



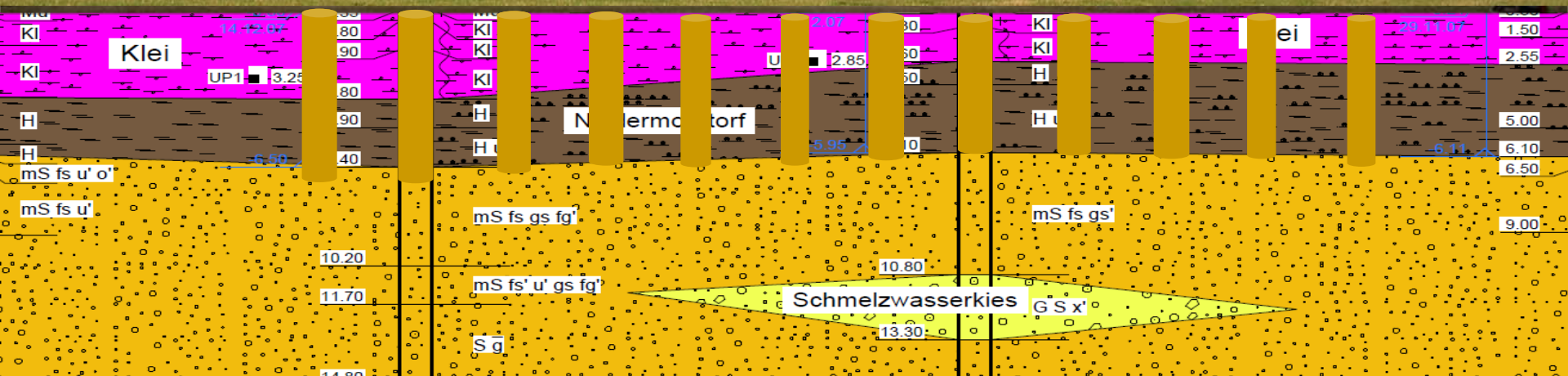
Messtechnische Anforderungen in der Entwicklung des akustischen Geo-Scanners für das Vibrationsrammverfahren

Measurement requirements for engineering of Acoustic Geo-
Scanner for Vibratory Pile Driving Technology

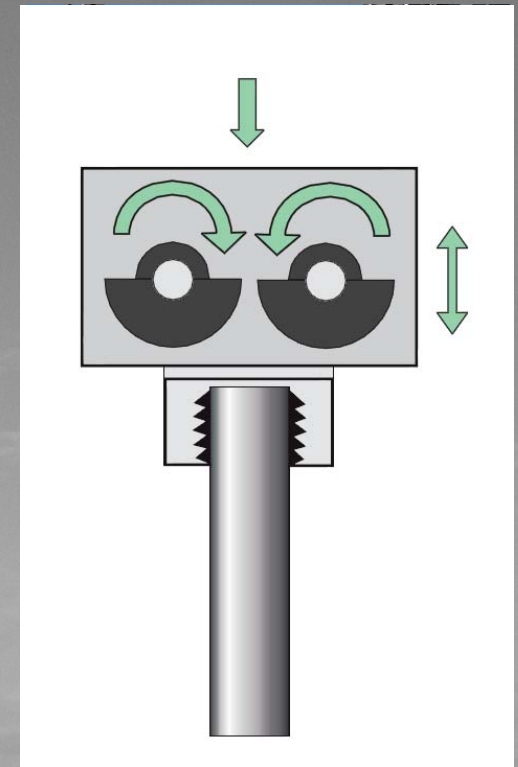
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Dipl.-Ing. Heiko Hertel
Wolfgang Exner

