Statnamic Pile Load Testing

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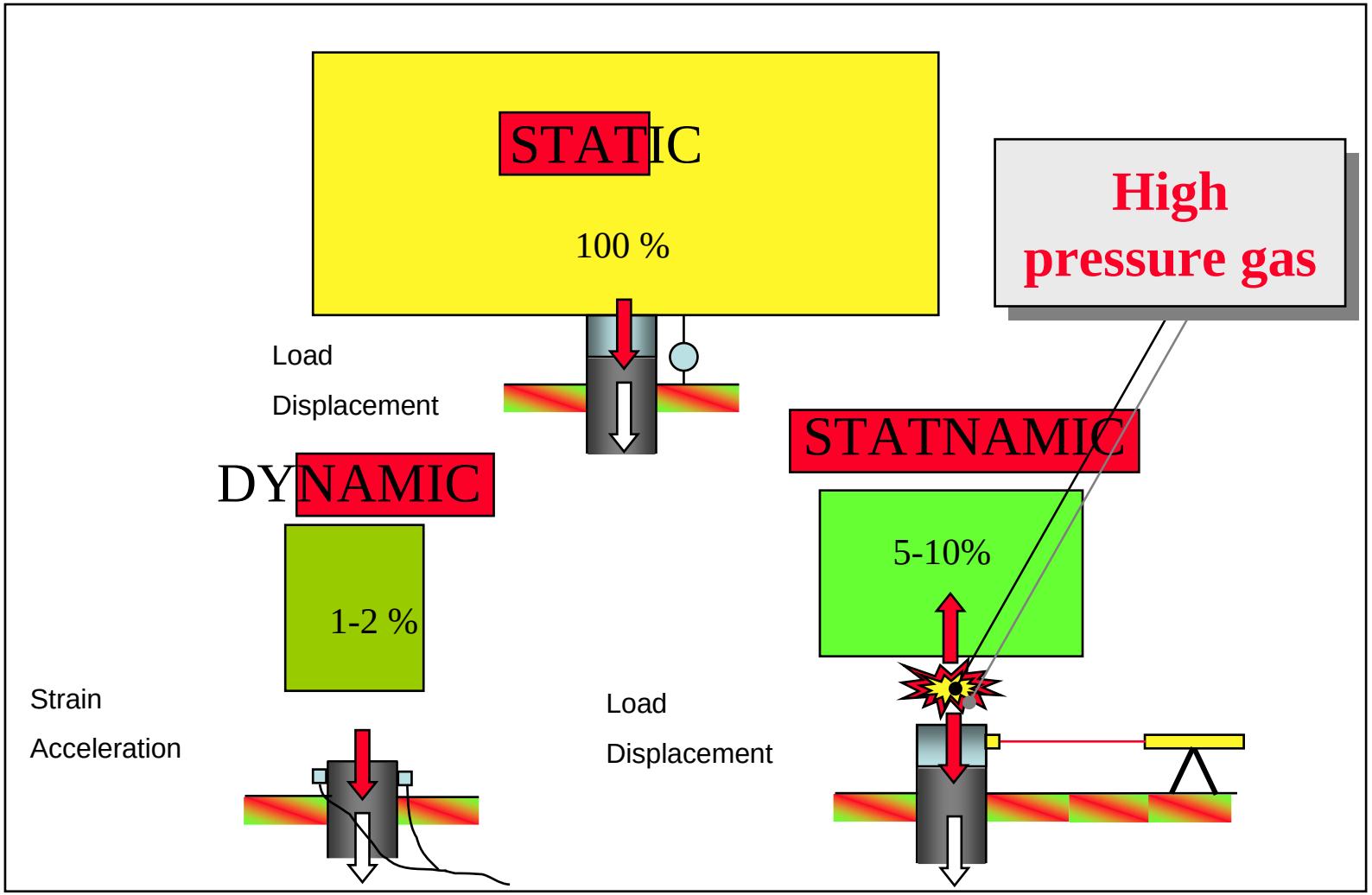
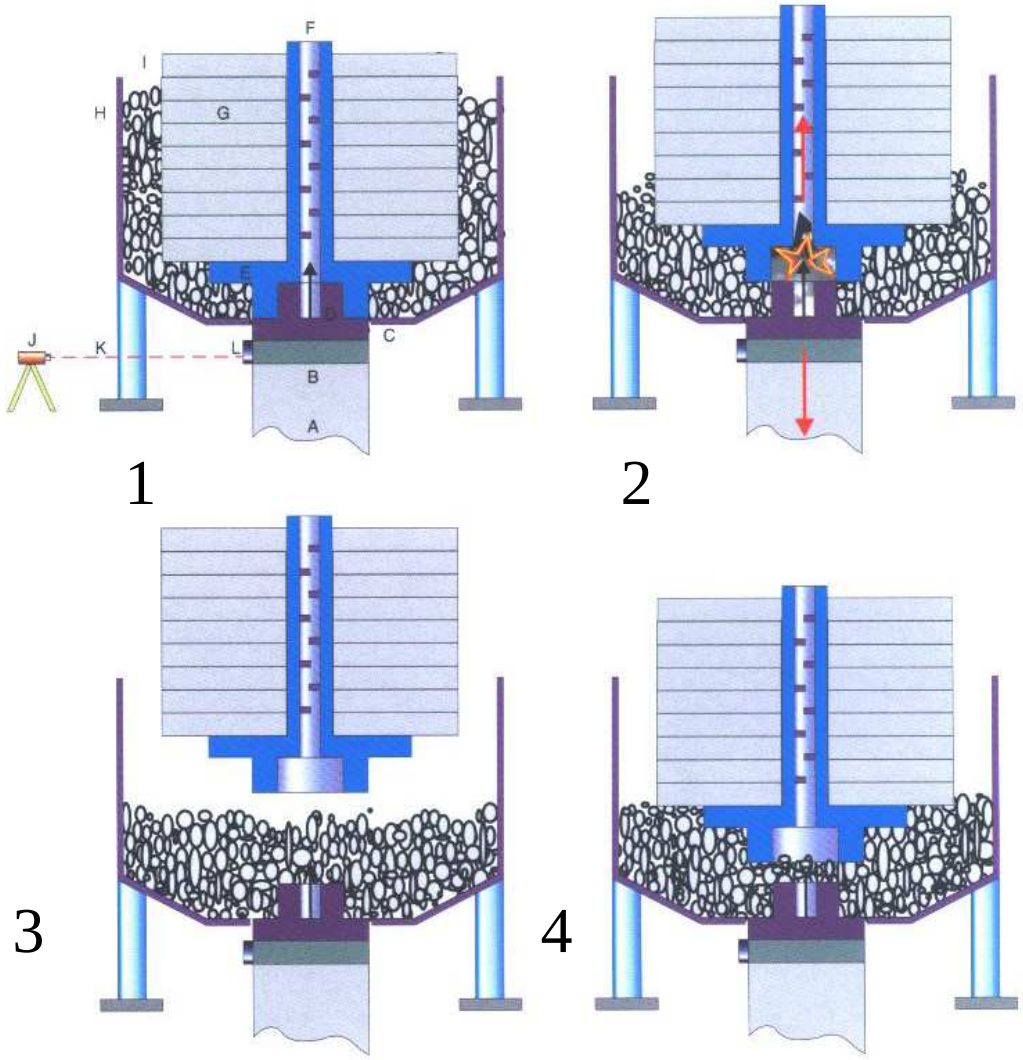
Load Testing Methods

