A formal Approach for Interfaces and Requirements of Smart Objects in Building Models

CIB W78 conference 2021, Luxembourg

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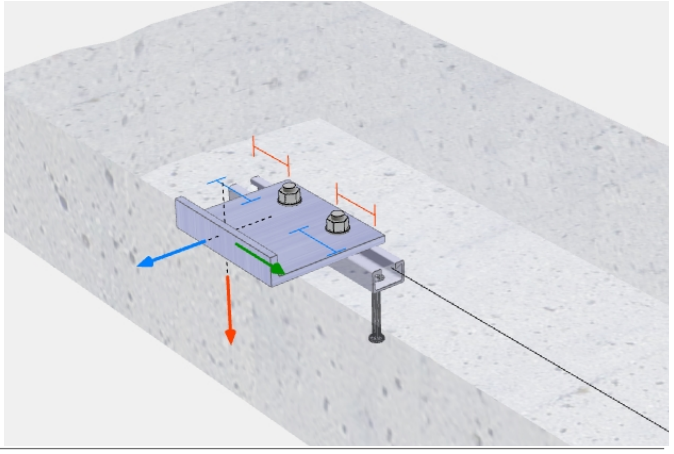
October 14th 2021

Motivation

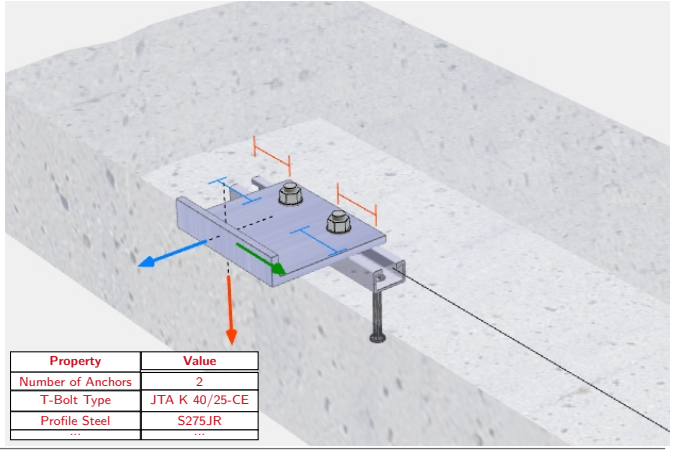
Smart object



Motivation

Smart object

- Unit of data



Property	Value
Number of Anchors	2
T-Bolt Type	JTA K 40/25-CE
Profile Steel	S275JR
...	...

Motivation

Smart object

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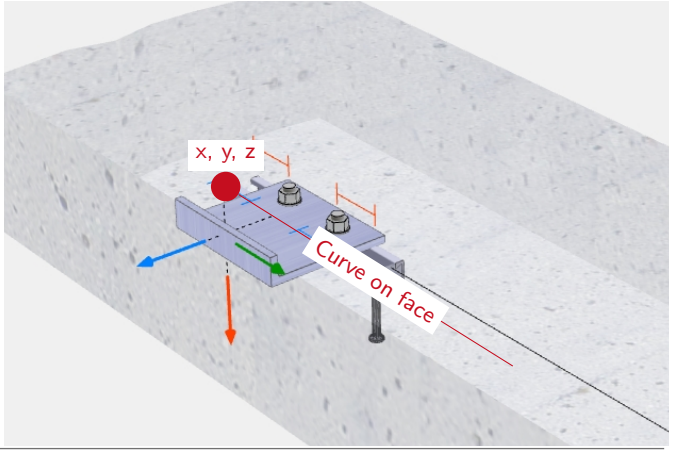
- Relations