Hannover Messe, 7. April 2011

subsoil and construction

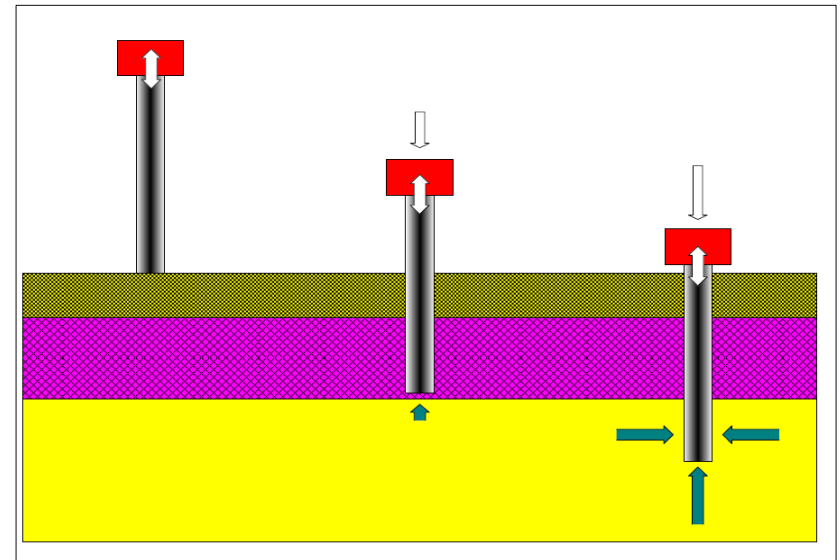


vibratory pile driving



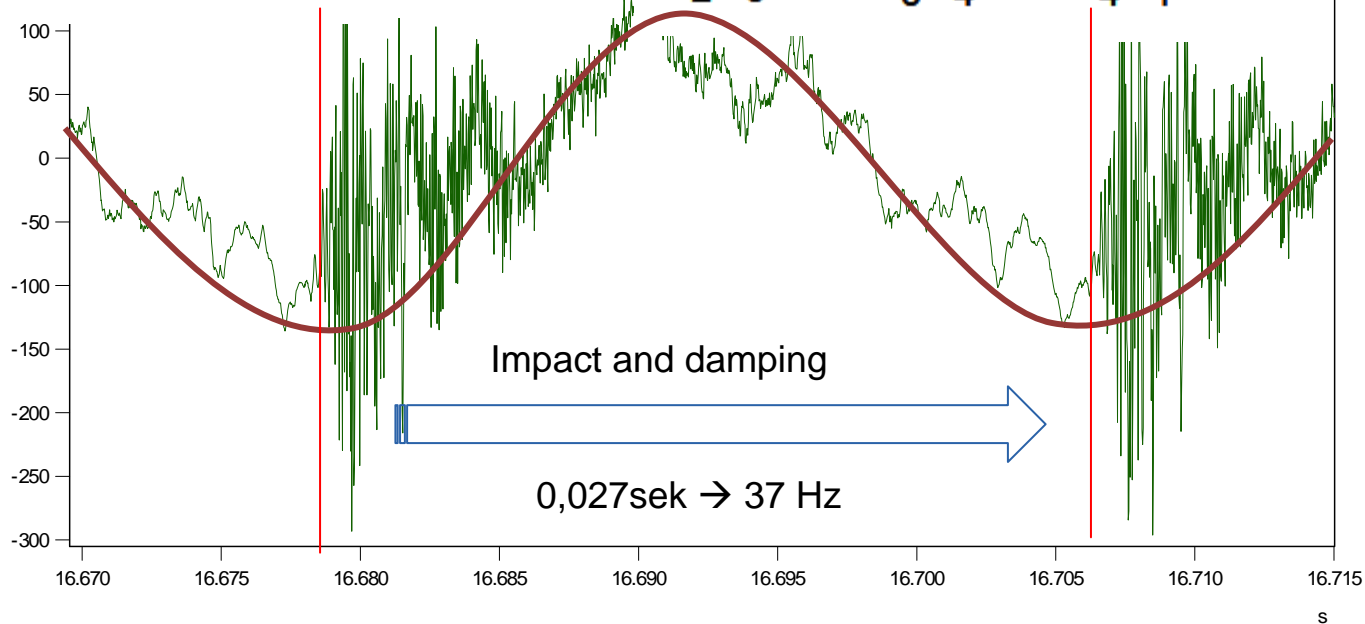
