

Work Theme B: Structural engineering on modern steel construction B2 Application of high performance steel materials Q690 to Q960 in super high-rise commercial buildings

Project Title:

b) “Blind-bolted End-plate to Concrete-filled Tubular Connections using High Strength Materials”

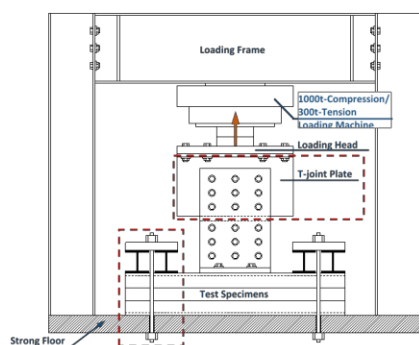
Theme: Application of high performance steel-concrete composite structures

Principal Investigator: Dr. T.M. CHAN (CEE)

Project Team Member: Dr. F. Xu

Progress / Achievement:

The experimental investigation on the load transfer mechanism through blind bolts has been performed, as shown in Figure 1. The failure modes and load-deformation curves are presented in Figures 2 and 3. With the aim of further assessing both geometry and material influences with an emphasis on the tube-wall deformation mechanism, the experimentally validated finite element models are established, as shown in Fig. 4. Through experimental and numerical investigations, the component design methodology will be proposed to effectively design the blind-bolted composite connection system.

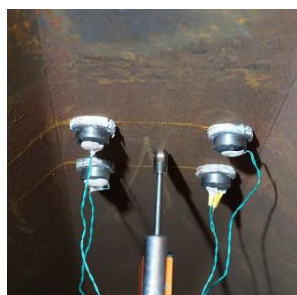


(a) schematic diagram for test set-up

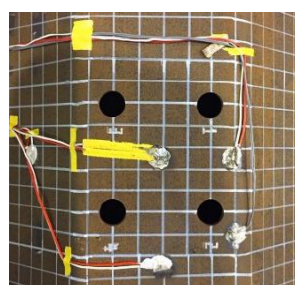
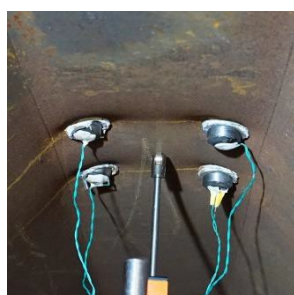


(b) Test set-up

Figure 1. T-stub tests



(a) Blind bolts



(b) Tube-wall face

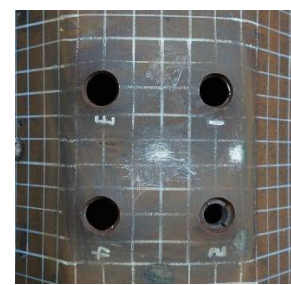


Figure 2. Failure modes

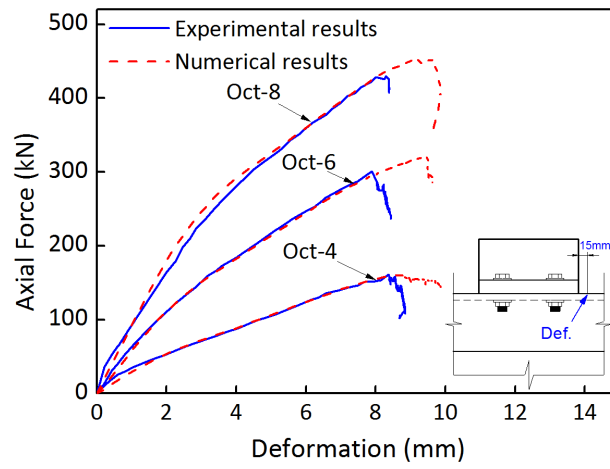
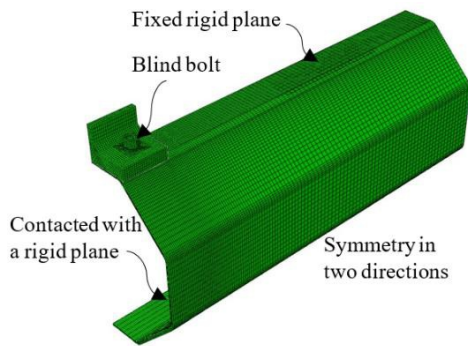
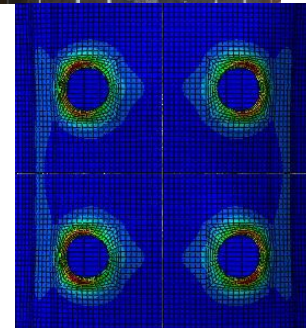


Figure 3. Load-deformation curves



(a) Finite element mode



(b) Comparison of tube-wall deformation (Equivalent plastic strain, PEEQ)

Figure 4 Numerical Investigation