

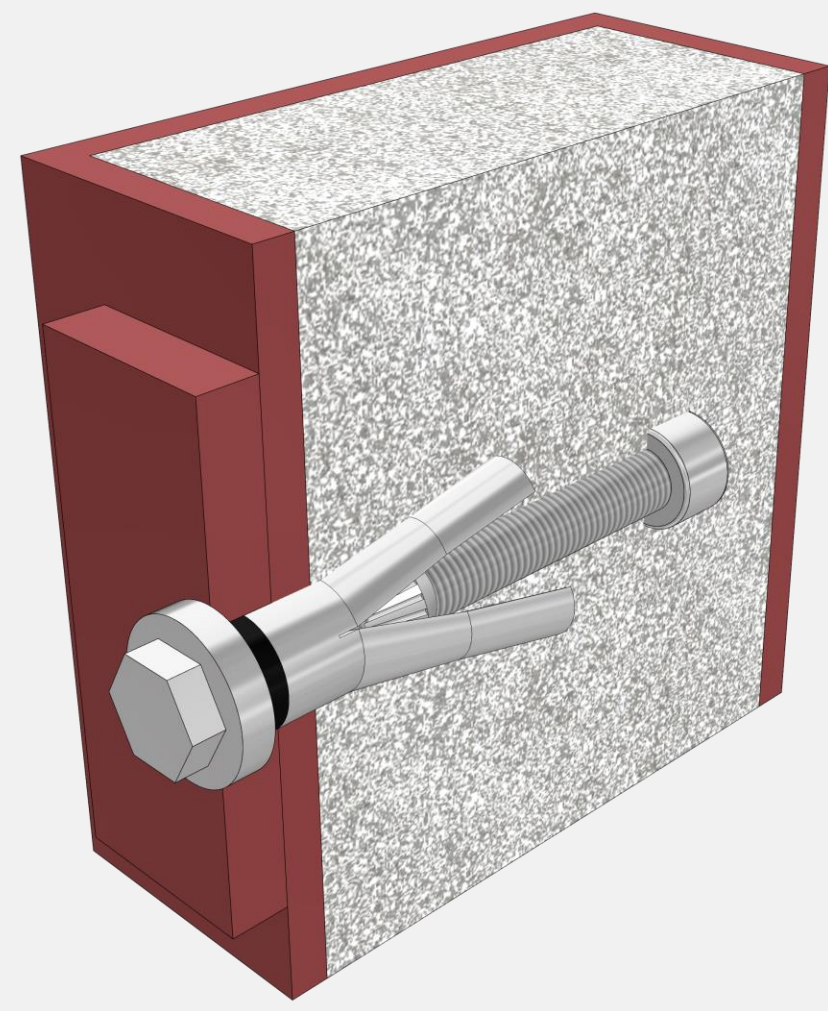


# Experimental and numerical modelling of blind bolted connections: Extended Hollo-Bolt in concrete-filled steel tubes

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## 1 Introduction

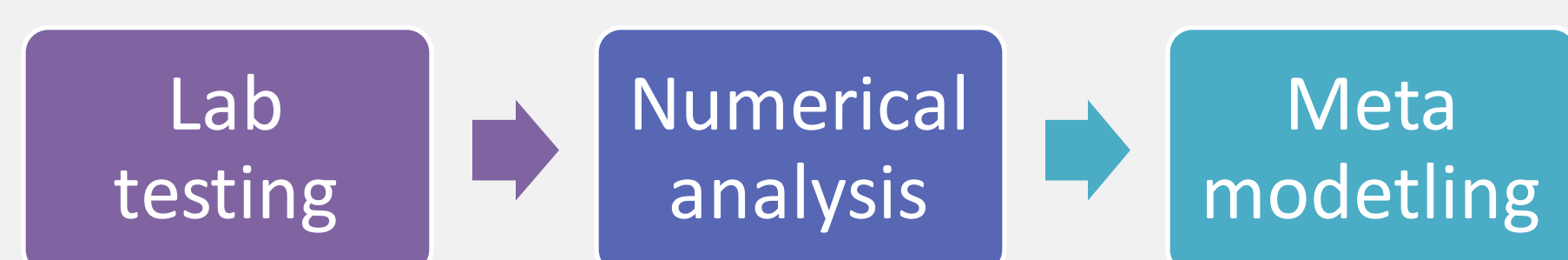


Steel tubes are versatile and efficient in construction applications. The Extended Hollo-Bolt (EHB) blind bolts are installed from one side to concrete filled steel tubes. This connection is complex, so it has not been fully characterised.

