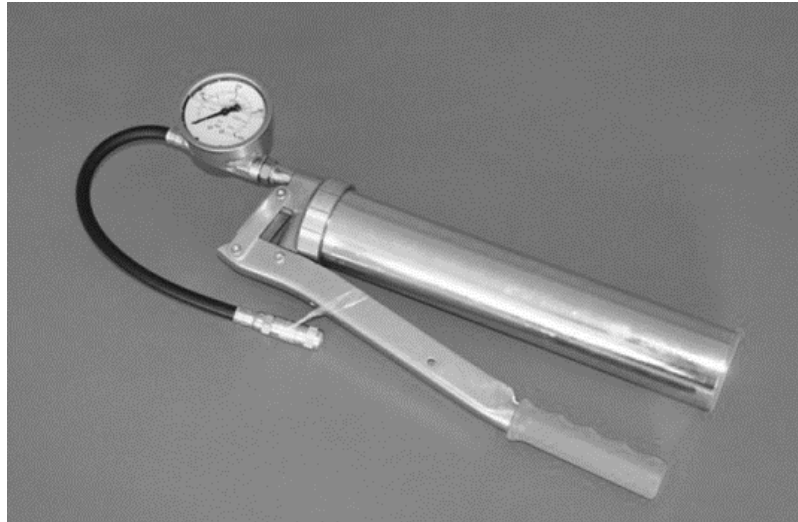


BENEFITS OF DIGITAL INJECTION

TECHNICAL OVERVIEW IN POSSIBILITIES FOR CONTROL AND RESULT, AND THE SOFTWARE BEHIND, WHICH ALSO INCLUDE DIGITAL DOCUMENTATION.

LOOKING BACK PUMP EQUIPMENT



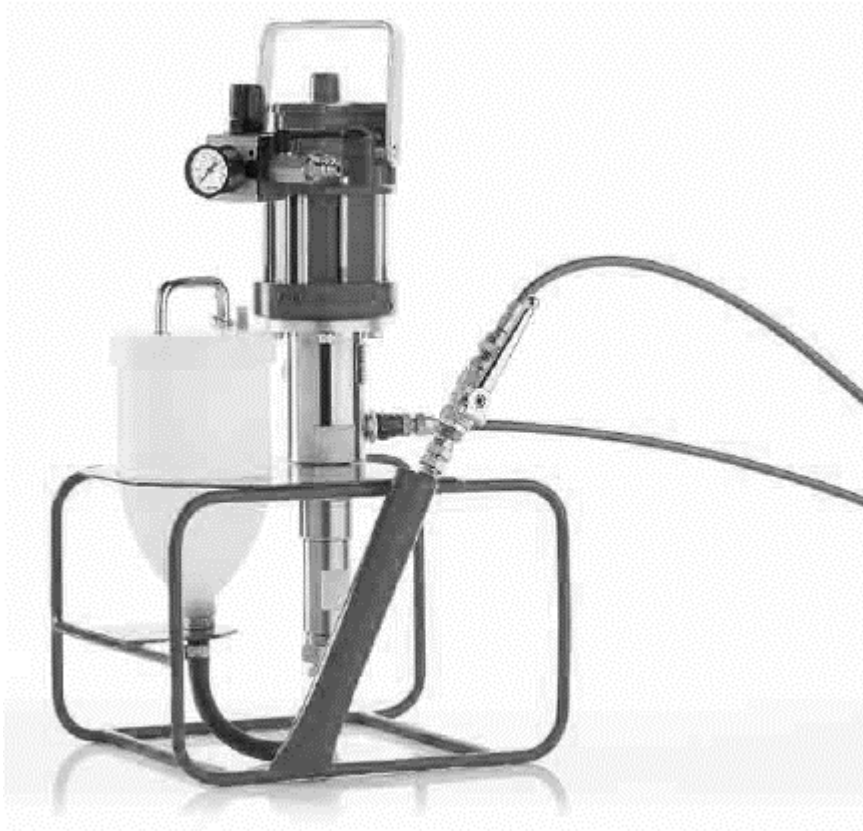
- Hand lever press, up to 400 bar!
- Visually checked by the employee with a pressure gauge.
- Volume by refilling.
- One-component application.

LOOKING BACK PUMP EQUIPMENT



- Electric diaphragm pump.
- Visually checked by the employee with a pressure gauge.
- Volume by scale at the hopper.
- One-component application.

LOOKING BACK PUMP EQUIPMENT



- Air operated piston pump
- Visually checked by the employee with a pressure gauge and/or the inlet pressure
- Volume by scale at the hopper.
- One-component application.

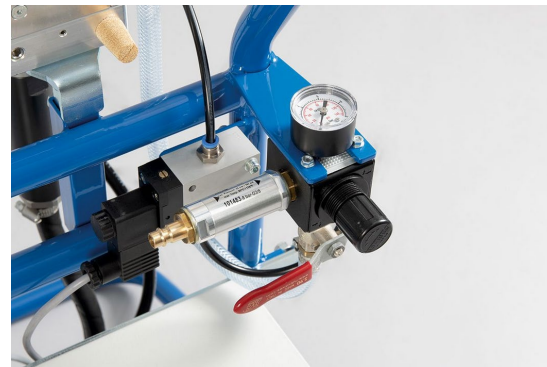
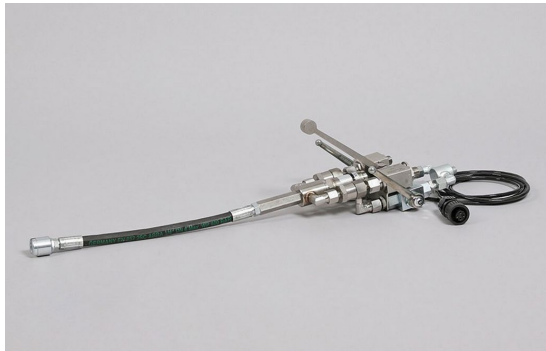
STATE OF THE ART