Motivation

Smart object

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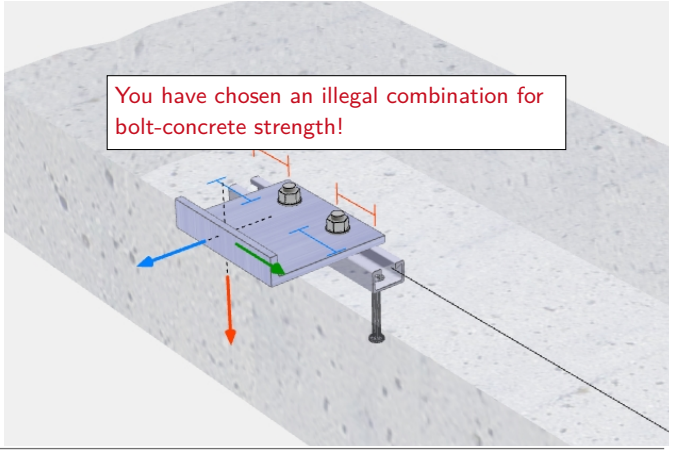
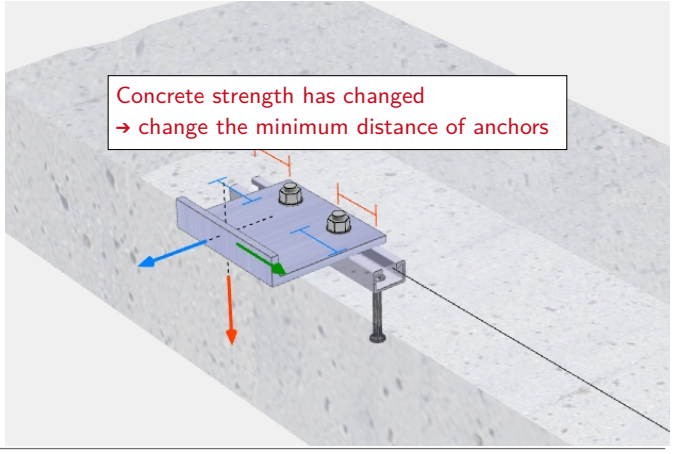
- Relations
- Feedback



Motivation

Smart object

- Unit of data
- Relations
- Feedback
- Adaptive



Motivation

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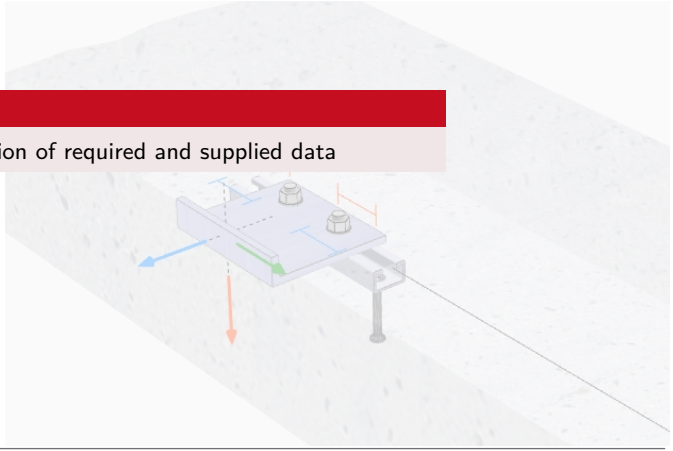
Current problem

No generalized description of required and supplied data



Current software

Interaction points:

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- Simple geometry

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- Predefined variables

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Automated Model checking

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Class 1: explicitly available

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Class 2: derived values

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Class 3: extended datastructures

Automated Model checking

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- Class 4: adaptive

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Automated Model checking

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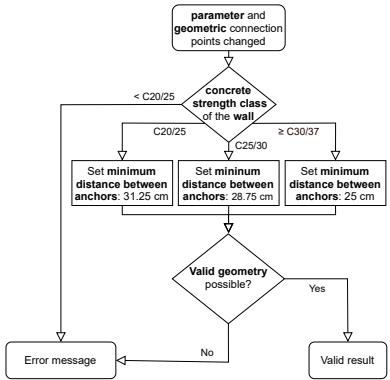
Smart objects for model checking:



