Sectional view of a Technidrill reverse circulation drill rod. SOLIDWORKS Flow Simulation analysis was used to refine its structure.
Technidrill designs, produces and distributes machinery for drilling, coring and boring for non-oil markets: geotechnics, special foundations and civil engineering, the mining industry, water and geothermal energy drilling, quarries and directional drilling, demolition and networks. Founded in 1989, Technidrill now has 50 employees and, since 2009, is part of EuroforGroup, the drilling machinery distributor.

Two thirds of its sales are in countries with large-scale mining activities, such as Australia, Canada and South Africa. Technidrill manufactures tools, such as tricone rock bits, three-wing bits and PDCs, and tubular products at its Carros plant in Alpes-Maritimes. Its head office is in Chassieu, and the company operates a logistics base with 2500 m² of storage capacity in Haute-Savoie.

Technidrill also manufactures customized products to meet specific needs or improve existing machinery. For instance, Technidrill manufactured a specialized drill rod for uranium mining in Kazakhstan.

The company has been using SOLIDWORKS since 2007. Etienne Bosch, Director of the Carros plant, explains this choice: “SOLIDWORKS already had a solid reputation in the industry at the time. It’s widely used in the educational system, ensuring that we could find young people on the jobs market who were already trained. Naturally, our reseller also provided more in-depth training and helped us extend use of the software to our team of technicians.”

### Challenge:
Achieve higher yields from reverse circulation drill rods so that mine operators can substantially reduce energy consumption compared with competing solutions.

### Solutions:
Use SOLIDWORKS and SOLIDWORKS Flow Simulation to design a drill rod model that minimizes injected compressed air pressure loss. Mechanically validate the solution with SOLIDWORKS Simulation.

### Results:
- 60% decrease in pressure losses compared with previous drill rods
- Simpler geometry for simplified manufacturing
- Lower drill rod production cost
- Operational savings for the client
- Technidrill is internationally recognized for this technique

“SOLIDWORKS Flow Simulation enabled us to decrease pressure losses by 60% for each of our RC drill rod connections.”
— Etienne Bosch, Director, Technidrill Carros Plant

### BLOWING DOWN AIR TO BRING UP CRUSHED ROCK
Reverse circulation (RC) drilling is a technique used in mining. It involves bringing up samples of crushed rock (called cuttings) to the surface using a pneumatic tool, such as a down-the-hole hammer, at the end of a drill rod. Drill rods consist of two concentric tubes. Compressed air flowing in the outer part of the ring moves cuttings to the surface through the central tube.

To drill, 3- or 6-meter drill rods are screwed together, and each connection provides tube tightness and concentricity while limiting compressed air pressure losses. Air pressure losses mean increased demand for air and higher energy costs for the drilling operator (usually diesel).

### PRESSURE LOSSES CUT BY 60%
The R&D team at Technidrill analyzed its range of rods using SOLIDWORKS Flow Simulation. To make the best design choices, this software simulates liquid and gas flows under real conditions and quickly assesses the effects of changing the geometric environment or fluid characteristics.

“The connections of our drill rods are simple. Stabilizers ensure concentricity of the two tubes, and a lock ring keeps the rods together,” Etienne Bosch explains. “We used SOLIDWORKS Flow Simulation to analyze the air circulation near the stabilizers and to measure the pressure losses in rods. Our increased understanding of the effect of stabilizer geometry on air circulation (turbulence effect) enabled us to change their shapes and use fewer of them. We considerably lowered pressure loss at each connection by up to 60%. It took only a few iterations to achieve the optimal solution, which we validated mechanically with SOLIDWORKS Simulation.”

### GAINS IN PRODUCTION AND OPERATION
Thanks to these advances and the operational savings generated, the company now has international recognition. It is even sought out to improve the productivity of current sites, implementing reverse engineering to adapt to the machinery in each facility.
Improved geometry and reduced number of RC drill rod stabilizers
In front, new stabilizers after flow analysis using SOLIDWORKS Flow Simulation

The analysis led to another important gain. The new geometry of the stabilizers lowered drill rod manufacturing costs. They are now welded onto the rod, while, in the past, the assembly was machined.

SOLIDWORKS Flow Simulation and SOLIDWORKS Simulation were used to reanalyze our range of tubes, so that the design and engineering department could work with the software along with in-house procedures.

CATALOGS PRODUCED WITH PHOTOVIEW
From the SOLIDWORKS Enterprise PDM “safe” to the catalog illustrations made in PhotoView, Technidrill uses all the resources available through the SOLIDWORKS Premium license. “2D studies have completely disappeared,” says Etienne Bosch. “Even the plan for loading our machinery into containers is done in 3D. We create our specialized machines and animations to verify that products operate properly.”

CAD AND SIMULATION FOR SPECIAL STUDIES
While Technidrill continually develops new products to meet market expectations, special studies are also important. This is particularly true for mining companies that want to benefit from the new performance of its drill rods on existing sites. The Technidrill design and engineering department combines reverse engineering (surveys using 3D measurement devices), CRD and simulation to accurately and quickly respond to calls for tenders.

The company maintains the pace with successive versions of SOLIDWORKS. “Each new upgrade confirms our original choice,” says Etienne Bosch. “Since 2007, improvements have appeared regularly. We also benefit from the integration of new products, including SOLIDWORKS Flow Simulation, which enabled us to optimize and validate our studies and see our reputation soar in our business sector.”

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