Digital Engineering Model Translation

Investigate reliable transfer from design model to analysis model

Internship area: Structural Engineering, Computational Mechanics, Civil Engineering or Computational Design
Level: challenging graduation or research internship at university of applied sciences / university level
Period: by agreement; 3 to 6 months

The assignment

Digital design models and numerical analysis models use different representations and levels of detail. In this internship, you investigate how geometry and relevant technical information can be transferred and transformed reliably into a technically usable analysis model.

You compare serious transfer and idealisation routes, define measurable quality criteria and substantiate which approach is most reliable for the selected model types. You implement the selected approach in a working proof of concept that demonstrably tests and validates geometry, information preservation, traceability and engineering choices. The question is therefore not simply whether information can technically be imported.

Possible research themes

- reliably transfer solids, surfaces, line elements and openings;
- compare different export, API and hybrid solution directions;
- control units, coordinates, topology and object identity;
- make technical modelling and idealisation choices explicit and traceable;
- present missing or ambiguous choices to an engineer in a targeted way;
- investigate where fixed rules are sufficient and where data-driven techniques such as machine learning may later add value.

What we are looking for

We are looking for a technically strong student who combines structural insight with an interest in programming and research. You enjoy bringing geometry, FEM, software and engineering judgement together. You will have freedom in the methods you choose, but you must demonstrate why a solution is reliable and technically usable.

Required skills

- basic knowledge of FEM and structural modelling;
- ability to program, preferably in Python;
- affinity with geometry, data representations and automation;
- ability to test, compare and debug systematically;
- ability to substantiate and document technical choices clearly.

A plus

- experience with Abaqus or comparable analysis software;
- Revit, Revit API, Abaqus Python, C#, Dynamo or pyRevit;
- IFC, CAD conversion or computational geometry;
- JSON Schema or typed data models;
- machine learning, similarity search or classification.

What we expect from you

- you first investigate what must technically be preserved or translated before choosing a route;
- you compare multiple serious solution directions using measurable criteria;
- you work with reference cases and validate against manually checked results;
- you make uncertain engineering choices visible instead of silently filling them in;
- you take initiative independently and request targeted technical validation;
- you deliver reproducible code, tests, documentation and a convincing demonstration.

What you will deliver

A substantiated comparison and validated model/data approach, supported by a working proof of concept for reliable model transfer. The result demonstrates which information is transferred correctly, which choices remain explicit, and how the generated analysis model compares with checked reference cases. The exact reference cases and implementation details are established at the start within the core assignment.