ANTI-TORQUE SYSTEMS OF HOT-WATER ICE-CORING DRILLS WITH POSITIVE DISPLACEMENT MOTOR

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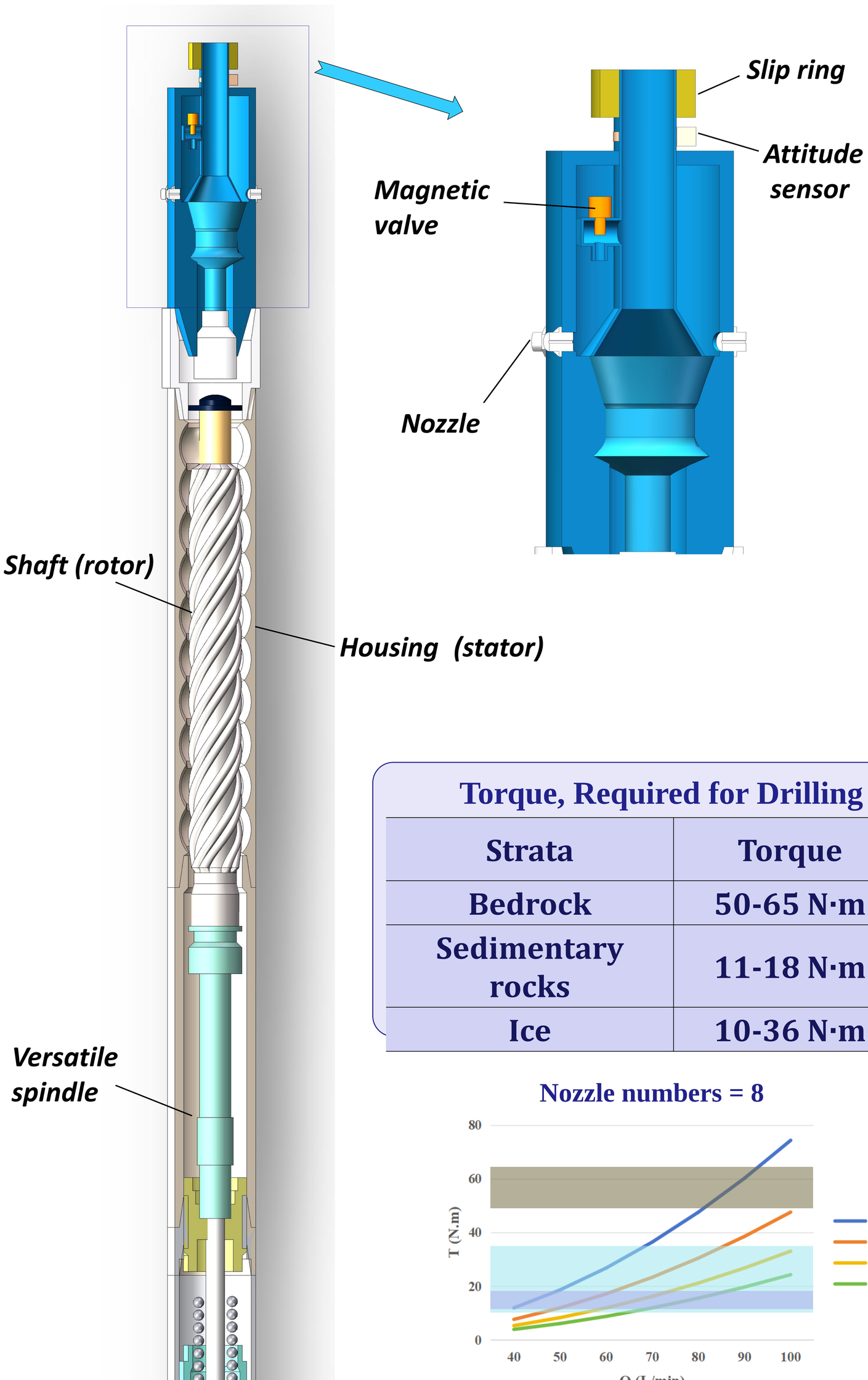
Hot-water drilling is the fastest method of drilling through ice. Currently, hot-water drilling is being actively used to observe ocean cavities beneath ice shelves, study internal ice structures, measure temperature and deformation within the ice, and clean access subglacial lakes. In general, hot-water drill drills are full-face (non-coring) drilling tools that can only produce meltwater and the borehole itself. To recover ice cores from desirable depths, specialized hot-water ice-coring drills can be used in combination with a full-scaled hot-water drilling system.



Main parameters of PDM motor

Type	5LZ73×7.0
Flow rate	2-7 L/s
RPM	133-467
Pressure drop	2.4 MPa
Working torque	320 Nm
Max torque	480 Nm
Output	4.8-17 kW
Recommended bit load	15 kN
Max bit load	20 kN
Length, mm	3670
Outer diameter	74mm
Weight, kg	85

Torque, Required for Drilling

Strata	Torque
Bedrock	50-65 N·m
Sedimentary rocks	11-18 N·m
Ice	10-36 N·m

To control a part of hot water through an electromagnetic valve, allowing it to be sprayed out centripetally through small nozzles to form anti-directional jets to balance the torque generated during mechanical drilling. The other part of hot water is used to maintain mechanical drilling with a positive displacement motor.

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