



15th November 2021, BIM Congress, Copenhagen
Topi Paananen, CEO, Peikko Group Corporation

Design for Disassembly – why, how, and what in practice

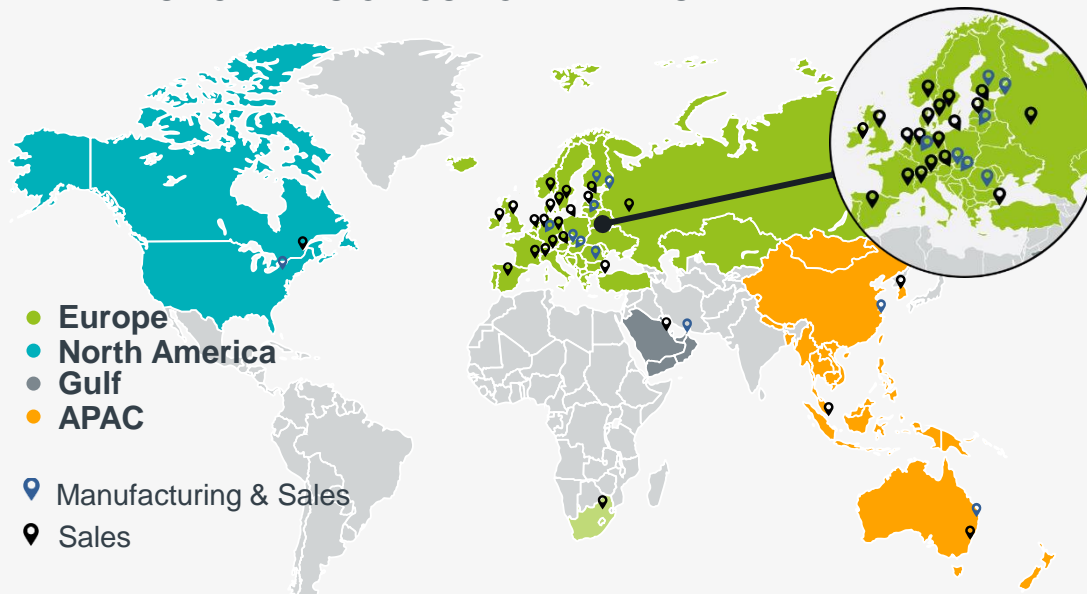
CASE PEIKKO & BOLTED CONNECTIONS



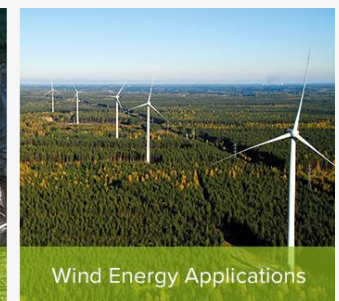
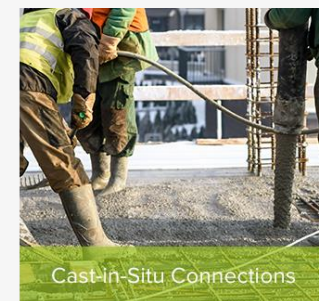
Peikko Group in Brief

-  Revenue **255 MEUR (EST 2021)**
-  Personnel **2,100 (OCT 2021)**
-  Own sales teams in **34 countries**
-  Own manufacturing in **12 countries**

THE VALUE CHAIN IS ON OUR OWN HANDS



Peikko is the Global Forerunner in slim floor structures, wind energy applications and connection technology for precast and cast-in-situ construction.



Doing the right things matters?

First company to offer steel structures made **from >90% recycled steel: decreases CO₂ emissions by 50%**

DELTABEAM® Green



Lightening environmental footprint.

**-50%
CO₂**



First company to offer steel structures actively in **combination with wooden floor slabs**, and to invest in research on this topic.