- Air operated piston pump,
two-component application



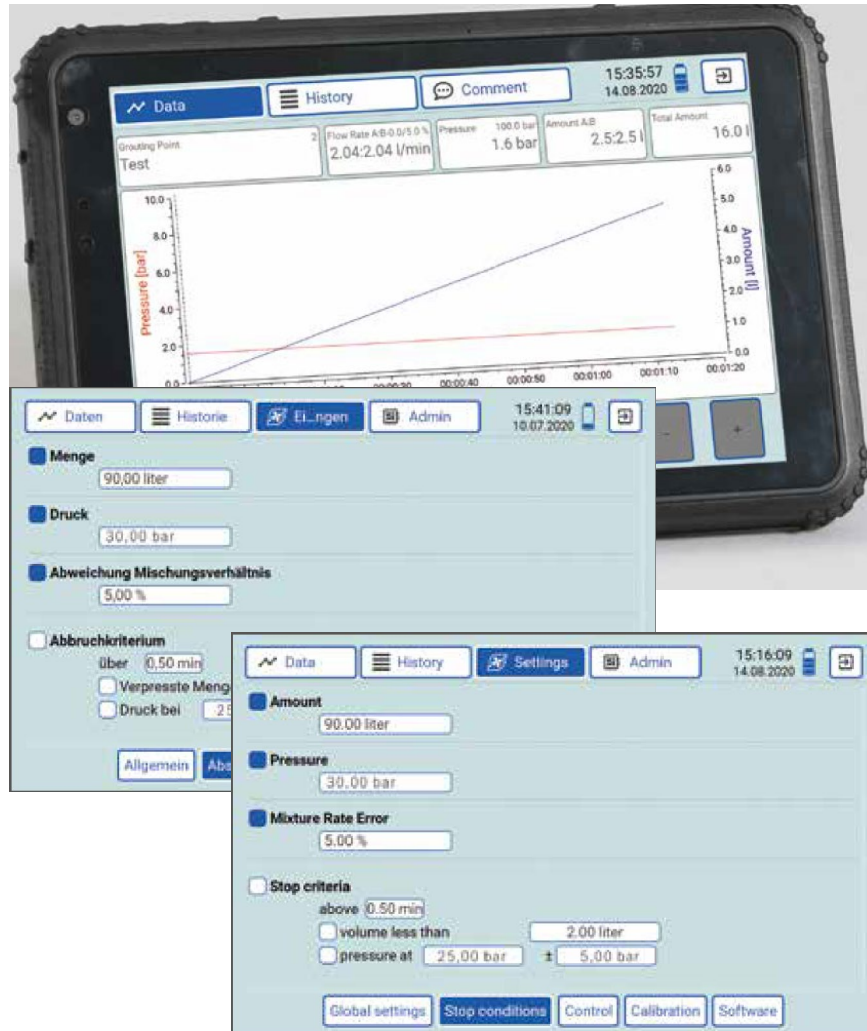
- Air operated piston pump,
one-component application



STATE OF THE ART

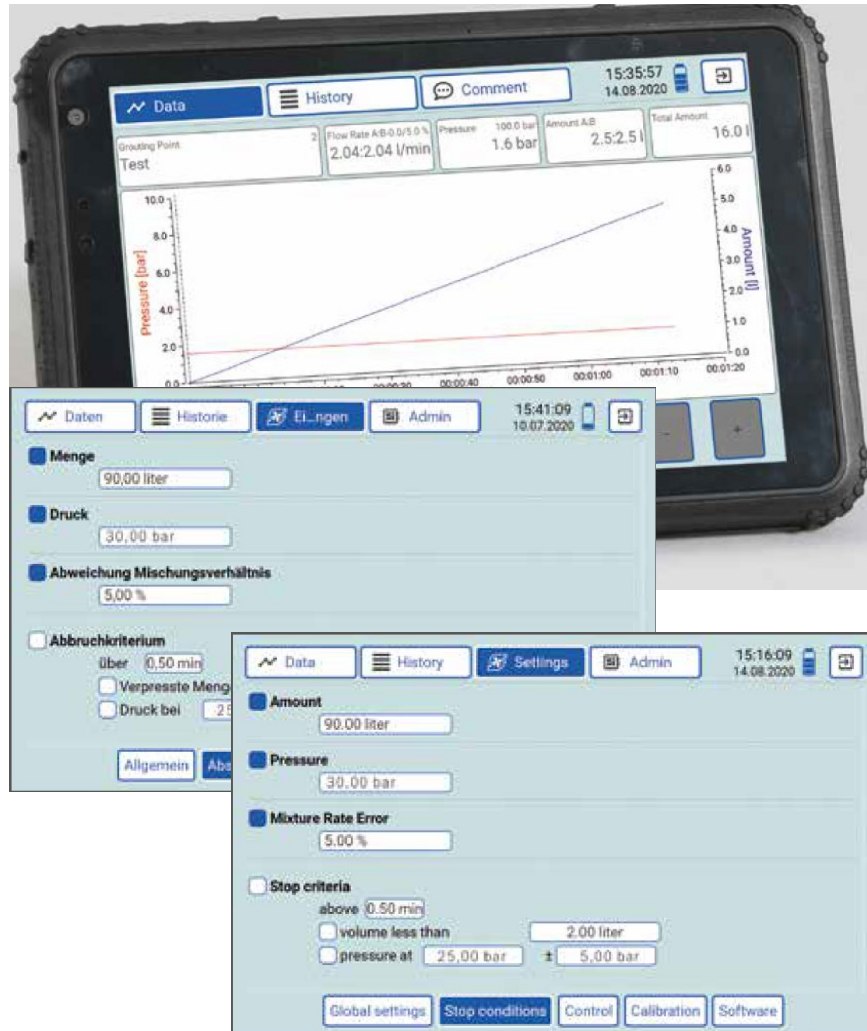
- Flow sensors recording the volume.
- Pressure sensor on the mixing head or at the pump
- A proportional valve controls the pressure.

