Life-Cycle Costs of a Minimally Invasive Refurbishment Approach in Comparison to a Standard Refurbishment

Daniel Heidenthaler | SBE19 Graz | 12.09.19
Overview

- Project description
- Challenges
- Construction
- Methodology
- Life Cycle Cost
- Conclusion
- Outlook

Source: FH Salzburg
Project description

Refurbishment (and extension) of a residential building with a multifunctional façade

- Conservation of the existing building
- Tenants do not have to be resettled
- Prefabrication
- Newly developed facade system
  - Sound absorption
  - Insulation
  - Heating from outside

Source: FH Salzburg
Challenges

• Social housing
• Erected: 1950s
• Characteristics:
  – High traffic volume
  – Aging inhabitants (60+)
  – Lack of thermal insulation
  – Obsolete heating systems

➢ Refurbishment potential

Source: FH Salzburg
Construction
Methodology

Minimally invasive refurbishment

Component structure

U-Value 0.182 W/m²K
Thickness 81.5-84.5 cm
Heat dissipation Component activation
### Methodology

**Table 1.** Comparison of the selected variants.

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**Data basis:**
- Actual costs
- Obtained offers
- Estimated costs

**Tool Lekoecos:**
- Danube University Krems, Helmut Floegl
- ÖNORM B 1801-1 & 2
Methodology

Life-cycle costs (LCC) ÖNORM B 1801

Erection costs (ERK) ÖNORM B 1801-1

Construction costs (BAK) ÖNORM B 1801-1
- E1 Development
- Building costs (BWK)
  - E2 Building shell
  - E3 Building technology
  - E4 Building extension
  - E5 Equipment
  - E6 Outside facilities
- E7 Planning services
- E8 Incidental expenses
- E9 Reserves

Follow-up costs (OFK) ÖNORM B 1801-2

Usage costs (ONK) ÖNORM B 1801-2

Costs of building operation (KGB)
- F1 Administration
- F2 Technical building operation
- F3 Supply and disposal
- F4 Cleaning and maintenance
- F5 Safety
- F6 Building services
- F7 Overhaul, modification
- F8 Other
- F9 Object removal, demolition
Selected cost groups of Life Cycle Cost
Selected cost groups of Life Cycle Cost

- Erection costs: 7% gap
  → façade- and heating system (minimal invasive refurbishment)

- Usage costs: 3% gap
  → radiators and plastered façade (standard refurbishment)

- Total difference: 4%
  → equal 36% according to the façade relevant costs
Conclusion

Cost reduction necessary to become economically competitive

Non-monetary added value:

- Minimally invasive approach
- Heat dissipation
- Reduced use of floor space
- Sound absorption
- Wood-based materials

Source: FH Salzburg
Cost reduction and further optimization:

- Building service system
- Façade construction
- Materials
- Control strategy

Source: FH Salzburg
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