Geo-Vista

Wireline Mechanical Coring

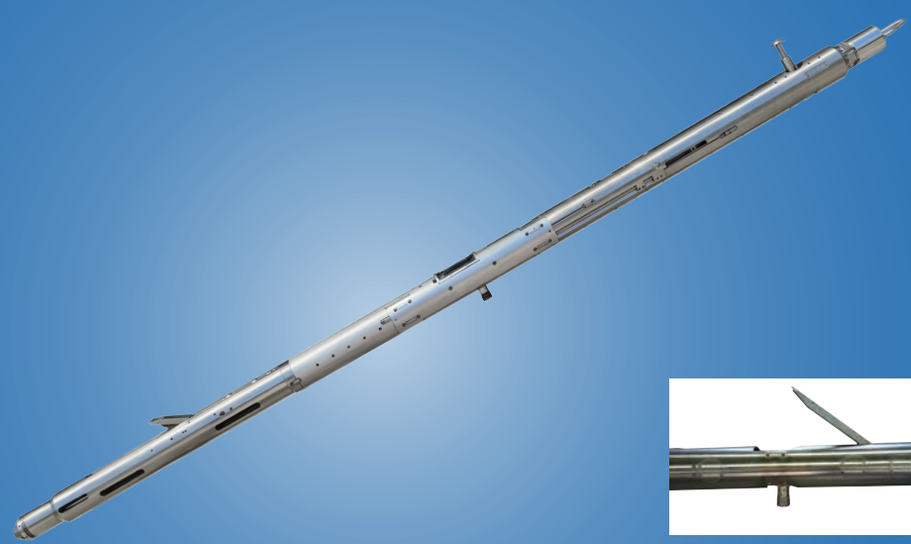
Formation Coring Tool (FCT)

Formation Coring Tool-Large (FCT-L)

Large Core & Horizontal Formation Coring Tool (LHFCT)

Mechanical Sidewall Coring Tool (MSC)

NMR Rock Sample Analyzer (NRA)



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Formation Coring Tool (FCT)
Formation Coring Tool-Large (FCT-L)

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Applications

- Lithology and Secondary porosity analysis
- Porosity and permeability determination
- Confirmation of hydrocarbon shows
- Determination of clay content
- Determination of grain density
- Detection of fracture occurrence

Introduction

This coring service enables collecting sidewall-core samples equivalent to standard laboratory core plugs in high-angel and horizontal wells. FCT-L is a new version of FCT series to take large cores, which is 1.5 inches in diameter and 2.5 inches in length. The core's volume is 3 times as much as that of FCT. 25 cores can be obtained in one trip. With optional tools, the number of cores is up to 50. The FCT/FCT-L tool is combined with Downhole Force Gauge (DFG-F) to measure downhole cable tension to make safe PCL operation. For wireline sidewall coring, Multi-Conductor Extreme Jar (MCE) and Cablehead Releasable (CHR) is suitable for safety operation.

FCT/FCT-L also includes gamma ray sensor and orientation sensor inside. GR make sure sidewall coring operation in any depth. GR curve helps compare with openhole logging curves. Orientation indicates the core direction.

Compared with drilling pipe coring, sidewall coring is quickly, large range, position accuracy, reduce cost and save operation time. Compared with explosive sidewall coring, FCT samples are not broken, that represent the original downhole formation better.