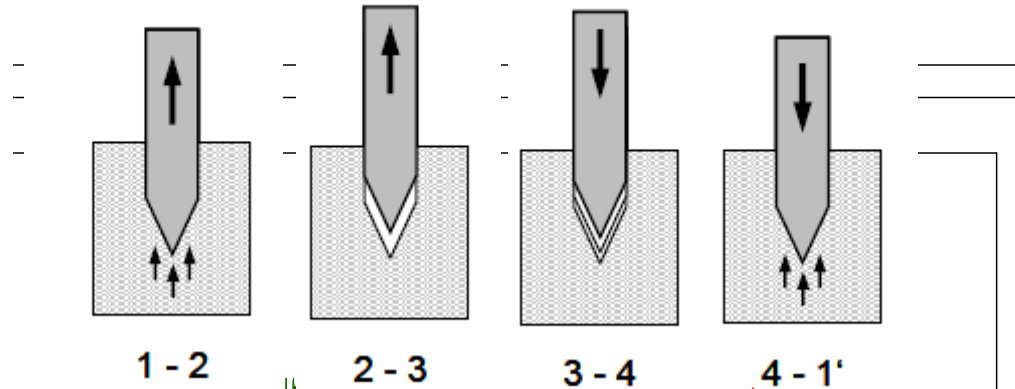
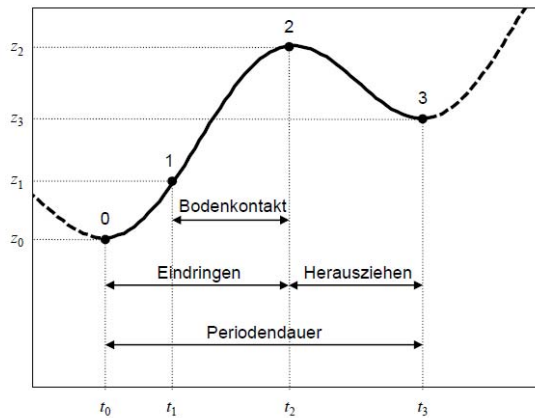
frequency	30 - 40 Hz
amplitude	1 – 7 mm
max. centrifugal force:	1400 kNm
axial acceleration :	15 - 30 g
shock	> 100 g

