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SDIMI 2022

SUSTAINABLE DEVELOPMENT
IN THE MINERALS INDUSTRY

10TH INTERNATIONAL
CONFERENCE



SAIMM
THE SOUTHERN AFRICAN INSTITUTE
OF MINING AND METALLURGY



NAMIBIA
UNIVERSITY
OF SCIENCE AND
TECHNOLOGY

Windhoek Country Club & Resort, Windhoek, Namibia



Fluidic functional verification for closing structures and fluid-based sealing of the contact zone (STROEFUN III)

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September 15, 2022

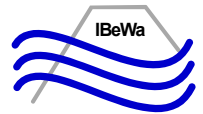
Agenda

- Idea
- Concept
- Dam Construction
- Permeability
- Injection
- Samples

Idea

What is STROEFUN III about?

- Fluidic functional verification for closing structures
- Proving the hydraulic properties of a closure structure without damaging the construction
- Fluid supported sealing of the contact area



Project from Jan. 2019 up to July 2022

5 different partners and 2 service providers:



Supported by:



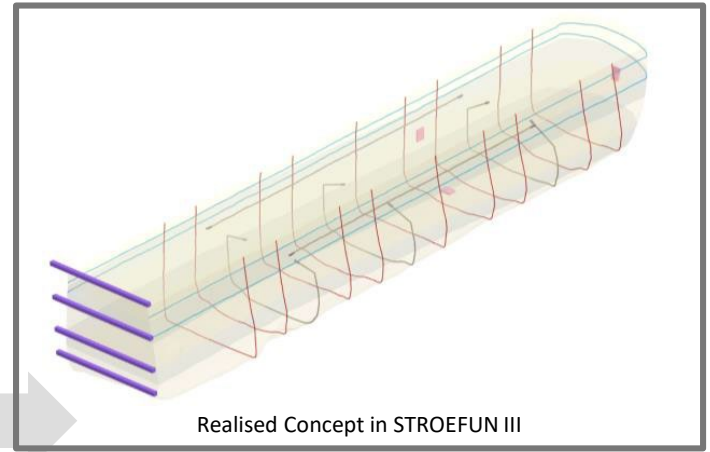
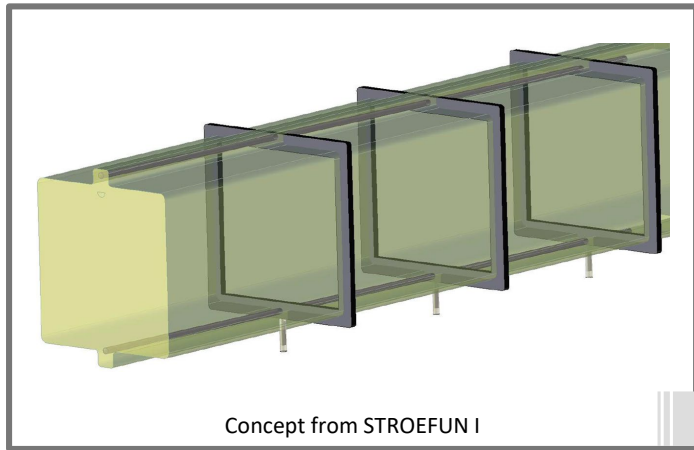
on the basis of a decision
by the German Bundestag