Specifications

Surface Power Supply	380 Vac/50 Hz
Maximum Temperature	275°F (135°C)/350°F (175°C)
Maximum Pressure	20000 psi (138 MPa)
Make-up Length	25.3 ft. (7.7 m) (FCT)
	24.6 ft. (7.5 m) (FCT-L)
Weight	436.5 lbs. (198 kg) (FCT)
	507.1 lbs. (230 kg) (FCT-L)
Tool Maximum Diameter	5 in. (127 mm) (FCT)
	5.83 in. (148 mm) (FCT-L)
Minimum Hole Diameter	6 in. (152.4 mm) (FCT)
	6.875 in. (174.6 mm) (FCT-L)
Maximum Hole Diameter	13 in. (330.2 mm) (FCT)
	17 in. (431.8 mm) (FCT-L)
Core Diameter	1 in. (25.4 mm) (FCT)
	1.5 in. (38.1 mm) (FCT-L)
Maximum Core Length	1.75 in. (44.5 mm) (FCT)
	2.375 in. (60.325 mm) (FCT-L)
Vertical Resolution	0.2 m
Hole Deviation	Vertical to Horizontal
	(in highly-deviated hole needs proper tools)
Maximum Coring Number (One Trip)	25 (Optional 50) (FCT)
	25 (Optional 50) (FCT-L)
Relative Bearing (Optional)	
Measurement Range	0°~359°
Accuracy	±1° (DEV 90°)
	±1.5° (DEV10°)
	±2° (DEV 3°-5°)
	±5° (DEV 1°-2°)

Formation Coring Tool (FCT)
Formation Coring Tool-Large (FCT-L)

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Applications

- Lithology and Secondary porosity analysis
- Porosity and permeability determination
- Confirmation of hydrocarbon shows
- Determination of clay content
- Determination of grain density
- Detection of fracture occurrence

Optional

DFG-F（Downhole Force Gauge）	
Tool Diameter	3.386 in. (86 mm)
Make-up Length	3 ft.-8.76 in. (1.14 m)
Weight	58 lbs. (26.5 kg)
Measurement Range	0-12,000 lbs Tension
	0-12,000 lbs Compression
Absolute Accuracy	± 110 lbs.
	± 220 lbs. @ 175°C
MCE（Multi-Conductor Extreme Jar）	
Tool Diameter	3.375 in. (86 mm)
Make-up Length（Open）	13 ft.-1.7 in. (4 m)
Make-up Length（Closed）	12 ft.-6.7 in. (3.83 m)
Weight	260 lbs. (118 kg)
Maximum Tensile	210,000 lbs. (95,254.4 kg)
Minimum Setting	1,000 lbs. (453.6 kgf)
Maximum Setting	8,000 lbs. (3628.7 kgf)
Voltage Rating	1,000 V

Formation Coring Tool (FCT)
Formation Coring Tool-Large (FCT-L)