Dependent relationship in process of vibratory pile driving to structure borne sound measurements

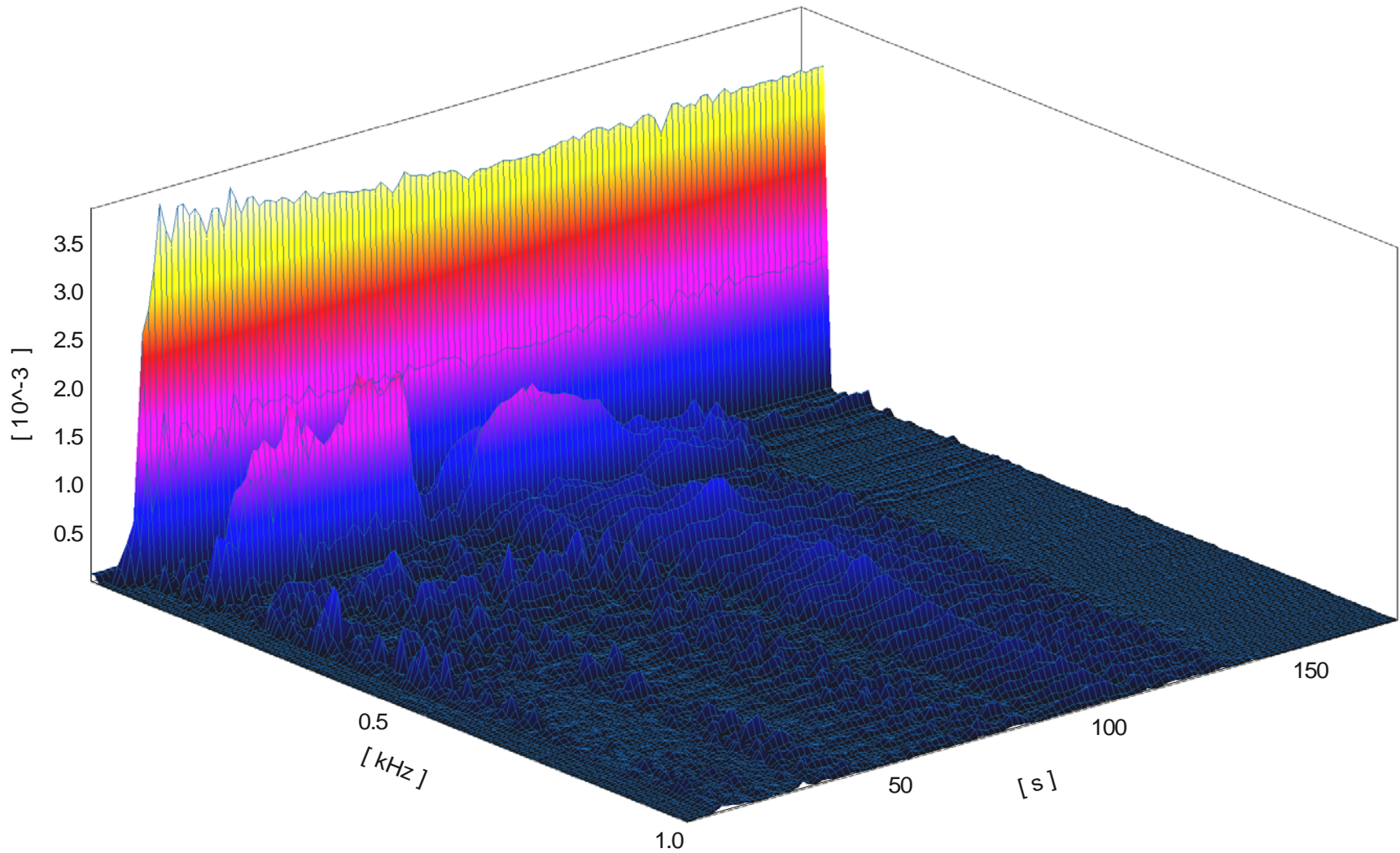


- Initial vibration by vibratory pile driver
- Driven pile fixed by clamb on pile driver
- Driven pile model than rigid body
 - onesided fixed pile
 - vibration conditions are dependent of soil properties

Dependent relationship in process of vibratory pile driving to structure borne sound measurements