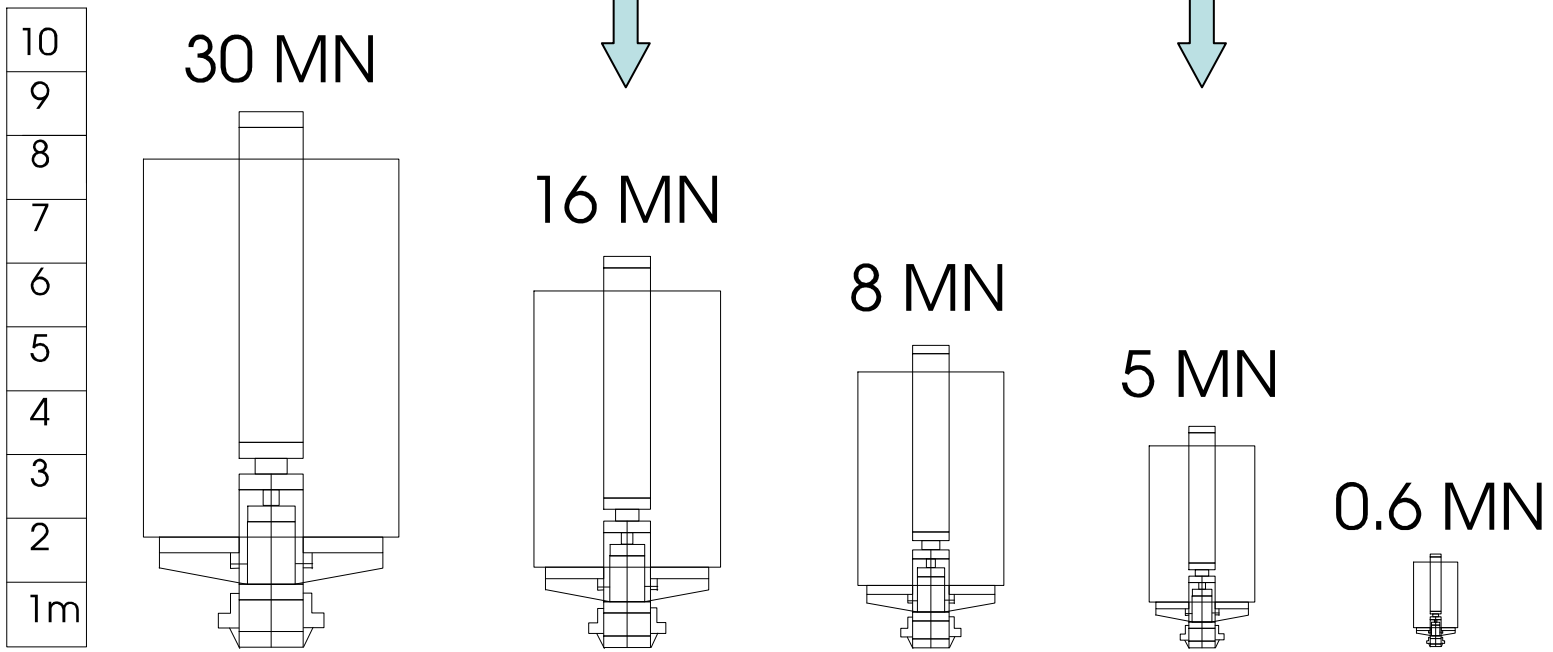


Description Stanamic



A = Pile
B = Load cell
C = Cylinder
D = Piston with chamber
E = Platform
F = Silencer
G = Reaction mass
H = Gravel Container
I = Gravel
J = Laser
K = Laser beam
L = Laser sensor

Description Stanamic



Clients

Word wide

Knowledge and experience Statnamic

(Peter Middendorp)

Description Stanamic

Hydraulic Catching Mechanism

Containers filled with local material (gravel or equivalent)

4 test a day

Simple inspection ignition system

Transport on one trailer

Description Stanamic

Equipment:

80 tons reaction mass

7 trailers for transport

2 to 3 days a test

one cycle of testing

Video of Test

Application, Static Load Test

Advantages:

- Static behaviour
- Separation of:
  - End Bearing
  - Shaft Friction

Disadvantages:

- Cost
- Selection of Test Piles

Application, Dynamic Load Test

Advantages:

•Low Cost

•Test on all Piles

Disadvantages:

•Dynamic Pile-Soil behaviour

•High stresses in Pile

•Requires advanced analyzing Techniques

•Applicable only for Steel Pipe Piles

Application, Statnamic Load Test

Advantages: Relatively low Cost

Free selection of test Piles

Disadvantages: Difficult to determine Bearing Capacity

Difficult to distinguish between End Bearing and Shaft Friction

Application: Re-use of existing Piles

Load-Settlement behaviour

Condition:

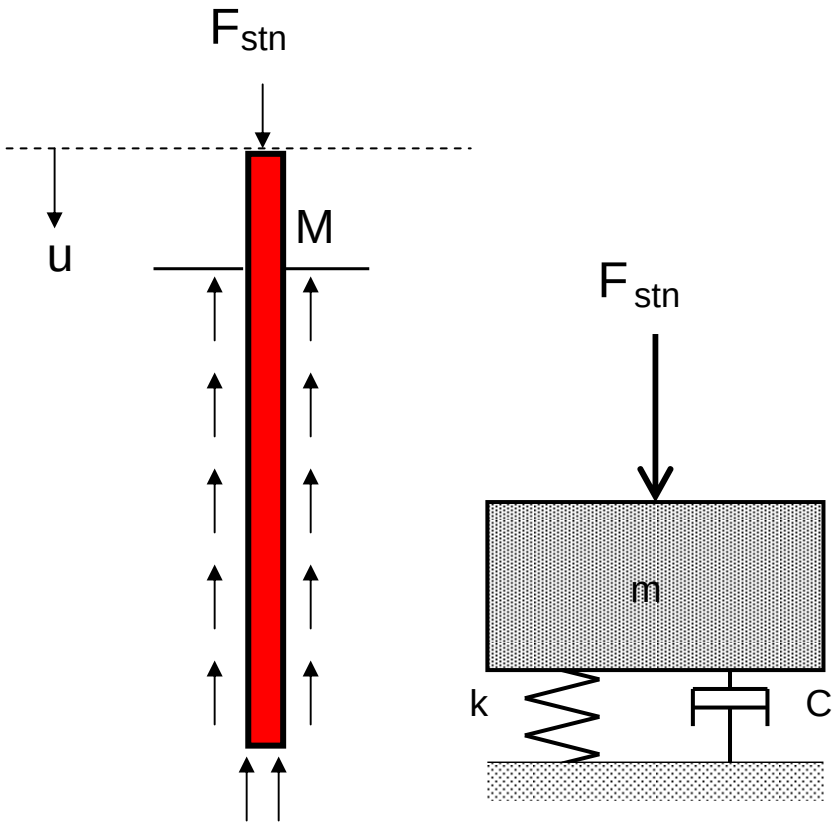
$$10 \leq \frac{T_f}{L/c_p} \leq 1000$$

T_f Duration of rapid load

L pile length

c_p stress wave velocity test pile

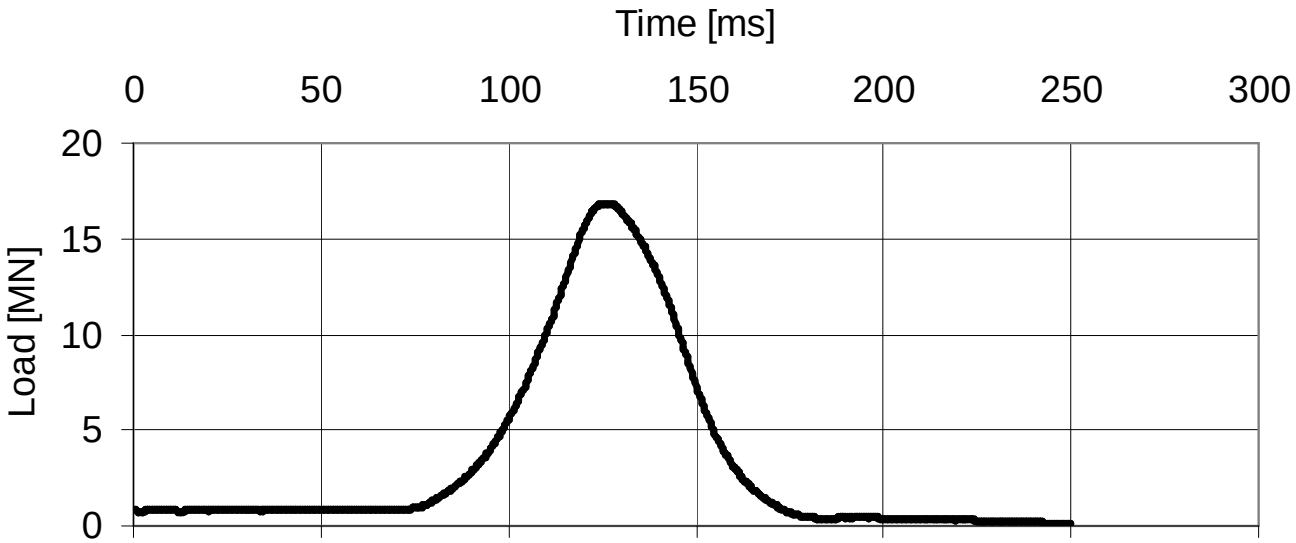
Interpretation



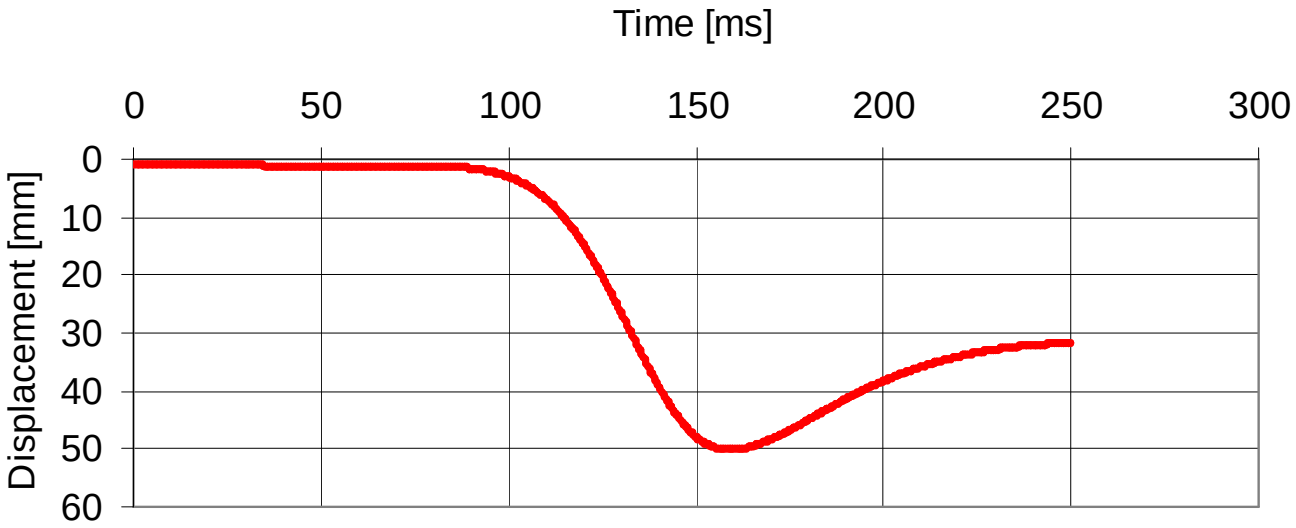
F_{stn}	= statnamic force, measured
F_{st}	= static resistance
u	= displacement, measured
v	= du/dt
a	= d^2u/dt^2
m	= pile mass
C	= damping coefficient

