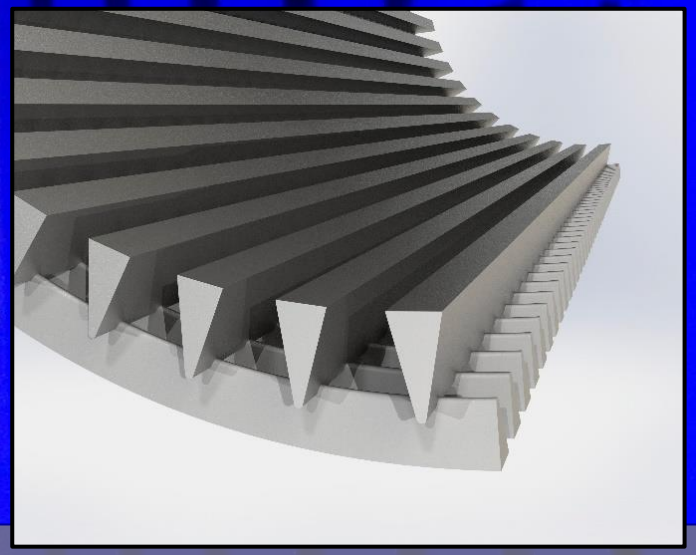
AT *EaziGoFlo*® FD - Erosion Resistant Sand Screen
The Boron Diffused Solution

T O D A Y ' S T O P I C

Examples of Inside Erosion and Corrosion Phenomena of different Sand Screens

Equipment and Services for Underground Operations for O&G, Water, Geothermal and Mining

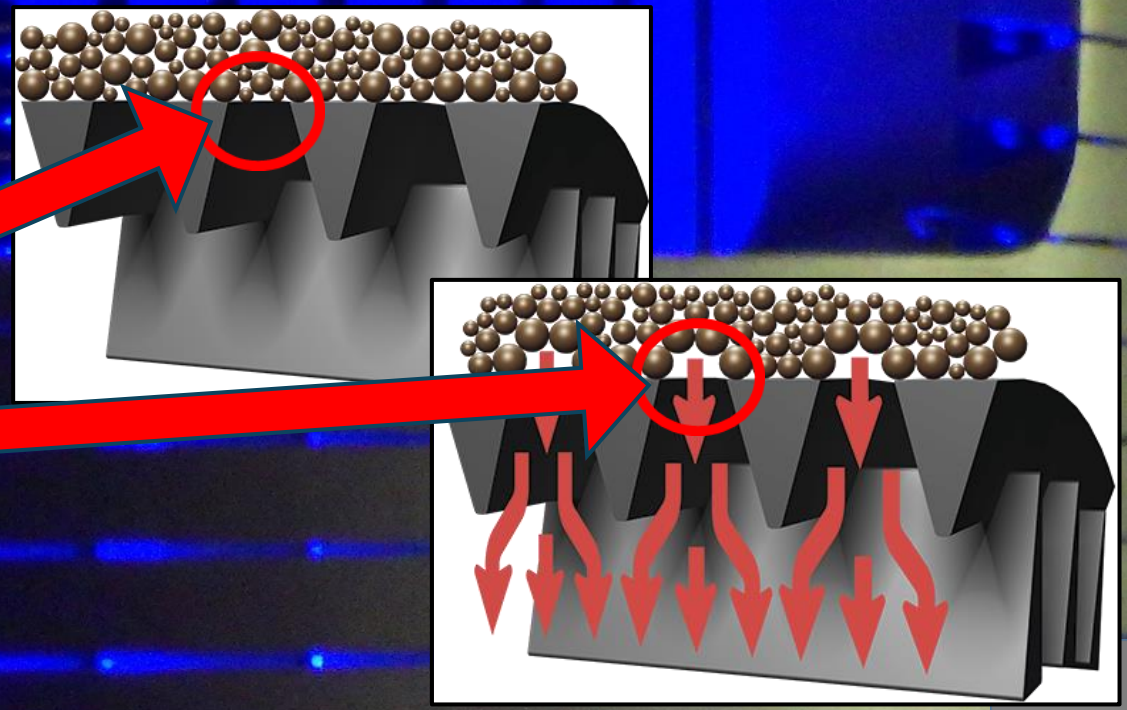
Wire Wrapped Screen without BasePipe – Stainless Steel