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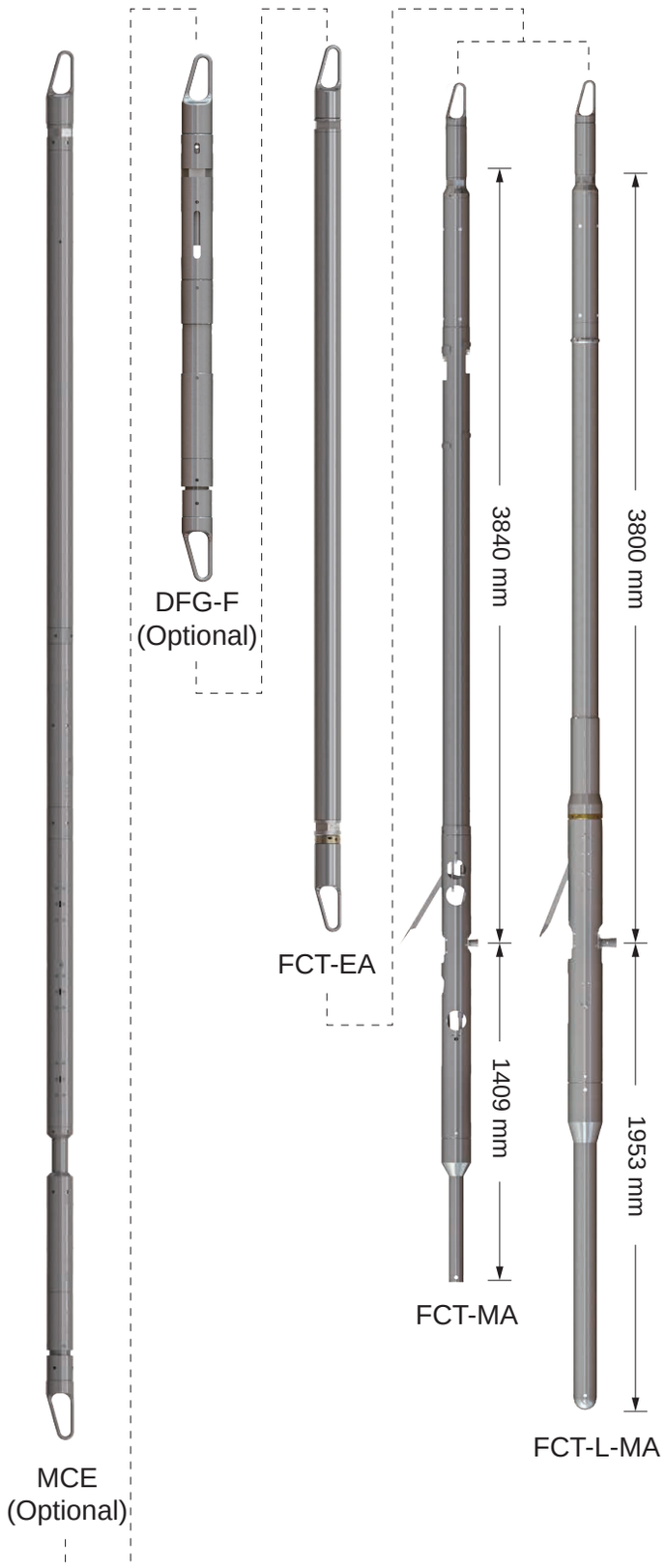
Tools:



Large Core & Horizontal Formation Coring Tool (LHFCT)

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Applications

- Coring of horizontal wells
- Lithology and Secondary porosity analysis
- Porosity and permeability determination
- Confirmation of hydrocarbon shows
- Determination of clay content
- Determination of grain density
- Detection of fracture occurrence

Introduction

Large Core & Horizontal Formation Coring Tool (LHFCT) is wireline sidewall coring tool for large size core in horizontal wells by Pipe Conveyed Logging Tools (PCL). The core is 1.5 inches in diameter and 2.5 inches in length. LHFCT gets 25 cores in one trip by standard configuration, also, gets 50 cores by extend cores cylinder.There are core separators between core samples. The core separator will help to confirm core sample depth. And each sample is isolated for positive identification.

Downhole Tool string

PCL-H	Pipe Conveyed Logging Tool-H
DFG-F	Downhole Force Gauge-FCT
FCT-EA	Formation Coring Tool-Electronics Assembly
FCT-L-MA	Formation Coring Tool-Large-Mandrel Assembly

Specifications

Maximum Temperature	275ºF (135ºC)/350ºF (175ºC)
Maximum Pressure	20000 psi (138 MPa)
Make-up Length	25.3 ft. (7.7 m)
Weight	507.1 lbs. (230 kg)
Tool Maximum Diameter	6.25 in. (158 mm)
Minimum Hole Diameter	7.25 in. (184.2 mm)
Maximum Hole Diameter	17 in (431.8 mm)
Core Diameter	1.5 in. (38.1 mm)
Maximum Core Length	2.5 in. (63.5 mm) Optional 2 in. (50.8 mm) *FCT-L-MA outside diameter is 5.24 in. (133 mm)
Vertical Resolution	0.2 m
Maximum Coring Number (once trip)	25 (Optional 50)
Surface Panels Power Supply	220 Vac/50-60 Hz
Electronics Power Supply	220 Vac/50-60 Hz
Motor Power Supply	3-phase, 600 Vac

Large Core & Horizontal Formation Coring Tool (LHFCT)

