

The Heavy Oil Market 2011-2021

6. Expert Opinion

6.1 Kudu Industries Inc.

Kudu is a progressive cavity pump provider to the oil and gas industry. The company offers a variety of pumping solutions for challenging situations and has developed advanced progressive cavity pumps for the more efficient pumping of viscous oils. Kudu is headquartered in Calgary, ideally located for the heavy oil market in Alberta, but also has international presence in Australia, Kazakhstan, Oman, Romania, Russia and the USA.

In October 2011, visiongain interviewed Chief Operating Officer Alex Damnjanovic and is grateful for the insight offered.

6.1.1 The Challenges of Extracting Heavy Oil

Visiongain: What are the fundamental challenges associated with extracting heavy oil?

Alex Damnjanovic: Heavy oil as the name implies can be very viscous fluid with a high percentage of solids making it challenging to pump. In deeper wells, you can also run into mechanical limits on the rod string.

6.1.2 The Advantage of Progressing Cavity Pumps

Visiongain: What technical aspects of Kudu's progressing cavity pumps make them suited to heavy oil extraction?

Alex Damnjanovic: PCPs in general are a good way to pump heavy oil because of its efficiency and ability to handle solids. Kudu offers models particular to heavy oil that,

- 1) have aggressive geometry to deal with high solid content,
- 2) deal with potentially higher torque,
- 3) have a range of elastomers to handle various downhole conditions.

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6.1.3 The Capability of Progressing Cavity Pumps

Visiongain: Kudu offers a wide range of pumps for different situations, what kind of viscosities are they capable of pumping?

Alex Damnjanovic: Typically the limiting factor is the mobility of the oil not the PCP. We have pumped oils nearly 400,000cP.

6.1.4 Cold Pumping Solutions for Sensitive Production Areas

Visiongain: There are heavy oil deposits in Alaska, Northern Canada and Russia where thermal recovery techniques to reduce oil viscosity would both damage the permafrost and be costly. Is there/will there be a cold pumping solution that could produce commercial yields?

Alex Damnjanovic: Thermal extraction techniques have evolved considerably making them an efficient and safe way to recover very heavy oil. These would be used in cases where the oil was not mobile in the first place. Different technologies are emerging that may present a cold solution using polymers and/or a hybrid using some heating technique. If the oil is mobile, then cold pumping with a PCP is a commercial practice.

6.1.5 The Demand for Heavy Oil Extraction Equipment

Visiongain: How has the demand for heavy oil extraction equipment developed over the last few years? And what equipment/technology has seen the strongest growth in sales?

Alex Damnjanovic: With limited supplies of lighter oils, more emphasis is being placed on heavy oil. This required an investment in infrastructure not only from the well but also downstream in the refining process. From our perspective, technology improvement and growth has been on two fronts.

1) Improved PCP elastomers, pump geometries and related accessories. For example, elastomers are now pushing temperature limits that were unheard before. Similarly, our patented Kudu Top Tag is a simple device yet can dramatically improve inflow performance and pump life.

2) Utilisation of well optimisation technology, we're always looking at ways of getting more out of an existing well. Our automation team has done incredible work with customers optimising well

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performance, improving overall production and run times. Of course in both scenarios, none of this would work without knowledgeable and dedicated service personnel. This is particularly important in new markets where experience with PCPs may be limited.

6.1.6 Markets with High Potential Growth

Visiongain: Your international offices are located in Australia, Kazakhstan, Oman, Romania, Russia and USA. Do you feel these countries will be strong growth markets for the heavy oil industry? Which ones in particular?

Alex Damjanovic: All of these markets are important to us in their own right, but we certainly have a keen interest on Russia because of the size of the opportunity and the technical advantages Kudu PCPs would provide.

6.1.7 Kudu's Fastest Sales Growth

Visiongain: In which countries is Kudu seeing the fastest growth in sales for progressing cavity pumps and heavy oil extraction equipment?

Alex Damjanovic: Similar to last questions, Russia has huge potential and we want to be a big part of that. Currently the fastest growth of PCPs is Australia (CBM play), Middle East (overall need for pumping solutions including heavy oil), USA (although mature fields, PCPs are now seen as a superior more efficient alternative to other lift methods), Romania and Kazakhstan which are natural PCP markets.