#DELTABEAM #CLT #hybridstructure - #slimfloor #longspan

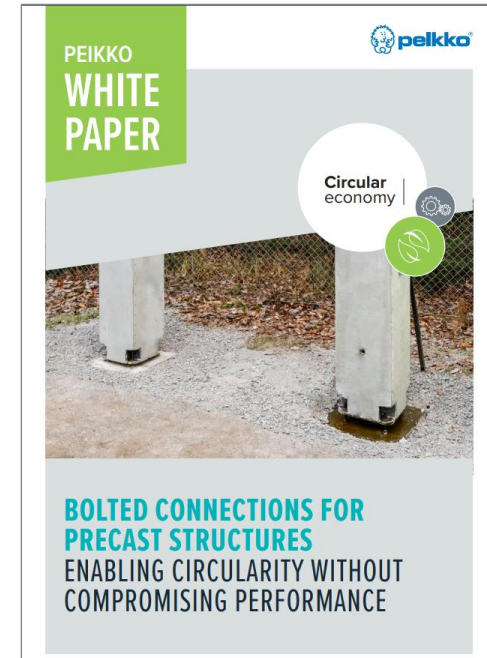
Ambiance Bois Structures
2,342 followers
3w • 🌐

Nos travaux se poursuivent à l'Université de Sherbrooke, en dépit d'une météo parfois difficile.
Félicitation à notre équipe d'installateur qui fait un travail incroyable. ...see more

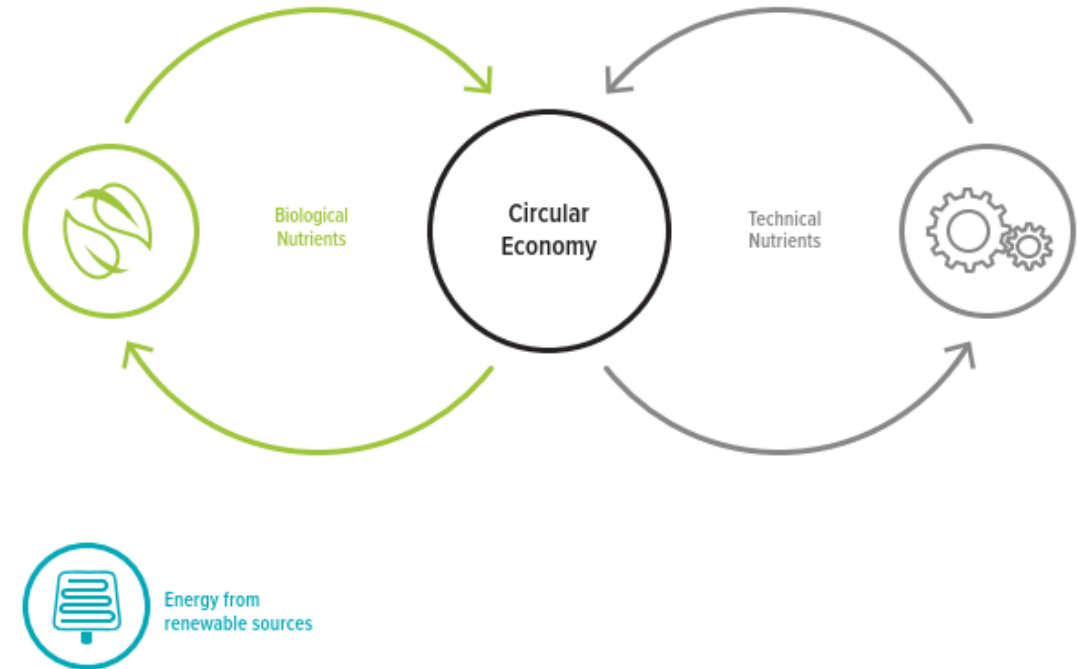
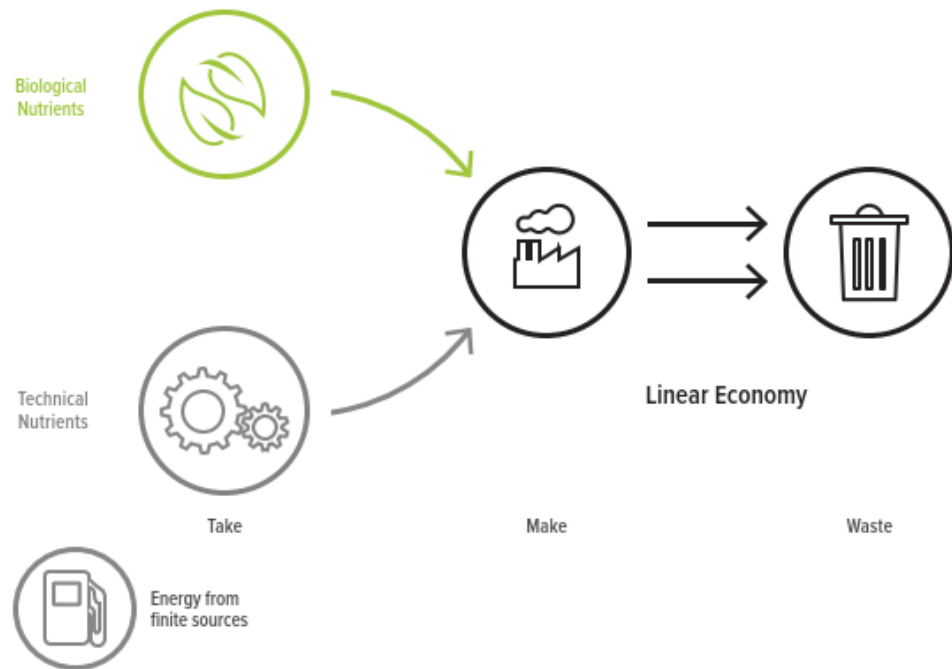
[See translation](#)