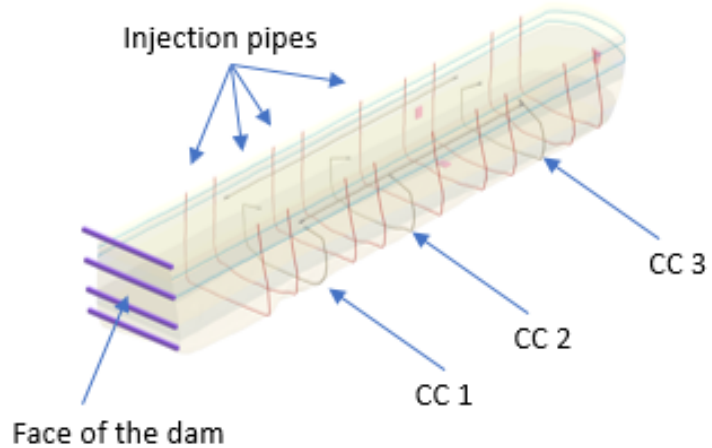
Concept

Control chambers which can estimate the integral permeability between each other

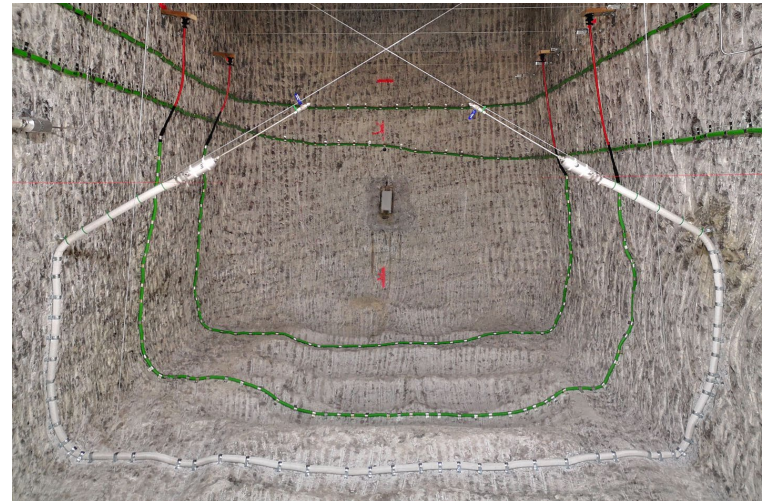
- Air pressure wave is applied to the contact zone
- Monitored by the chamber system along the rock contour



Concept



Overview of the installed measurement, test and injection infrastructure



Pre-installed CC3 (without connecting pipes)

Dam Construction

- The concrete is based on the A1-recipe from the BGE Tec
 - Anhydrate as an additive





Dam Construction

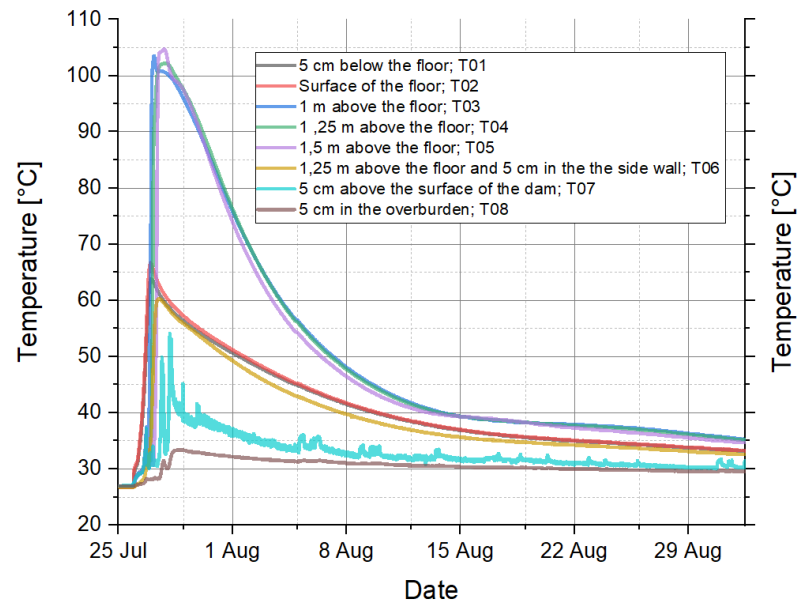
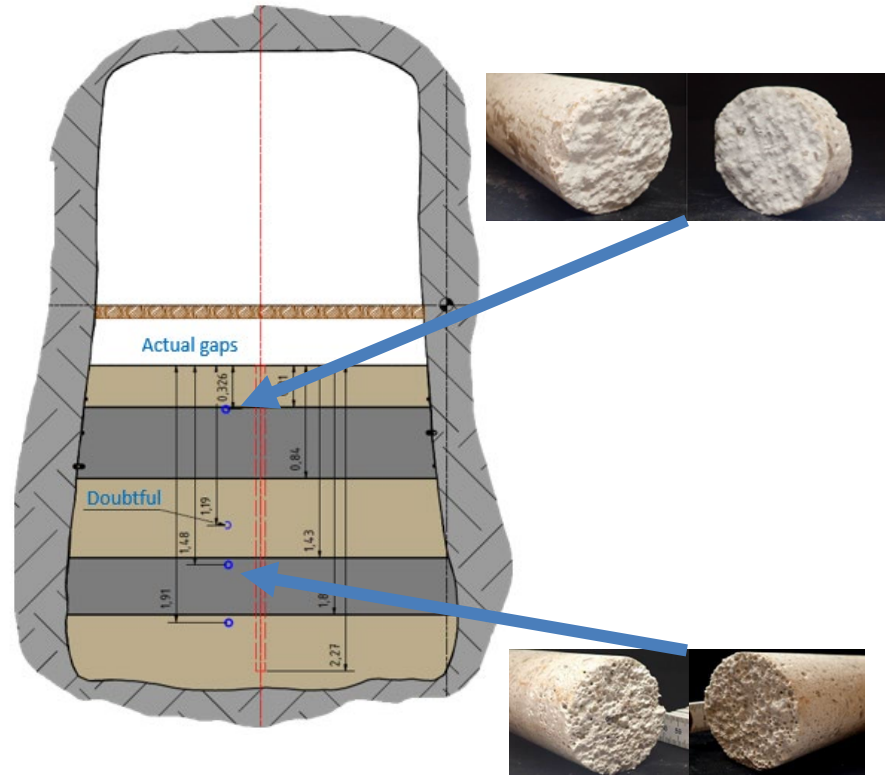