3-D Illustration of frequency spectrum



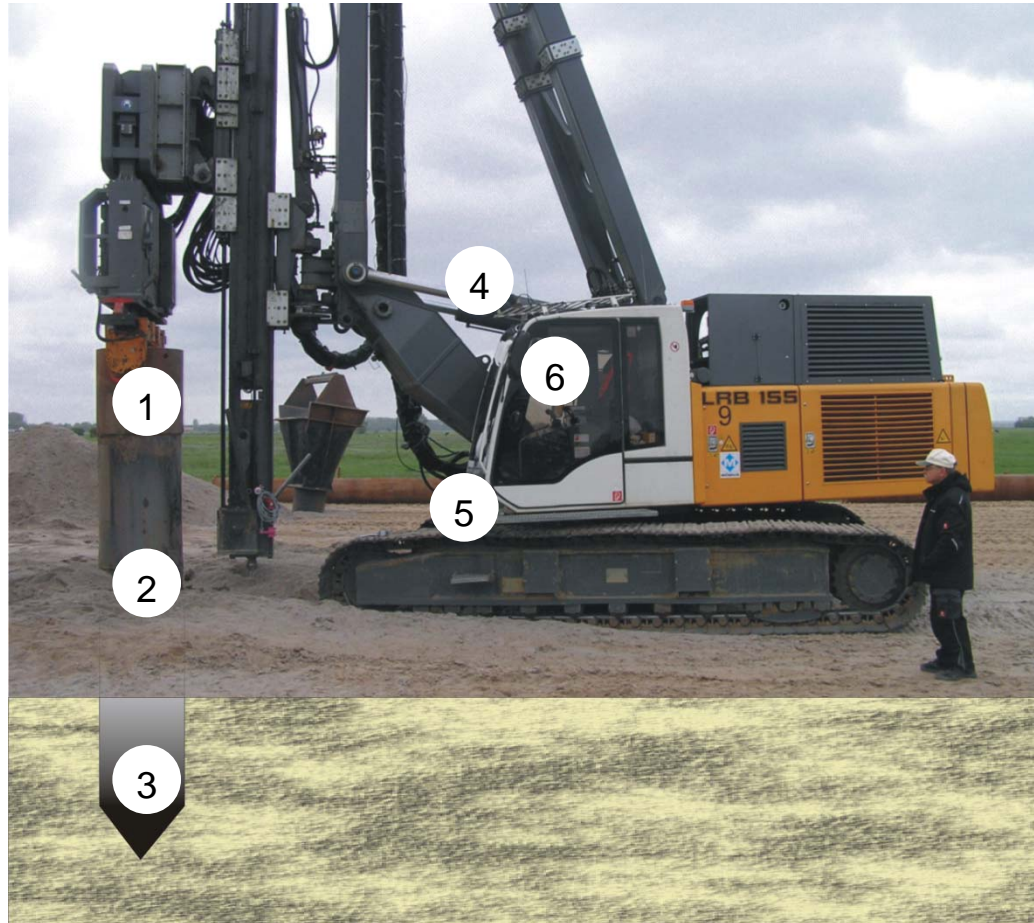
measurement system components

Components installed at driven pile

1. emitter

2. data wire

3. ICP - Sensor



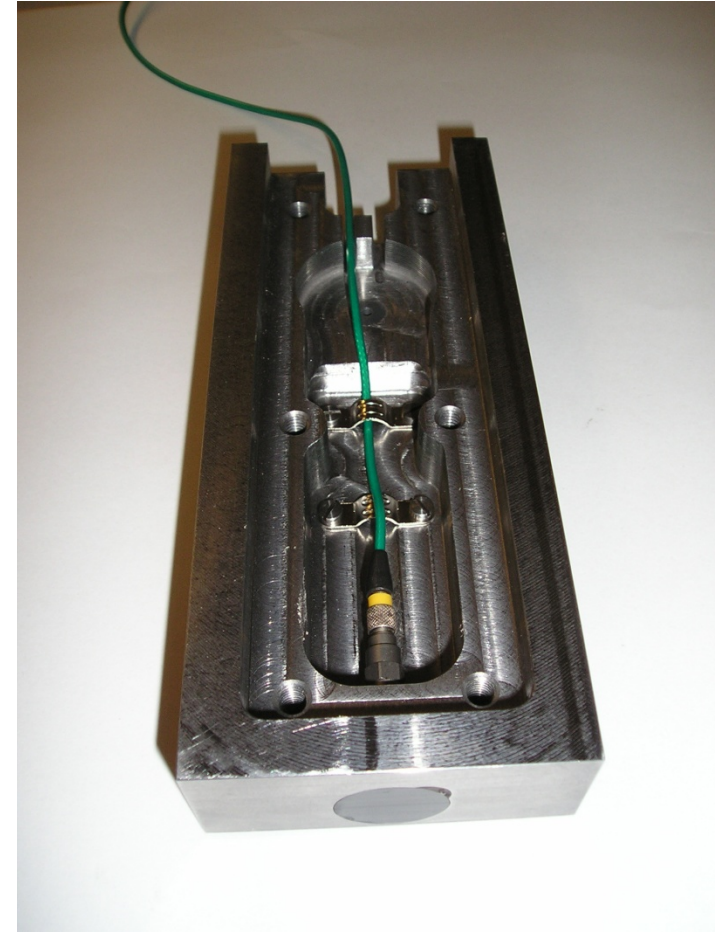
Components installed at rig

4. receiver

5. data acquisition unit

6. data processing unit (realtime)

