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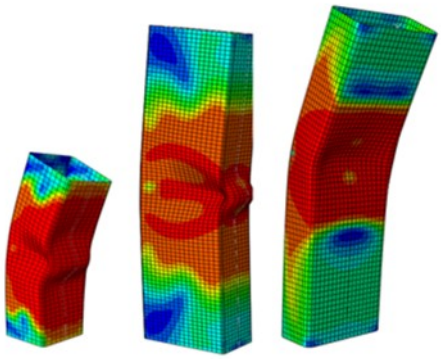
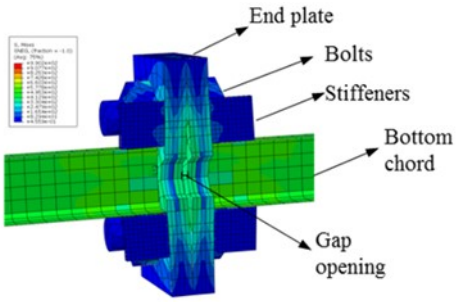
Structural performance of High Strength Steel Structures

High Strength Steel (HSS) which was introduced relatively recently as a constructional material is defined in structural engineering as steel with yield capacity higher than 460MPa. The increased material properties of HSS lead to smaller sections, which in turn result in less material used and hence in cost and energy savings. On the other hand, HSS slender sections are more susceptible to buckling phenomena and deflection limitations. These structural concerns together with limited practical experience and restricted market availability seem to discourage designers from applying HSS for their projects. In addition, most of the design codes around the world have only recently updated their specifications to make them applicable to higher steel grades, whereas many of their parts have been based on experimental results on normal strength steel due to limited test data on HSS.

The aim of the current project was to enhance the knowledge on the structural response of HSS. To achieve this, structures in steel grades S460 and S690 were modelled in the general purpose finite element package ABAQUS. The developed numerical models were validated against experimental data and subsequently used for the execution of parametric studies. Both linear and non-linear static analysis are performed, whilst geometric imperfections were properly considered. The results were used in order to assess codified design specifications.



Modelling of short columns (failure mode: local buckling)



Modelling of a steel truss joint

Project finished: June 2015

Case study

Client Profile

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Product Used

ABAQUS

Funding

RFCS