SAIDEL Monopile

Drilled Foundations

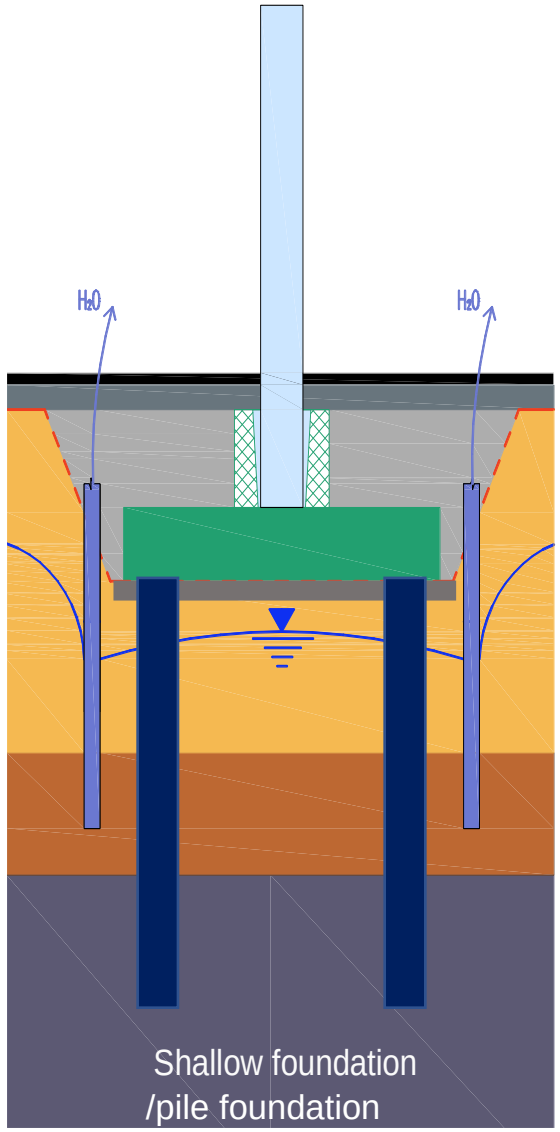
SAFE. VALUE. ECOLOGIC.

SAIDEL–Monopile = *"Simpler is better!"*

Replaces the classic foundations for any type of columns.

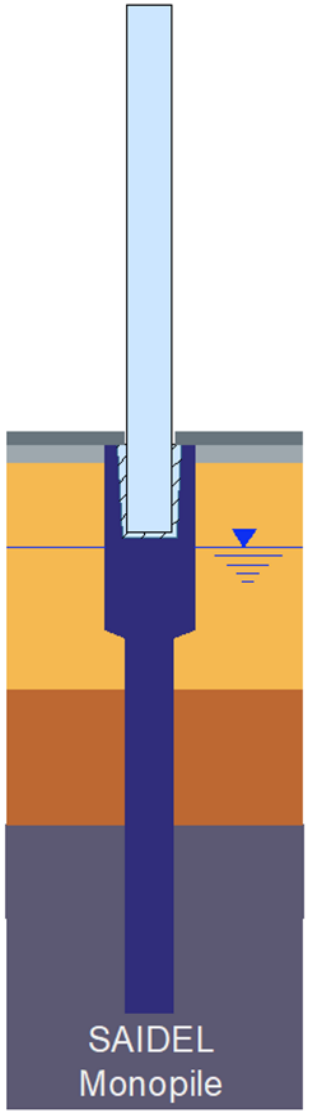
High-quality, economic and ecologic foundations by saving materials, time and manpower

Classic Foundations



Shallow/pile foundation

1. Groundwater lowering
2. Excavation and slopes support
3. Leveling concrete
4. Reinforcement placement
5. Manufacturing & installing of precast socket
6. Formwork installation
7. Concrete pouring and hardening
8. Formwork dismantling
9. Placing and compacting of fill



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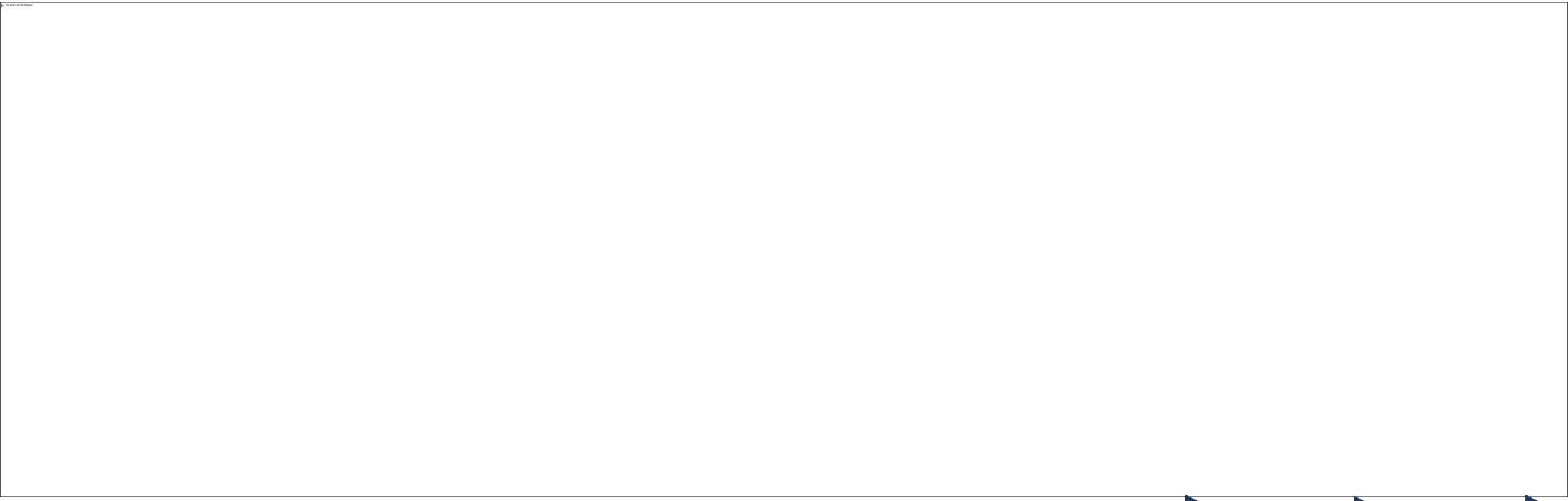
1. Single phase CFA drilling
2. Concrete casting
3. Reinforcement placement
4. Formwork installation
5. Formwork dismantling

