

Pressure Core Sampler

Scientific Application

The Pressure Core Sampler (PCS) is capable of retrieving core samples from the ocean floor while maintaining in situ pressures up to 689.7 bar (10,000 psi). The primary application of the PCS is to recover in situ hydrates. The PCS is free-fall deployable and wireline retrievable.

Operation

The PCS is free-fall deployed down the drill string for intermittent “spot” coring while using the Advanced Piston Corer/Extended Core Barrel (APC/XCB) bottom-hole assembly (BHA). The PCS inner core barrel is latched in to the XCB rotary window sub and is rotated with the drill string while weight is applied to the bit. After cutting the core, a ball is released by wireline action to divert flow to a piston that pulls the core tube into the pressurized core barrel and closes the ball valve. The core is then retrieved by wireline.

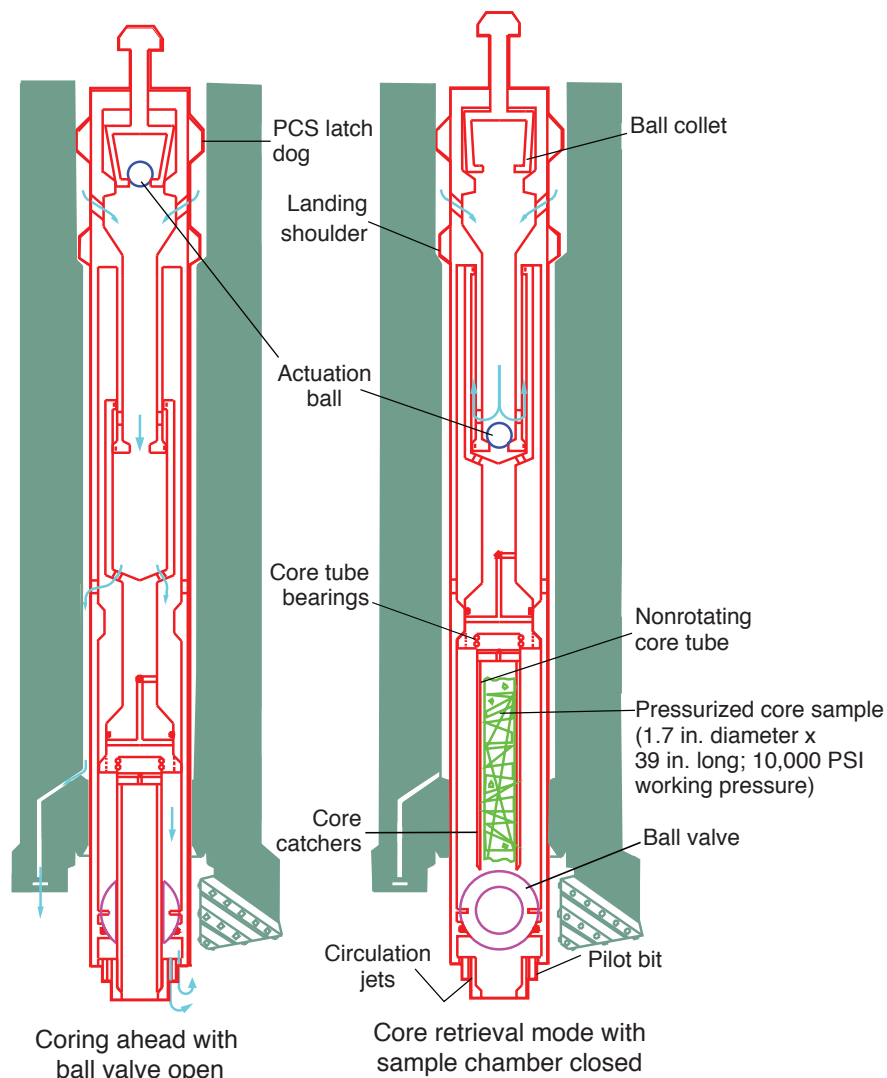
Features

Compatibility

The PCS is completely compatible with the existing BHA used for the APC and XCB coring systems. The PCS can be deployed during routine coring without a pipe trip.

