Eindrücke vom SPE-Sand Control Forum in Galveston

Das SPE-Forum „Sand Control in Next-Generation Brownfields and Depleted Reservoirs – A Future-Forward Approach" fand vom 8. bis 11. Dezember in Galveston, Texas, statt. Es war eine großartige Veranstaltung, um sich über die neuesten Branchentrends und lokalen Herausforderungen der Golf von Amerika Region zu informieren. Con-slot SCREENs war als Silver-Sponsor mit einem Vertreter anwesend und präsentierte außerdem ein Poster über die bahnbrechende FormationLink-Ceramic® Technologie.

Der Schwerpunkt dieses Forums lag auf Sandkontroll-Komplettierungen vor allem in Offshorelagerstätten. Da Greenfield-Projekte seltener werden, gewinnt die Produktion aus Bestandsbohrungen und neuen Bohrungen in Brownfields zunehmend an Bedeutung. Das Forum begann mit einer allgemeinen Übersicht über aktuelle Herausforderungen, gefolgt von Herausforderungen bei der Komplettierung von Open-Holes. Der zweite Tag begann mit Through-Tubing-Lösungen und befasste sich am Nachmittag mit Komplettierungen von verrohrten Bohrlöchern. Der gesamte dritte Tag war den technischen Grenzen von Sandkontrolltechniken gewidmet, und die letzte Sitzung am vierten Tag befasste sich mit den Herausforderungen bei der Komplettierung in druckabgesenkten Lagerstätten.

Neben vielen sehr tiefgehenden technischen Diskussionen kam während der dreieinhalb Tage immer wieder ein Thema zur Sprache : Wie kann Innovation gefördert werden? Nach einigen Diskussionen über Anreize von Betreibern zur Risikominderung für Servicefirmen kam man zu dem Schluss, dass viele neue und bahnbrechende Technologien nicht von den großen, voll integrierten Servicefirmen stammen. Stattdessen sind unabhängige Unternehmen bereit, das Risiko einzugehen, ein bahnbrechendes Produkt zu entwickeln und auf den Markt zu bringen – wie beispielsweise den FormationLink-Ceramic® Sand Screen.

Development and Application of Ceramic Coated Wire Wrapped Screens for Through Tubing Installations

Lukas Ochmann*, Dirk Martin**, Manuel Venus**, Bernd Gronde***, Jörg Richter***, Benjamin Jäger***, Werner Länger**** Georg Huebner****
*AtkinsRéalis, ** MUW Screentec GmbH, ***Fraunhofer IKTS, ****con-slot Screens GmbH

How: Through tubing remedial installations have become more and more popular to continue production from aging wells with starting sanding issues or failed primary sand control. Due to the limited inflow area of the screens and low pressure, the insitu flow rates and velocities are often high. This leads to an increased risk of erosion of the screens.

Why: In order to increase the erosion resistance of wire wrapped screens a rigorous research program on plasma spraying technologies has been carried out. Laboratory tests and qualifications were utilized to reach initial field readiness. Afterwards the experience of almost 50 deployments in south east Asia along with external validation of the erosion resistance by Universiti Teknologi Petronas (UTP) have led to further understanding of failure mechanisms of through tubing sand screens. This knowledge has been integrated into the further development of a second generation of plasma sprayed ceramic coating. The result is a wire wrapped screen with a ceramic coating that can withstand challenging well conditions with high flow rates and sand production. The screens haven been used to bring idle wells back to production and continue production from wells with sand production.

Plasma Spraying Technology

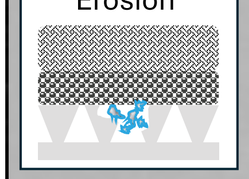
The screens are coated using the method of thermal spraying. This process uses a hot plasma jet to melt powdery materials and apply them to a solid surface. The molten particles solidify on the surface and form a hard coating with little porosity. The coating steps are:

1. **Sand Blasting**
2. **Plasma sprayed bonding layer**
3. **Plasma sprayed main ceramic layer**
4. **Liquid Sealer**

Laboratory Qualifications

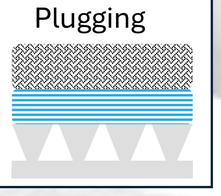
Laboratory investigations of all failure mechanisms were carried out. These included:

Erosion



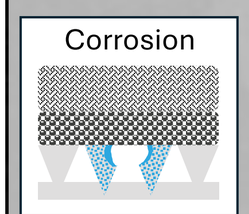
- Slurry (liquid) and pressurized air (gas) erosion was tested
- Tested up to 60 ft/s for liquids
- Qualified up 150 ft/s for gas

Plugging



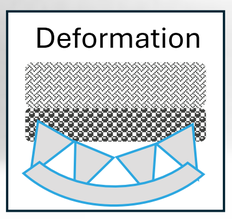
- Sand Retention Tests conducted (see [2] for details)
- No difference between coated and uncoated screens

Corrosion



- Long term corrosion resistance tests
- CO_2 atmosphere and high salinity brine
- Resistant to short term exposure to hydrochloric acid

Deformation

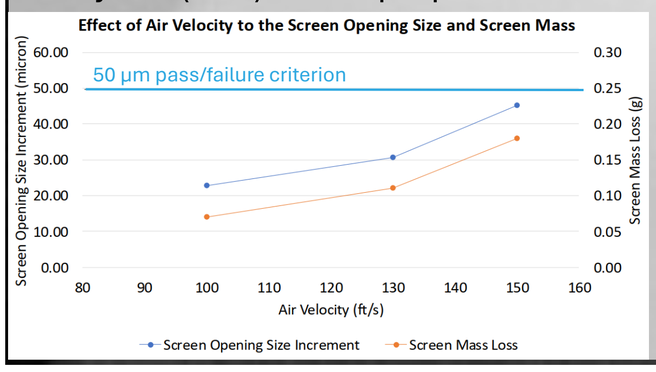


- Torsion, bending and tension tests performed
- Coating doesn't change the mechanical properties of the screen
- No parting of coating and screen under high deformation

