A COMPONENT-BASED MODEL FOR FIN PLATE CONNECTIONS IN FIRE

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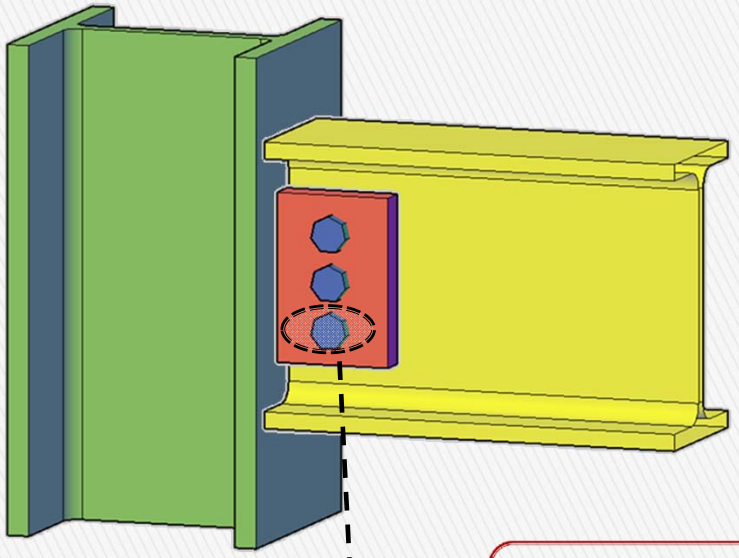
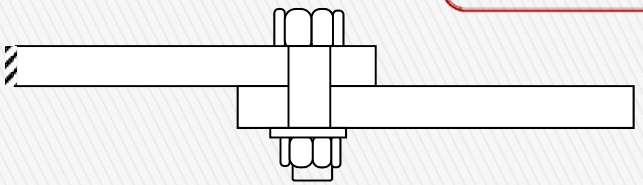
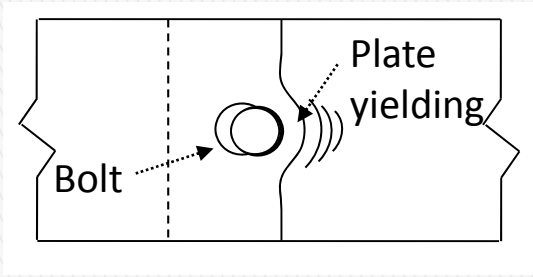
Fin plate connection



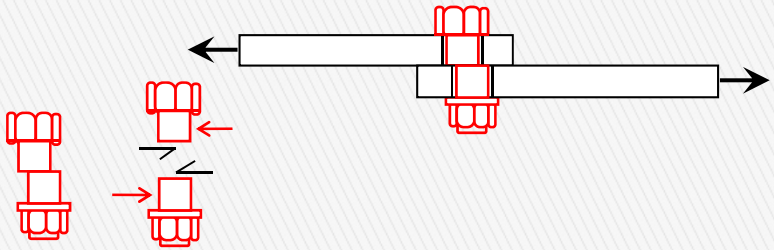


The lap-joint of a single-bolt-row

Fin plate failures

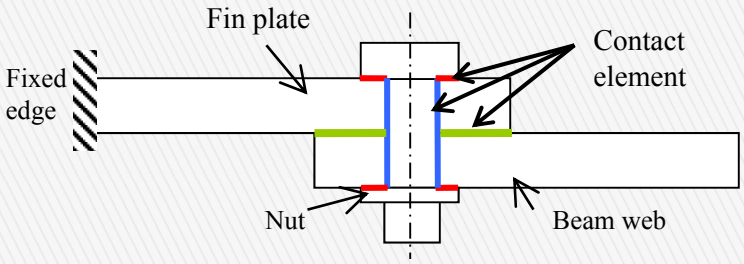


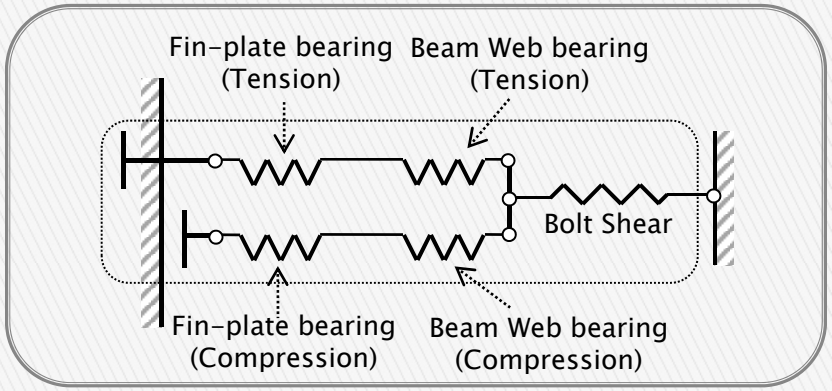
Bearing failure of the plates involves yielding of the plate material close to the contact region at the hole edge.