STATE OF THE ART



- Documentation of:
 - Material consumption for each injection point
 - Injection pressure
 - Injection duration
 - Order of injections
 - Re-Injections
 - Date and time

STATE OF THE ART



- Safety shutdown:
 - Reaching a maximum amount of injection material
 - Reaching a maximum amount
 - Wrong mixing ration (2-C application)
- Pressure maintenance function over time and/or volume

ENSURE THE QUALITY AND KEEP TRACK OF THE INJECTIONS PROCESSES



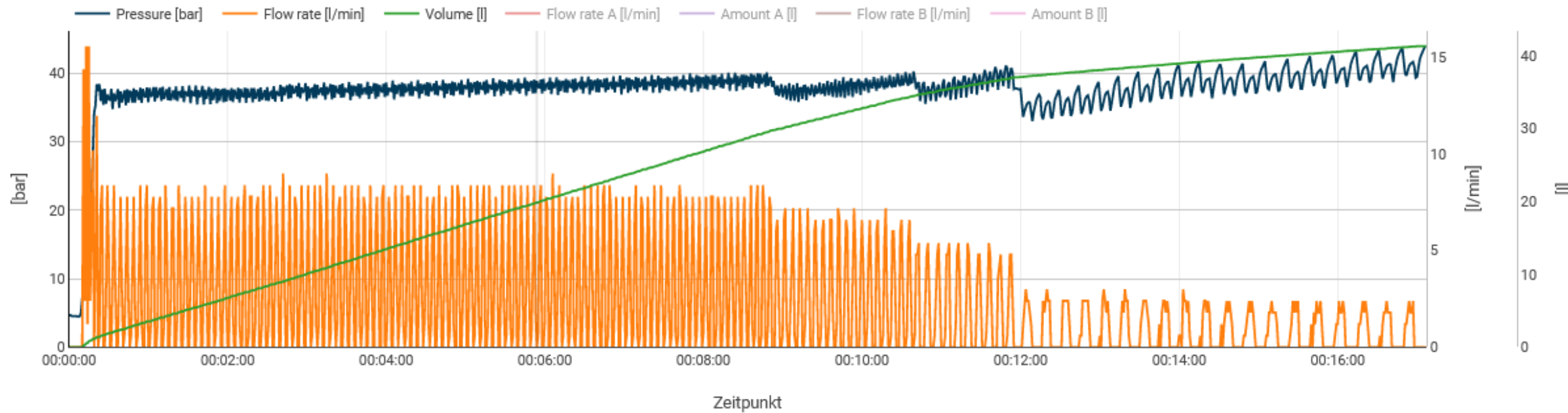
- Automated upload of injection processes to the data management system/web-platform
- AI supported quality checks and data analysis
- Visualization of the injection processes and progress
- Real-time key performance indicators (KPI)
- Complete, continuous documentation
- Export to BIM/ERP-Systems

EXAMPLE

1 Zeile ausgewählt



<input type="checkbox"/>	Injektions-Id	Inj.-zeit	Dauer	Vmax	Vist	Pmax	Status	Kommentar
--------------------------	---------------	-----------	-------	------	------	------	--------	-----------



FLC + Christiansen & Essentbank

HELP ACCOUNT

Segment Injections > Injections

26.09.2023 - 30.01.2030

PERFORMANCE DATA PROCESS MANAGEMENT BOQ VISUALIZE PLANDATA WORK ASSIGNMENTS MATERIAL

Dashboard

Site comparison

Fleetmanagement

Gewerk

Sites

- Site Add
- Tunnel Factory
- Segment Injections
- Ginah Injections
- eValuator
- Settings
- Deactivate Site
- Danish Tunnel Portal
- German Tunnel Portal

