

A new well shape with direct application to geothermal drilling in order to reduce costs and improve lifetime of the well

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Currently geothermal wells are drilled using the long established drilling and well construction technology that has been borrowed from the oil and gas wells. The geothermal well construction will thus be based on the telescopic design in which a larger diameter hole is drilled, followed by a casing run and cementing. The process is continued with smaller and smaller sizes until the final depth is achieved. This technology is using the rotary drilling process in which the bit is rotated while pushed against the rock and a drilling fluid is circulated in order to transport the cuttings generated during rock breaking process. The results of this is normally a round hole (with some minor imperfections). With geothermal wells needing high temperature depth is critical and thus the deeper the well will be the higher the temperature. With lower temperature increase production flow rate is necessary which implies larger hole and casing diameters. However, with the current geothermal drilling methods and well construction the deeper the well is the smaller the final (production casing) will become, resulting in the impossibility to meet the geothermal requirements without high drilling costs which are not favorable to geothermal development. In this paper, we will investigate the possibility of using a different well shape instead of the classical circular shape as drilled today. The main reason for this approach lies in the fact that circular well shapes are always prone to deformations, thus the real well shape being far from the perfect theoretical well shape. Furthermore, since geothermal production wells require high flow area, we propose a combination of possible technical and operational solutions that one day could revolutionize the geothermal well construction.