**1 Introduction**

Steel tubes are versatile and efficient in construction applications. The Extended Hollo-Bolt (EHB) blind bolts are installed from one side to concrete filled steel tubes. This connection is complex, so it has not been fully characterised.

**Aim**
To investigate the EHB preload and tensile behaviour when combined failure mode can occur.

**Objectives**

**Lab testing**

**Numerical analysis**

**Meta modelling**

**2 Experimentation**

Tensile pull-out tests are performed studying the effect of changing the following parameters:

- Concrete strength
- Column thickness
- Bolt shank length
- Bolt grade & diameter
- Gauge and pitch distances

**3 Numerical Analysis**

Finite element software allows to model complex 3D problems at a lower cost compared to laboratory testing. It also provides access to data that cannot easily be recorded during testing.

Parametric studies are performed with validated models.

**4 Metamodelling**

Efficient method to explore design optimisation alternatives.

Allows capturing complex behaviour that cannot be studied with traditional analytical methods.

**5 Conclusions**

- EHB is a promising alternative which will allow to expand the use of steel tubes in construction, generating more efficient multi-storey buildings.
- EHB combined failure mode is complex to analyse and requires further investigation.
- Metamodels combine experimental and numerical data with the purpose of being used in design guidance.