Deactivated Sites

merlins

Unlocked

5.016 BW 07.3.FBQ

S3 / TM 868 - 1085

E 47

Eisenbahnstrecke FBQ

A. 7.2, Bl. 1 A. 7.2, Bl. 2 A. 7.2, Bl. 3 A. 7.2, Bl. 4

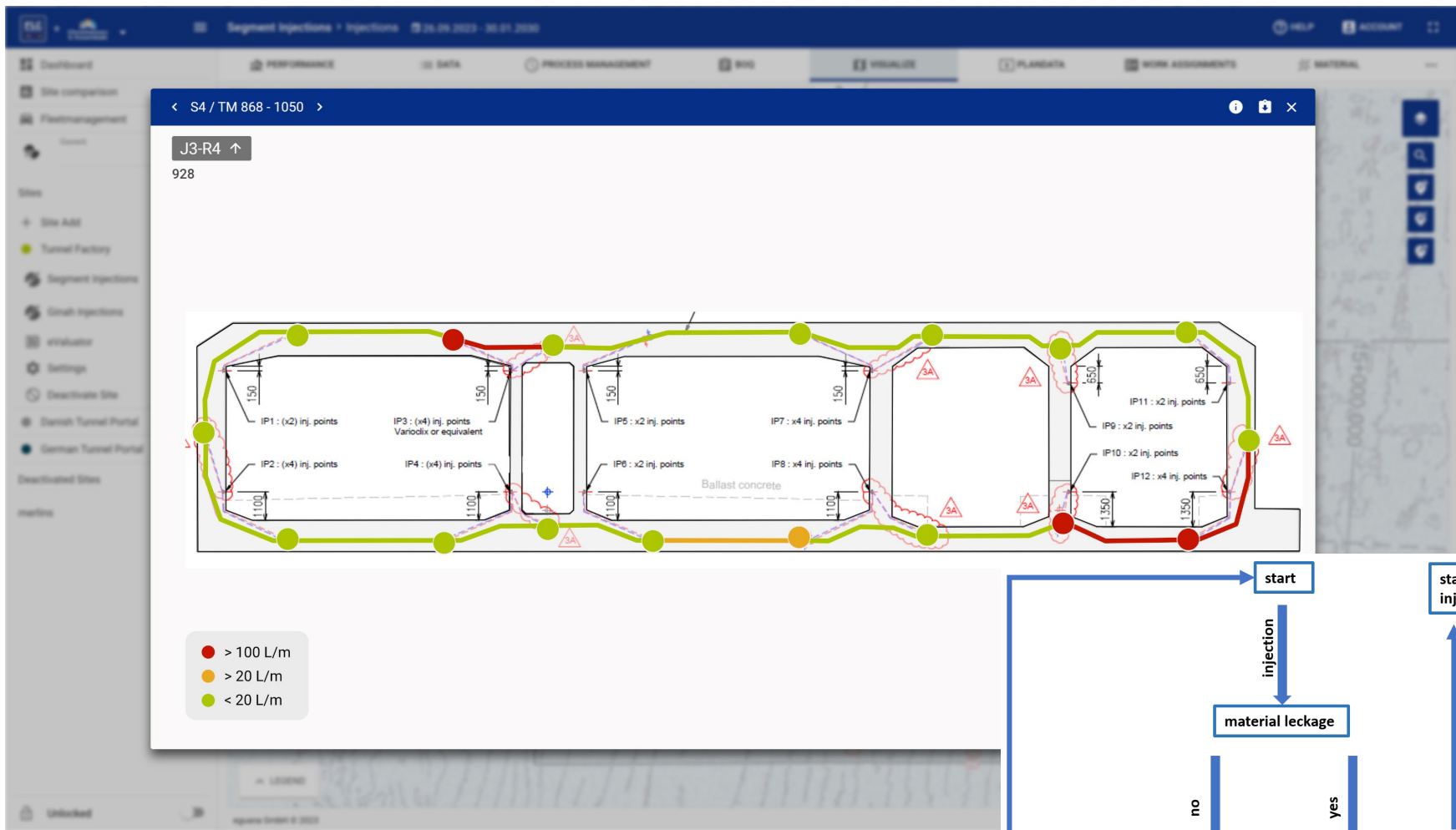
5.014 5.015

BW 07.1.FBQ BW 07.2.FBQ

LEGEND

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SUMMARY

The injection is not a black box or mumbo jumbo.

Transparency for everyone involved.

The future of injection is digital.

The data are available over a long period of time for further maintenance plan of the building .

The quality of the injection gets better.

Clear start and stop criteria and parameters can be preset.

TAK FOR DIN OPMÆRKSOMHED!



Markus Schmidtke



+49 171 7575211

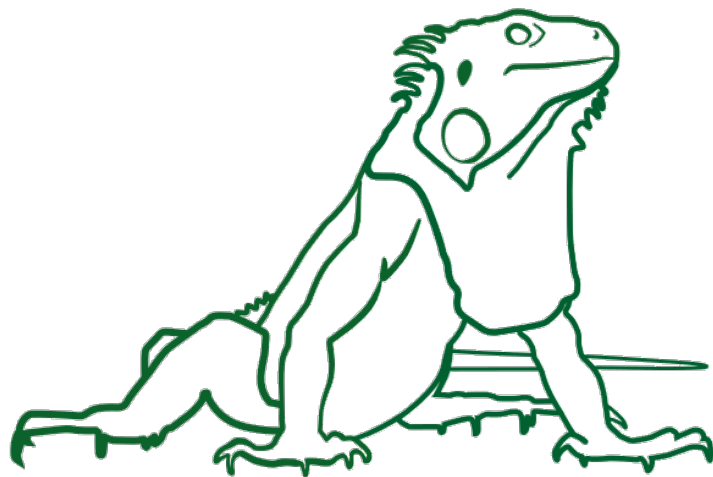


msc@ceas.dk



Data to Information

- why Data alone won't save the Day



eguana SCALES



Data in various Systems



Breaking Barriers



Where to start?