Crack formation after a 2 hours break; July 27th 2021- 16:36

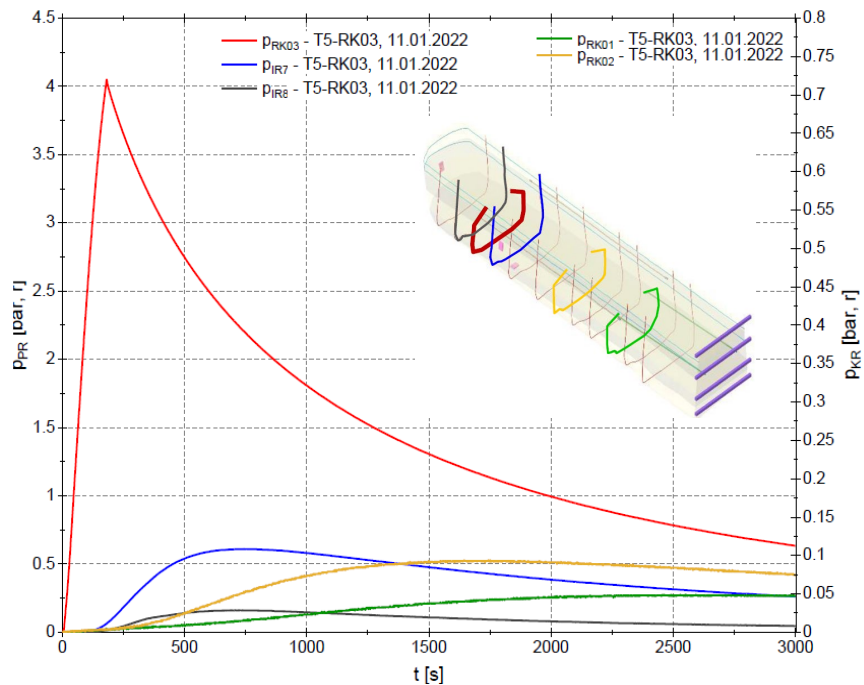




Dam Construction

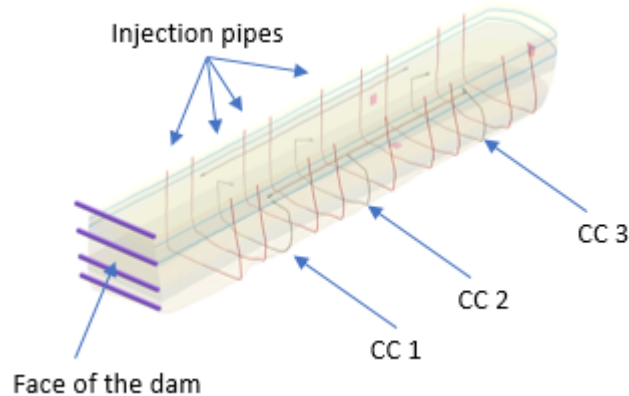


Permeability



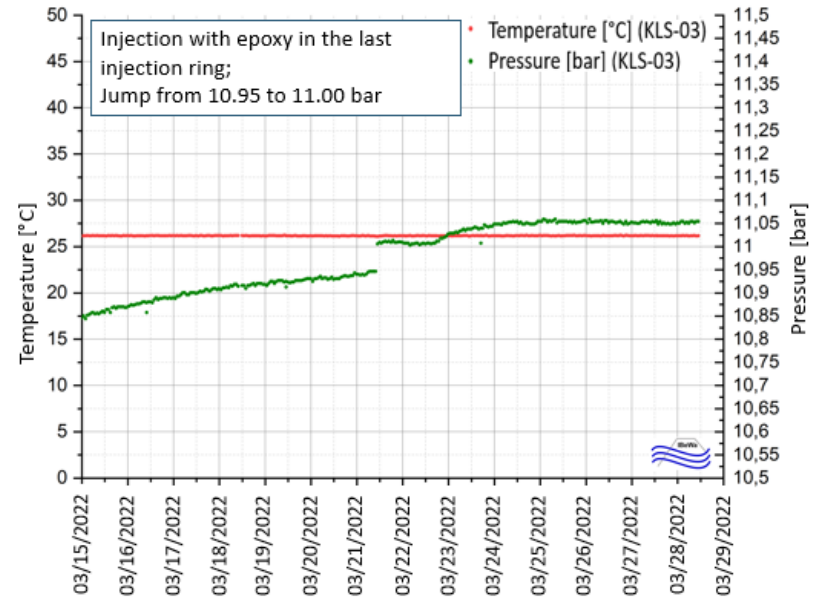
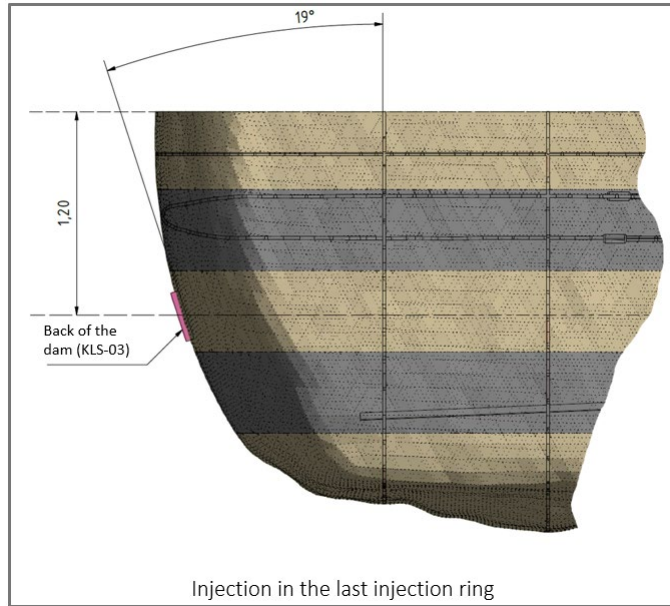
Measured date	Tested control chamber	Permeability between CC 1 und CC 2 [m ²]	Permeability between CC 2 und CC 3 [m ²]
01/21/2022	01	$8,0 \times 10^{-15}$	$3,0 \times 10^{-15}$
06/13/2022	01	$7,0 \times 10^{-15}$	$9,0 \times 10^{-16}$