$$F_{stn}(t) = F_{st}(t) + m \cdot a(t) + C \cdot v(t)$$

Interpretation



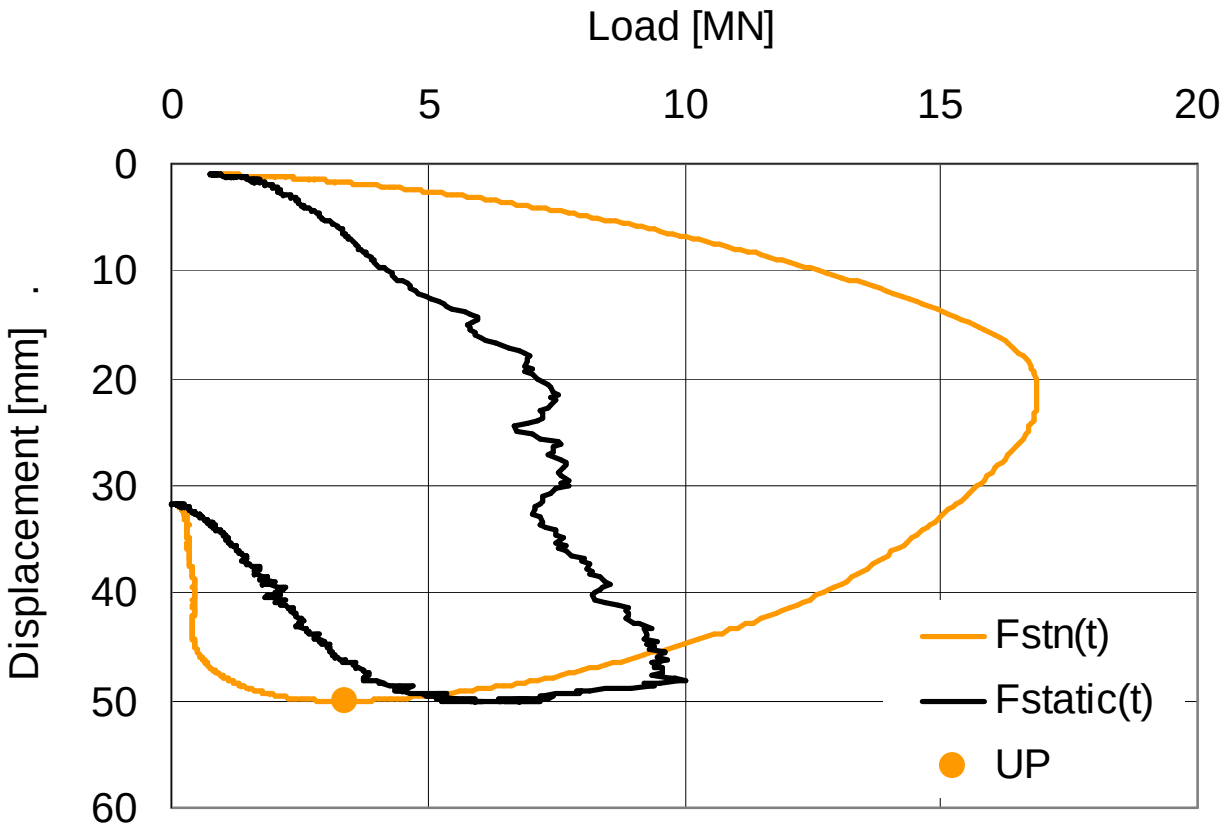
Load Cell



Laser Sensor

Accelerometer

Interpretation

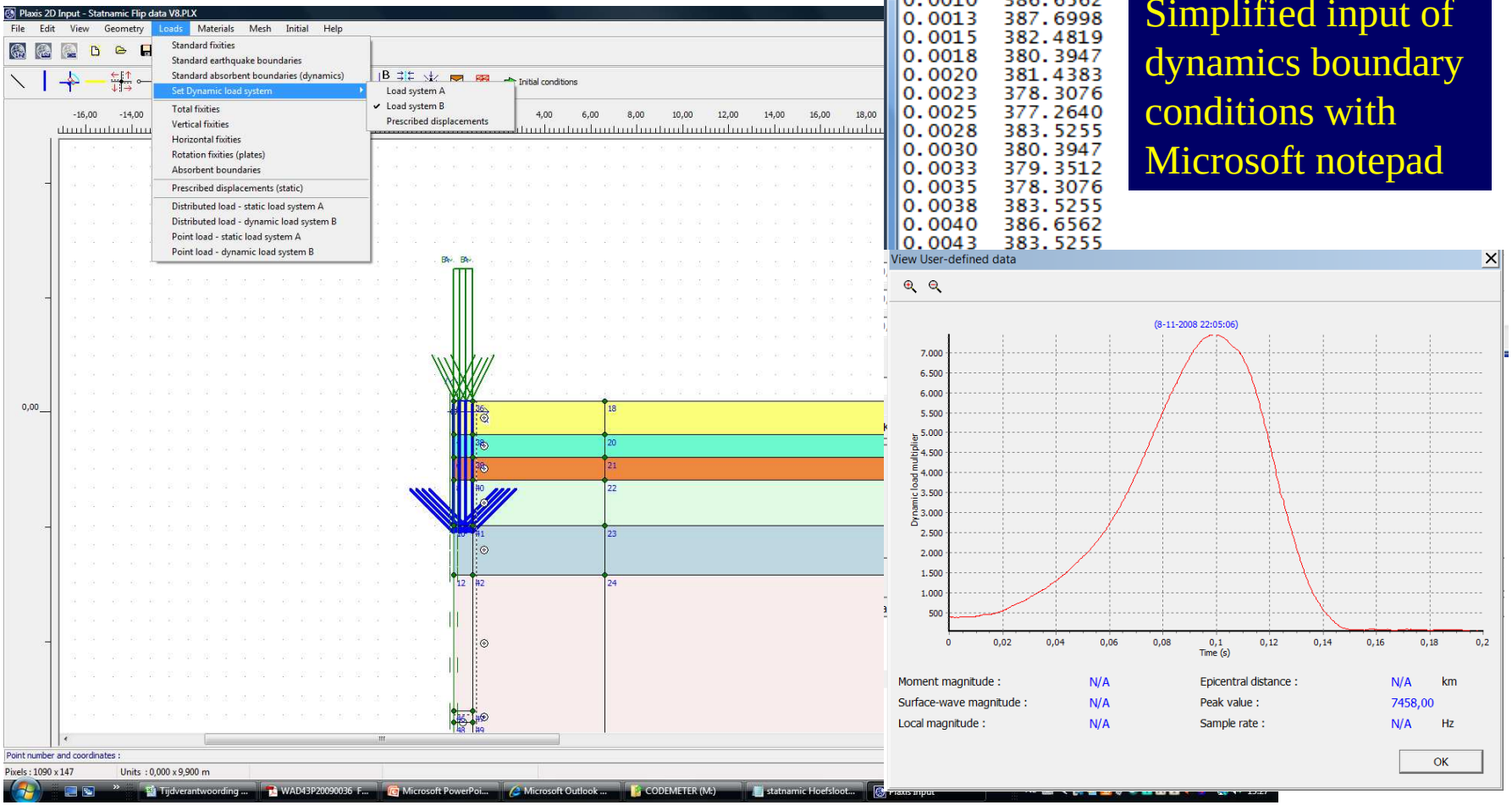


$$F_{st}(t) = F_{stn}(t) - m \cdot a(t) - C \cdot v(t)$$

