Product Catalog 2019

COUGAR

DRILLING SOLUTIONS

RELIABLE. CAPABLE. CONSISTENT.

Drilling Jars and Jar Booster

DJ10 Dual Hydraulic Drilling Jar

- Cougar proprietary internal latch
  - Eliminates need for external jar clamp on surface
  - Prevents jar from misfiring downhole
- Ability to fire up and down hydraulically
- Lock loads can be tailored to fit specific applications
- Available in 4.75” to 9.50” OD

DJ6 Hydro Mechanic Drilling Jar

- Cougar proprietary internal latch
  - Eliminates the need for external jar clamp on surface
  - Prevents jar from misfiring downhole
- Hydraulic jar upward
- Mechanical jar downward
- Available in 3.50” to 9.50” OD

JB1 - Jar Booster

- Maximizes effective impact from your drilling jars
- Ensures jarring performance where minimal pipe stretch is available
- Creates effective jar impact in highly deviated wellbores

Shock Tools

ST5 Shock Tool - Standard

- Dual acting spring stack to compensate for high differential and high WOB applications
- Provides ample reductions in axial shock and vibrations
  - Protect the bit
  - Protect the BHA
- Optimal seal and wear material for maximum service life
- Available in 4.75” to 14” OD

ST5 Shock Tool - PDC

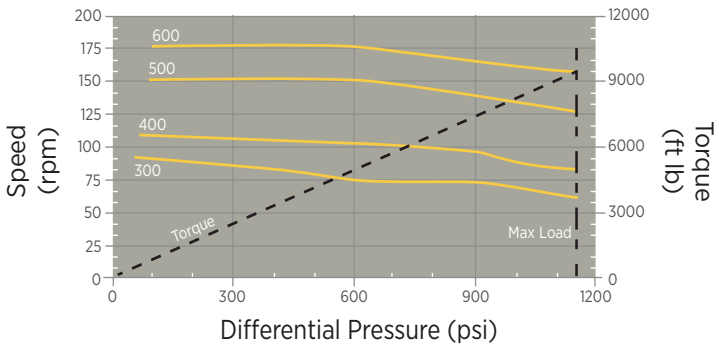
- Same Dual acting spring stack as the standard ST5
- Designed with a softer configuration to provide maximum benefits at lower WOB in PDC bit applications
- Available in 4.75” to 14” OD

Drilling Motors

- Heavily built, highly robust lower end for increased reliability
- Sealed bearing design, utilizing the highest-grade rotary seals available
- Designed for maximum flow capability, with large fluid bypass components
- CDS proprietary adjustable housing available
- Most power section speeds and types available upon request
- Available in 3.125” to 11.75” OD

6 3/4” (171 mm) 7-8 5.0 Stage HR		
Maximum Pump Rate	600 gpm	2,271 Lmp
Revolutions per unit volume	0.288 rev/gal	0.076 rew/L
Pressure at full load	1,130 psi	7,760 kPa
Torque at full load	10,460 ft-lb	14,190 Nm

Imperial Perfomance Curves



Stabilizers and Reamers

- Constructed with the highest-grade steel and carbide available
- Heat treated and stress relieved steel
- Designed for maximum flow by, allowing maximum circulation
- Plasma transfer arc used for contact faces
- Most sizes available – customer specified prior to build

- Stabilizers
  - Spiral blade
  - Straight blade
  - CDS Bit-Bull near bit stabilize

- Reamers
  - Roller reamers
  - Taper blade reamers
  - Near bit reamers

The Certified by Cougar program is the first industry certification of its kind. As well as controlling a facility, designing service procedures and proper shop layout, and controlling inventory for maximum serviceability at the lowest overhead.

- Increased control over your fleet
- Tools maintained to optimal standards
- Reduce unforeseen costs
- Simplify inventory control process
- Access to Cougar's Engineering and Operations specialists
- Maximize shop efficiency

Please contact Cougar for complete specifications and additional information

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COUGAR DRILLING SOLUTIONS

RELIABLE. CAPABLE. CONSISTENT.

COUGAR
DRILLING SOLUTIONS
طاقة
a TAQA company

The Mechanical Thruster

Reducing Shock and Vibration

Every Trip Counts

How the Mechanical Thruster Works

High shock and vibration can quickly drive up drilling costs, causing irreparable damage to bits and BHA components. These erratic motions and associated damages cause additional trips, raising well costs.