Automated Model checking

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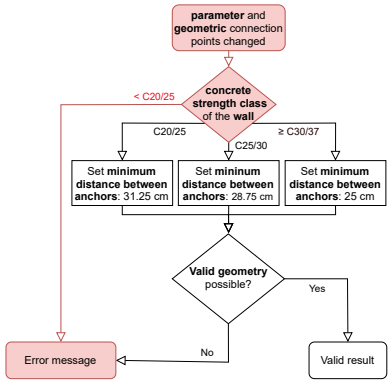
Smart objects for model checking:

- Feedback strategy



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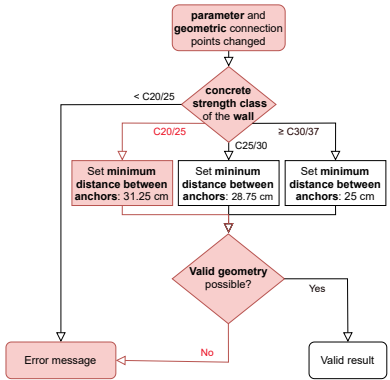

Automated Model checking

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Smart objects for model checking:

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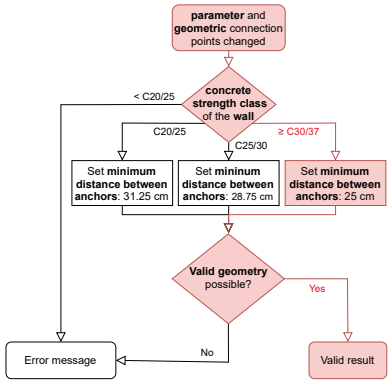
- Adaption strategy



Concept

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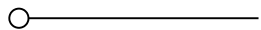
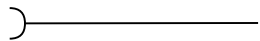


- ...requiring interface:



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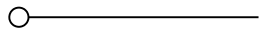

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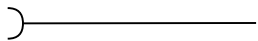
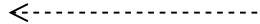


- Property-Access / Geometry-Access:



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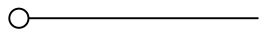

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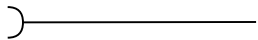
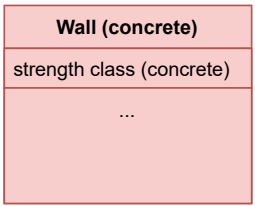
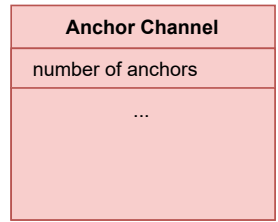


- Property-Access / Geometry-Access:

- "'Plug-In"'-System

Example

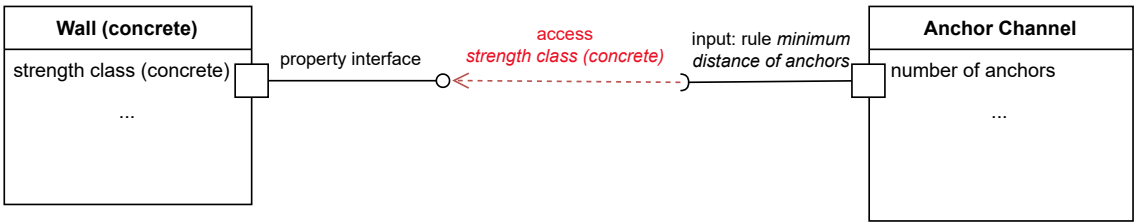

Wall (concrete)
strength class (concrete)
...


Anchor Channel
number of anchors
...

