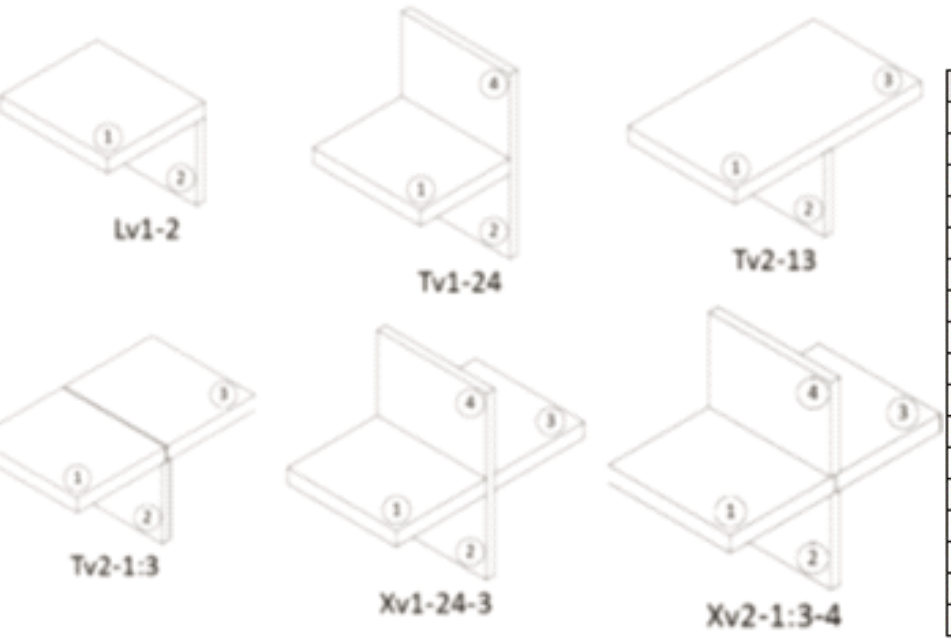

Connection Types	Classification	Grading
None	DryConnection	1.0
Click		
Velcro		
Magnetic		
BoltAndNut	WithAddedConnections	0.8
Spring		
Corner		
Screw		
Peg	DirectConnection	0.6
Nail		
Sealant	SoftChemicalConnection	0.2
Foam		
Glue	HardChemicalConnection	0.1
Landfill		
Weld		
Concrete		
ChemicalAnchor		

Figure
Connection type classification [2] and junction types [4]

ESTIMATION OF DETACHABILITY FOR CIRCULARITY ASSESSMENTS USING BIM AND KNOWLEDGE REPRESENTATION

Summer 2024

For circularity assessments, semantic information of building components in Building Information Models models is often incomplete and uncertain, e.g. unspecified materials or some properties are unavailable. Nevertheless, to calculate building circularity assessments holistically, e.g. using the Madaster platform [1], and to get reliable results, further information, such as connection types, accessibilities, or crossings, needs to be manually enriched [2,3]. Recent research in fields with similar challenges, such as acoustical simulations [4], proposes solutions using the semantic and geometric information of BIM and knowledge representation, e.g. using junction types, to automatically enrich missing information about element connection types. This master thesis aims to propose a novel method for estimating detachability and connection types for circularity assessment of components using BIM and knowledge representation.

Topics

Develop and implement a method for (semi-)automatically estimating detachability and connection types of components using Building Information Modeling and knowledge representation. Therefore, you will:

- Research on building circularity assessment, detachability indices, and connection types of the most frequent building component
- Develop a methodology to automatically estimate detachability and connection types of components using BIM
- Implement the developed methodology and formalize relevant domain knowledge about in combination with connection types
- Test and validation the implemented algorithms using exemplary BIM models

References

[1] https://docs.madaster.com/files/ch/de/Madaster%20BIM%20-%20IFC%20Export_CH%20DE.pdf
[2] Ogunjinmi, G. J.: Estimating Circularity of Building Elements Using BIM, Master thesis, TUM, 2022
[3] Châteauvieux-Hellwig, Camille; Abualdenien, Jimmy; Borrmann, André (2022): Analysis of early-design timber models for sound insulation. In: Advanced Engineering Informatics 53, S. 101675. DOI: 10.1016/j.aei.2022.101675.

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