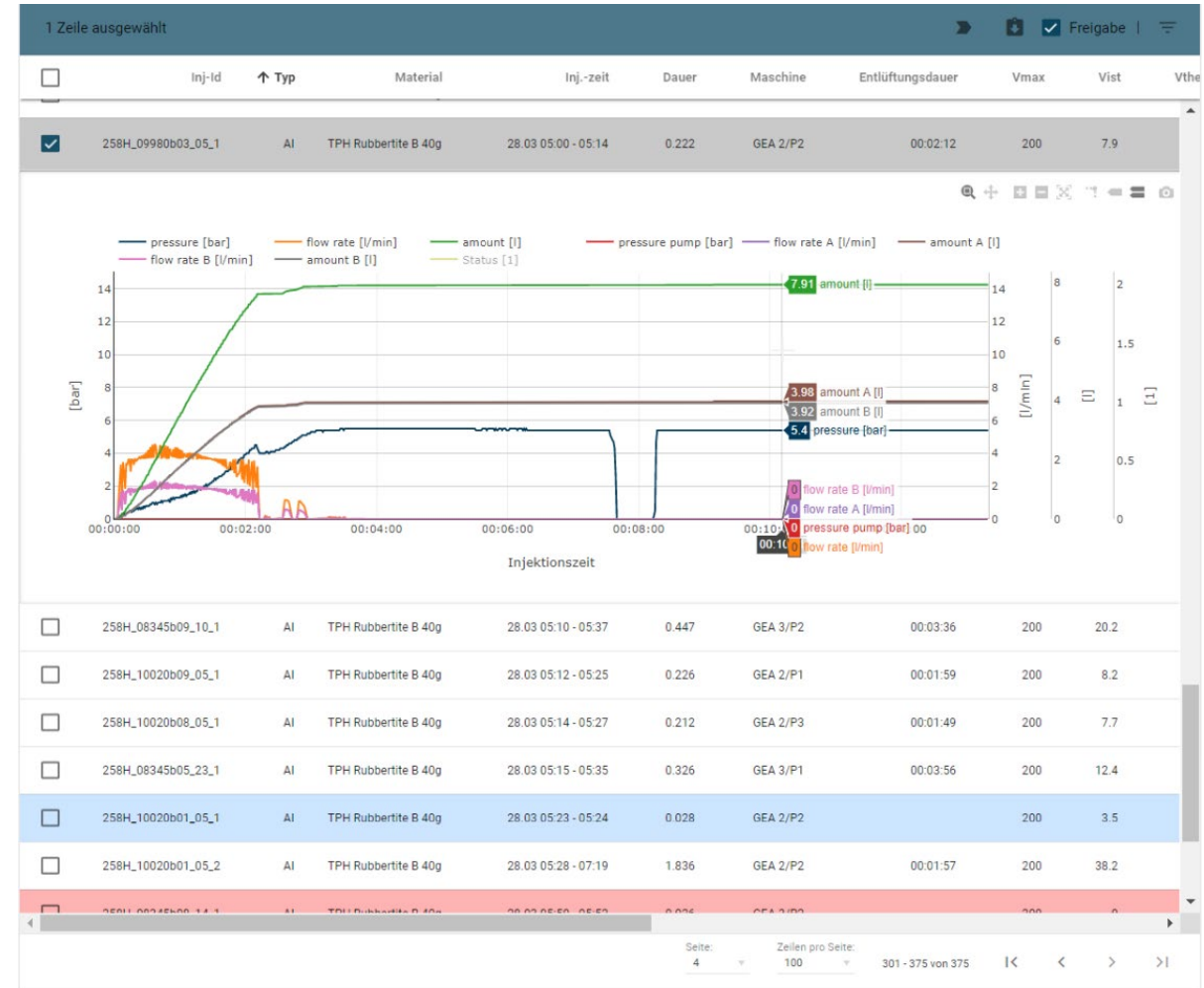


Data Management



Data Verification and Validation

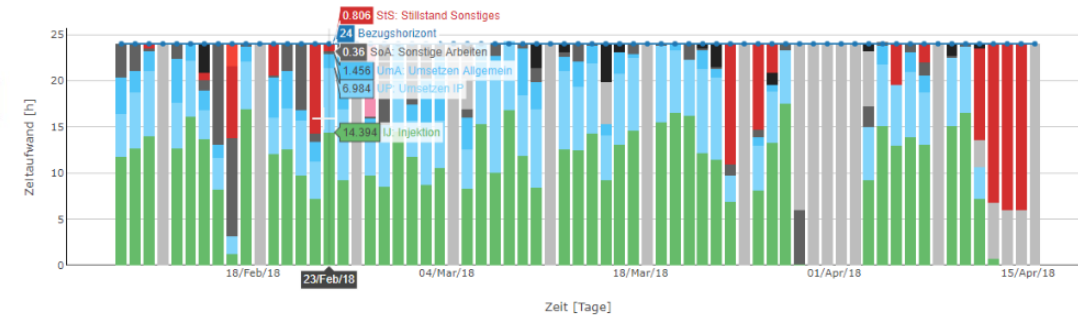
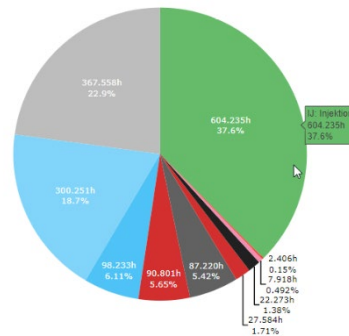
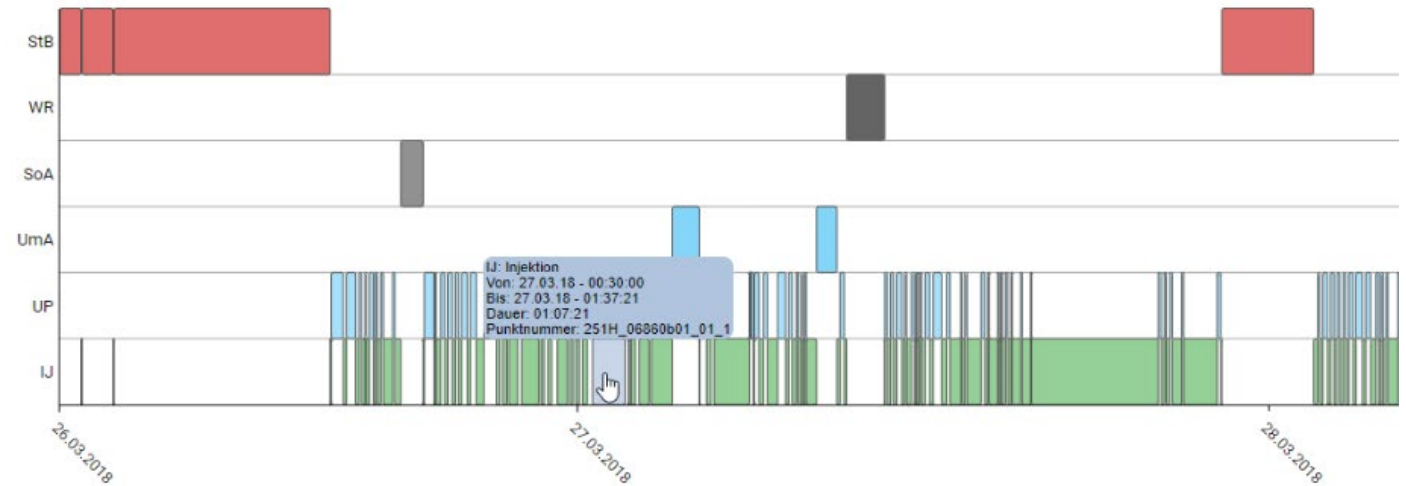
- Automated verification of data integrity and specific grouting characteristics
- Fast and Easy Navigation
- Continuous documentation
 - Grouting protocols
 - Daily reports
 - Bill of Quantity