Injection



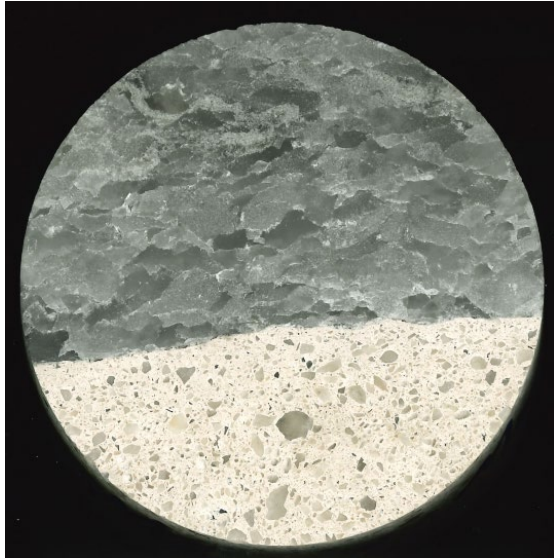
- Injection of 1,8 L of injection grout have been injected at the last injection pipe at a pressure of 18 bar
- Afterwards 7,0 Liter of Epoxy was injected in the same injection pipe (40 bar)
- Injection in the first two injection pipes failed (70 bar) using an injection grout
- While cleaning, an attempt was made to injection the cleaning liquid, a particle free $MgCl_2$ -solution. 0,075 Liter have been injected (65 bar)

