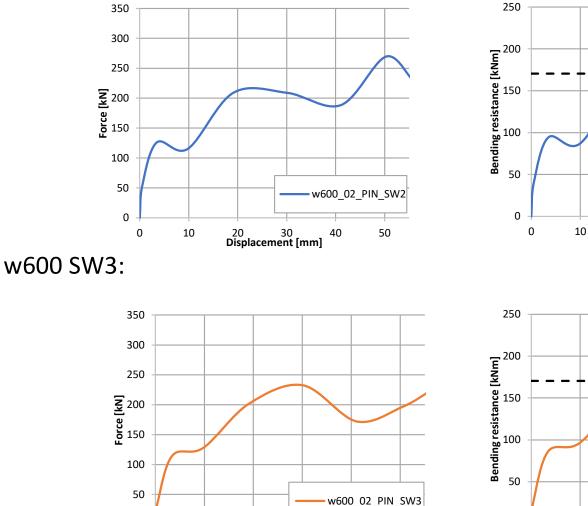
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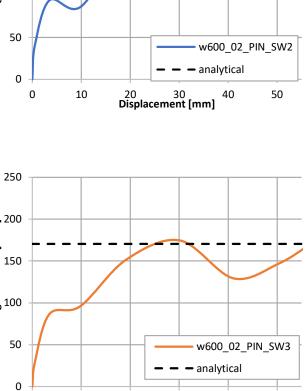
• w600 SW2:



20 30 Displacement [mm]

40

50



20 30 Displacement [mm] 40

50

10

0



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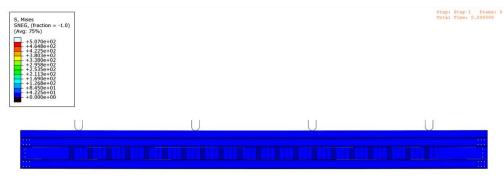
0

0

10

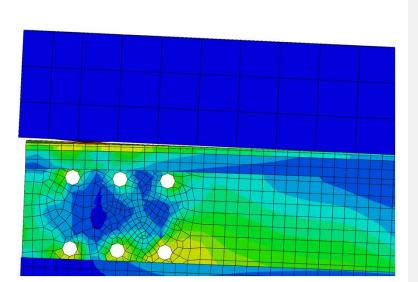


w600 SW2

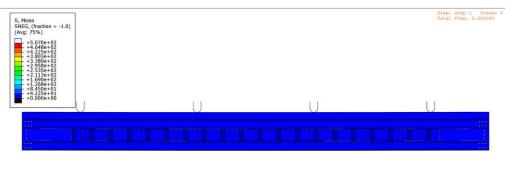


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Step: Step-1 Increment 0: Step Time = 0.0 Primary Var: S, Mises Deformed Var: U Deformation Scale Factor: +1.000e+00

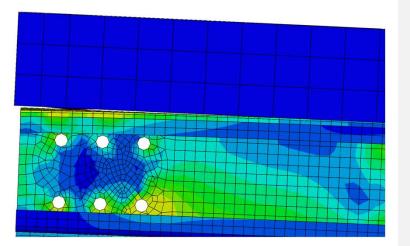


w600 SW3



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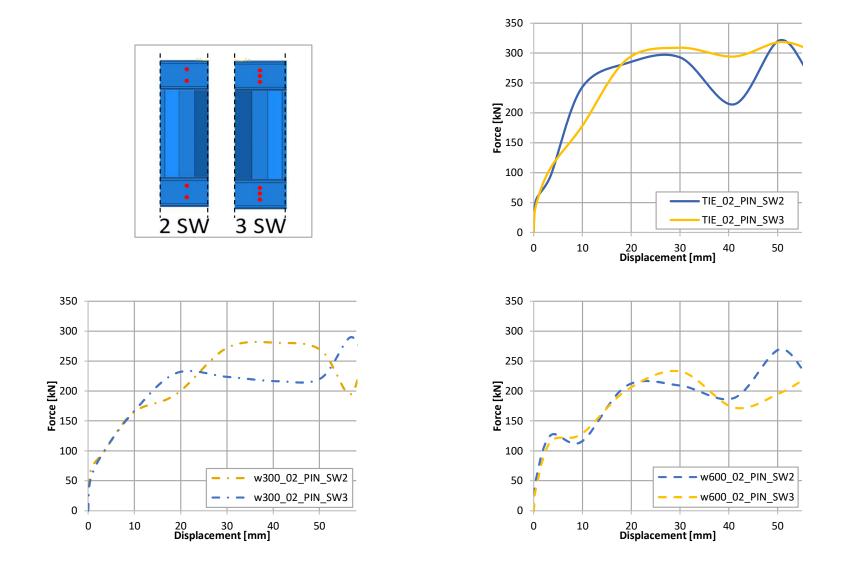




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• Comparison of the results

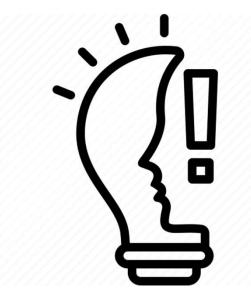




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6. Conclusions

- Steel-concrete structural systems are, due to their efficiency, increasingly used in the construction industry and are the subject of intensive research.
- The system offers vital benefits in terms of a high degree of prefabrication, reusability and long spanning capability to maximize the values of building components and materials.
- bending capacity of the LWT-FLOOR beams is affected by the resistance of the cold-formed steel components, as well as by degree of shear connection.





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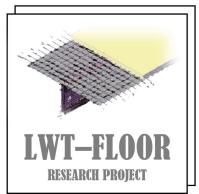
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