Monopile Foundation - Construction Phases

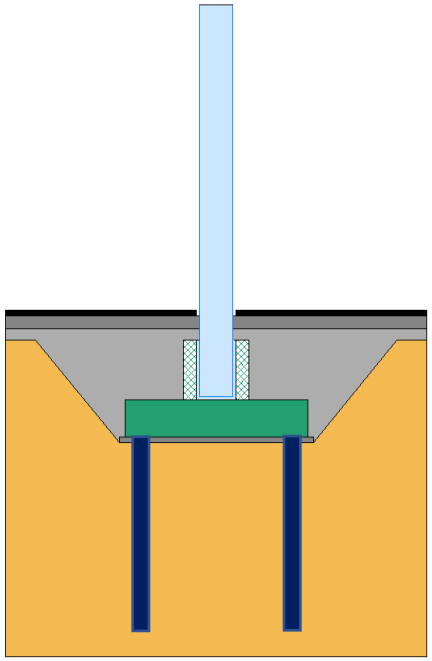


Construction time < 1 hour

Formwork removal 1 day

Column installation 3-5 days

Pile Foundation vs. SAIDEL-Monopile

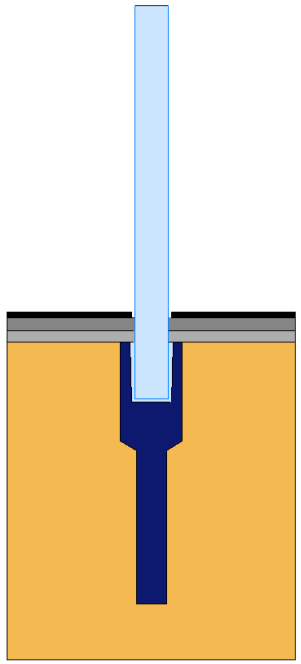


Advantages

1. Common method
2. Standard design
3. Standard equipment

Disadvantages

1. **Expensive**
2. **Long time – 3-5 Found./shift**
3. **High materials consumption**
4. **Labour-intensive**
5. **Weather dependent**
6. Various earthworks
7. Working platform is lost
8. Linked construction stages
9. Dewatering works needed
10. Pile trimming
11. Need of prefab. sleeve
12. Risk for slab on fill
13. No possibility of foundation test
14. Boring



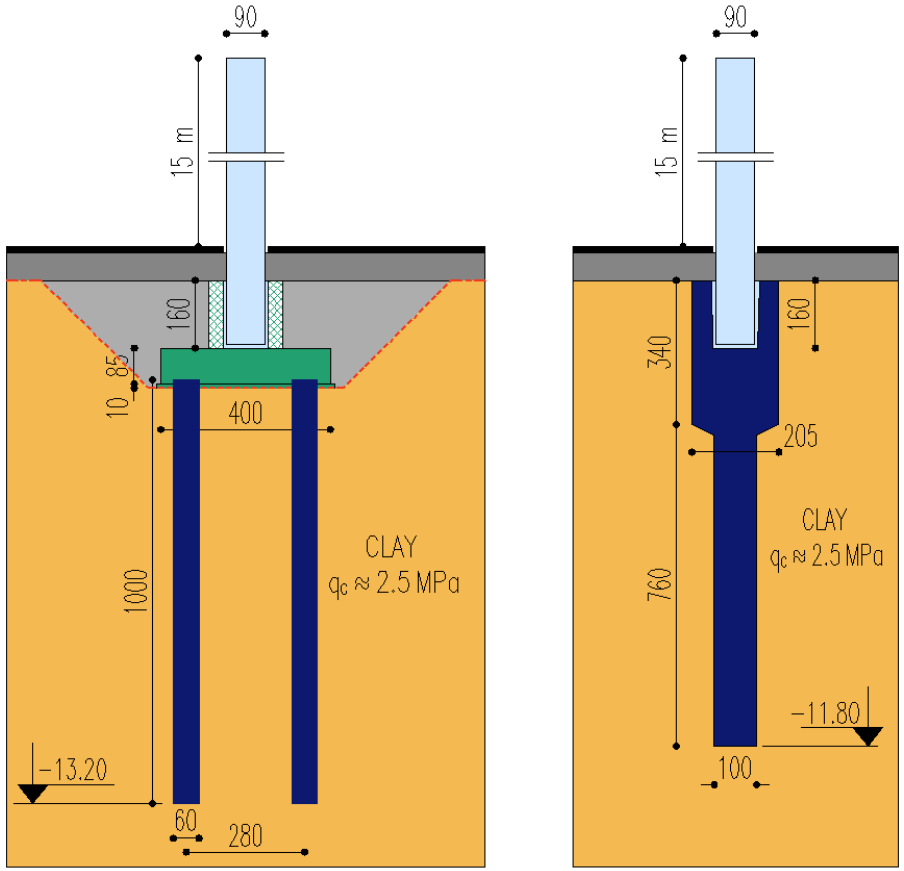
Obstacles

1. New method
2. Special design
3. Special equipment

Advantages

1. **Cost saving**
2. **Short time – 5-10 Found./rig/shift**
3. **Saving of materials -> Ecologic**
4. **Labour-saving**
5. **Weather independent**
6. No earthworks
7. Working platform as slab subgrade
8. One construction stage
9. No dewatering
10. No pile trimming
11. Sleeve is part of the Monopile
12. No need of fill around foundation
13. Eliminated quality risk by foundation load tests
14. Cool ☺