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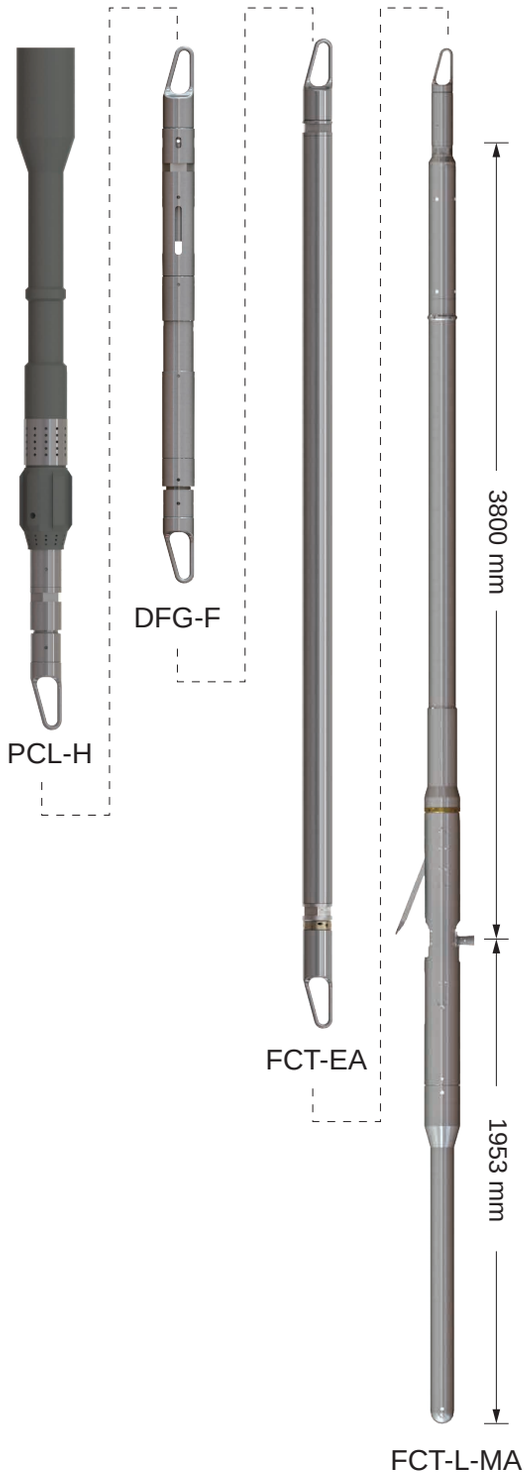
Tools:



Mechanical Sidewall Coring Tool (MSC)

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Applications

- Cuts and retrieves formation large volume sidewall core samples at known depths
- Stores the cores in the sequence in which they were collected
- Protects the cores to preserve evidence of formation characteristics where each core is collected
- Transports the cores to the surface

Advantages

- Core sample's Orientation data match Formation Micro Resistivity Imaging logging data
- Surface Nuclear Resonance Analysis (NRA) Data match Nuclear Magnetic Resonance Tool (NMR) downhole logging data

Features

- Core samples' Orientation Data recorded
- Core Separator between core samples. Different core separator quantity will help to confirm core sample depth.
- High Pressure and High Temperature well sidewall coring operation

Introduction

The MSC tool is designed to take core samples (up to 60 per run) from downhole formations and return them to the surface.

