

METAL TO METAL TECHNOLOGY

Full Metal Motors Extreme Environment Reliability

The Full Metal Motor is a highly specialized Positive Displacement Motor (PDM) engineered entirely without elastomers, rubber stators, or polymer O-rings. Designed for the most extreme wellbore conditions, this tool delivers reliable rotary power where traditional conventional mud motors would rapidly degrade or fail.

How It Works

In a standard PDM, a steel rotor turns within an elastomer-lined stator. In an all-metal motor, both the rotor and the stator are manufactured from precision-machined, highly wear-resistant metal alloys. Because there is no rubber to provide a compressive seal, the motor relies on microscopic clearances and the dynamic flow of the drilling fluid to create the pressure seal between the progressing cavities.

Key Advantages

- **Extreme Temperature Tolerance:** Completely immune to the thermal degradation that destroys rubber stators. Capable of operating in Ultra-High-Pressure/High-Temperature (UHPHT) and geothermal wells with temperatures frequently exceeding 500°F (260°C).
- **Absolute Chemical Compatibility:** Impervious to explosive decompression and chemical attack. It can be run seamlessly with highly corrosive fluids, concentrated acids, aggressive hydrocarbon solvents, and energized fluids or 100% nitrogen gas.
- **Elimination of Stator Swelling:** Without elastomers, there is zero risk of stator swell due to chemical absorption or thermal expansion. This eliminates the risk of chunking, tearing, or the motor locking up downhole.
- **Extended Shelf Life:** Conventional stators degrade over time in storage due to environmental exposure. All-metal power sections have an indefinite shelf life, simplifying inventory management.

Applications

- **Harsh Environment Interventions:** Thru-tubing milling and cleanouts in HPHT environments where standard tools cannot survive.
- **Nitrogen and Foam Drilling:** Ideal for underbalanced operations utilizing dry gas, which typically destroys standard elastomers through friction and lack of lubrication.
- **Geothermal Drilling:** Providing reliable bottom-hole assembly (BHA) power in extreme subsurface heat.
- **Acidizing and Matrix Stimulation:** Rotating jetting tools or mills while pumping high concentrations of HCl or other aggressive stimulation fluids.