

Motor Driven Core Barrel



Scientific Application

The Motor Driven Core Barrel (MDCB) is a wireline-retrievable coring system compatible with the Advanced Piston Corer/Extended Core Barrel APC/XCB) Bottom-Hole Assembly (BHA). It is designed to improve core recovery in formations that are difficult to APC/XCB core (e.g., hard fractured crystalline rock, interbedded hard/soft formations, and friable conglomerate and reef materials). The MDCB is typically used to recover intermittent short intervals (a few 4.5 m cores) because of the handling time (~1 hr) to prepare the tool for consecutive coring runs.

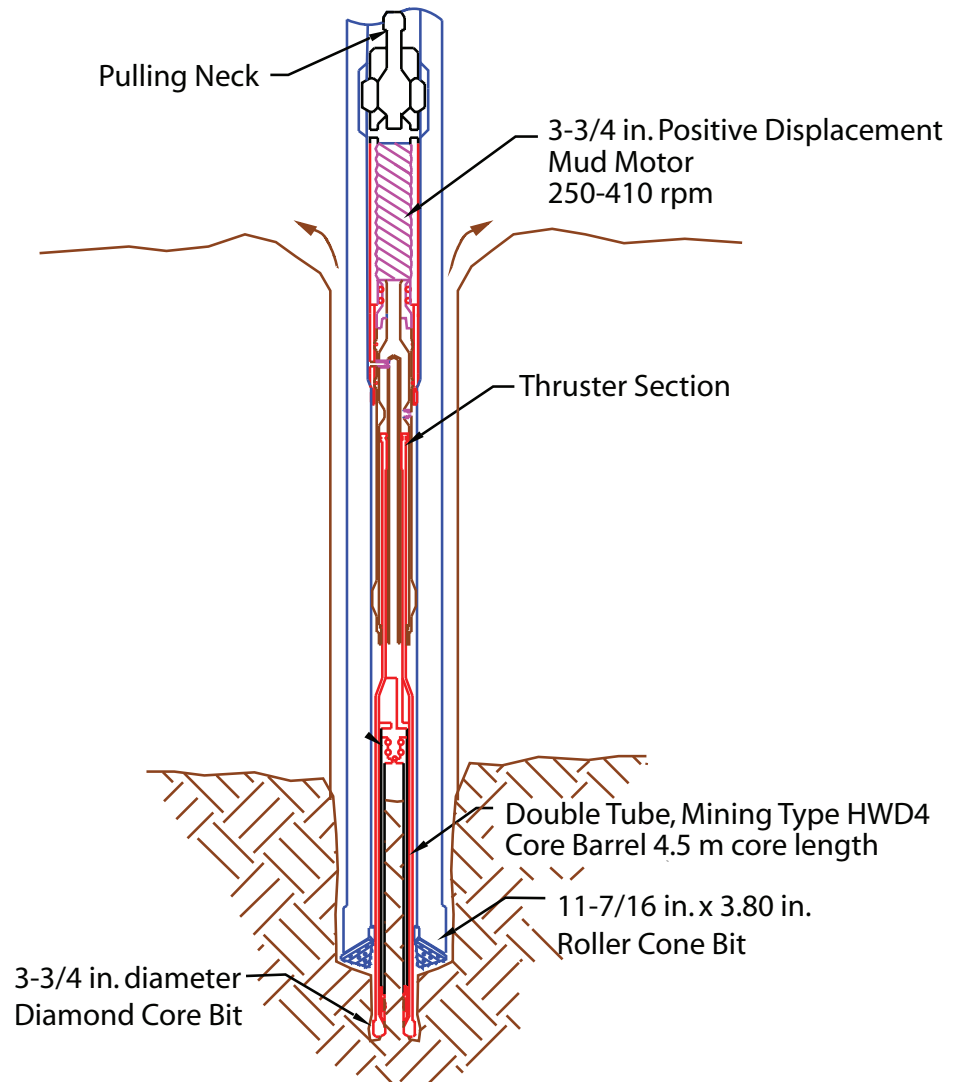
Operation

The MDCB can be run interchangeably with the APC/XCB coring systems with the addition of a latch sub to the BHA. The MDCB consists of a motor section, thruster section, inner core barrel section, and a narrow-kerf core bit. The motor section is powered by the hydraulic force of fluid pumped down the drill string, which causes the motor to rotate. The thruster section uses hydraulic force to provide weight on bit (WOB) and advance the inner core barrel. The inner core barrel section has a 4.5 m core tube with a thin-kerf core bit on bottom; the core diameter is 2.25 in. (57 mm).

Features

Diamond Core Mining Technology

Compared to the APC/XCB coring system, the MDCB operates at higher revolutions per minute (rpm) with lower WOB and uses narrow-kerf, surface-set diamond



Schematic of the MDCB tool.

impregnated as well as geoset and tungsten carbide core bits to recover cores from friable, laminated hard/soft, and crystalline formations.

Positive Displacement Mud Motor

Downhole rotation and torque are produced by a positive displacement mud motor. The motor rotates the bit; therefore, drill string vibration is eliminated.

Thruster Unit

Hydraulic force is translated into WOB, and interchangeable nozzles optimize WOB at various flow rates. The WOB can be controlled to provide a more uniform application of weight to the diamond bit, thereby improving diamond bit life and recovery.

Core Barrel Assembly

A modified version of a standard Christensen Mining Products HWD4 inner core barrel provides a nonrotating core tube to receive the core sample into a clear plastic liner. Reduces rotational torque and stress in cores to improve core quality and recovery.

Diamond Core Bits

A 3.75 in. (95 mm) outer diameter (OD) core bit is used to trim a 4.5 m long × 2.25 in. (57 mm) diameter core. Optional bit types include: narrow-kerf diamond-impregnated or surface-set diamond bits as well as geoset and tungsten carbide core bits. Different bit cutting structures can be selected for each MDCB run, based on the anticipated formation, to optimize core quality and recovery.

Interchangeability

With the addition of a latch sub, the MDCB can utilize the same BHA as the APC and XCB. Eliminates extra pipe trips to change the BHA.



Rig floor flow test of MDCB.

Specifications

- Tool size OD: 3¾ in. (95 mm)
- Motor pressure: 1160 psi
- Pump rate: 190 gpm
- Power: 96 hp
- Bit speed: 410 rpm
- WOB: 2000–8000 lb
- Max. torque: 1250 ft-lb
- Bit flow rate: 15–35 gpm
- Efficiency: 83%
- Core diameter: 2.25 in. (57 mm)
- Core length: 4.5 m

Limitations

Diamond coring does not work well in soft or unconsolidated granular formations.

The core length is 4.5 m, which requires three times the wireline and handling time than typical 9.5 m APC/XCB cores.

Due to manpower/budget constraints, the MDCB does not reside full-time on the *JOIDES Resolution*. Pre-cruise planning and budgeting must specifically call for the tool.