Rotary Latch

The PCS latch dog locks into the APC/XCB latch window in the BHA, which transmits BHA rotation to the PCS. A combination of low weight on



Schematic of the PCS in the “coring ahead mode” (with the ball valve open to accept core) (left). After cutting the core (right), the wireline is picked up to release the ball, which redirects fluid to lift the core tube for “core retrieval” mode (with the core tube and core retracted inside the tool and the ball valve closed). Arrows indicate fluid flow.

bit, slow rotation, and low pump rate is required to core. Fragile samples and sticky clays can be recovered with minimal hydraulic disturbance or contamination.

Actuator

After the PCS core sample is cut, the actuator hydraulically pulls the inner core barrel and core sample through a ball valve into the sample chamber and closes the ball valve, thereby sealing the sample chamber at in situ pressure. The PCS core sample is trapped at near in situ pressure behind a ball valve that closes by rotation to maintain its seal at both positive and negative pressure differentials.

Detachable Sample Chamber

A removable pressure chamber maintains the core sample at near in situ pressure, provides for internal pressure monitoring, incorporates safety pressure release mechanisms, and offers two sampling ports for collecting gas and fluids. The pressured core sample chamber is moved to a lab for further examination.

Specifications

Core Diameter

43.2 mm (1.70 in.)

Core Length

39 in. (0.99 m)

Sample Chamber Working Pressure

689.7 bar (10,000 psi) maximum

Operating Range

Formation

From mudline to indurated formations

Depth Range

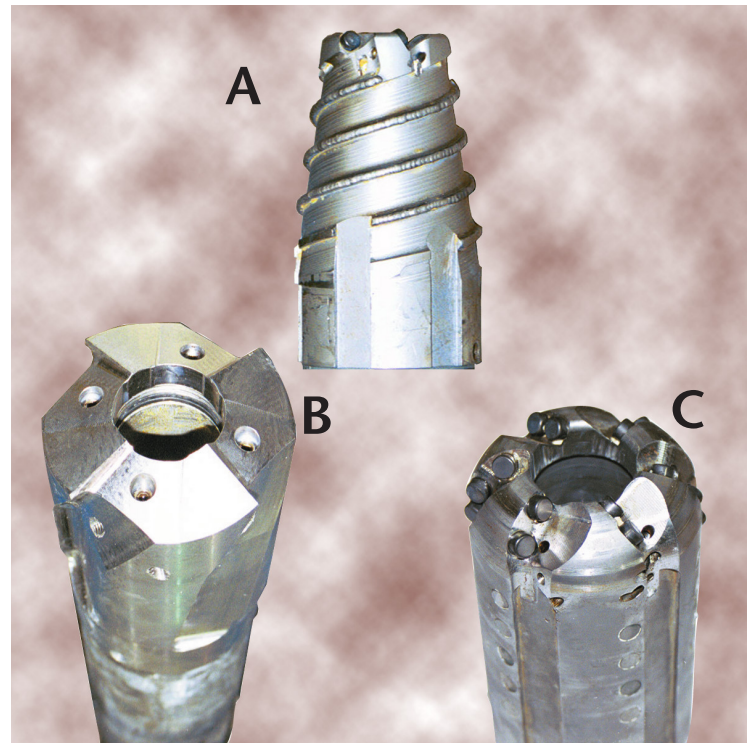
Up to ~6500 m combined water depth and formation penetration

Limitations

Tool is limited to formations composed of soft sediments to firm clay

Sample chamber is short to accommodate lab handling

Core diameter is limited by ball valve size



There are three bits available for rotary coring with the PCS tool: (A) RBI auger bit, (B) Christiansen standard bit, and (C) RBI PDC bit.

No method of transferring pressurized cores to an autoclave

Small core diameter could impact scientific sampling

Wireline core recovery time per meter of core increases approximately 10:1 compared to standard coring system because the core recovered is one-tenth the length of a standard core.