ICP and protection housing

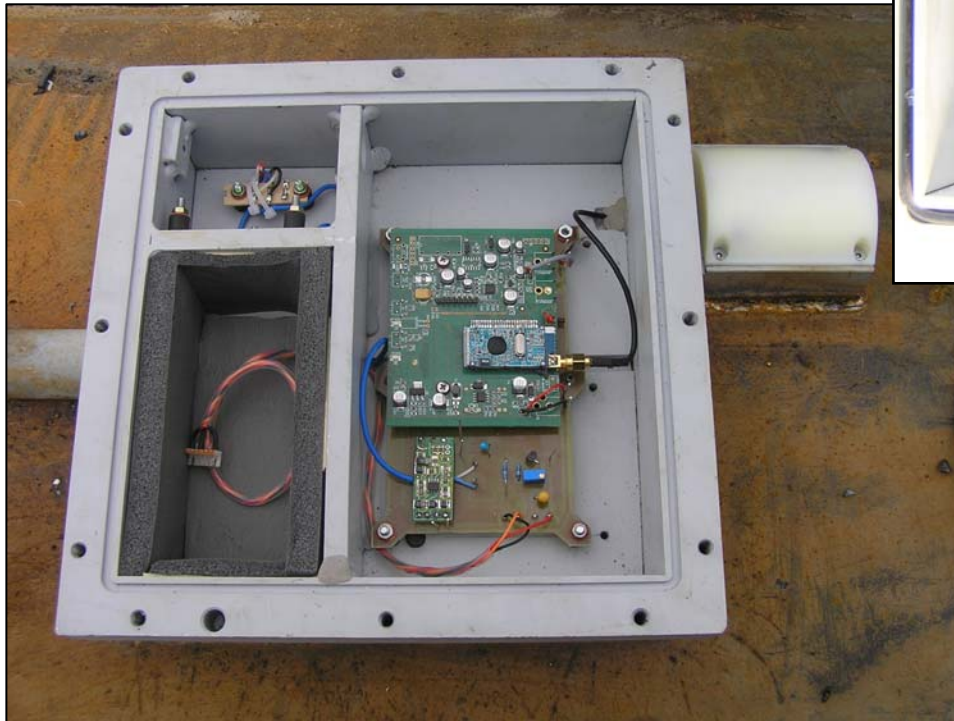


Standard ICP, Sensivity 10 mV/g

data transmission and power supply unit

Wireless data transmission

modified standard digital audio system (I²S), transmission power 100 mW, s/n ratio 94 dB