Construction Process Management

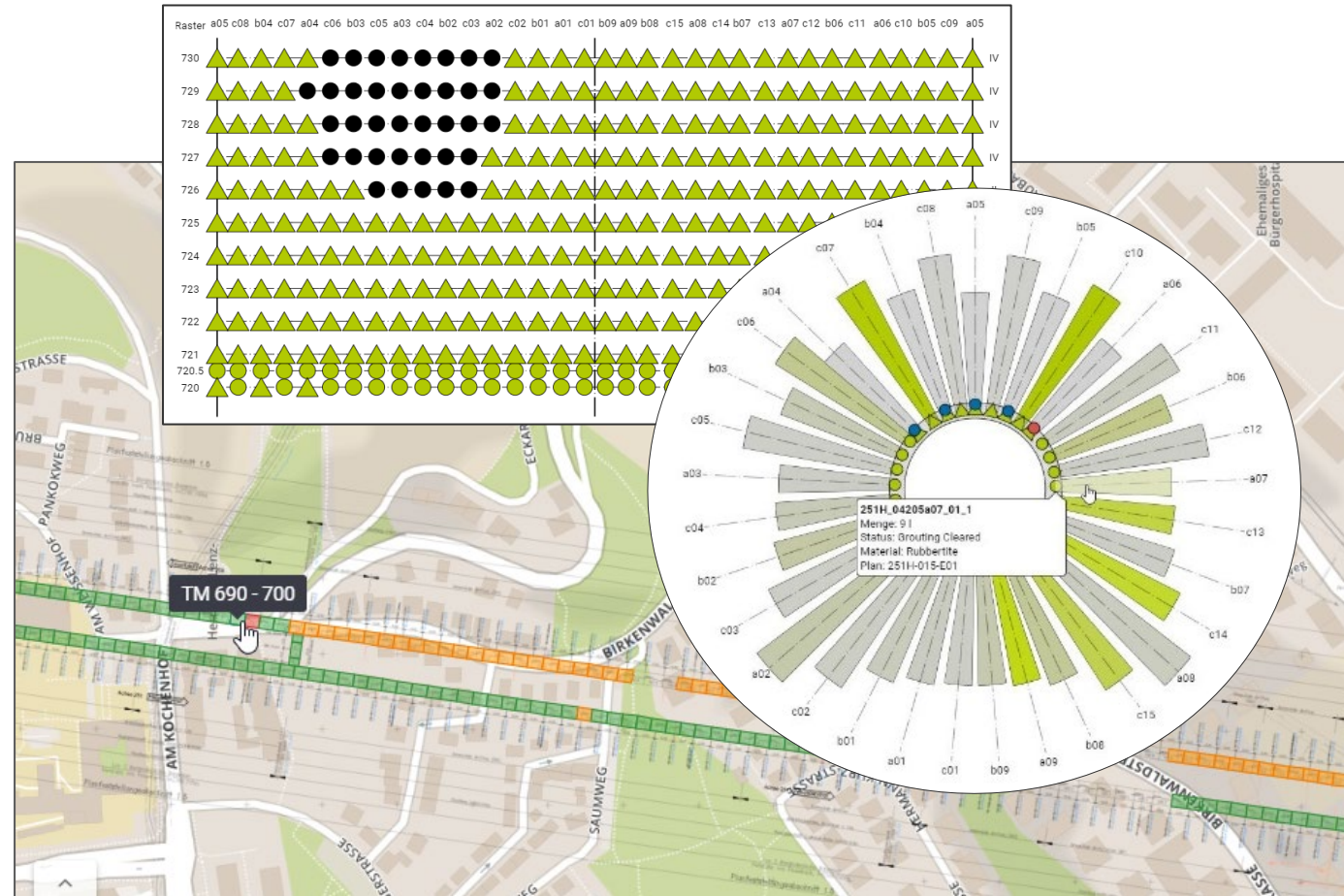
- Automated process proposal
- Documentation of construction processes
- Identification and verification of potentials for optimization