Injection

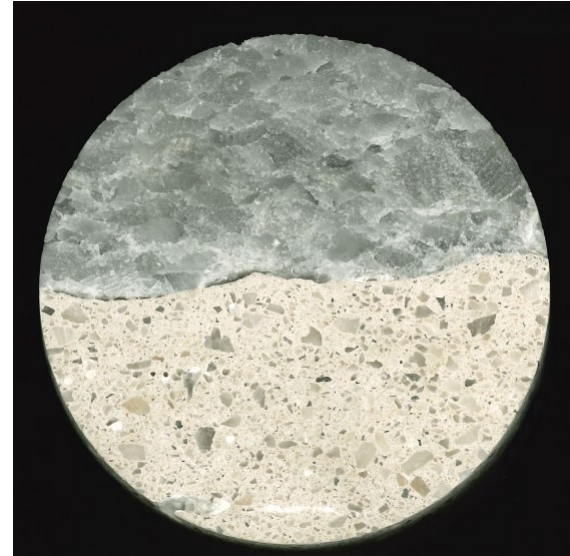


Samples

- M4

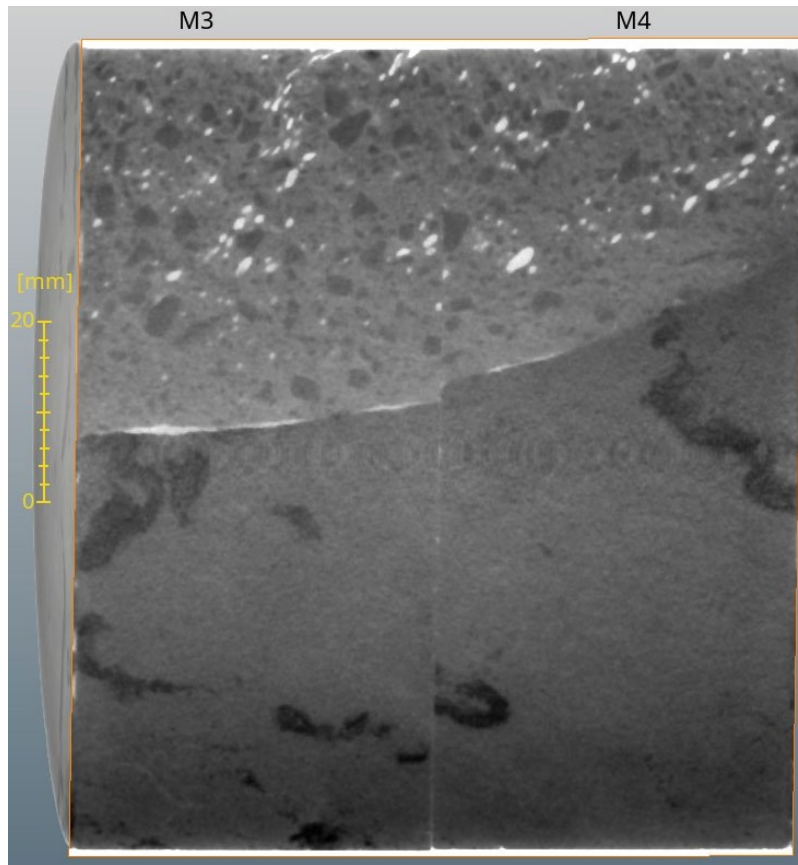
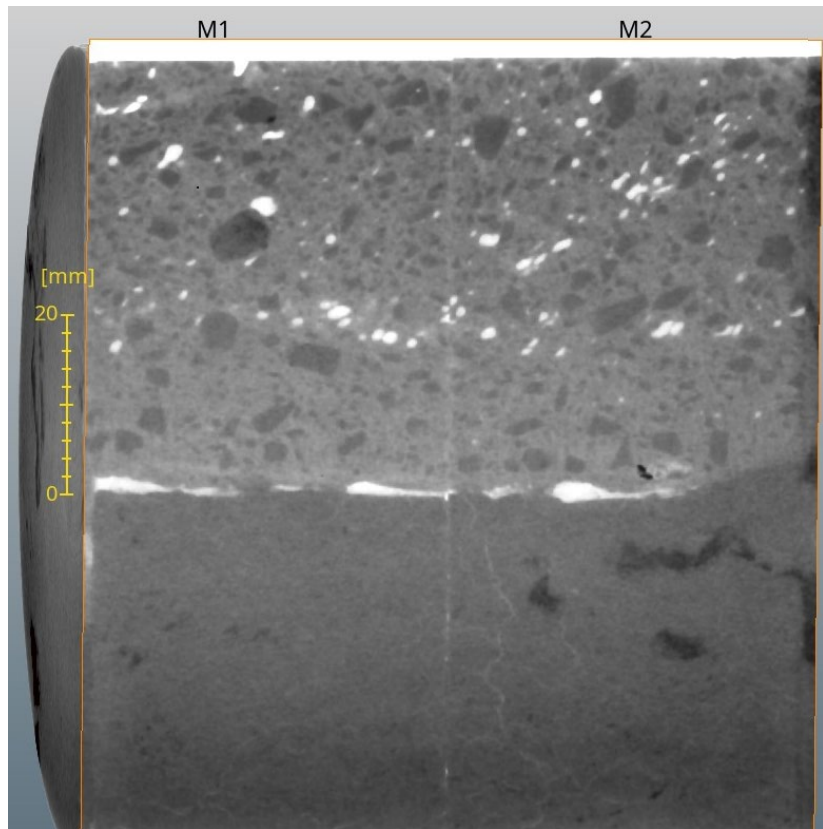


- M1





Samples



Actual Status

Evaluation

Report