Advantages / Disadvantages

- Design (++)
- Sharp edges for bridge building during production (++)
- Material against Erosion (–)
- No increased Turbulent Flow through the Slot (++)

  Hence more likely less Erosion phenomena

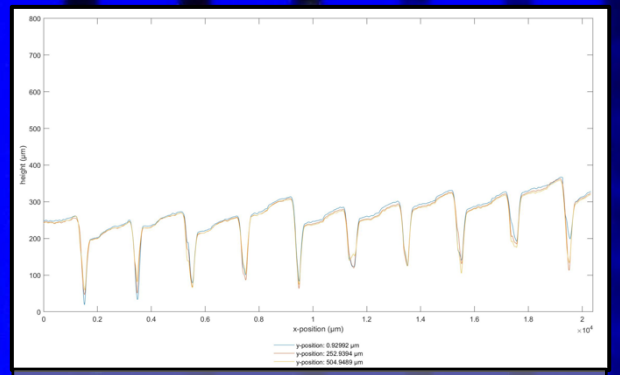


EaziGoFlo® Sand Screen – a msc resources solution, Patent pending

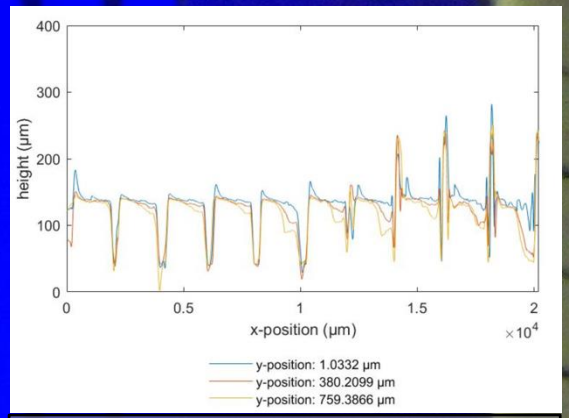
Wire Wrapped Screen treated with Boron in furnace

Specification

- Hardness for B_4C: 29.5 – 33 GPa



Source: Fraunhofer IEG, before Test



Source: Fraunhofer IEG, after 48h

Testing after SPE-191942-MS

- First Test for 48h to get an impression.
- No Erosion under microscope to see
- No weight loss after 48h Testing

Source: msc resources AB

Advantages

- Proven Wire Wrapped Screen Application (++)
- No BasePipe – Flow environment (++)
- No Coating (++)
- Full coverage, out- and inside the whole screen (++)
- Still sharp edges after treatment with Boron (+)
- Very competitive in pricing and investment return (++)

Exceptional resistance to wear:

The higher the hardness, the lower the erosion

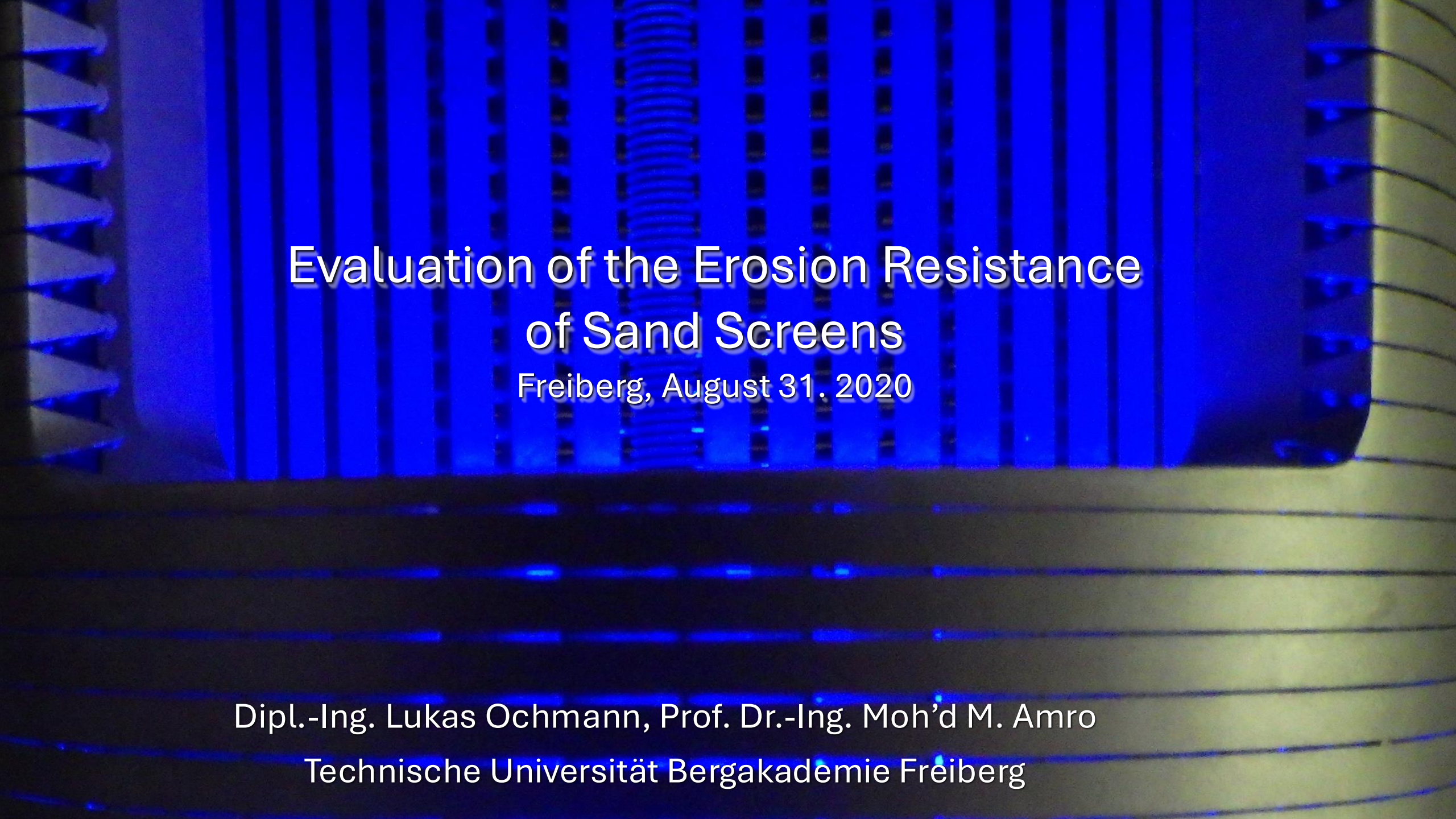
Equipment and Services for Underground Operations for O&G, Water, Geothermal and Mining

Technical Summary

Advanced Screen	Company	Design	Knoop Hardness in GPa	SPE-191942	Result	Advantages / Disadvantages	
Basic Wire Wrapped Screen without BasePipe XT EaziGoFlo Sand Screen	Different	Wire Wrapped Screen. Stainless Steel. With/No Basepipe.	< 0.5	2h Testing	Average increase in gap aperture size is 114.0 µm.	Design (++) Sharp edges for bridge building (++) Material against Erosion (--)	
Hard Metal / Ceramic Coated Screen	Company Y	Wire Wrapped Screen. Stainless Steel. No Basepipe. Outside coating with Hard Metal or ZrO_2.	Hard Metal: 16 ZrO_2: max. 21.7	48h Testing	Erosion for all coating surfaces: 140µm to > 300µm.	Coating can get loose (-) No coverage inside screen (-) No sharp edges for bridge building (-)	
SiC Ceramic Screen	Company X	Build from SiC and Stainless Steel. With Basepipe. SIC Rings stacked above each other. Hold in place with springs.	21 – 25	48h Testing	Average increase in gap aperture size is 23.4 µm.	Material (+) SiC rings are very briddle (-) If one ring or a spring breaks, the whole screen falls apart (--)	
EaziGoFlo ® Sand Screen	msc resources AB	Wire Wrapped Screen. Stainless Steel. No Basepipe. Treated with Boron in Furnace.	29.5 – 33	48h Testing	No Erosion under microscope.	Proven Wire Wrapped Screen App. (++) No BasePipe – Flow environment (++) No Coating (++) Full coverage inside screen (++) Sharp edges after treatment with Boron (+)	