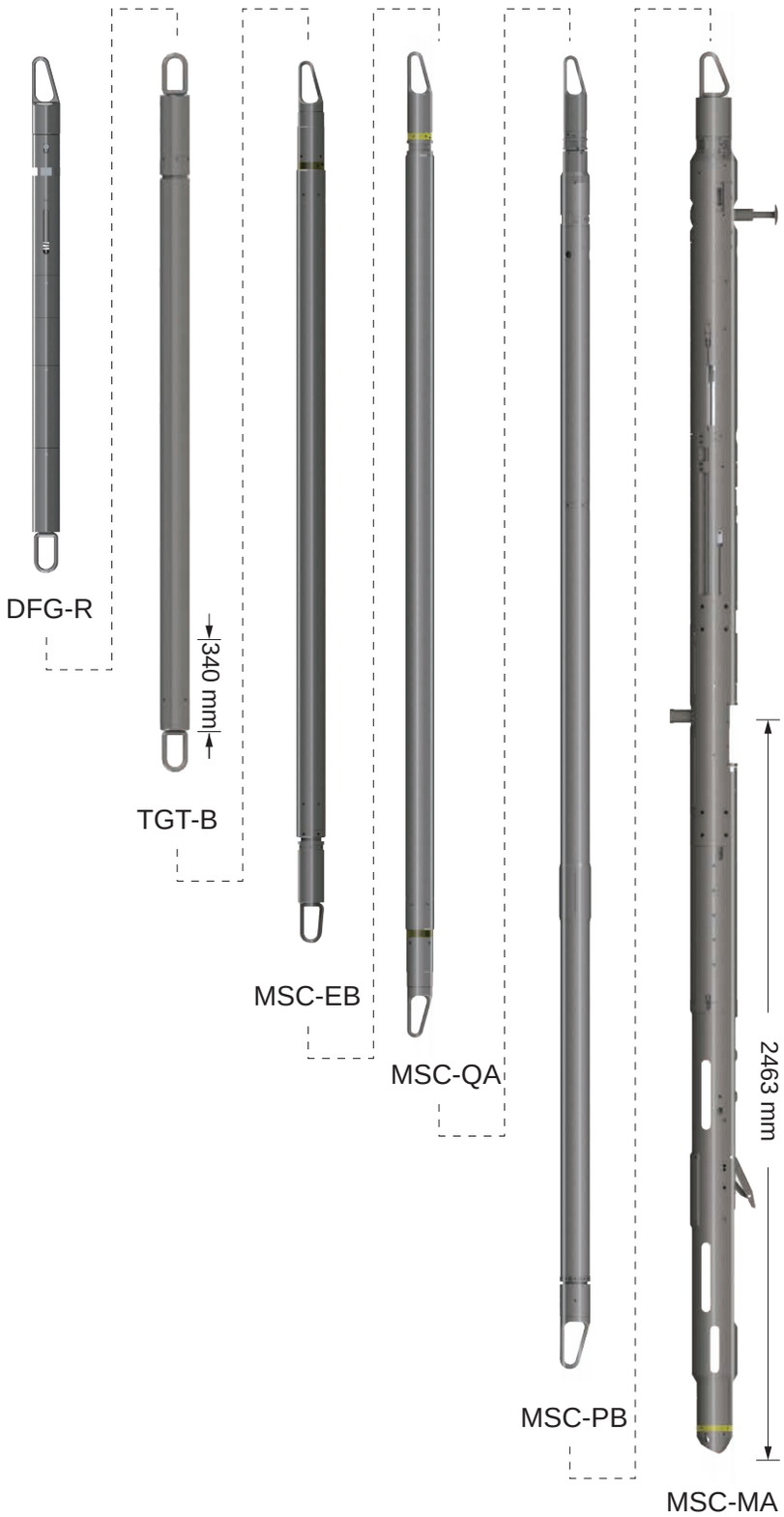
The tool can take out cores with diameter of 1.5 inches and a length of 2.5 inches. This mandrel uses a set of Electronics MSC-EB, MSC-QA and Hydraulic Sub MSC-PB.

There are gamma ray detector, orientation detector & fluid density sensor (Optional) which could provide Gamma Ray data, core sample orientation data and density data, these data could match with the other logging data in MSC. It is useful for client to confirm logging data accuracy.