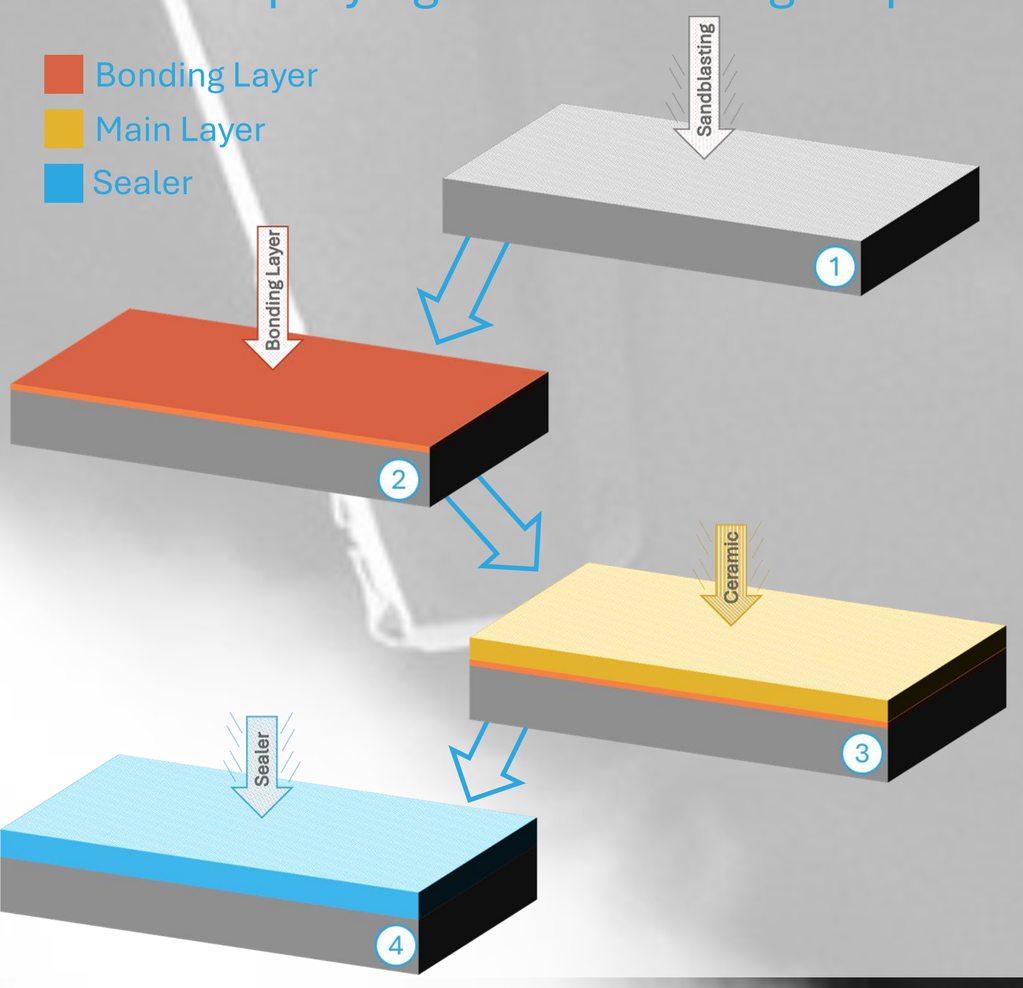
Gas-Sand-Erosion Testing

The resistance against erosion has been investigated on an internal test stand during the development and optimization of the coating. The set up is derived from the set ups describe in SPE-191942 [3]. It uses a pressurized air stream to accelerate particles onto screen samples. The erosion is measured by mass loss and slot size increase. The relationship between airflow and particle size was calibrated using a high-speed camera.

After internal qualification, the final coating was sent to an external lab at Universiti Teknologi Petronas Department of Petroleum Engineering in Malaysia (UTP). The purpose of the external tests was to validate the internal results and to provide independent proof of the erosion resistance. Based on the failure criterion of 50 µm of slot size increase over the testing period the results qualify the screens up to a flow velocity of 150 ft/s.



Plasma Spraying Manufacturing Steps

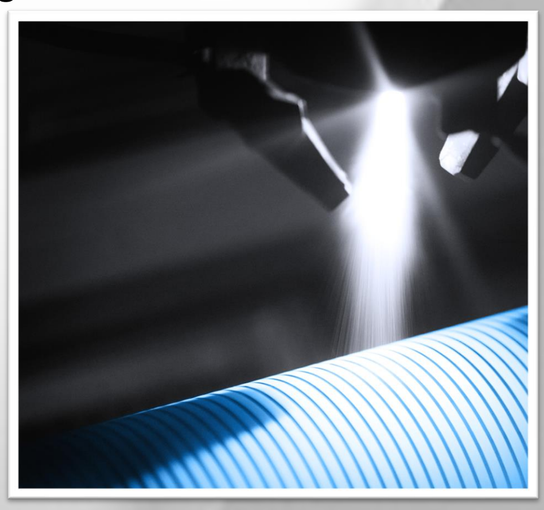


Field Application Results

First Application: The first Ceramic Coated Wire Wrapped Screen was installed in 2020 (see SPE-210377 [4]) proving field readiness and increased erosion resistance. As of December 2025, almost 50 oil and gas wells from different operators have been equipped.

Continuous Success: The screens were deployed with different methods such as nipples plug or lock mandrel via slickline or lock mandrel via coiled tubing. Initially, screens were retrieved to review the condition prior to failure and establish an expected lifetime. Later some wells were produced for several years until sand was produced to surface.

100% Successful Retrieval: All attempts to retrieve the through tubing assembly were successful. All screens were pulled in total and without parting. Several tear downs in cooperation with operators were conducted. The tear downs were used to gain deeper understanding about the potential failure mechanisms of ceramic coated screens and through tubing screens in general.



Plasma Coating

Coated Screen

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Lukas Ochmann
AtkinsRéalis
Heiligengeiststraße 6-8
26121 Oldenburg, Germany

Lukas.Ochmann@atkinsrealis.com
+49 40 303 339 667
+49 151 146 141 72

Con-slot SCREENS
Development & Trading
Graue Riethe 2
Industriegebiet Hafen
29378 Wittingen

info@con-slot.de
+49 (0) 5831 2515-0

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[1] Ochmann, Lukas , et.al. "Development of Plasma Sprayed Coatings to Improve the Erosion Resistance of Wire Wrapped Screens." International Petroleum Technology Conference, Virtual, March 2021. doi: https://doi.org/10.2523/IPTC-21158-MS
[2] Ochmann, Lukas, et.al., "Development of a Sand Retention Test Set-Up Focussing on the Measurement of Produced Sand," *OIL GAS European Magazine*, no. 2, pp. 25–32, 2021, https://doi.org/10.19225/210609
[3] Manning, Nickolas , et.al. "Performance of Ceramic Sand Screen for High Rate Gas Application - Gas Sand Screen Erosion Testing." SPE Asia Pacific Oil and Gas Conference and Exhibition, Brisbane, Australia, October 2018. doi: https://doi.org/10.2118/191942-MS
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