Estimated damping parameter C (hyperbolic curve)

Interpretation

Dynamic Analysis, PLAXIS

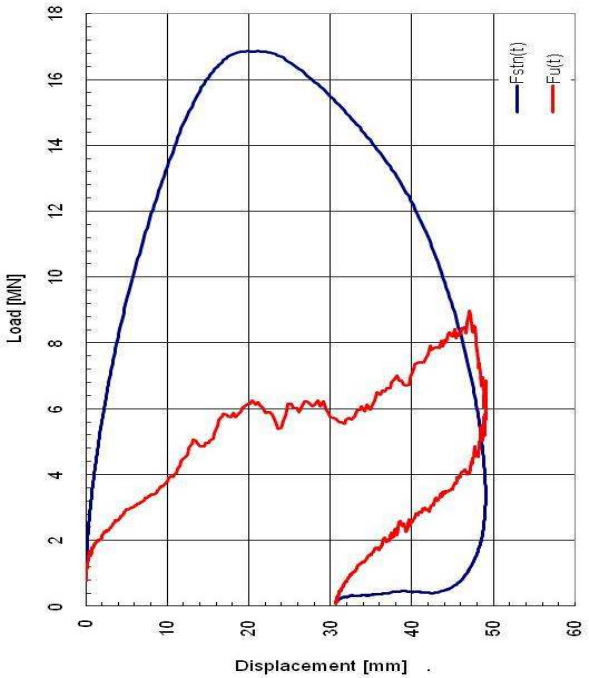


Interpretation

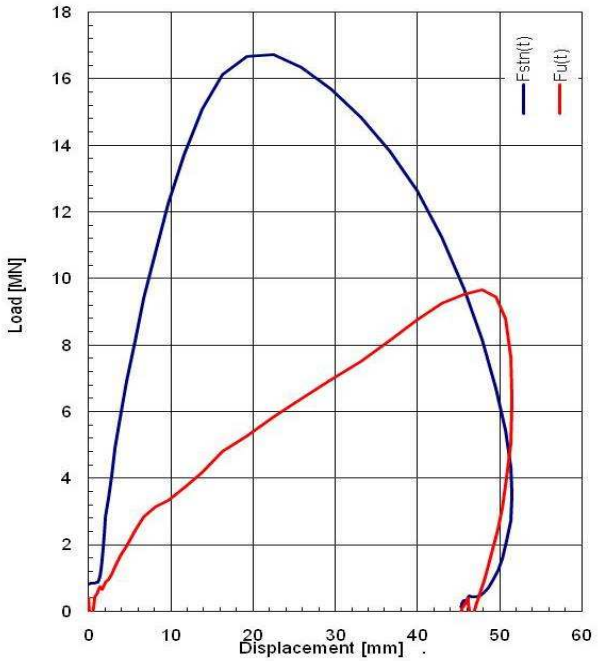
Dynamic Analysis, PLAXIS

Calibration model with static behaviour
Average damping parameter selected based on hyperbolic curve

