



Ultra-Hard Tungsten Carbide Based Coatings



Weatherford International Ltd

Case Study

► Profile

Weatherford International Ltd. is one of the largest global providers of innovative and advanced mechanical solutions, technology and services for the drilling, completion and production sectors of the oil and gas industry.

One particular challenge for effective removal of oil and gas reserves is to control the production of sand within the production fluids. Downhole sand control is used to address this issue, preventing sand from entering into the wellbore from the formation.

Attempting to resolve this challenge resulted in the development of Weatherford's proprietary Expandable Sand Screen (ESS[®]) technology. The ESS[®] consists of a slotted basepipe fitted with a Petroweave filter membrane and outer pre-perforated shroud. Long joints can be connected together to provide a continuous barrier across large production zones.

► Challenge

Once downhole, expansion of the screen is achieved through actuation of a proprietary tool. This allows intimate contact with the varying well geometry and the slots to open to provide maximum inflow area. Compliant expansion is the key to providing intimate contact with the wellbore, borehole support and to prevent sand particle migration.

The expansion tooling has to function under a harsh loading environment, and the rollers within the tool have to function smoothly and effectively over a potentially long, continuous string of ESS[®]. Therefore the bearing within the rollers must have high strength but low friction capabilities. The previous treatment process applied to the bearing pins had poor resistance to galling. A solution was required that would provide excellent wear together with improved friction characteristics.

The Hardide CVD coating applied to the roller pins has provided a significant contribution to tool reliability to allow completions to be run in deep wells and also over continuous production zones of over 2,000 ft. of continuous ESS[®]

► Further information

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► Solution

Weatherford and Hardide Coatings developed an excellent working relationship and worked together to engineer a solution. Modifications were made to the bearing pins and in-depth testing proved that the Hardide coating provided excellent wear resistance and improved friction benefits over the existing treatment process.

After extensive testing, Hardide's binderless tungsten carbide coating entered service on Weatherford's Expandable Sand Screen (ESS[®])/ Expandable Zonal Isolation (EZI[™]) expansion tool roller bearing pins. Since then, Weatherford's sand control group has experienced trouble-free coating applications to the pins and outstanding performance.

The Hardide coating applied to the roller pins has provided a significant contribution to tool reliability to allow completions to be run in deep wells and also over long production zones of over 2000ft of continuous ESS[®].



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