

Freitag, 21. Februar 2025, 11.40 Uhr
Baden Arena Kongress 2
Oberflächennahe Geothermie

Friday, 21 February 2025, 11.40 am
Baden Arena Congress 2
Shallow geothermal energy



New GeoESP® Pump Intake Enhances Performance in High-Flow Geothermal Wells

Neuer GeoESP®-Pumpeneinlass verbessert die Leistung von Geothermiebrunnen mit hohem Durchfluss

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Geothermal Electric Submersible Pumps have been key to geothermal project development, serving as a flexible and reliable artificial lift method to handle high flow rates and downhole temperatures up to 150 L/s and 150 °C, respectively. However, due to the harsh well conditions, common problems such as scaling and abrasive solids production could affect the mechanical integrity of the pump, leading to system failure and compromising the project's economic goals. To address these challenges, a new pump intake design has been developed by leveraging technologies from the oil and gas and medical industries, to minimize scale accumulation within its parts, avoiding plugging, increasing flow rate, and preventing premature failures. The innovative design included a longer intake section encompassing multiple holes drilled with different shape patterns and variable outer diameters to reduce friction losses, generate a better flow transition, and provide a uniform velocity pattern across the inlet segment. It can operate with a wide flow range from 0.4 L/s to 184 L/s and has been tested in high-flow applications with severe scaling tendencies, in which the well intervention costs could be reduced by increasing the pump's useful life while managing open hole completions. Through Computational Fluid Dynamics (CFD) simulations and real-time high-resolution monitoring data, this study demonstrates that the enhanced flow dynamics and mechanical design are the key factors in reducing the pressure drop by up to 70% and 50% compared to standard and integral inlets, respectively. After the pump was pulled from the well, the physical inspection confirmed the new intake's ability to manage open-hole completions with solid production, by reducing scale accumulation on its holes and bearings. The field implementation encompassed several engineering proposals until a final modular design was crafted, which has not experienced any failure to date.

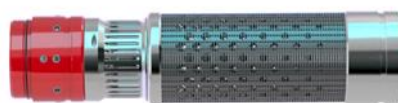


Figure 1. GeoESP® pump intake.