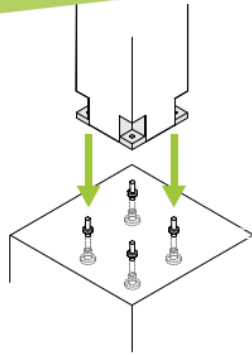
First company to offer precast connections that **enable design for disassembly > re-use** of building components possible.



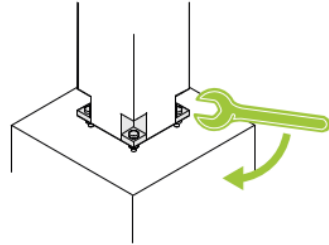
Why "Design for Disassembly"?



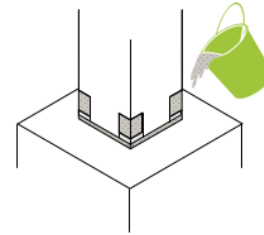
”Design for Disassembly” – precast columns



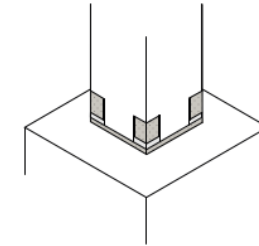
Step 1 – Assembling
The column with the Peikko Column Shoe is mounted to the cast-in Anchor Bolt.



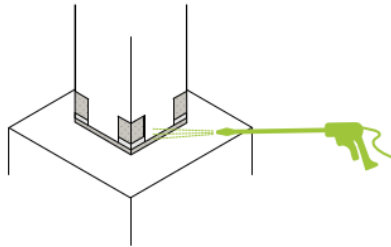
Step 2 – Fastening
The column is bolted, already achieving the stability for the building process to continue.



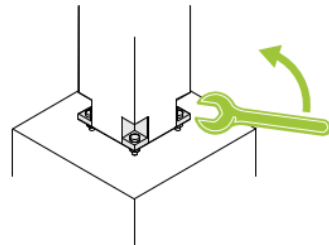
Step 3 – Casting
The Peikko Column Shoes are cast with lime mortar to project the joint from external impacts.



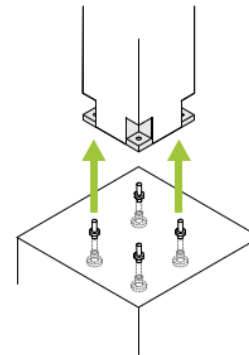
Step 4 – Using
The building is complete and ready to be used.



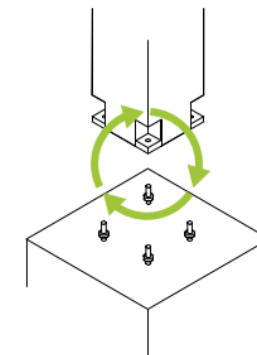
Step 5 – Hydroblasting
The lime mortar in the Column Shoes is removed by hydro-blasting.