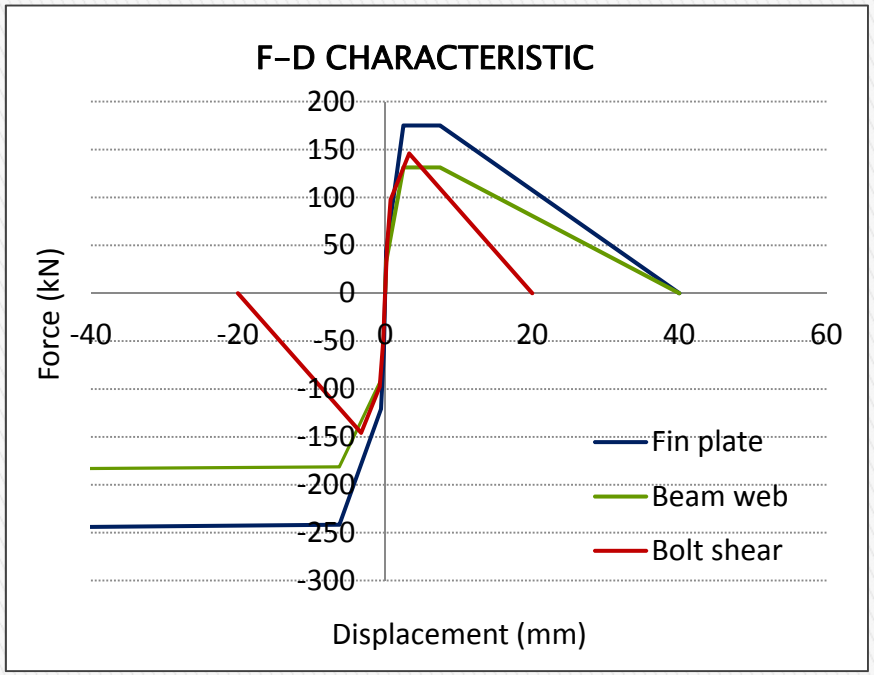


Bolt shear failure affect the integrity of the structural system, having inadequate ductility to ensure simultaneous plastic distribution of the forces taken by the bolts, and therefore allowing a progressive failure.

Component-based model

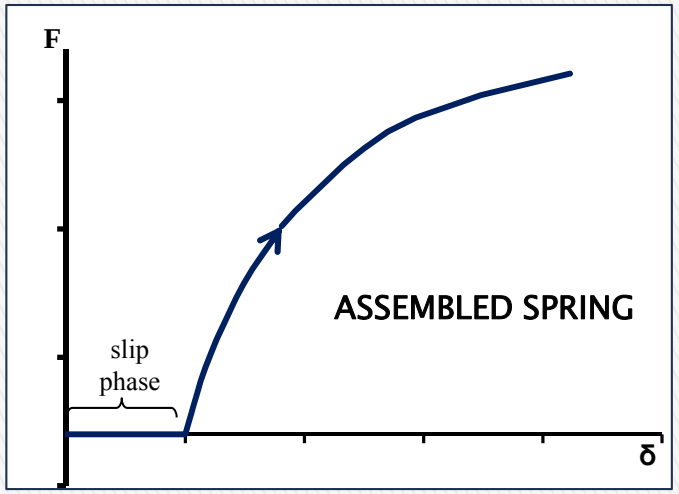


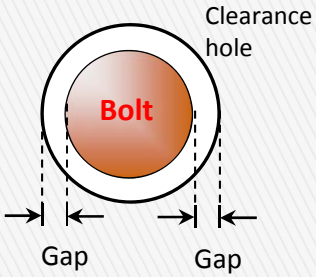


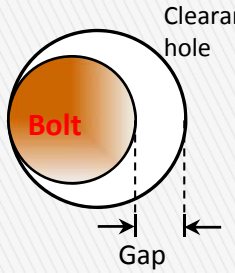


The lap-joint zone consists of three fundamental components with no physical length, placed in series, for each bolt row:

- fin-plate in bearing;
- bolt in shearing;
- beam web in bearing.



