

VAREL INTERNATIONAL INC.



In early 2004, Varel International began utilizing Advanced Force Balancing in all of its fixed cutter products. While force balancing has been used to design polycrystalline diamond compact (PDC) bits since the mid 1980s, Advanced Force Balancing is an evolutionary step that significantly improves rate of penetration (ROP), dull bit condition and deviation

control over conventionally balanced PDC bits. The theory of force balancing is to minimize the resultant side force by strategic adjustment of individual cutter side rake and back rake. As PDC bits drill, each cutter exerts a force on the bit in a predictable direction and amount. If all of the forces exerted by all of the cutters are summed, there is a resultant force in some radial

direction around the face of the bit. Advanced Force Balancing is made possible by Varel's proprietary design software SPOT 4D. This design software allows the company's design engineers to force balance PDC bits over the widest range of ROPs and revolutions per minute (RPMs) possible. The result is a bit that is stable under practically all drilling conditions. The benefit to customers is a bit that drills faster, lasts longer and is more directionally stable than ever before. Recent results from Canada support these claims.

Field study

A field study measuring the difference between conventional force balancing and Varel's Advanced Force Balancing was recently conducted in eight oil fields in Western Canada. The study compared 18 Varel bits runs with conventional force balancing and 14 recent competitor bit runs against 11 Varel bit runs using Advanced Force Balancing. With the technology, the average number of meters drilled increased 52% while ROP increased 41% and dull condition improved an average of two points. Drillers also reported that they could push the bits harder in zones known for deviation problems without increasing deviation.