Pile Foundation vs. SAIDEL-Monopile



Construction time [h]	Foundation on Piles	Monopile
Pile construction	1	0.75
Dewatering	0.25	
Excavation	0.5	
Lean concrete	0.5	
Reinforcement	4	
Sleeve installation	0.25	
Formwork installation	1	0.5
Concrete casting	0.25	
Formwork dismounting	0.25	0.25
Earthfill compaction	2	
TOTAL	10	1.5

Double CFA Drilling Tool

Double CFA Site View

Reinforcement, Formwork & Guiding Frame

Reinforcement cages and formwork

Installed socket formwork, including frame

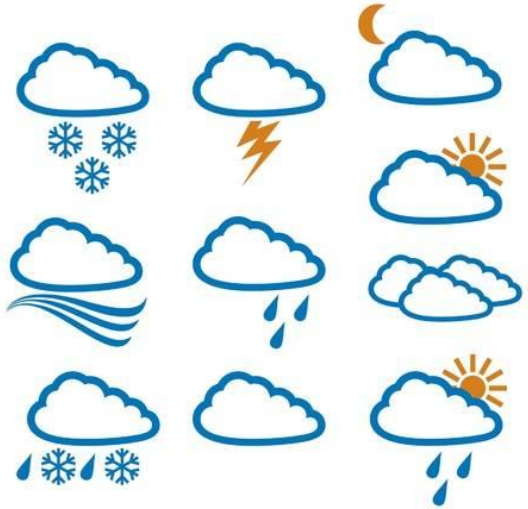
Installation of the socket formwork using guiding frame

Internal View of the Socket

Socket after removal of internal formwork and details of the indentation for optimal column-foundation coupling by concrete casting

Site Layout – Working Below Freeze Point

All weather



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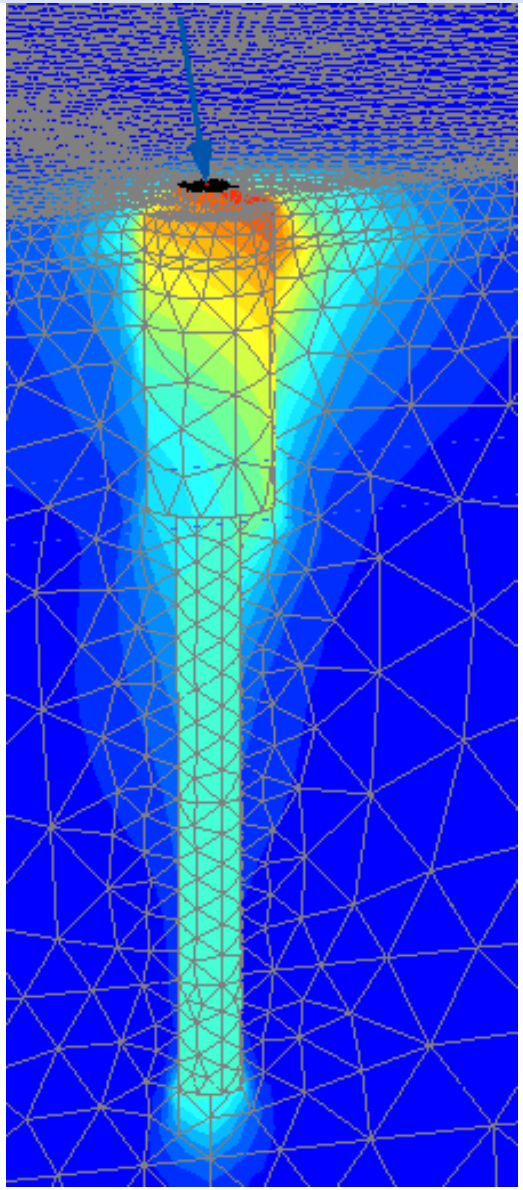
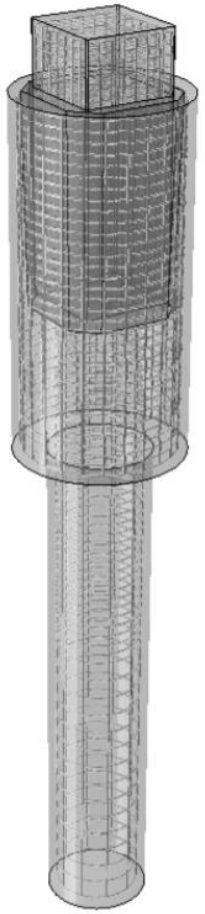
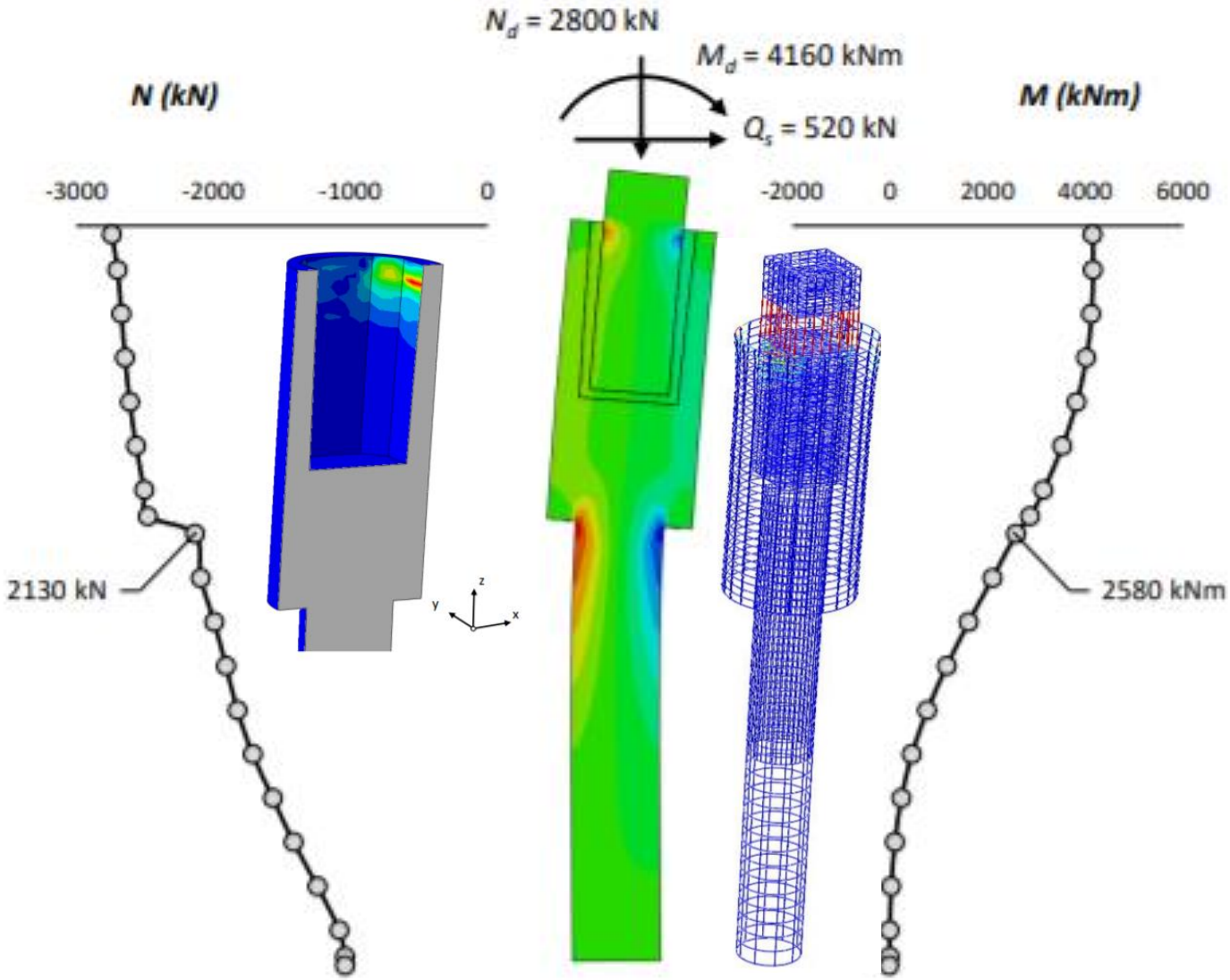