Downhole Tool string

DFG-R	Downhole Force Gauge
TGT-B	Telemetry & Gamma Ray Tool
MSC-EB	Electronics Assembly
MSC-QA	Hydraulic Electronics
MSC-PB	Hydraulic Sub
MSC-MA	Mandrel Assembly

Tools:



Mechanical Sidewall Coring Tool (MSC)

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- High Pressure and High Temperature well sidewall coring operation

Specifications

Maximum Temperature	350°F (175°C)
Maximum Pressure	23,200 psi (160 MPa)
Hole Diameter:	
Minimum	7.5 in. (190.5 mm)
Maximum	14.00 in. (355.6 mm)
Operating Position in Borehole	Decentralized & secured against borehole wall
Instrument Diameter	6.25 in. (158.8 mm)
Instrument Diameter (Large Hole Kit)	9.82 in. (249.4 mm)
Make-up Length	64 ft.-3.4 in(19.59 m)
Instrument Weight	1685.5 lbs (764.54 kg)
Maximum Logging Speed	150 ft./min (45 m/min)(GR/SP)
Minimum Logging Speed	30 ft./min (9.14 m/min)(GR/SP)
Maximum Tripping Speed (POOH)	300 ft./min (100 m/min)
Sample Diameter	1.50 in. (38.1 mm)
Sample Length (Maximum)	2.5 in. (63.5 mm)
Repeatability	30+cores (30 separated) (60 w/options)
Zero Point	Core bit
H_2S Qualified	Yes
Power Requirement	
Tool Power	250 Vac, 50 Hz, 0.25 A nom
Auxiliary Motor Power	400 Vac, 50 Hz, 1.5 A nom
DC Motor	500 Vdc, 2 A, 4 A max
Line Utilization	
AC Tool Power	1 & 4
AC Motor Power	CT (2, 3, 5, 6) & 10
DC Motor Power	CT (1 & 4) & 10
Wireline Requirements	7-conductor
Relative Bearing	
Measurement Range	0°~359°
Accuracy	±1° (DEV 90°) ±1.5° (DEV10°) ±2° (DEV 3°-5°) ±5° (DEV 1°-2°)
Density measurement: (Optional)	
Measurement Range	0.0 g/cc to 1.6 g/cc
Accuracy/Repeatability	±0.03 g/cc
Resolution	0.01 g/cc
Viscosity Measurement: (Optional)	
Measurement Range	1.0 cS to 50 cS
Response time	2 seconds

NMR Rock Sample Analyzer (NRA)

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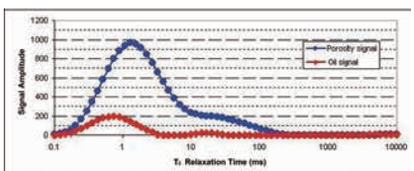
Applications

- No sample shape requirement
- Without sample broken
- Various results from one sample
- Fast report



Porosity(%)	19.27	Permeability (mD)	0.86
Oil Saturation(%)	13.83	Oil Saturation(%)	--
Irreducible Fluid	80.01	Movable Water	6.16
Movable Water	86.17	Initial irreducible Fluid	--
Initial Movable Water	--	Initial Water Saturation(%)	--
Initial Water Saturation(%)	2.53	Movable Fluid Saturation	6.42

Introduction

NMR technology have lots of excellences: detecting more parameters, advanced technology, no requirement on shape, getting many parameters in one sample and so on. The instrument shape could be smaller and the weight could be lighter by upgrade in digital way. So that, it is adapt to build up a mini-laboratory for geological service.

Specifications

System Frequency	2 MHz-5 MHz series, tunable
Magnetic Field Strength	1200 Gauss
Availability Sample Metering Zone	Diameter 1.5 in.
	Height 2.5 in.
Frequency Precision	0.01 Hz
Radio Frequency Emission Power	25 W
Radio Frequency Phase Variation Ability	4
Signal Receive-send Method	Digital perpendicularity
Max Echo Wave Number	8000
Least Echo Wave Time	150 ms
Probe Switching Time	No more than 0.5 s
System Control Method	USB port control
Operating System	Microsoft Windows XP
Weight	55 kg
Volume	240 mm x 400 mm x 210 mm x 3

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