Step 6 – Unfastening
The bolt in the Peikko Column Shoe is unfastened from the threaded rod.



Step 7 – Disassembling
The column with the Peikko Column Shoes is disassembled and lifted away.



Step 8 – Reusing
The column with the Peikko Column Shoes is ready to be reused in new buildings.

Diagram showing the possible assembly and disassembly process for Peikko's Column Shoe.

TEST 1: Dismount & reuse test of precast column

- **Objective:** to prove & to show that the demountability and reusability of precast columns & foundation.
- Tests performed in 2019-2020
- Used products Peikko HPKM® column shoes and COPRA® and HPM® anchor bolts



TEST 1: Dismount & reuse test of precast column

- **Three variants**
 - Currently used solution
 - Use of demolding oil
 - Use of thin steel plates
- All column types assembled, disassembled, and reassembled



FIGURE 4 FOUNDATION WITH HPM® ANCHOR BOLTS FURTHER BACK AND FOUNDATION WITH COPRA® ANCHORING COUPLERS IN THE FOREFRONT



FIGURE 5 PRECAST COLUMN INSTALLED ON A FOUNDATION WITH TIMBER FORMWORK



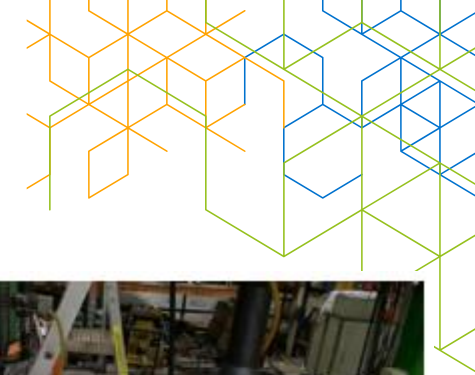
FIGURE 6 REMOVED GROUT PAD AND EXPOSED FOUNDATION WITH COPRA® ANCHORING COUPLERS



FIGURE 7 SURFACE OF THE GROUT PAD WITH REMOVED COLUMN. CONNECTION WITH THE USE OF HPM® ANCHOR BOLTS



TEST 1: Dismount & reuse test of precast column



- Shear tests performed by Eurofins laboratories
- All three variants functions well. Demountability is possible and affects the shear transfer, but the performance is still within acceptable limits