Statnamic Test



Numerical Simulation PLAXIS



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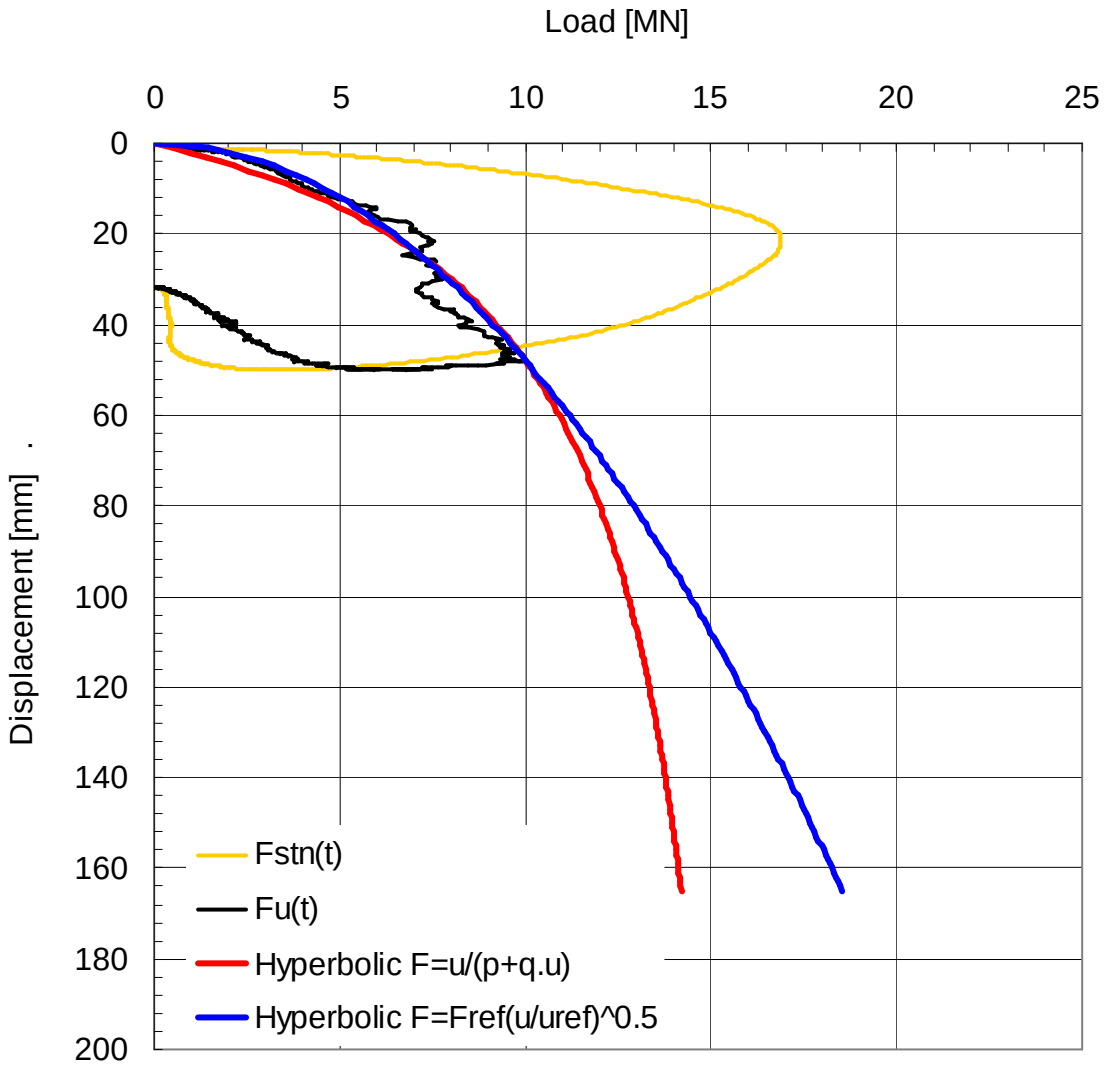
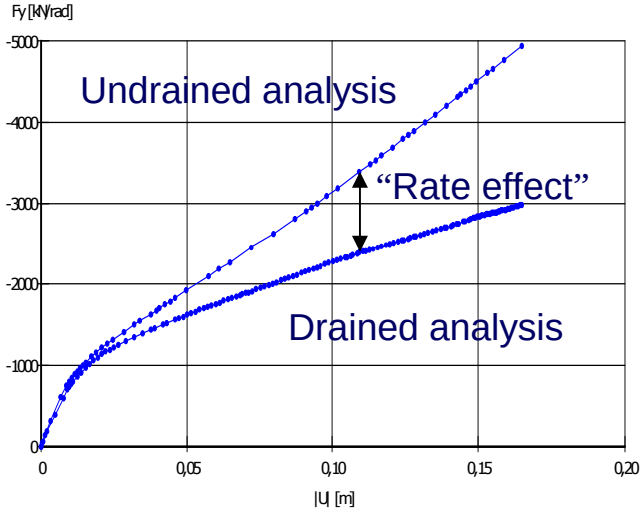