Exceptional resistance to wear:

The higher the hardness, the lower the erosion



Evaluation of the Erosion Resistance of Sand Screens

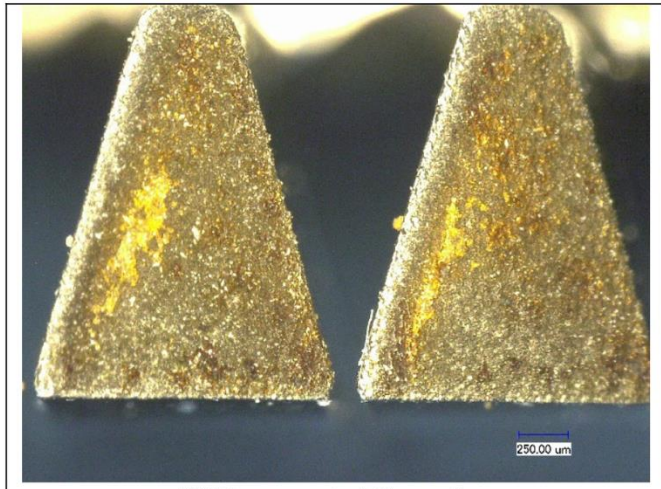
Freiberg, August 31. 2020

Dipl.-Ing. Lukas Ochmann, Prof. Dr.-Ing. Moh'd M. Amro

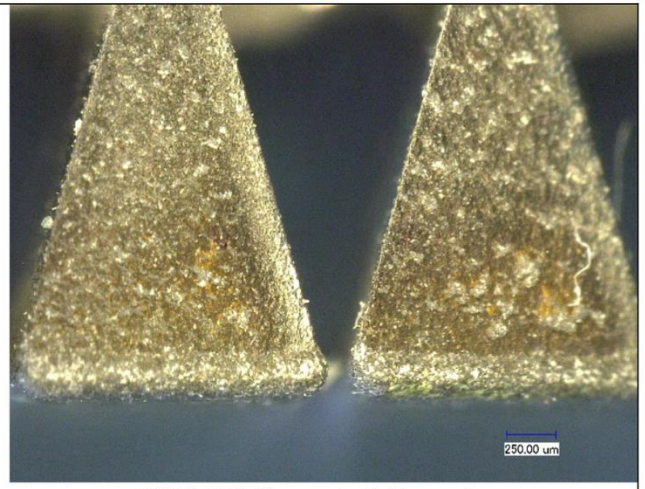
Technische Universität Bergakademie Freiberg

Uncoated and Coated sample

Table 7: Slot geometry comparison between coated and uncoated samples



V30 uncoated Sample



V30 HM1 coated Sample

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Table 7 shows side views of an uncoated and a coated sample. It can be seen that the uncoated wire has a much smaller radius when entering the slot. The coated sample shows a larger radius, and an almost funnel-like opening. In addition, the slot does not open up continuously. Instead a discontinuity can be seen between coating. This is especially prominent on one side of this slot. The reason for that can be found in the coating process and the relative movement of nozzle and sample towards each other.

Interpretation

In addition to the discontinuity within flow direction, the coating also leads to a much higher roughness of the slot opening perpendicular to the flow. These two effects seem to change the characteristic of the flow inside the slot. Calculations of the Reynolds-number indicate, that the flow should transform into turbulent right after the slot opening. For the coated samples however, it seems like the conditions lead to more collisions of particles with the surface of the wire

However, the optical impression is, that uncoated screens loose material on the outside and coated screens on the inside.
The minimal slot width on the outside is the characteristic value of a sand control wire wrapped screen. It defines its filtration characteristics. The change in location of material loss for the coated screens can therefore be interpreted as an improvement of the erosion resistance over uncoated wire wrapped screens of the same material grade.