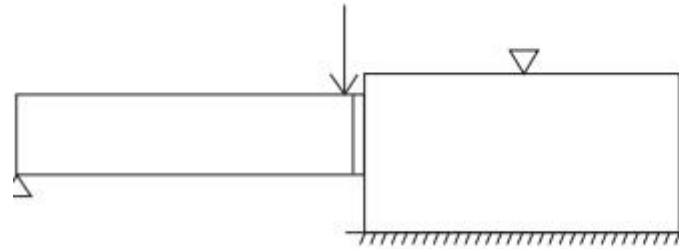


FIGURE 12 SCHEMATIC PRESENTATION OF TEST SETUPS

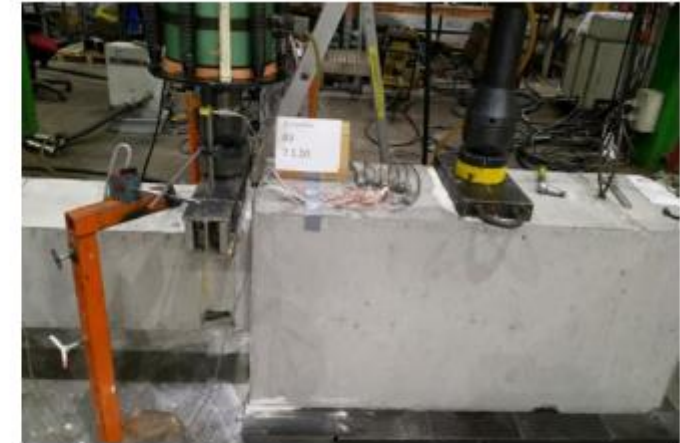


FIGURE 13 PHOTO FROM THE TEST SETUP, BEFORE LOADING THE CONNECTION

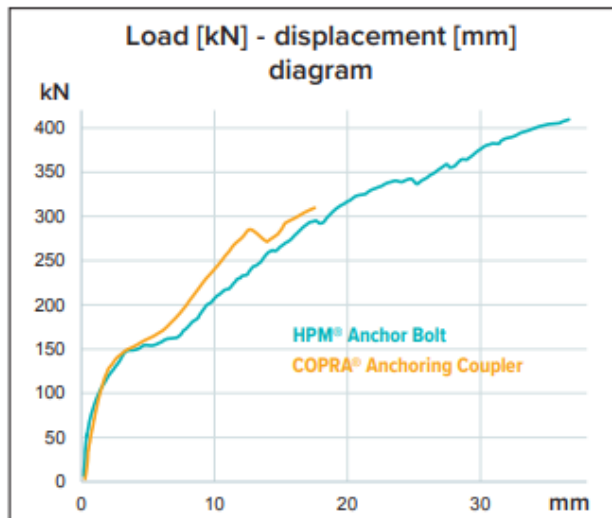


FIGURE 14 FORCE - DISPLACEMENT RELATIONSHIP

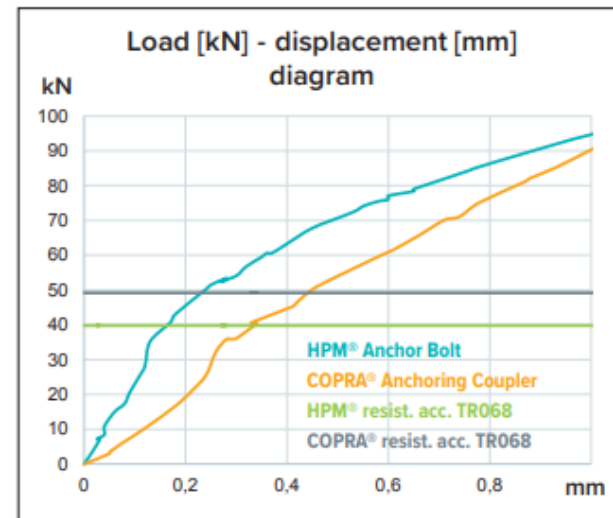
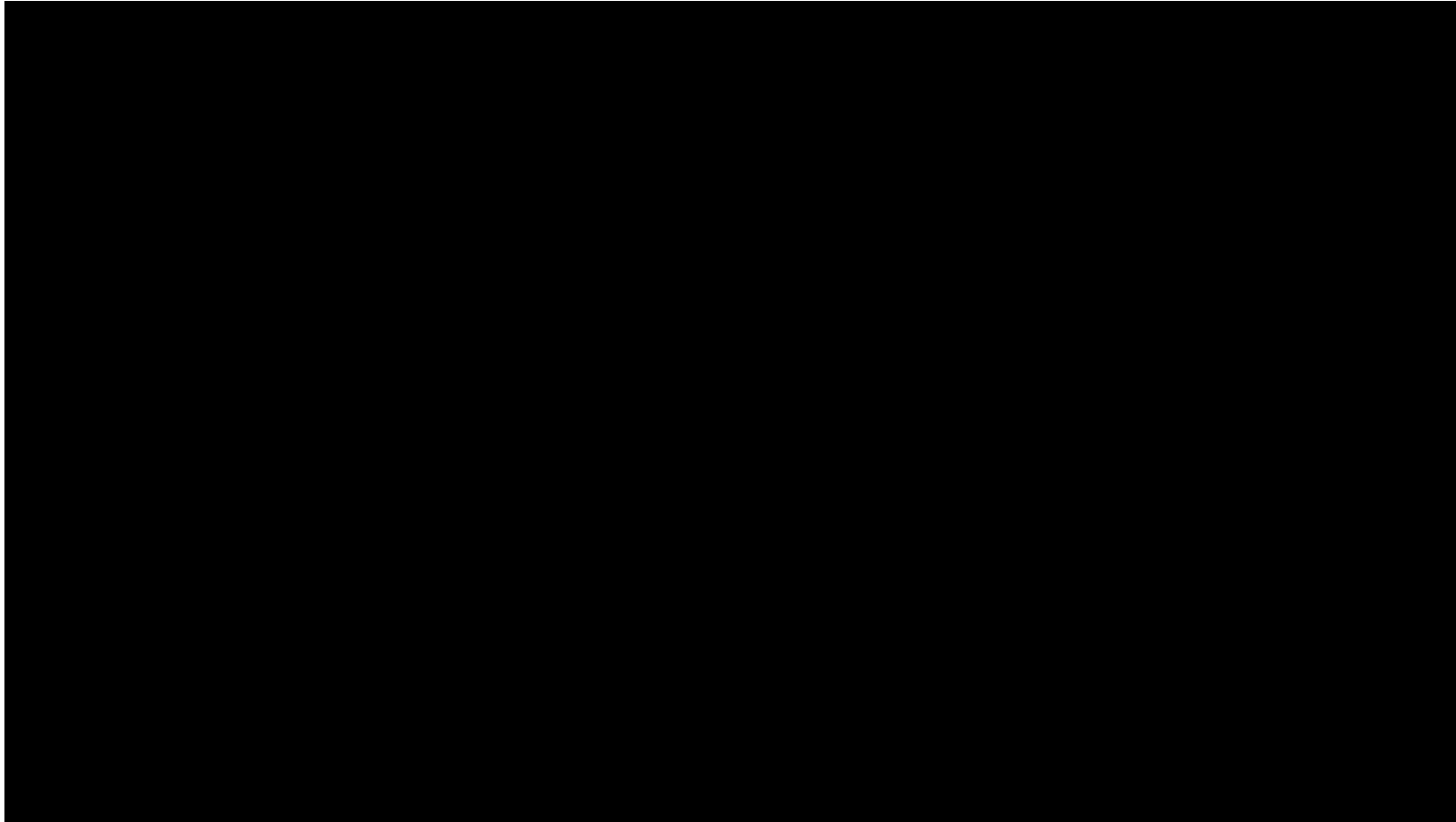
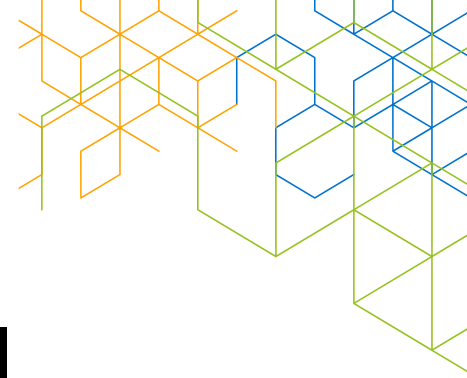