The Mechanical Thruster provides a consistent force to the bit by balancing hydraulics (pressure drop below tool) and mechanics (weight on bit). This balance provides smooth energy transfer to the bit —even in erratic situations. It reduces shock and vibration-induced damages to bottom-hole-assembly (BHA) components, decreasing section times and trips.

From an Engineer

> The main benefit – and the reason why we picked up the thruster – was due to some severe vibrations at around 4,500-5,000' on the first two runs. In that zone, thruster drilled much better, higher ROP, no vibrations and eliminated a trip – about 12 hours of savings and one bit rental.
>
> **– Drilling Engineer, Delaware Basin**

How We Optimize It for Your Well

We don't just sell tools – we partner with you to increase effectiveness. We analyze your BHA, well profile and drilling performance requirements and discuss your objectives with your drilling team. This ensures you get optimal performance from the Mechanical Thruster.

Case Studies

Midland Basin

Challenge and Solution

The main benefit – and the reason why we picked up the thruster – was due to some severe vibrations at around 4,500-5,000' on the first two runs. In that zone, thruster drilled much better, higher ROP, no vibrations and eliminated a trip – about 12 hours of savings and one bit rental.

Results

Over a five well offset comparison, shock and vibration was reduced, section times decreased and the operator saved an average of about $41,000 per well. The operator has continued to run the Thruster across their drilling program with repeated results.

Axial Reductions

80%

Axial Vibrations

60%

Axial Shock Count

Average Section Time Reductions

15%

Surface Section

8%

Intermediate Section

Average savings per well

$41K

Delaware Basin (Single BHA)

Challenge and Solution

A Delaware Basin operator needed to make multiple trips per lateral section due to damaged-beyond-repair (DBR) bits. The operator wanted to run more aggressive bits to increase ROP without the negative consequences of DBR bits resulting in more trips. We evaluated the BHAs, well profiles and drilling requirements, then optimized the MT3X-500's configuration and placement.

Results

The drilling engineer chose a bit that typically damages beyond repair quickly but provides higher ROP. They had back-to-back record runs on two rigs, with more than 10,000 feet drilled using a single BHA on each well.

Average Footage to TD with Single BHA

>10,000'

Average Reduction per Section Drilled

2.5 Bits

Average Net Savings per Well

$142.5K

Delaware Basin (Single Run)

Challenge and Solution

A major operator in the Delaware Basin experienced high shock and vibration, resulting in damaged bits and multiple trips per section. We evaluated the well and drilling requirements and optimized the placement and configuration of the MT6-800 to maximize its effectiveness in decreasing shock and vibration.

Average ROP

2.5 Bits

Single Run Footage

8,013'

The New Generation of Mechanical Thruster

MT3X

As wellbore geometry becomes more tortuous and lateral lengths grow, we've developed a new generation of Mechanical Thruster.

We qualified this new model with full-scale destructive testing. The MT3X includes 165 KSI steel and redesigned internal and service connections. The result – even more downhole reliability. This further reduces drilling risk as engineers continue to push the limits of the possible.

82%
Higher Yield Torque

3x
Fatigue Life

Specifications

Maximum temperature rating 204°C

		UP	DOWN					
	Size	Max Stroke Length (mm)		OAL (m)	OD (mm)	ID (mm)	Dry Weight (kg)	POA (cm^2)
MT3	500 - 127 mm	N/A	610	7.32	127	57.15	454	71.00
	650 - 165 mm	N/A	610	6.40	166	63.50	703	120.65
	800 - 203 mm	N/A	610	6.86	204	76.20	1,225	198.10
MT6	650 - 165 mm	204	204	6.04	166	63.50	726	108.40
	800 - 203 mm	305	305	6.86	204	76.20	1,361	198.10

Min/Max spring force for MT3 is directly inverse to total available stroke length. Max spring force for MT6 is standard, variable configurations can be built to suit if needed. Customer and well specific configurations are available.

