Summary of the research project PROGRESS
PROGRESS webinar 4
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What is reuse?
Products designed to survive harsh conditions in several lifecycles or management of industrial waste?
Steel is reusable multiple times

1942 London
1958 Rotterdam
2015 Schiphol

1958: Brussel’s World Fair
1959: "Zoo-Brücke" in Duisburg
2000: Bridge further south the A3

Steel is important in all construction

Picture credits: Peikko Group

Picture credits: Taros Nova
PROGRESS scope

Systemic approach can be easily developed on such structures that are technically fit for reuse. Therefore, PROGRESS focuses on single-storey steel buildings, their primary and secondary steelwork and envelope.
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PROGRESS consortium

[Diagram showing the PROGRESS consortium, including VTT, Ruukki, RWTH Aachen University, and other partners.]

[Diagram showing the process cycle with stages: Steelwork manufacturing & delivery, Site to site, Operation & maintenance, Side to grave, Recovery (recycling, reuse), Grave to cradle, Cradle to gate, Products design & fabrication, Gate to site.]

27/05/2020 VTT – beyond the obvious
PROGRESS work description

**Inception stage**
- Reuse of components from existing buildings
- Design for the future reuse

**Research and innovation stage**
- WP2: Reuse of components from existing buildings
- WP3: Design for the future reuse
- WP4: Hybrid systems
- WP6: Environmental and economic benefits

**Demonstration stage**
- WP7: Case studies

**Management and dissemination**
- WP9: Coordination

**PROGRESS outcomes**

**Design guides**
- Design from reused elements
- Design for deconstruction and reuse

**Methodologies**
- Assessment of reusability
- Declaration of environmental impacts
- Economic assessment

**Protocols**
- Pre-demolition inspection
- Deconstruction protocol
- Material testing protocol

**Tools**
- Online trading portal

**Case studies**
- Testing of methods and protocols
- Design for improved reusability
- Design from reused elements
Highlights from the PROGRESS project

Calculation of impacts beyond the system boundary

\[ X = \sum (M_{\text{out},i} - M_{\text{in},i}) \cdot \left( \frac{F_{MR,i} - E_{VM,i}}{Q_{VM,i}} \right) \cdot Y_i \]

Can be used
- with modular approach  
  e.g. as Module D in EPDs
- with market-based approach (A:100-A)  
  e.g. in PEF (Product Environmental Footprint)
- with end-of-life approach (0:100)  
  e.g. current World Steel Association method
Method to estimate reuse potential

Assessment of technical reusability and economic prospects of reuse

Definition of waste and product

Recommended interpretation of the EU legislation
Business models

Evaluation of the business opportunities for reusable steel components

Prototype steel reuse portal

Online trading platform with BIM integration
**Improved design of portal frames and trusses**

Design recommendations to achieve better reusability

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**Solutions for new and existing envelopes**

Smart Flashing Connector

Overcladding
3D scanning using drone

Photogrammetric survey of the building exterior, inaccessible surfaces and significant details

New deconstruction techniques

Using demolition excavators to lay down the portal frame
Material extraction and miniature testing

Small punch method to determine material strength and ductility

Summary

- PROGRESS project deals with reuse of building components and whole structures of single-storey steel buildings, their primary and secondary structures and envelopes
- The project addresses the full reusable building lifecycle
- The innovations developed for single-storey steel buildings can be in the future extended to other building typologies
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