Summary

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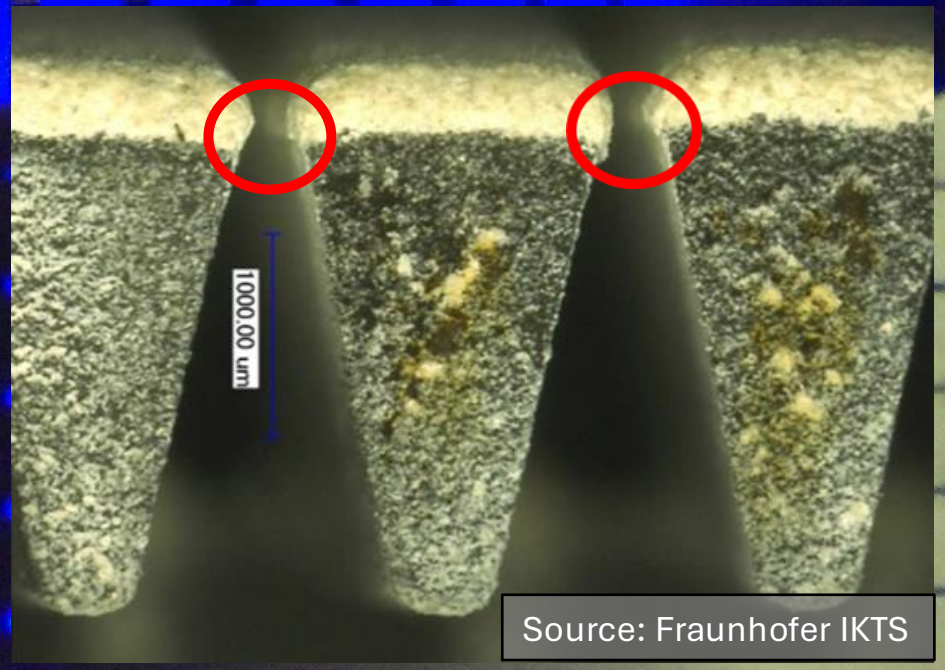
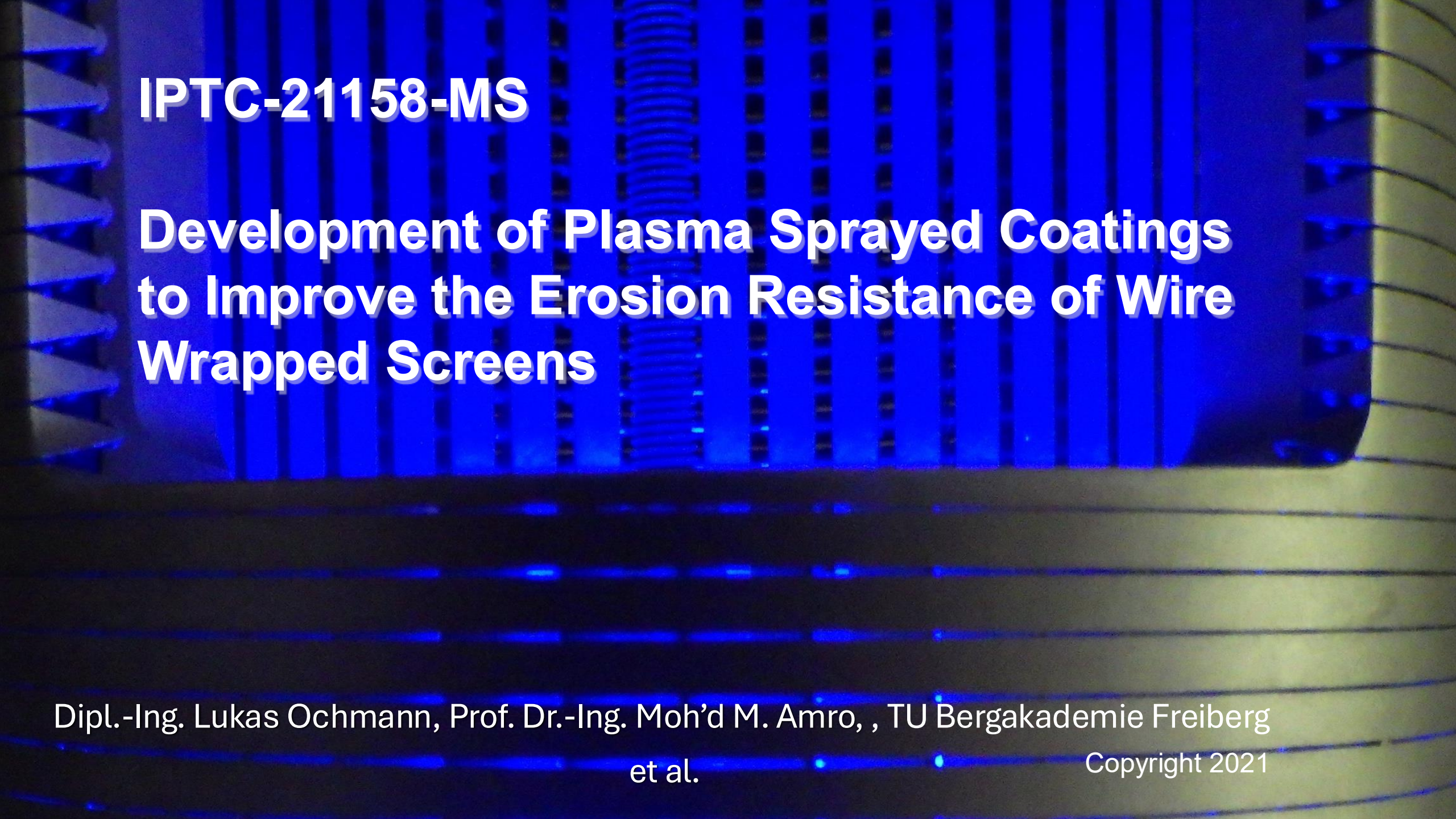
The mass loss between coated and uncoated samples is similar. The effect of the hard metal coating can therefore not be described by this value. Optical investigations show that uncoated screens erode at the slot opening while coated screens show very distinct erosion patterns on the inside. We conclude that the weak point of wire wrapped screens can be shifted to the inside by the coating. Since the outside slot width is the defining characteristic of the screens, this can be interpreted as an improvement in erosion resistance



