



MATURE FIELDS



UNCONVENTIONALS

Operator Triples ESP Run Life Over Competitor in Extreme Solids Environment

PUMP AND GAS SEPARATOR WITH SPECIALTY COATING PROTECT COMPONENTS FROM EXTREME ABRASION/CORROSION

ALBERTA, CANADA

CHALLENGES

- » Excessive abrasive wear from sand production causing a broken shaft
- » Severe erosion in gas separator

SOLUTIONS

- » Tiger Shark® II pump designed for extreme environments, including heat and abrasion
- » Patented Erosion Buster® pump diffuser designed to actively move sand away from the pump OD and mitigate possible pump housing washouts
- » Liberator™ gas separator designed to perform in abrasive solids environments while separating gas and liquid efficiently
- » DuraHard® 7 and 15 coating to harden pump stages and gas separator components against extreme abrasion and corrosion

RESULTS

- » Mitigated damage from produced sand, reducing workover costs and non-productive time
- » Run life of 180+ days, tripling run time over competitor's pump

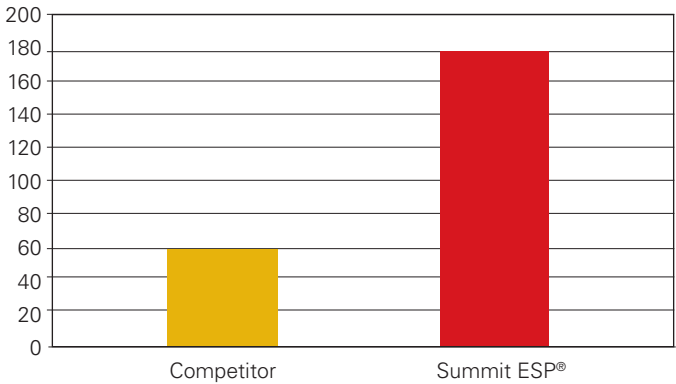
OVERVIEW

Sand is a common and troublesome solid that interferes with production by causing both abrasion and accumulation, shortening the run life of an electric submersible pumping system (ESP). The Montney formation in Western Canada has significant sand content that forces frequent maintenance and workovers, leading operators to seek an alternative to avoid high maintenance costs.

In Western Canada, an operator was running a competitor's ESP for approximately 60 days before it failed from a broken shaft due to erosion from solids. The solids had eroded the hubs of non-abrasion-resistant pump stages, leaving space for solids to lock the pump. There was also severe erosion in the gas separator to the extent that the integrity of the system was nearly compromised.

Designed and tested for extreme conditions, including high heat and abrasion, Summit ESP® proposed the Tiger Shark® II pump and Liberator™ gas separator with DuraHard® 7 and 15 coating. The Tiger Shark II pump stages incorporate innovative hydraulic design concepts with wide mixed-flow vanes and greater operating ranges, designed specifically to handle broader drawdowns of conventional wells and rapidly declining, sandy, and gassy wells. The Liberator gas separator was proposed to help mitigate gas interference with the pump. It is designed to separate gas and liquid efficiently, while maintaining structural integrity in solids

Run Life (Days)



environment. To protect the pump and gas separator from severe heat, abrasives, and corrosion, DuraHard 7 and 15 coating was applied. DuraHard 7 is high-phosphorous nickel coating providing non-molecular surface hardness to stage materials. The DuraHard 15 coating provides hardness comparable to carbide materials, but ductile enough to coat and bond steel components.

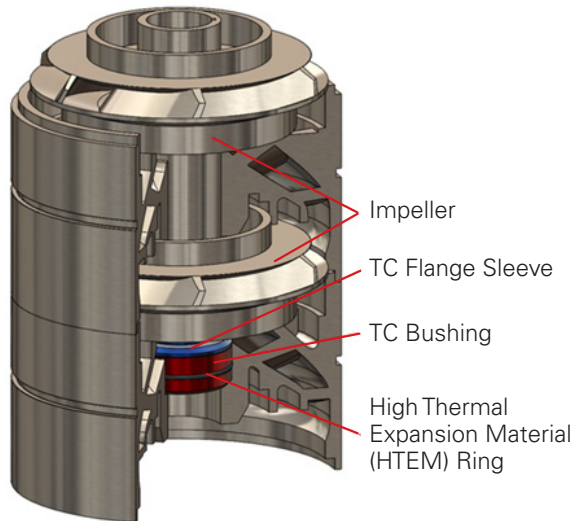
The Summit ESP solution helped mitigate damage from produced sand, reducing workover costs and non-productive time. The new pumping system installed has been running for 180+ days with no issues.

TIGER SHARK® II PUMP

Left Top » New bearing system designed to expand when operating temperature rises, creating a mechanical lock to retain the bushing-diffuser connection.

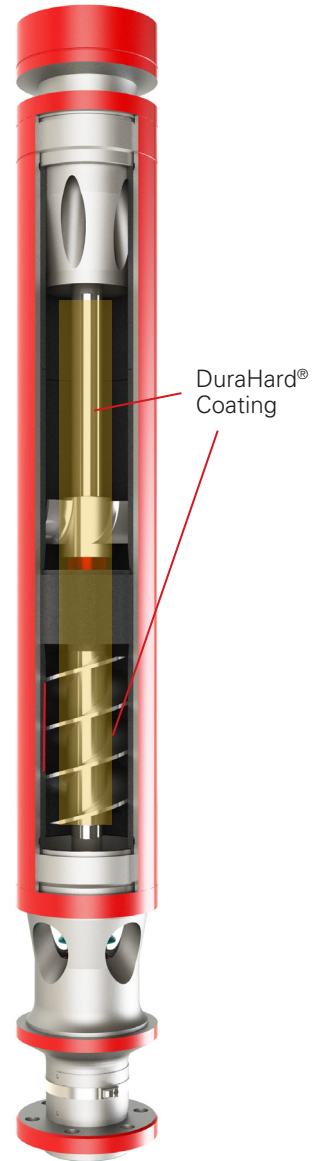
Left Middle » Ring lock temperature size differential.

Left Bottom » Enhanced Tiger Shark® II pump designed to increase run life and extend operating range in extreme environments.



LIBERATOR™ GAS SEPARATOR

Right » Designed to separate gas and liquid efficiently, reduces or eliminates gas locking to increase system run life, and corrosion-resistant metallurgy improves reliability in both corrosive and abrasive applications.



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