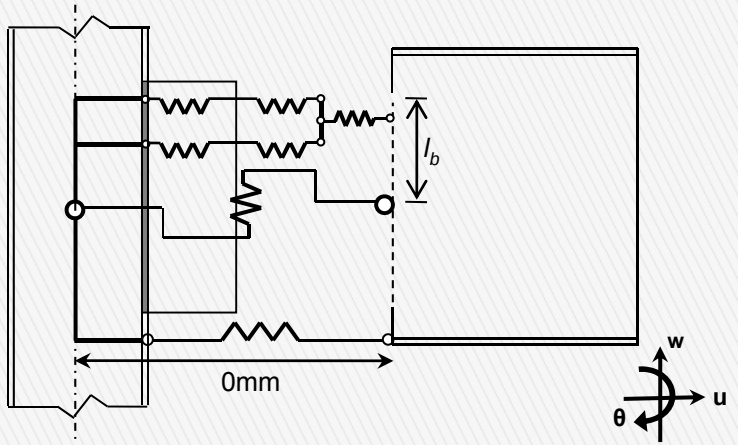




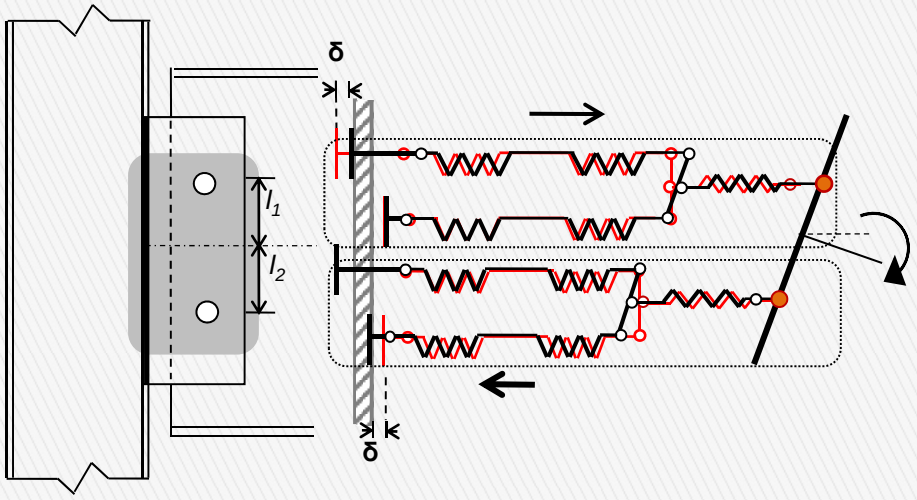
Component model position

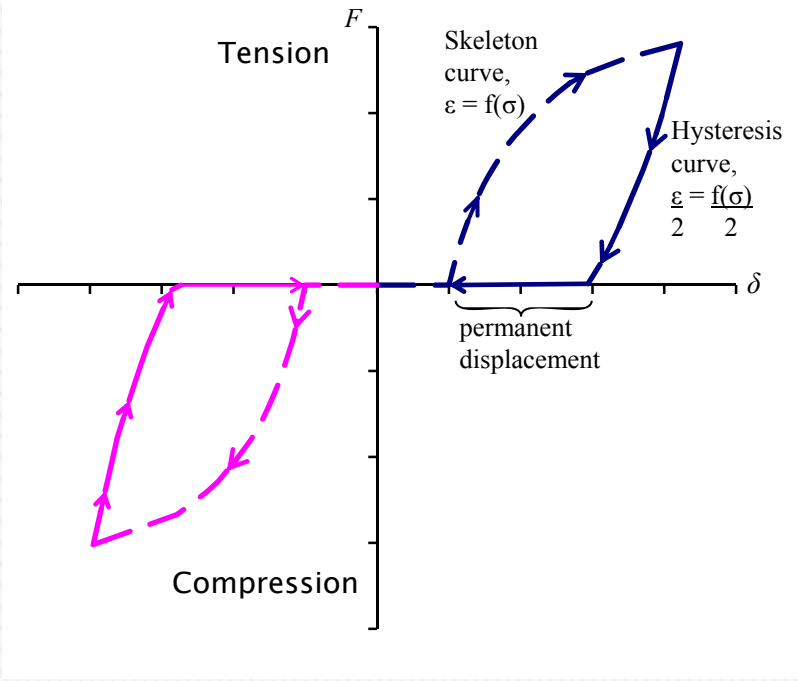
The joint element on the beam-to-column connection zone consist of:

- The lap-joint component in series, in each bolt row.
- A vertical shear spring, which is presently assumed to be rigid
- A spring at the lower beam flange



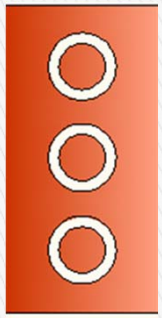
Loading and unloading of component model

