

# Utilizing electro beam additive manufacturing to enhance an all-metal annular barrier for effective zonal isolation in Geothermal wells

## The challenge

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Enhanced Geothermal Systems rely on the permeability and flow paths between injector and producer wells to facilitate the optimal exchange of heat. Stimulation is required to create the flow paths, but often will follow the path of least resistance. To effectively stimulate the wells, zonal isolation is critical for the execution of stimulation programs to maximize reservoir contact. Higher temperature systems (>300 °C) have significant cost advantages over low-temperature systems, but they require equipment capable of operating in a reliable way at elevated temperature and corrosive environments.

## The solution

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The metal expandable packer (MEP) with all-metal seal was designed and tested leveraging the principles of the Welltec Annular Barrier (WAB®) to address the need for effective zonal isolation in very high temperature and corrosive well conditions. The sealing system incorporates multiple directional metal membrane seals, welded to a metallic expansion sleeve to work in temperatures up to 350°C.

## Incorporating additive manufacturing

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Each of the seals requires expandable welds, which is complex and represents manufacturing challenges. The selected Electron Beam Additive Manufactured (EBAM) process enables a “weldless concept”. The all-metal seals are designed as an integral part of the metal expansion sleeve. This will significantly improve the system by:

- 1) allowing the use of a higher number of seals without limitations of manufacturing length
- 2) Enable bi-directional seals that enhance the sealing capability
- 3) eliminate waste while improving the overall economics



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