### Aim

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

### Objectives



## 2 Experimentation

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

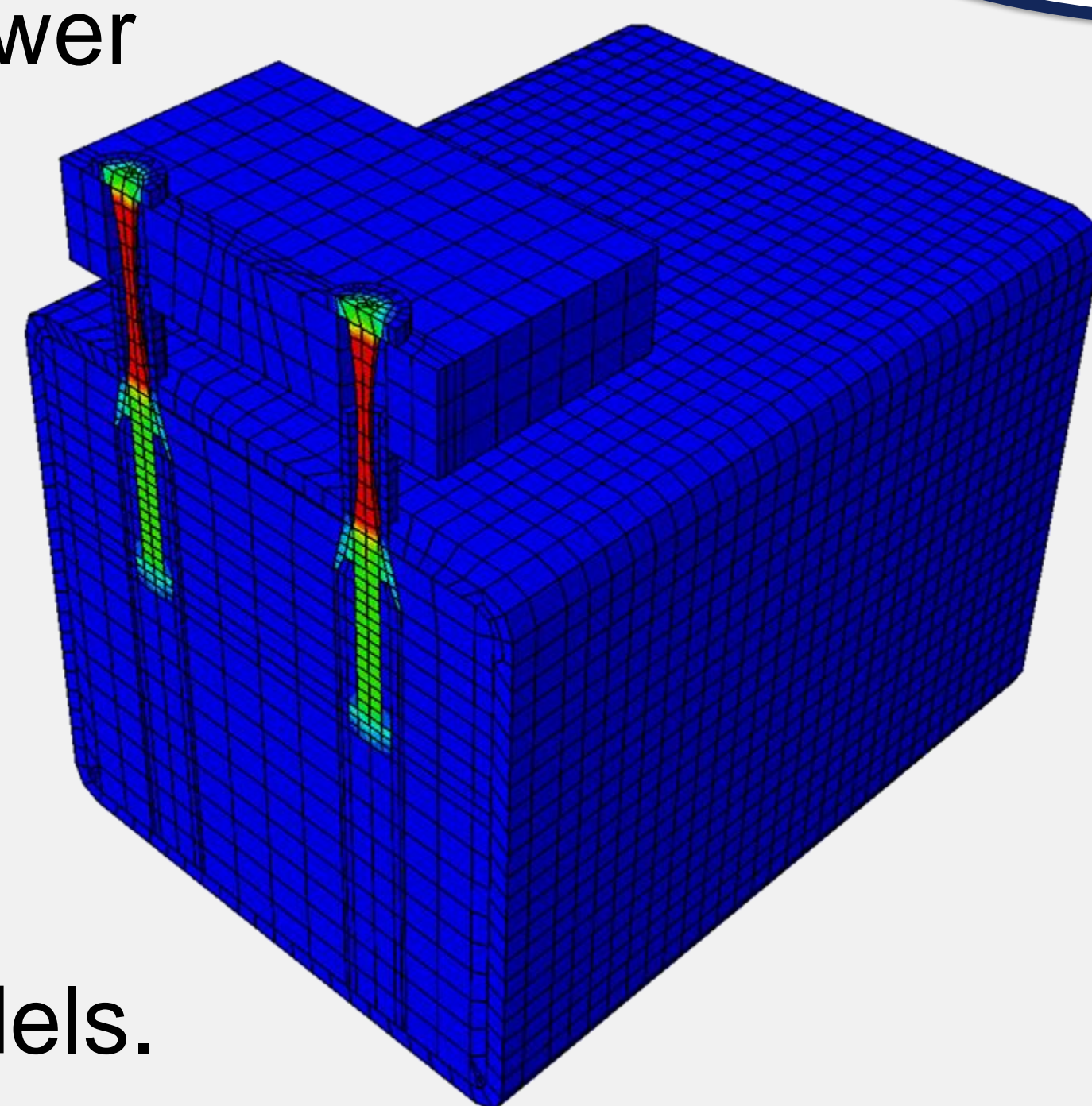
- Concrete strength
- Column thickness



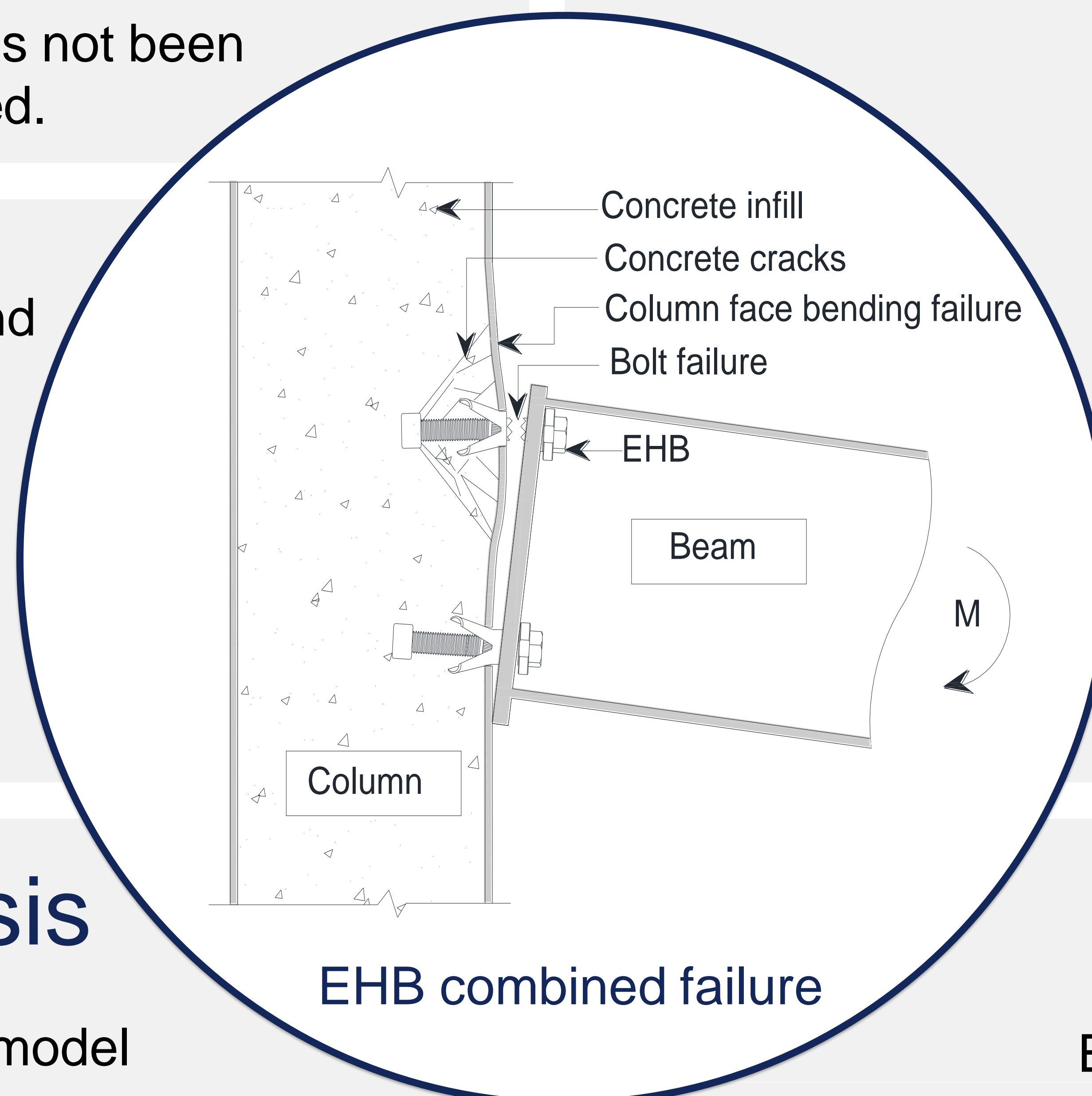
- Bolt shank length
- Bolt grade & diameter
- Gauge and pitch distances