Power supply

Li-Ion accumulator, 18 V and 3300 mAh

data transmission and power supply unit



on pile head mounted unit by final depth

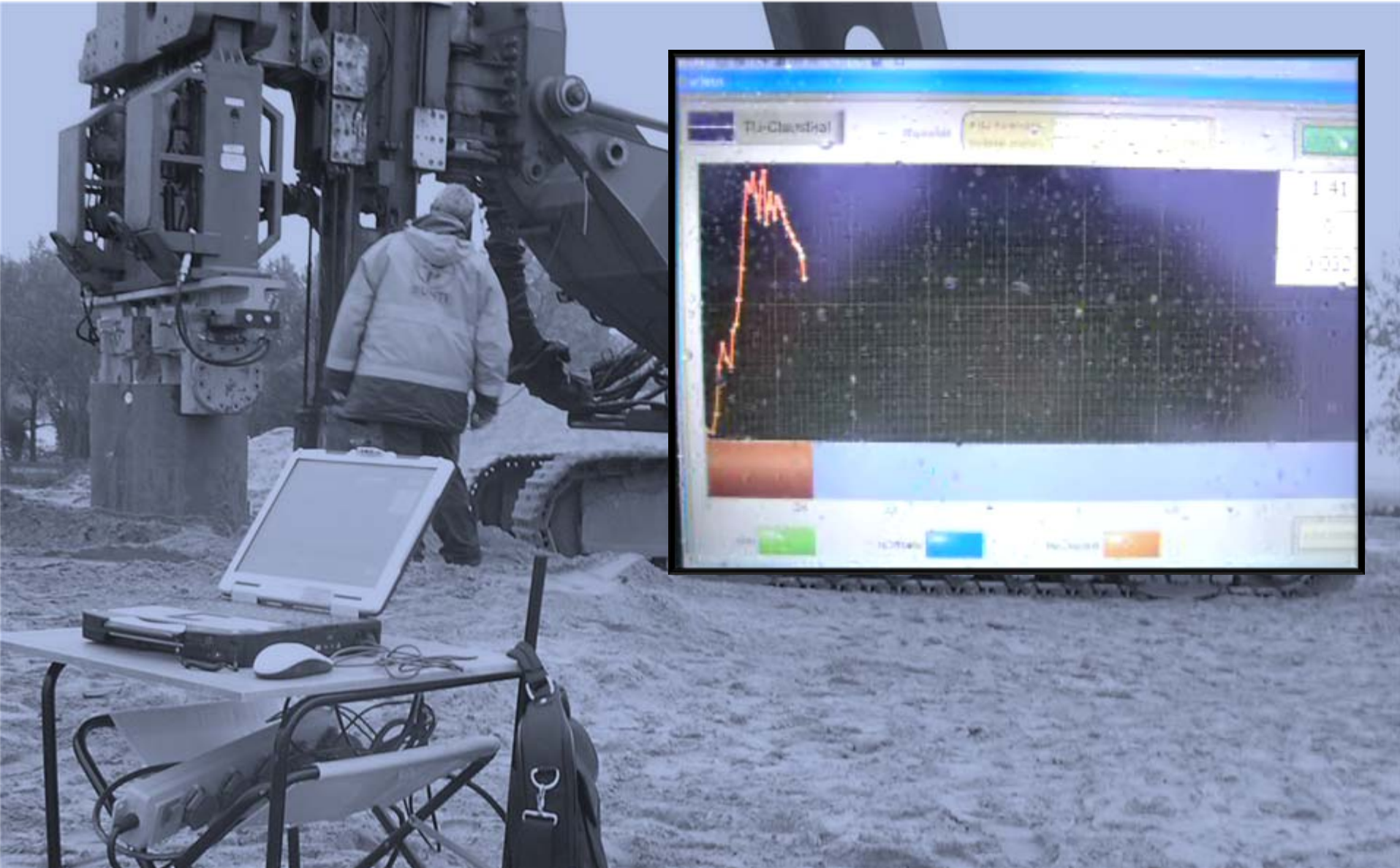
Battery box



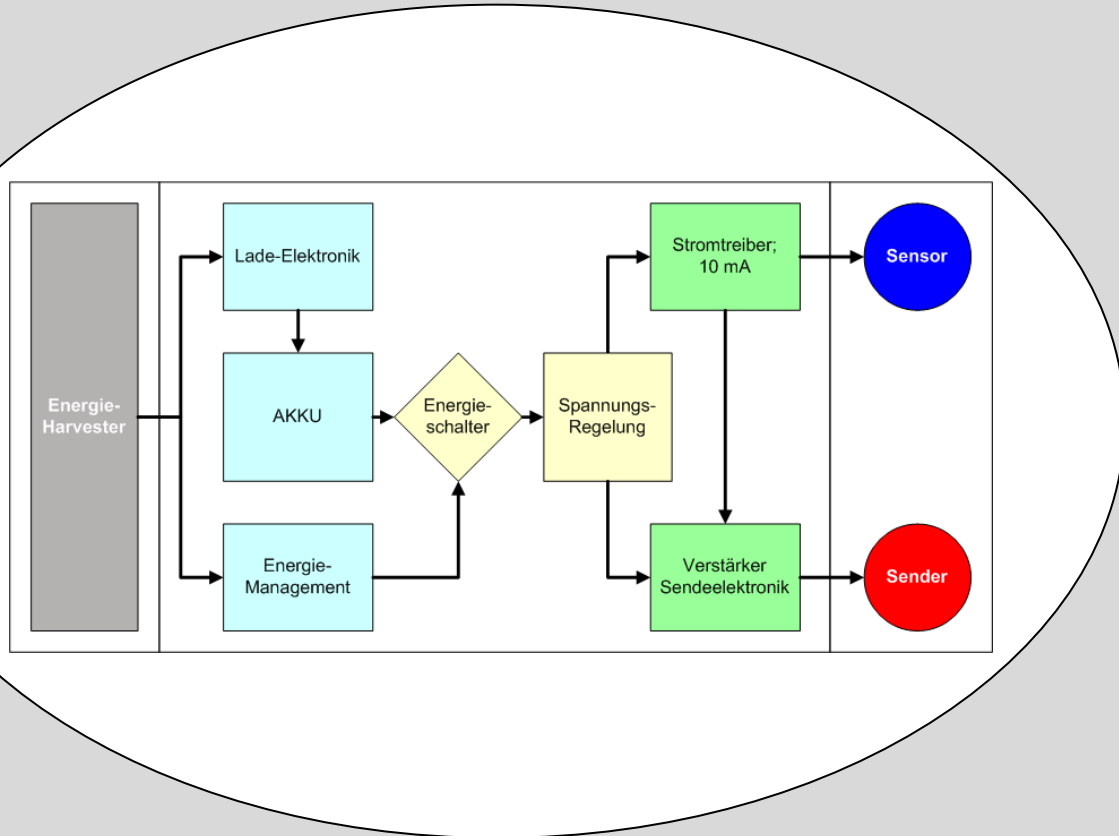
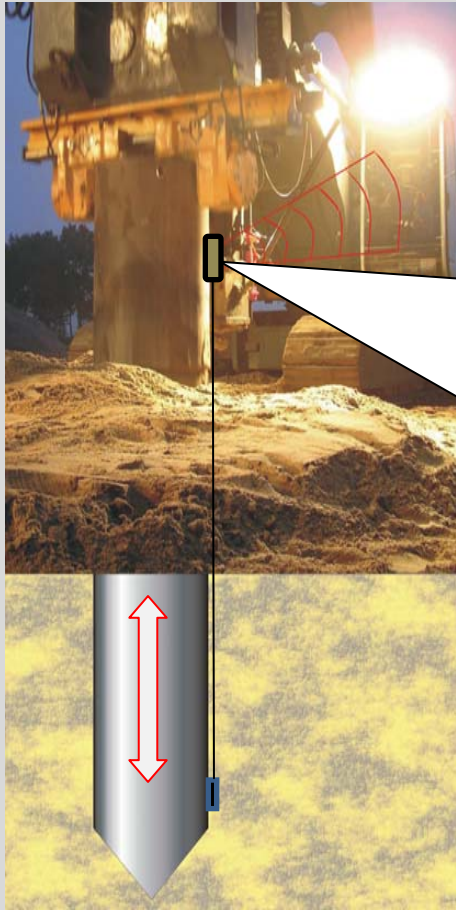
Data acquisition and processing unit



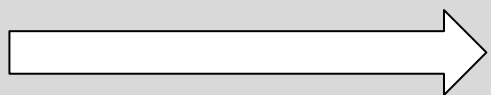
material detection in pile driving process



Profile energy harvester



frequency ~ 30 bis 40 Hz
amplitude : 1 – 7 mm
acceleration: 15 bis 30 g



12 V , 350 mA



Profile energy harvester

- modular construction,
- quick release system
- Water and dust protected
- Impact resistant
- Vibration resistant
- Temperature resistant
(-20 bis +60°C)





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