Source: Fraunhofer IKTS



IPTC-21158-MS

Development of Plasma Sprayed Coatings to Improve the Erosion Resistance of Wire Wrapped Screens

Dipl.-Ing. Lukas Ochmann, Prof. Dr.-Ing. Moh'd M. Amro, , TU Bergakademie Freiberg

et al.

9. Conclusions

• Traditional (uncoated) wire wrapped screens erode on the outside and on the inside.

• Coated sand screens erode from the inside out when a slurry flows through them due to increased internal turbulence compared to uncoated screens.

• Since the slot width is kept constant by the erosion resistant coating, the lifetime of the newly developed screens will be longer under erosive conditions.

• Screens that result in higher internal turbulences are more susceptible to mass loss.

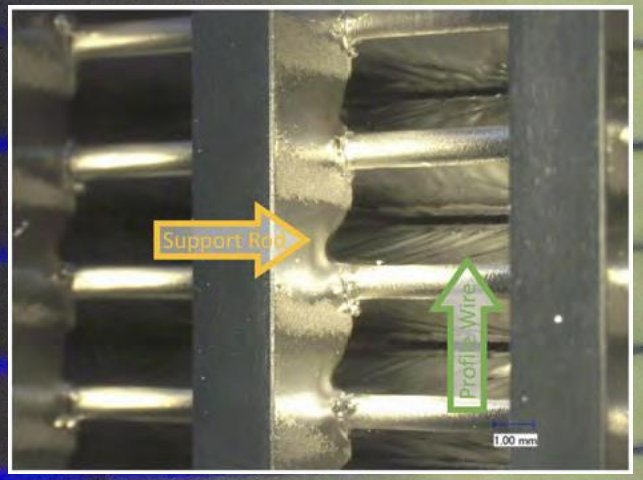


Figure 15—Example for Erosion on Support Rods and Profile Wires