GEA 2/P1



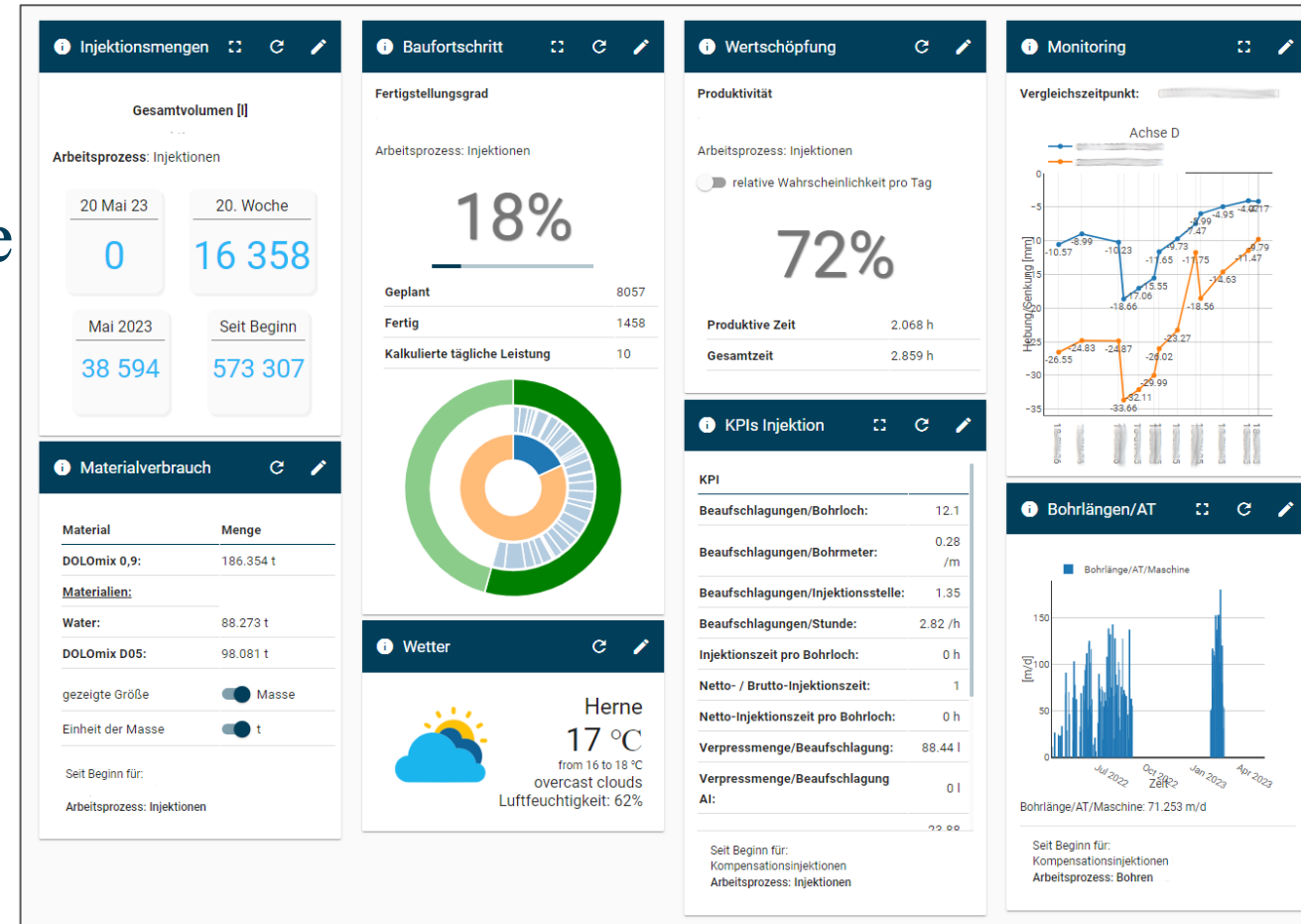
Visualization and Communication

- Automated, interactive Visualizations
- Better understanding of the construction process and progress
- Identification of problems
- Decision basis