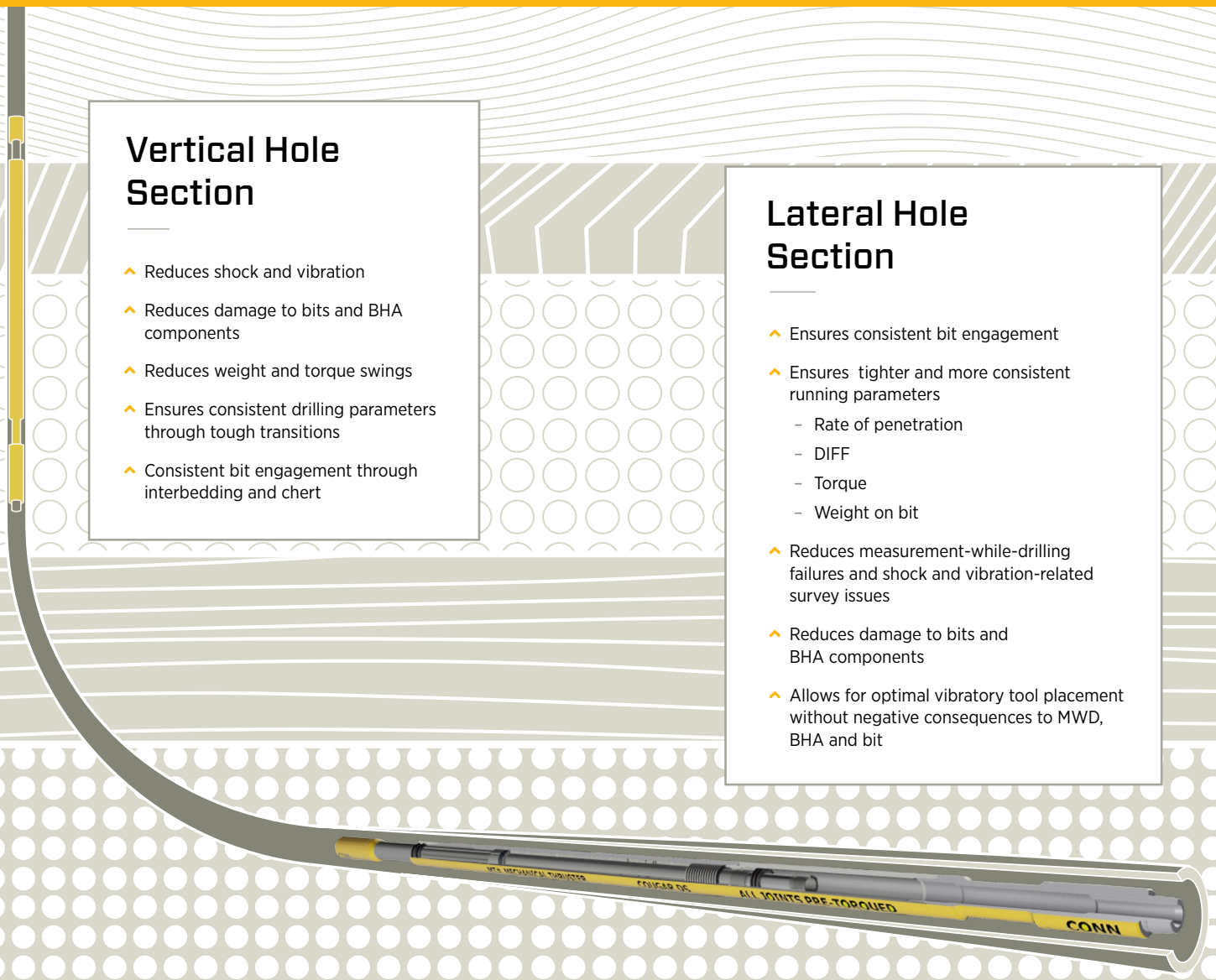
Benefits of the Mechanical Thruster in Lateral and Vertical Sections

Vertical Hole Section

- Reduces shock and vibration
- Reduces damage to bits and BHA components
- Reduces weight and torque swings
- Ensures consistent drilling parameters through tough transitions
- Consistent bit engagement through interbedding and chert

Lateral Hole Section

- Ensures consistent bit engagement
- Ensures tighter and more consistent running parameters
  - Rate of penetration
  - DIFF
  - Torque
  - Weight on bit
- Reduces measurement-while-drilling failures and shock and vibration-related survey issues
- Reduces damage to bits and BHA components
- Allows for optimal vibratory tool placement without negative consequences to MWD, BHA and bit



Consistent Parameters | Increased Reliability | Reduced Days on Well