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A Discussion of the Cementless Well Construction an the impact towards Well Integrity

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The integrity of the well is mainly dependent upon casing and cement. However, it will be interesting to find out whether the same standard of well integrity can be achieved with cementless well construction or not. In this respect, different well construction presented in the past year's literature will be discussed in this paper along with the long-term load-bearing capacity of cement in wells is analyzed.

In the first part of this study, a review study on the vertical, slim hole, pre-salt, and horizontal well will be presented. To find the efficiency of the thin cement sheet in the slim hole a straightforward mathematical calculation on the casing-to-cement ratio was made. Contrary to the existing standards that back the thin cement sheet in the slime our calculations have found that the thin cement sheet will not perform better as a barrier in the slim hole well. Consequently, there is a need for a novel solution.

Whereas in the second part of this paper, different well constructions that are relatively new will be discussed that will include the metallic wellbore isolation and external casing packer. One of the better alternatives to the well cement is hydraulically expanded metal packers. These sorts of packers are mounted over the casing joint and can rotate while it is lowered into the well. They have been successfully deployed in the wells that have a differential pressure of more than 15,000 PSI. Moreover, these packers have a high diametrical expansion that can confine the whole wellbore geometry. Whereas FEA is used to analyze the load-bearing capabilities of these packers in various well types that have been outlined in the preceding paragraph. This approach will help to determine the suitability of this innovative technology for replacing cement in different well types. From this study, it is found that one of the approaches to replace the cement in the wellbore will be the use hydraulic expandable packer. Moreover, this approach will assist in lowering the release of CO_2 in the atmosphere, as the production of cement is a high CO_2-intensive process as 1 kg of cement production releases about 0.5 to 0.9 kg of CO_2 into the atmosphere.