FIGURE 15 FORCE - DISPLACEMENT RELATIONSHIP, RANGE 0-1.0 MM

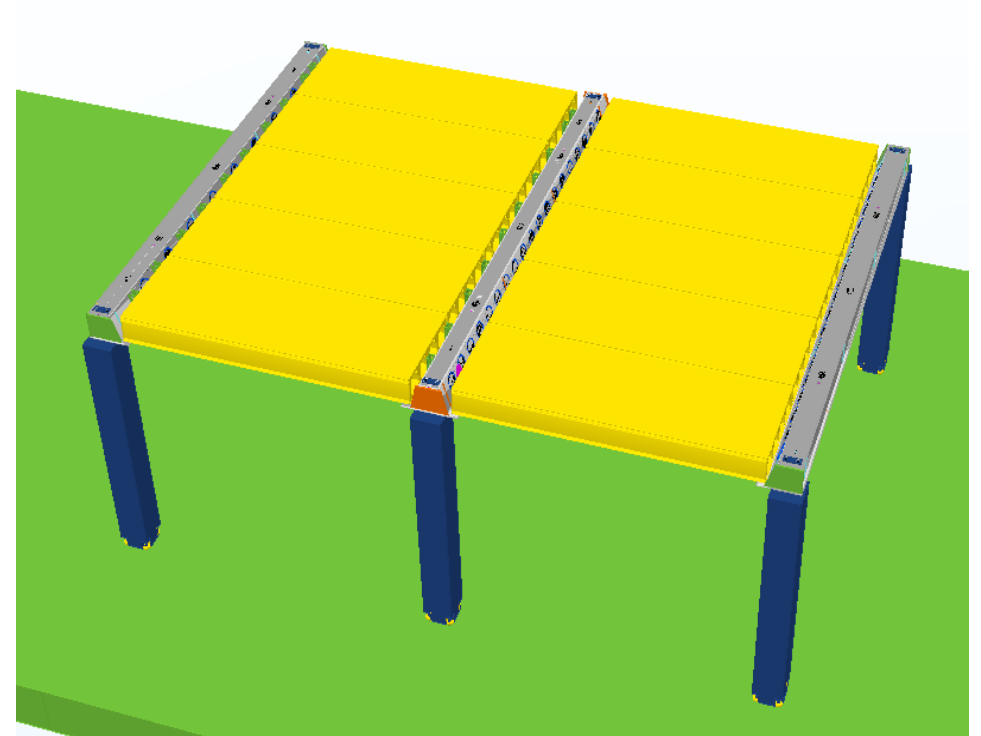
TEST 1: Dismount & reuse test of precast column