reinforced concrete members:
embedded element technique



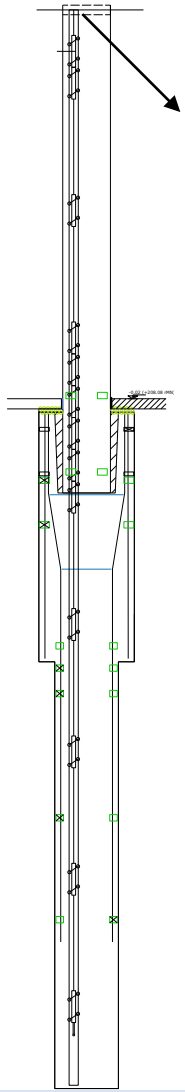
concrete:
nonlinear 3D continuum elements

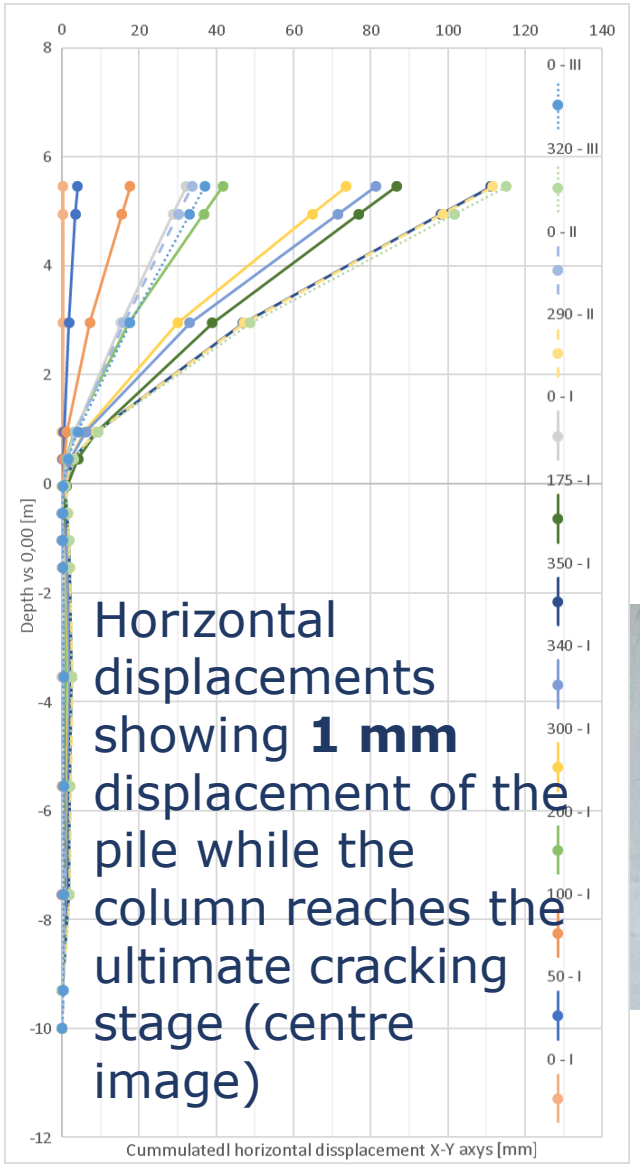
rebar cage:
nonlinear 1D truss elements



Soil-Structure Interaction

Real Scale Cyclic Load Test - Test results



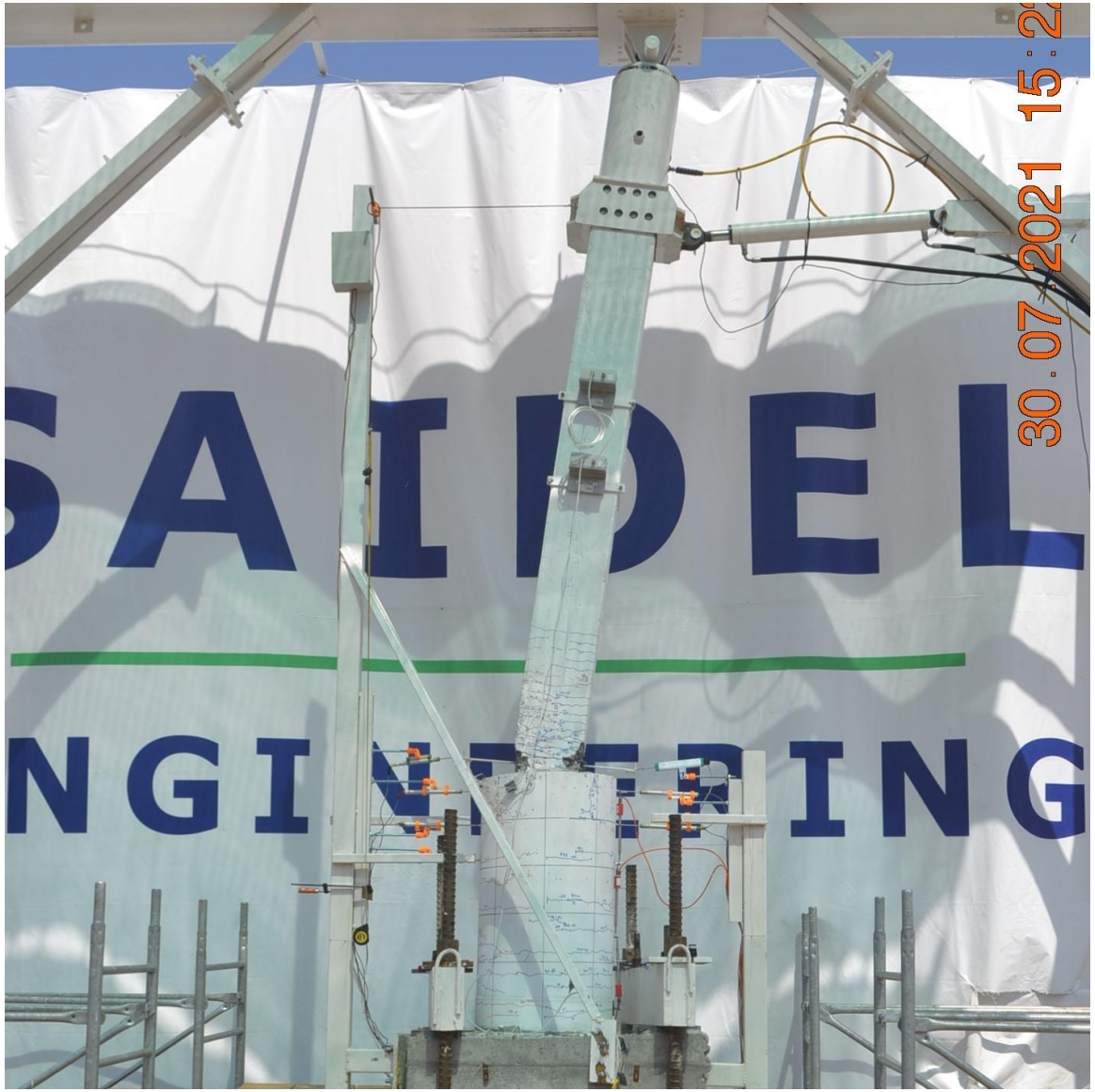


Horizontal displacements showing **1 mm** displacement of the pile while the column reaches the ultimate cracking stage (centre image)

The deformed column and detail of bending induced cracks developed at the base of the assembly during cyclic loading test reaching the ultimate bending stage of the prefabricated RC column

Scaled Test – Research & Development

Scaled Test – Plastic Hinge in the Column while Elastic Socket



- **Precast column** 750x750 mm
- C50/60
- 12Ø25+8Ø20 BST500C
- p =1.50%
- stirrups Ø10/120
- N=880kN, $\nu_{Ed} \approx 0.05$
- H_{column} = 3100mm
- H_{emb} = 1500mm
- Rough interface

- **Monopile** D1500/800
- C30/37
- D1500mm/D800mm
- H_{emb} = 1600mm
- Rough interface

