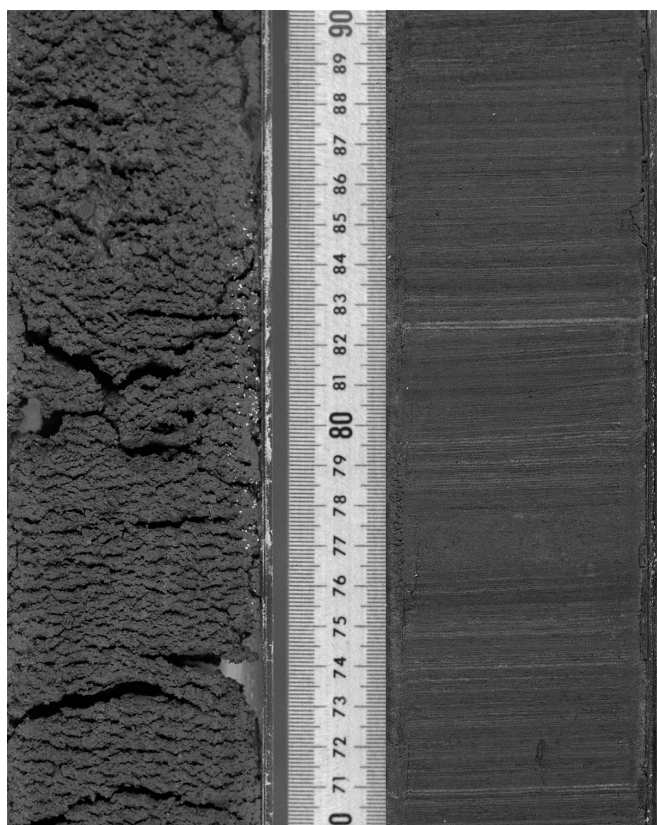


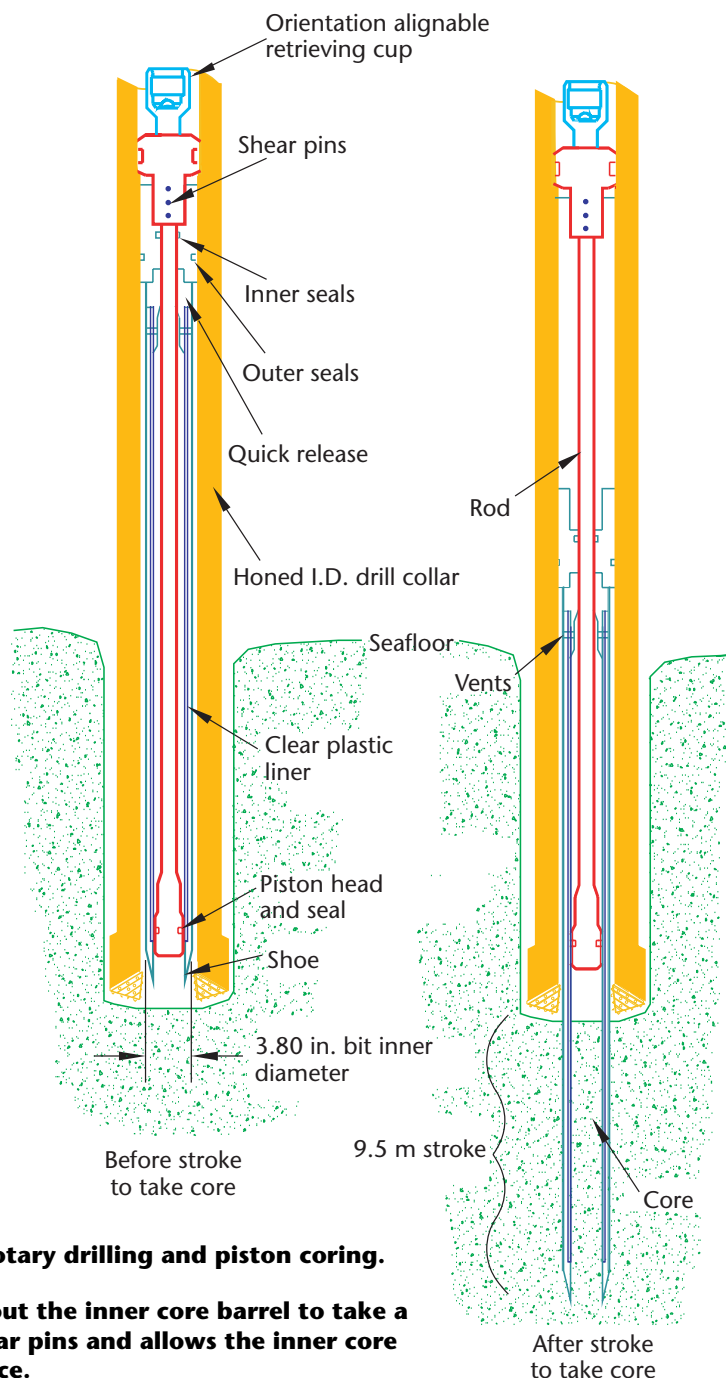
Scientific Application

The Advanced Piston Corer (APC) is crucial for high-resolution climate and paleoceanographic studies. The APC is a hydraulically actuated piston corer designed to recover relatively undisturbed continuous 9.5 m long oriented core samples from very soft to firm sediments that cannot be recovered well by rotary coring.