## 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.

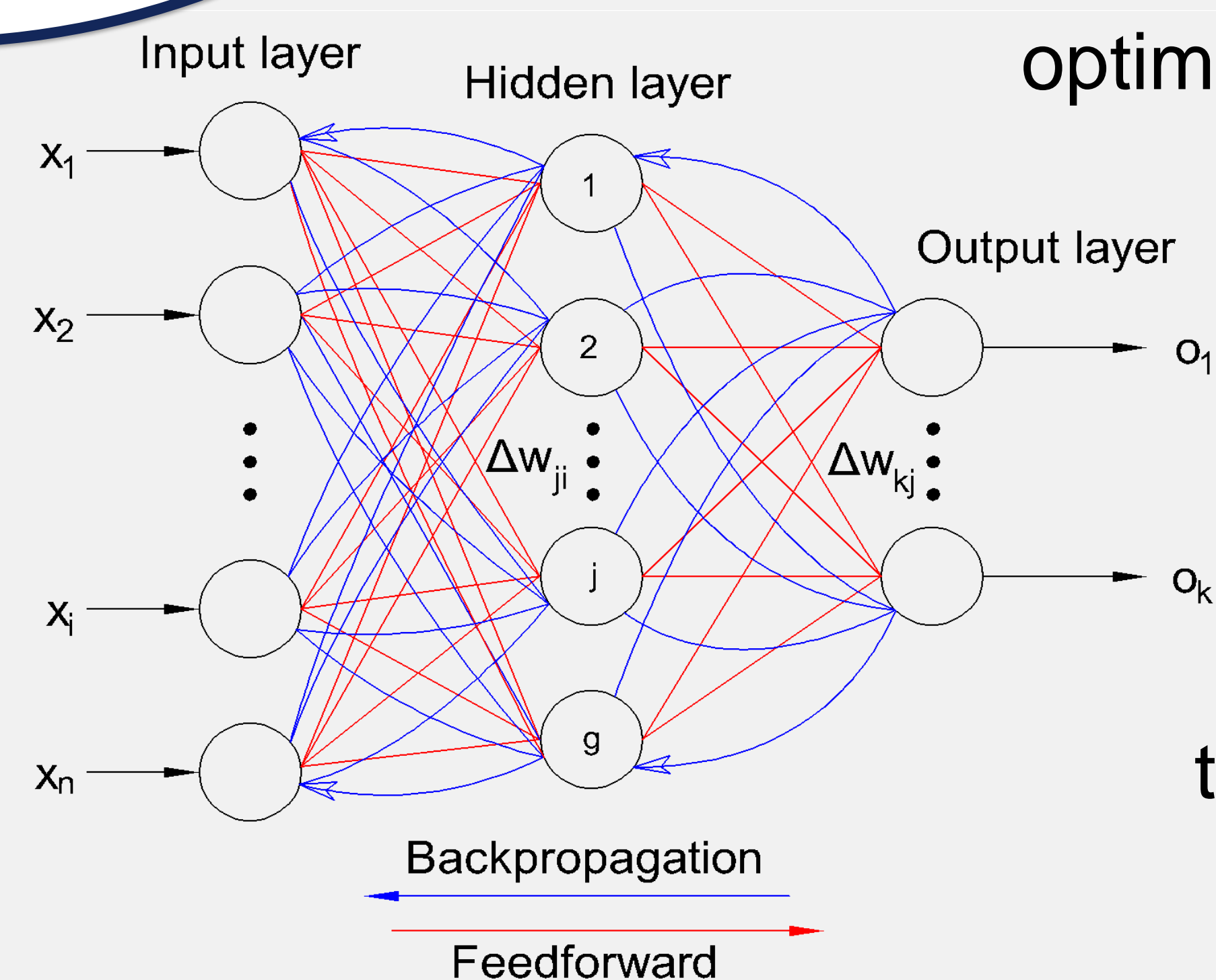


Parametric studies are performed with validated models.



## 4 Metamodeling

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.