Real Scale Cyclic-Load Test – Research & Development

Real Scale Cyclic-Load Test – Research & Development

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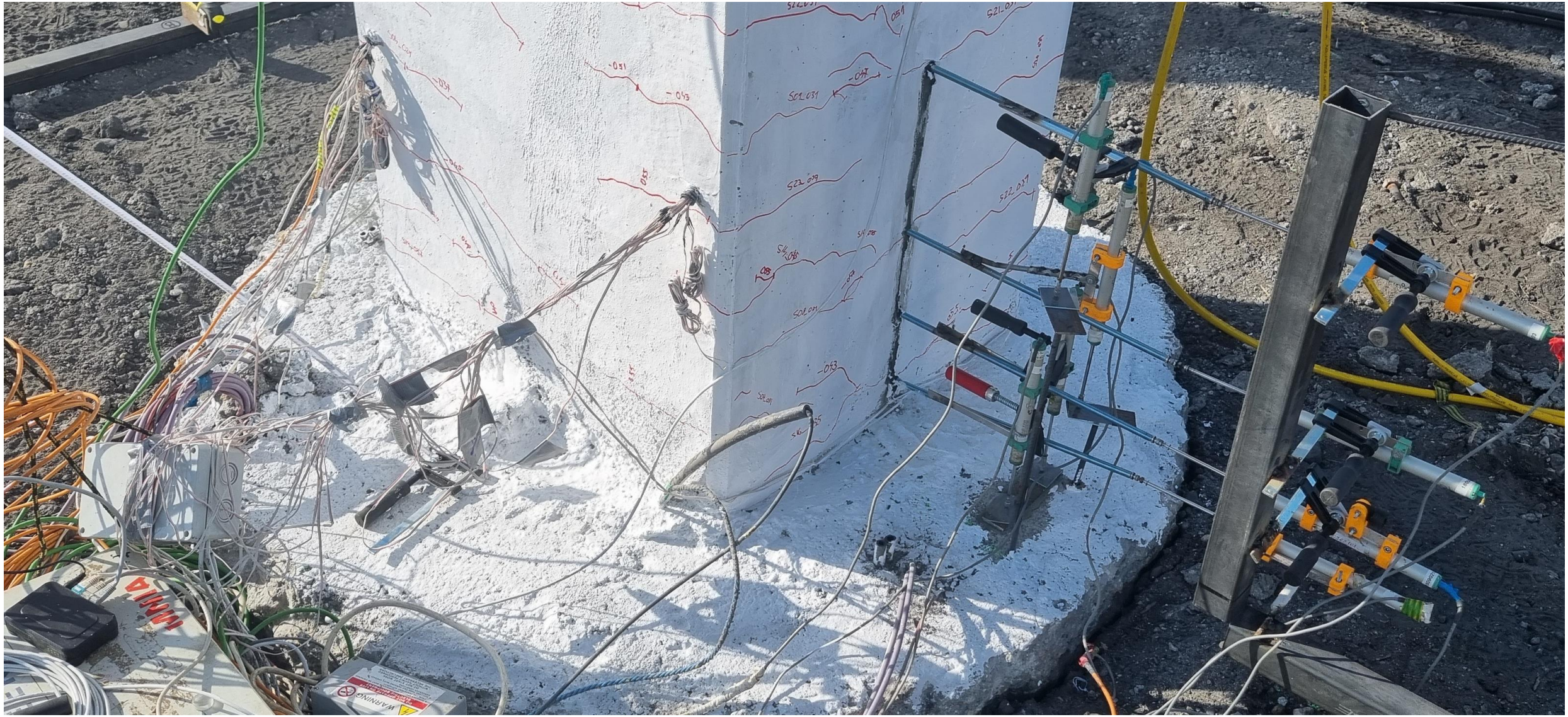

