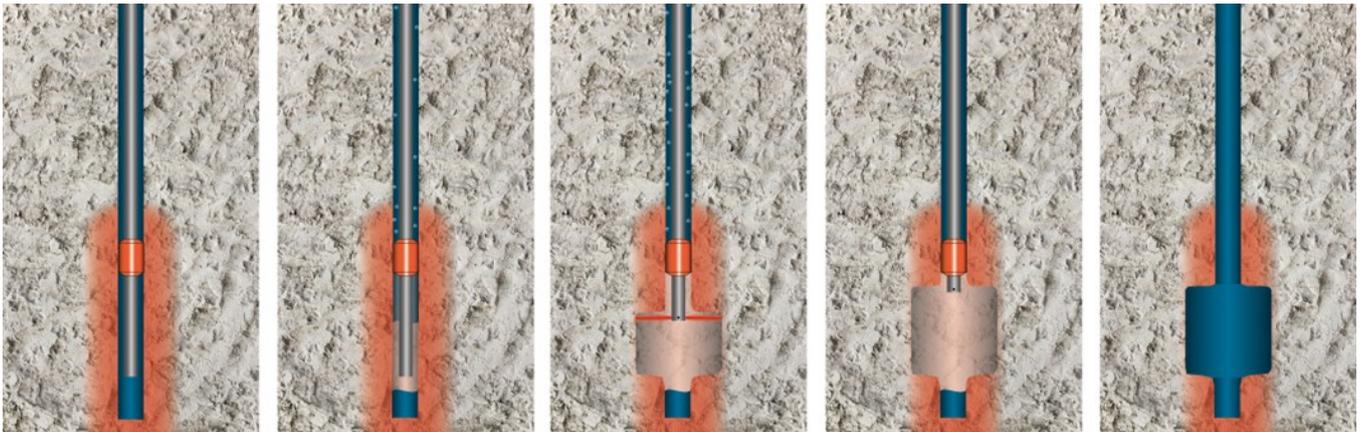


Licensing Opportunity

Creating efficient fracture networks in deep gas, oil and geothermal wells



1) Installation of jetting and packer system in borehole 2) Removal of the water from the jetting zone 3) Radial jetting of the reservoir zone 4) Completion of jetting process 5) Enlarged borehole

Summary

The efficiency of deep wells can be improved by the new thermal spallation technique. The shape of the borehole can be optimised in order to enhance the subsequent stimulation process.

Background

The creation of deep reservoirs for gas, oil and geothermal energy extraction is impeded by insufficient stimulation. Direction and extension of the created fractures are complex to control and, therefore, large stimulated and interconnected fracture networks are difficult to create. In order to reduce the project failure risks and increase the reservoir productivity, we developed a technology to control the creation of engineered reservoirs in hard deep rocks.

Invention

Thermal borehole enlargement is a technique, which locally increases the well diameter by utilizing the thermal spallation process to excavate rock on the sidewalls of an existing borehole. One or multiple nozzles are placed at the circumference of a burner assembly, creating a hot jet of combustion gases. When this hot jet impinges on the rock, high thermal stresses are induced, which lead to the disintegration of the rock surface. An adaptable packer system avoids water penetration during the jetting process and regulates the pressure in the jetting zone. The prototype was successfully tested at the Grimsel Test Site.

Features & Benefits

- Wide range of defined borehole enlargement geometries (e.g. notches, discs, slots ...)
- Optimized fracture propagation in hydraulic stimulation phase
- Reduced fluid pressure to initiate fracturing process
- Increased productivity of the well by additionally reducing the project failure risk

Fields of Application

- Any deep well for gas, oil or geothermal exploitation in hard rock
- Boosting the efficiency of new wells and recovery of abandoned wells

Patent Status

- Patent pending

Publications

- M. A. Kant et al., Applied Energy 212 (2018) 1501–1509

Technology Readiness Level



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