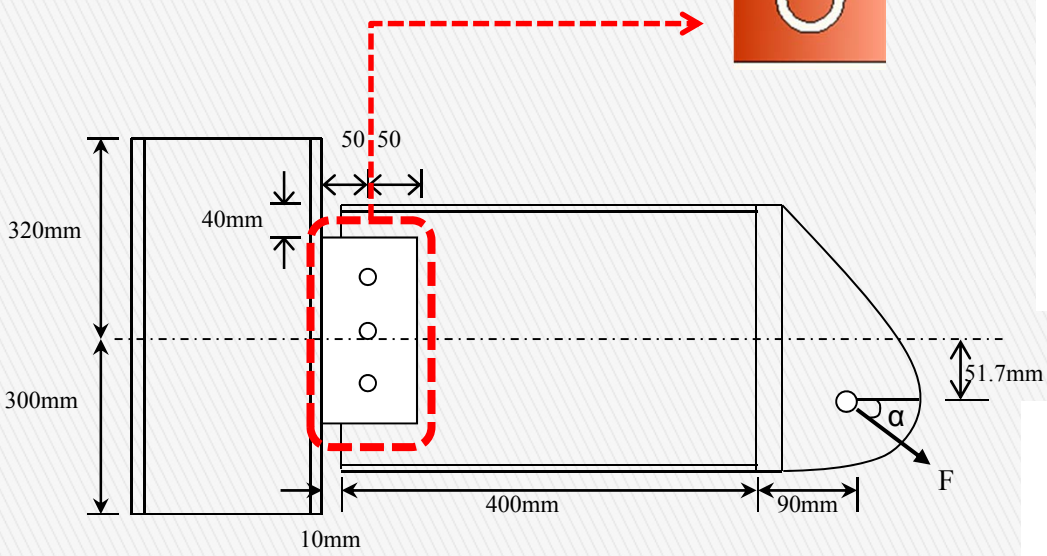




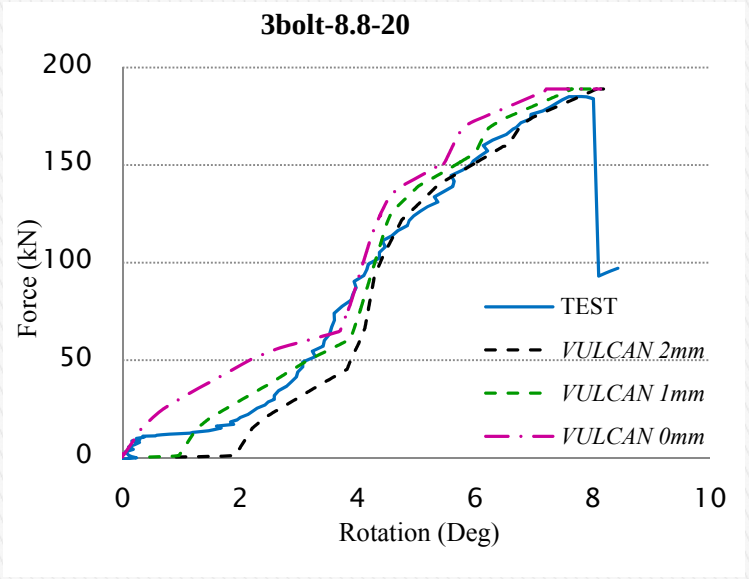
Experimental validation

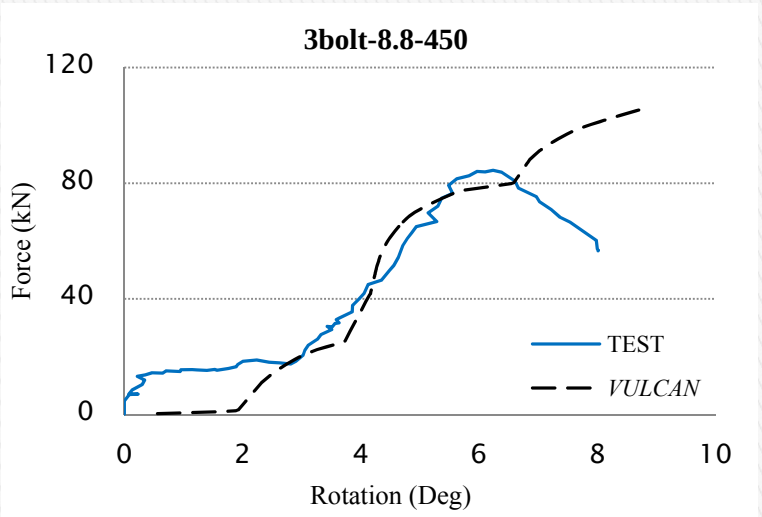
At ambient temperature





Geometry of test specimen





At elevated temperature

Thank you