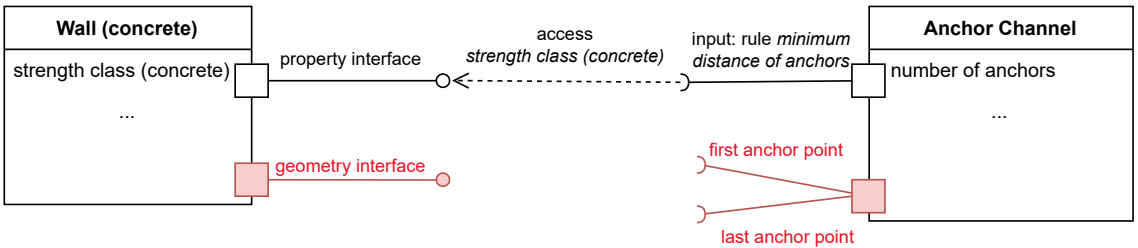
Example


Wall (concrete)
strength class (concrete)
...
property interface
input: rule *minimum distance of anchors*
Anchor Channel
number of anchors
...

Example


Wall (concrete)
strength class (concrete)
...
property interface
access
strength class (concrete)
input: rule minimum
distance of anchors
Anchor Channel
number of anchors
...

Example


Wall (concrete)
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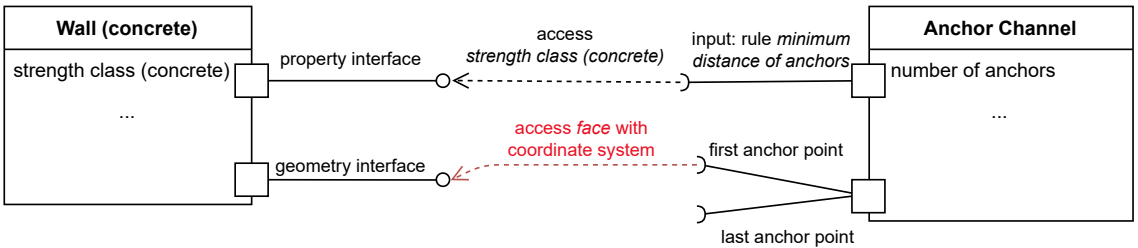
property interface
geometry interface
access
strength class (concrete)
input: rule minimum distance of anchors
Anchor Channel
number of anchors
...
first anchor point
last anchor point

Example


Wall (concrete)
strength class (concrete)
...
property interface
geometry interface
access
strength class (concrete)
access face with
coordinate system
input: rule minimum
distance of anchors
Anchor Channel
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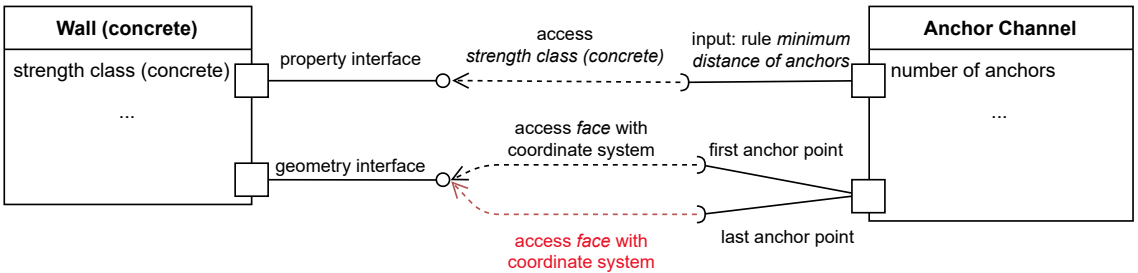
last anchor point

Example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Conclusion

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Challanges:

- Identification of properties

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Challanges:

- Identification of properties
- Identifying geometry objects

Outlook

Ideas:

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- Combining the approach with bSDD: Identification of properties

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Next steps:

Outlook

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Next steps:

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- Persistent and consistent geometry object classification

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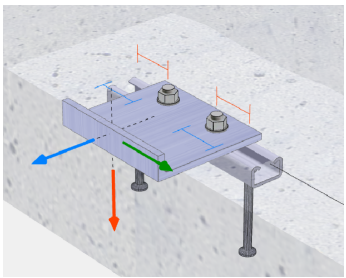
"'A formal Approach for Interfaces and Requirements of Smart Objects in Building Models"'



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Authors: **Dr.-Ing. Jakob Kirchner** Prof. Dr.-Ing. Wolfgang Huhnt

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