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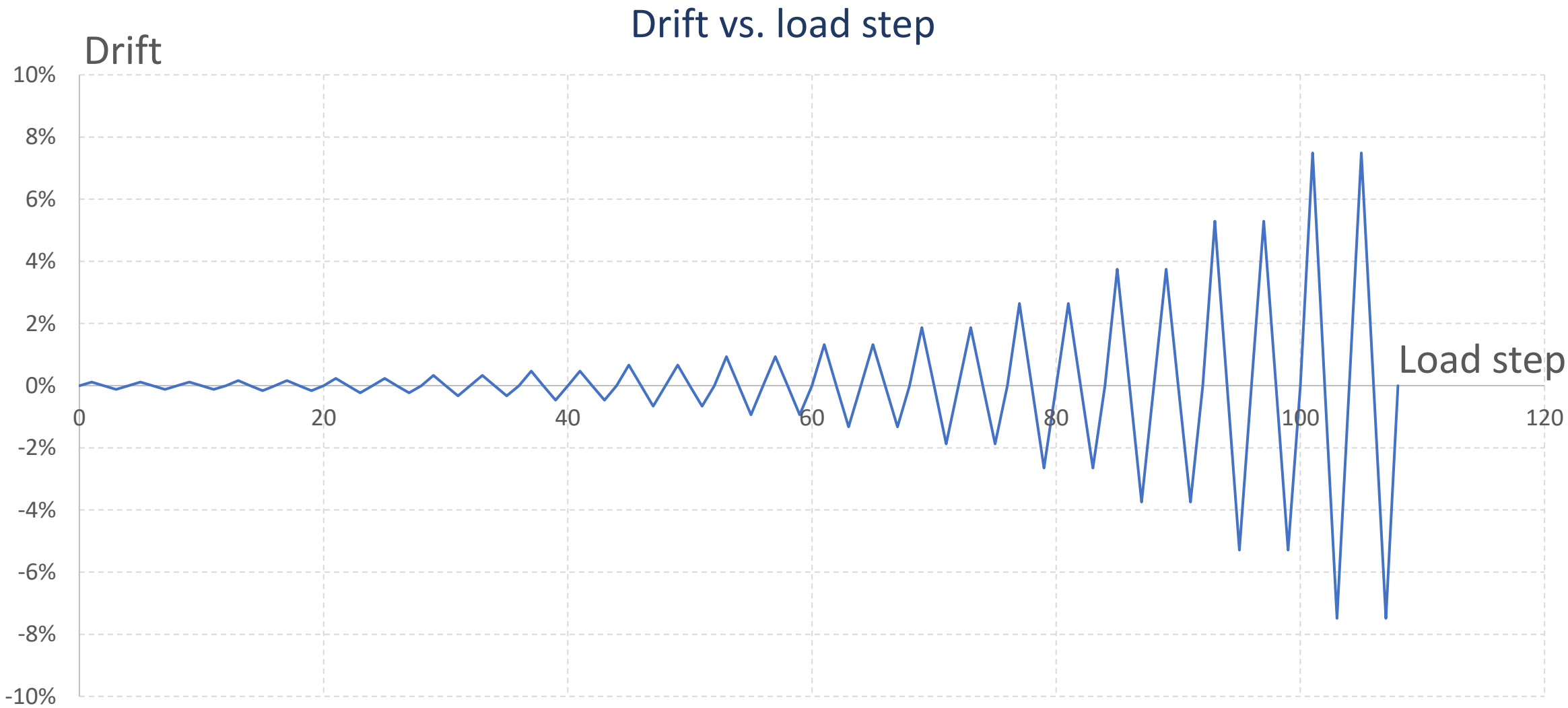
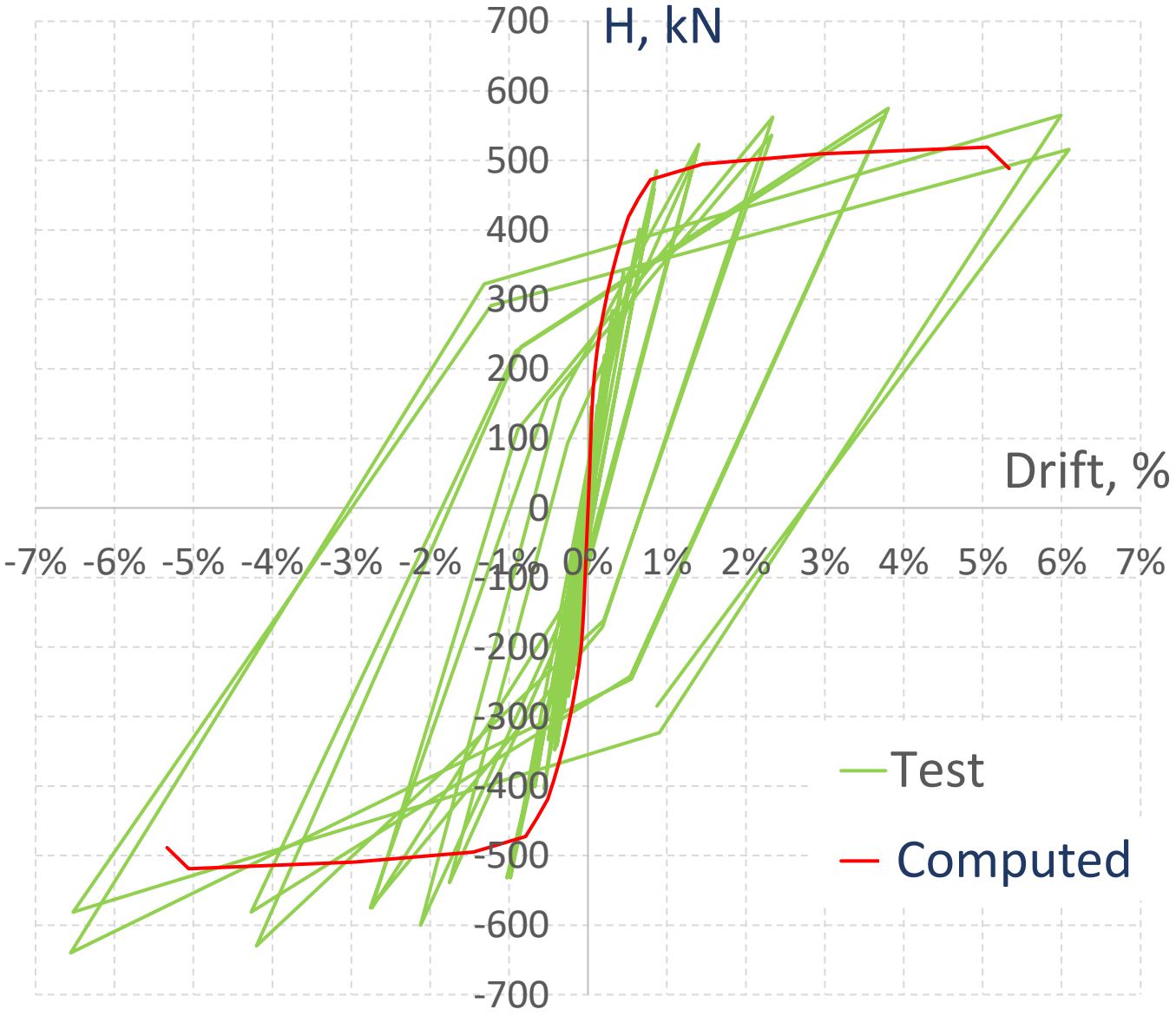


