Teaching Reuse of Existing Structures at the University of Sheffield

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Abstract
In response to the Climate Emergency, and to reflect the fact that many practising Structural Engineers work on existing buildings and other structures, staff from The University of Sheffield set up a new ‘Reuse of existing structures’ module in September 2022. The paper describes the rationale behind the module, the module content, the approach to learning, teaching and assessment., as well as reflecting on the overall success of the module, taking into account the quality of the working submitted and student feedback.

Keywords: Existing structures; reuse; retrofit; Climate Emergency; education

1 Introduction
Many practising structural engineers already work on existing buildings or structures, despite this topic not being covered in detail at university. Our response to the climate emergency means that reusing existing buildings and structures will almost certainly become an increasingly important part of what engineers do in the future.

In recognition of this, the University of Sheffield set up a 15-credit ‘Reuse of existing structures’ module for final-year Meng students in September 2022. This article discusses our approach and experience of introducing this module.

2 A different mindset
Although the underlying principles remain the same, working with existing structures requires a different mindset to designing new structures.

For a new structure, the structural engineer, in conjunction with the design team, has the luxury of being able to select the load paths and structural materials, but for an existing structure, the load paths and structural materials have already been determined.

Furthermore, it can reasonably be expected that a new structure will be built in accordance with the design intent, but an existing structure may have been altered over time (potentially changing load paths), while the condition of the fabric may have deteriorated.

Only when all these factors have been investigated and understood can new interventions be approached with confidence. Even then, the engineer must consider not only the behaviour of the structure in its final state, but also at every stage of construction.

3 Module overview
The 15-credit, 12-week module is led by two senior university teachers, who have significant industry experience of working with existing structures, and who deliver the core content. This includes the philosophy of working with existing buildings, a brief history of building construction, the inspection and appraisal process, and testing procedures.

Appropriate calculations are also covered, building on previous modules for steel, concrete and