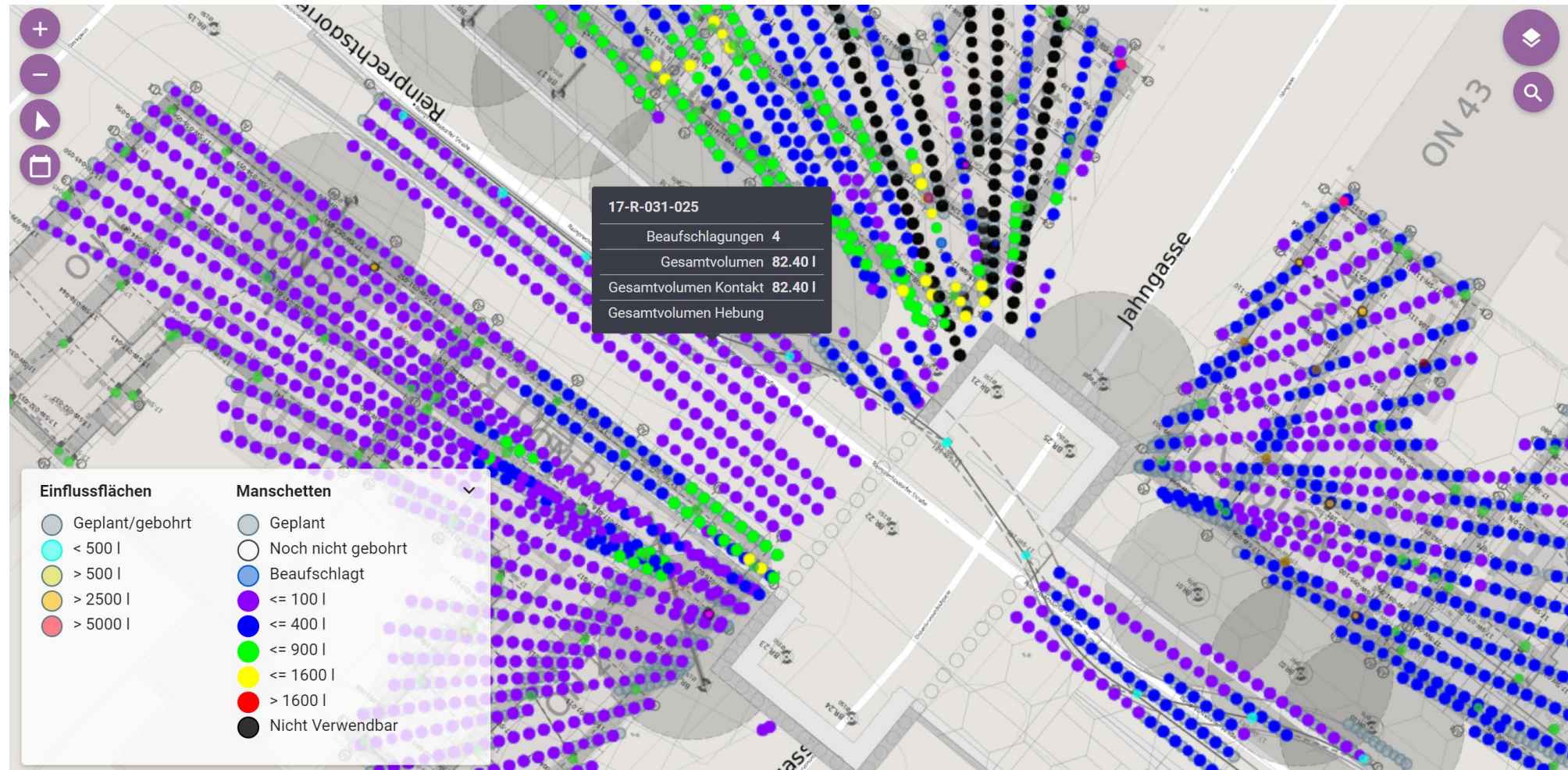
Management Information

- Calculation of bill of quantities
- Key Performance Indicators
- No additional effort
- ~~Data graveyard~~



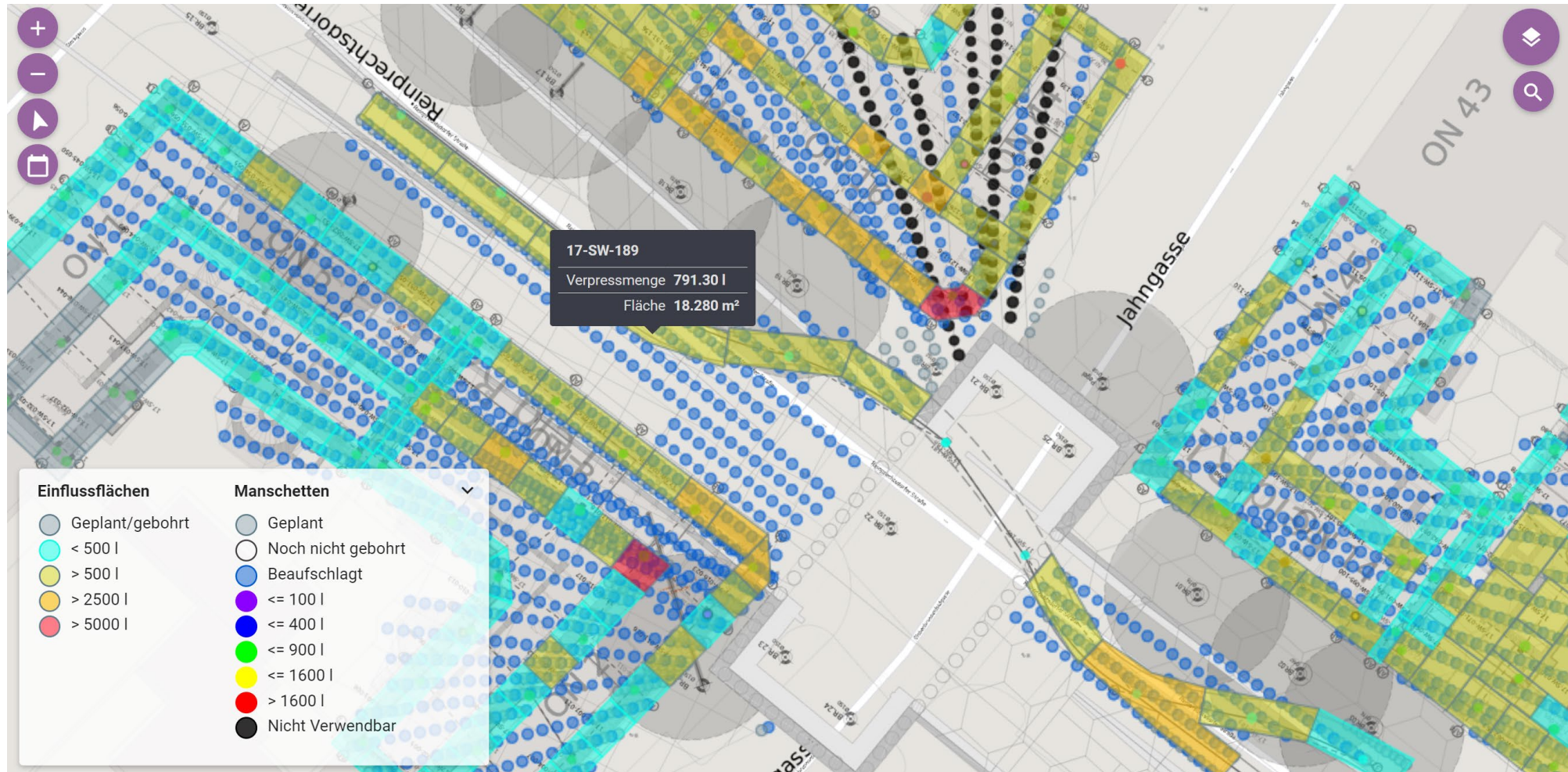
U2 17-21 Vienna

– 37.850 m² Compensation Grouting



U2 17-21 Vienna

– 37.850 m² Compensation Grouting



„It is not the strongest who survives,
nor the most intelligent. It is the one
that is the most adaptable to change.“

Leon C. Megginson following C. Darwin