Real Scale Cyclic-Load Test – Research & Development

SAIDEL ENGINEERING



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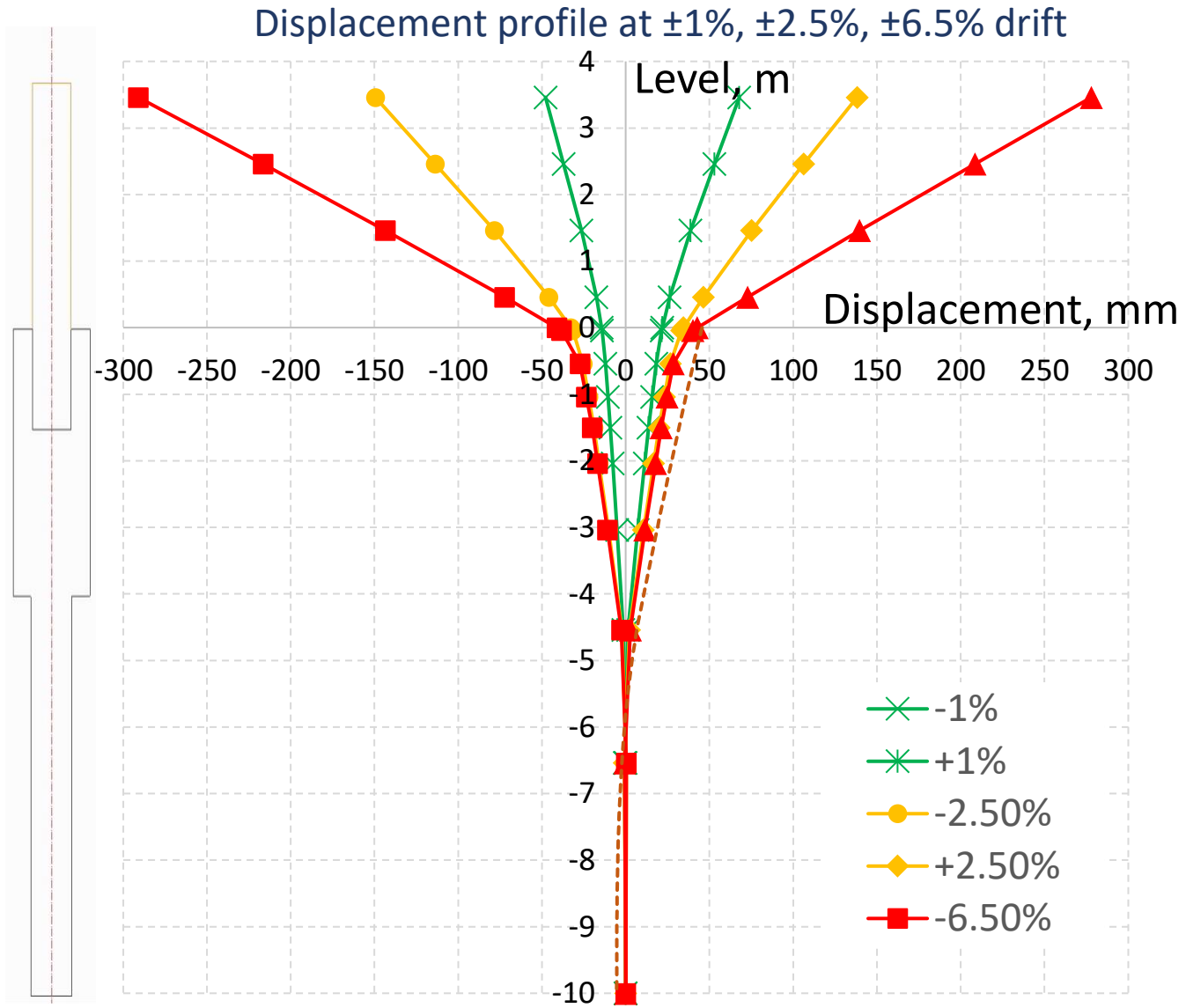

Real Scale Cyclic-Load Test – Results for ±2.5% Drift

- Cracks in the concrete column: 2…3mm
- No spalling of the column concrete cover
- Small number of visible cracks in the socket
- Crack width in the socket, smaller than 0,4mm

Real Scale Cyclic-Load Test – Results for ±6% Drift

Real Scale Cyclic-Load Test – Results for ±6% Drift

- Maximum column drift > 6%
- Cracks in the concrete column > 3mm
- Failure by buckling of the longitudinal column bars
- Small number of visible cracks in the socket:
- Crack width under 0,4mm for drifts 2,2-2,6%
- Maximum crack width 0,8mm for drift > 6%

Real Scale Cyclic-Load Test – Results for ±6% Drift

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- No local failure or cracks in the socket below ground level

References – Design and Build

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Projects

1. 2018 – Prime-Kapital Roman VALUE CENTER – 138 Monopiles
2. 2018 – Penny Market Lehliu – 33 Monopiles
3. 2018 – VGP Logistic Center – 129 Monopiles
4. 2019 – SEFAR & MONOSUISSE Factory in Sighisoara – 332 Monopiles
5. 2020 – Pioneer Production Hall – 50 Monopiles
6. 2021 – Kaufland Supermarket in Brasov – 82 Monopiles
7. 2021 – Kaufland Supermarket in Blaj – 56 Monopiles
8. 2021 – Moncler Production Hall – 77 Monopiles
9. 2021 – Kaufland Supermarket in Timisoara – 52 Monopiles
10. 2021 – CONTINENTAL Production Hall Timisoara – 90 Monopiles
11. 2021 – LIDL in Bucharest – 30 Monopiles
12. 2021 – Gebrüder Weiss in Sibiu – 25 Monopiles
13. 2021 – IKEA in Timisoara – 150 Monopiles
14. 2022 – Mömax XXXLutz Cluj – 60 Monopiles
15. 2022 – Kaufland Supermarket in Cernavodă – 70 Monopiles
16. 2022 – Jumbo Market in Sibiu 2022 – 70 Monopiles
17. 2022 – BOSCH in Blaj – 26 Monopiles
18. 2022 – Arabesque in Chitila – 62 Monopiles
19. 2022 – Funshop Retail Park in Vaslui – 75 Monopiles
20. 2022 – Terminal T4 Iași Aeroport – 120 Monopiles (in progress)

Total ~ 1800 Drilled Foundations

References – Design and Build

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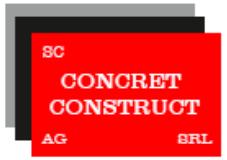
Partners



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Key Data

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Till Now

Column size 50÷100 cm
Socket diameter 1500÷2050 mm
Pile diameter 600÷1000 mm
Pile depth 4÷12,5 m
Soil type sand to gravel/boulders, soft clay to hard clay, q_c =0.15÷30MPa
Design Loads N = 9,000 kN, M = 4,000 kNm, H = 1,000 kN
Productivity 5÷10 foundations/rig/day

Available Capabilities

Column size up to 120 cm
Socket diameter up to 2500 mm
Pile diameter up to 1200 mm
Pile depth up to 22 m
Soil type sand to gravel/boulders, q_c up to 50MPa
Design Loads N = 15,000 kN, M = 8,000 kNm, H = 2,000 kN
Productivity up to 12 foundations/rig/day

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