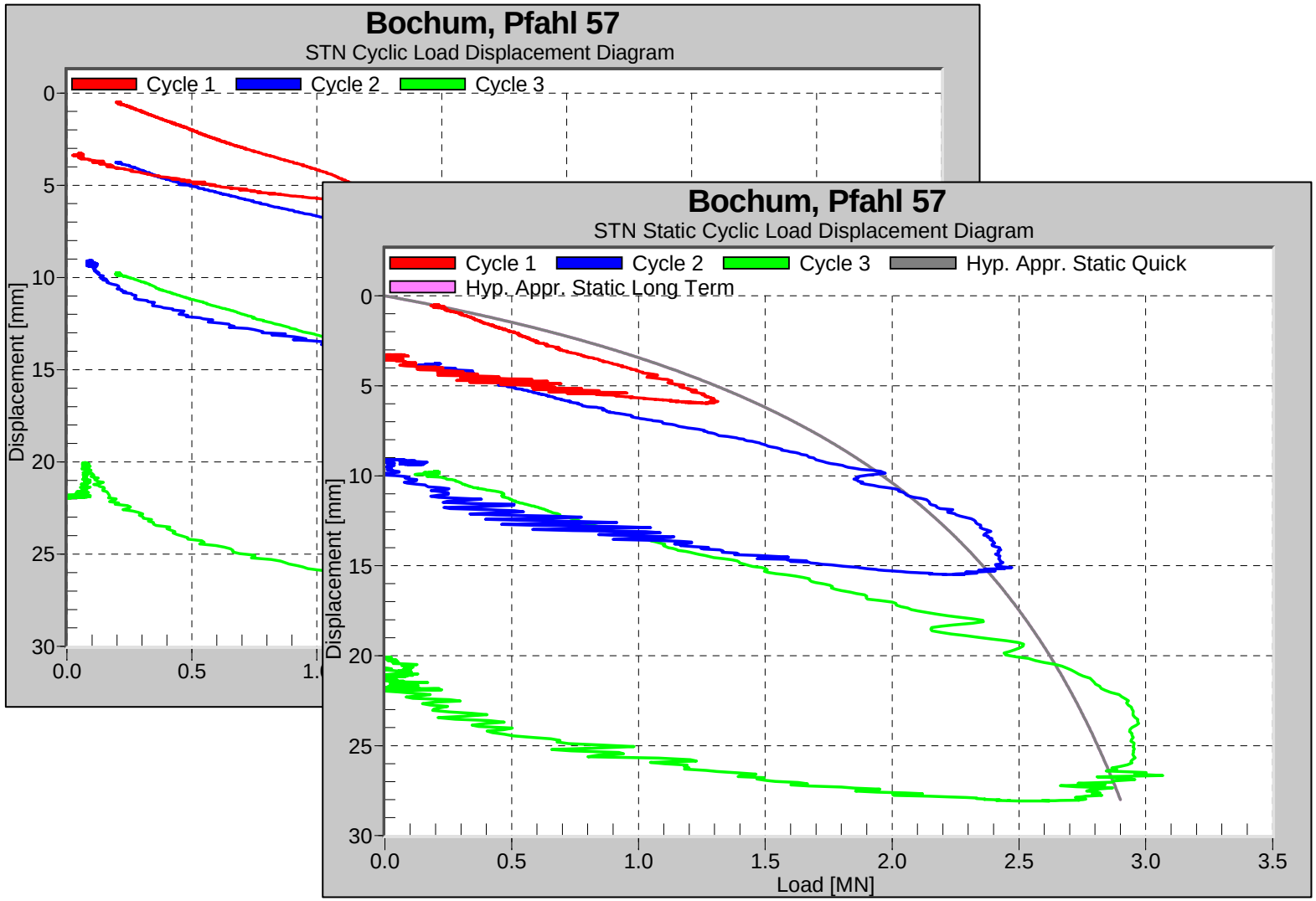
Extrapolation according to Middendorp and Bakker

Correction for “rate effects”:

Undrained behaviour



Interpretation



Guidelines

The Netherlands

- CUR-comittee H410 “Rapid load tests”
- goal: preparation European Codes
- Fugro is member (Maarten Profittlich)

European Codes

- Draft standard Rapid Load Testing procedure
- Working group 4 of TC 341
- (Testing of geotechnical structures; Testing of piles: rapid load testing (reference EN-ISO 22477-# version: 3.3, 23 April 2008)

- Guideline on the interpretation of Rapid Load test on piles
- 7 November 2008

Conclusion

Statnamic provides alternative in case

- Static load tests are not feasible
- Re-use of existing Piles
- Determine Load-Settlement behaviour

Thank You