DIRECTED HYDRAULICS FORGING DESIGN

The StrikeForce™ design platform is focused on enhancing reliability and rate of penetration. One of the ways this has been accomplished is by redesigning the arm geometry to create directed flow channels that more effectively remove cuttings from the bit and efficiently transport them up the wellbore. Computational Fluid Dynamics (CFD) analysis aided in creating the lifting surfaces and trailing wedges which better guides fluid flow at the face of the drill bit. This tightly controlled, upward directed fluid flow enables the formation cuttings to be rapidly removed from the cutting interface to prevent reworking of the cuttings. The three arms cooperatively generate an optimum spiral of fluid flow that entrains and lifts the formation cuttings upward while minimizing build-up of cuttings around the bearing sealing area, improving reliability of the seals.

In addition to the external geometry, internal flow profiles were also examined to balance maximize flow while preventing erosion. Just as with the fluid profile outside the bit, negative hydraulic effects were minimized while enhancing smooth balanced flow. Each component related to the directed flow leads to increased rate of penetration and longer bit life.

DIRECTED NOZZLES

Through comprehensive CFD design optimization, the drill bit nozzles are directed towards the leading edge of the cutting structure. This results in high fluid velocity across the face of the cutting structure which promotes a sweeping action across the cutting interface and improves cuttings removal. Another benefit is in the significant reduction of stagnant fluid zones in the fluid column, which ensures that cuttings will not be suspended near the bottom of the hole. The directed nozzles have eliminated recirculation paths in the fluid profile. This translates to reduction in the amount of cuttings that will fall back to the bottom of the hole and be re-drilled thereby eliminating lost ROP potential.