[YouTube link](#)

TEST 2: Assembly, disassembly and reassembly of precast frame

- **Objective:** to prove and to test the demountability and reusability of precast columns & foundation & hollow core slabs & DELTABEAM® composite beam.
- Tests performed in autumn 2021
- Used products Peikko HPKM® column shoes, HPM® anchor bolts, MODIX® rebar couplers & DELTABEAM® Green composite beams
- In co-operation with Consolis



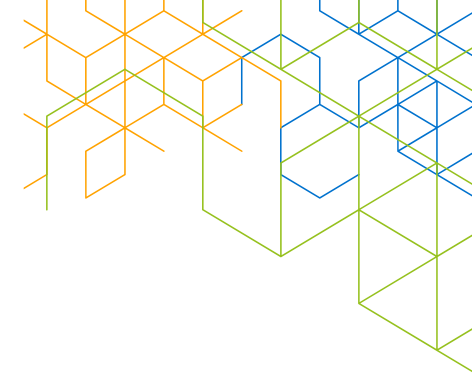
CONSOLIS

PARMA

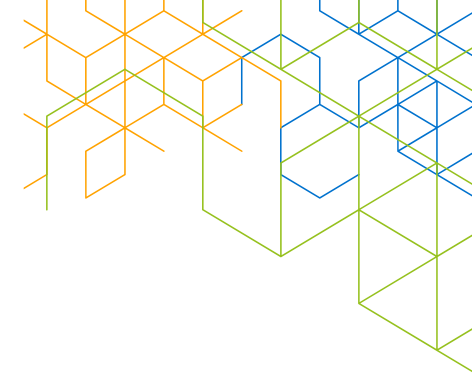
TEST 2: Assembly, disassembly and reassembly of precast frame



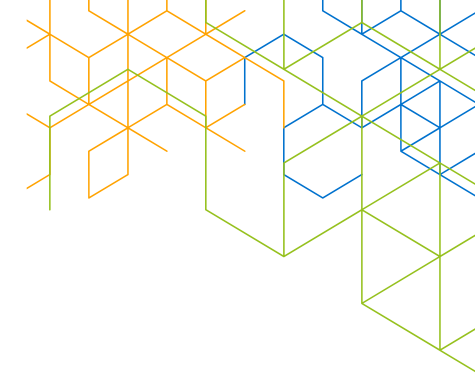
TEST 2: Assembly, disassembly and reassembly of precast frame



TEST 2: Assembly, disassembly and reassembly of precast frame



TEST 2: Assembly, disassembly and reassembly of precast frame



CONSOLIS
PARMA



TEST 2: Assembly, disassembly and reassembly of precast frame

- Assembly was done without any problems
- Disassembly to take place 16th – 17th of November 2021
- Reassembly to take place by end of November 2021
- Peikko to publish WHITE PAPER & videos by January 2022



SUMMARY

- Design for disassembly is completely feasible in practice, with current technology
- From tests to reality: Peikko has agreed to utilize the connections systems enabling design for disassembly in a villa project in Finland during autumn 2022.