Project application → Focus on the uncertainties

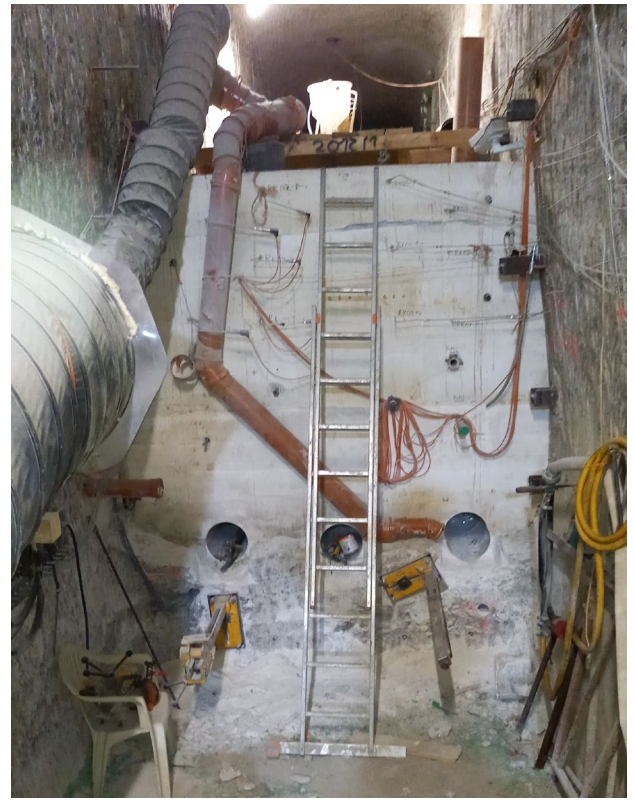
Foam development

Contact zone between host rock and concrete

Contact zone between concrete and concrete

Injection

Permeability development



Questions?