Rotary cored

Piston cored



(Above) Comparison of sediment core quality between rotary drilling and piston coring.

(Right) Schematic of the APC before and after stroking out the inner core barrel to take a core. Pump pressure inside the drill string severs the shear pins and allows the inner core barrel to stroke out 9.5 m in 2–3 s with ~27,000 lb of force.

Tool Operations

The APC inner core barrel is run to bottom on the coring wireline. Pump pressure is then applied to the drill pipe, which severs the shear pins and strokes the inner core barrel 9.5 m into the sediment. The inner core barrel containing the core is then retrieved by wireline. A wireline packoff at the top of the drill string permits rotation of the drill string and continued circulation while the core is retrieved. After core retrieval, the bit and bottom-hole assembly (BHA) are again advanced 9.5 m, repeating the process.

Design Features

1) Compatibility

The APC inner core barrel is deployed in the same BHA as the Extended Core Barrel (XCB); therefore, both tools can be used interchangeably depending on formation lithification. The Motor Driven Core Barrel and Pressure Core Sampler are also compatible with the APC/XCB BHA.

Benefit: Tools are interchangeable and no time is spent for bit trips.

2) Wireline Deployment

The APC inner core barrel is deployed (and recovered) using the coring wireline to avoid premature release of the shear pins, which determine penetration force of the barrel into the sediment.

Benefit: Allows rapid recovery of core with minimal nonproductive time.

3) Core Orientation

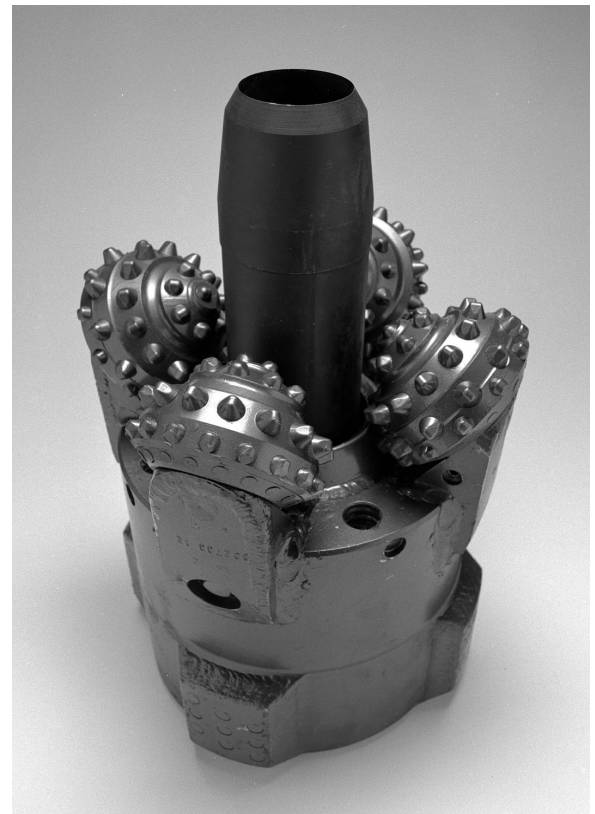
The APC core can be oriented with respect to the Earth's magnetic field by running a downhole orientation tool above the core barrel.

Benefit: Allows recovery of oriented core for paleomagnetic studies.

4) In Situ Temperature Measurement

Special APC shoes have a pocket in which a thermistor unit can be run to record the in situ formation temperature after taking a core (see APCT tool sheet).

Benefit: Provides in situ heat flow measurements for science and hydrocarbon safety.



APC piston shoe extending through 11⁷/₁₆ in. APC/XCB bit.

APC Specifications

Maximum Piston Stroke (Core) Length

9.5 m (31.16 ft)

APC Shoe Inside Diameter (Core Outer Diameter)

6.2 cm (2.44 in)

Piston Force

23,000 to 28,000 lb_f at 2300 to 2800 psi pump pressure

Typical Operating Range

Formation

Very soft to firm sediments

Depth Range

Seafloor to +300 m below seafloor (mbsf)

Recovery

~100% in soft sediments

Rate of Core Recovery

~38.0 to 9.5 m of core/hr (depends on depth/wireline time). Rate of penetration typically decreases with depth.

Quantity of Cores on Deck

1 to 4 cores/hr depending on water depth and formation cored.

Limitations

Does not penetrate or recover granular formations (such as sand) or hard ground. Core barrel may stick in firm sediments and require drill-over.