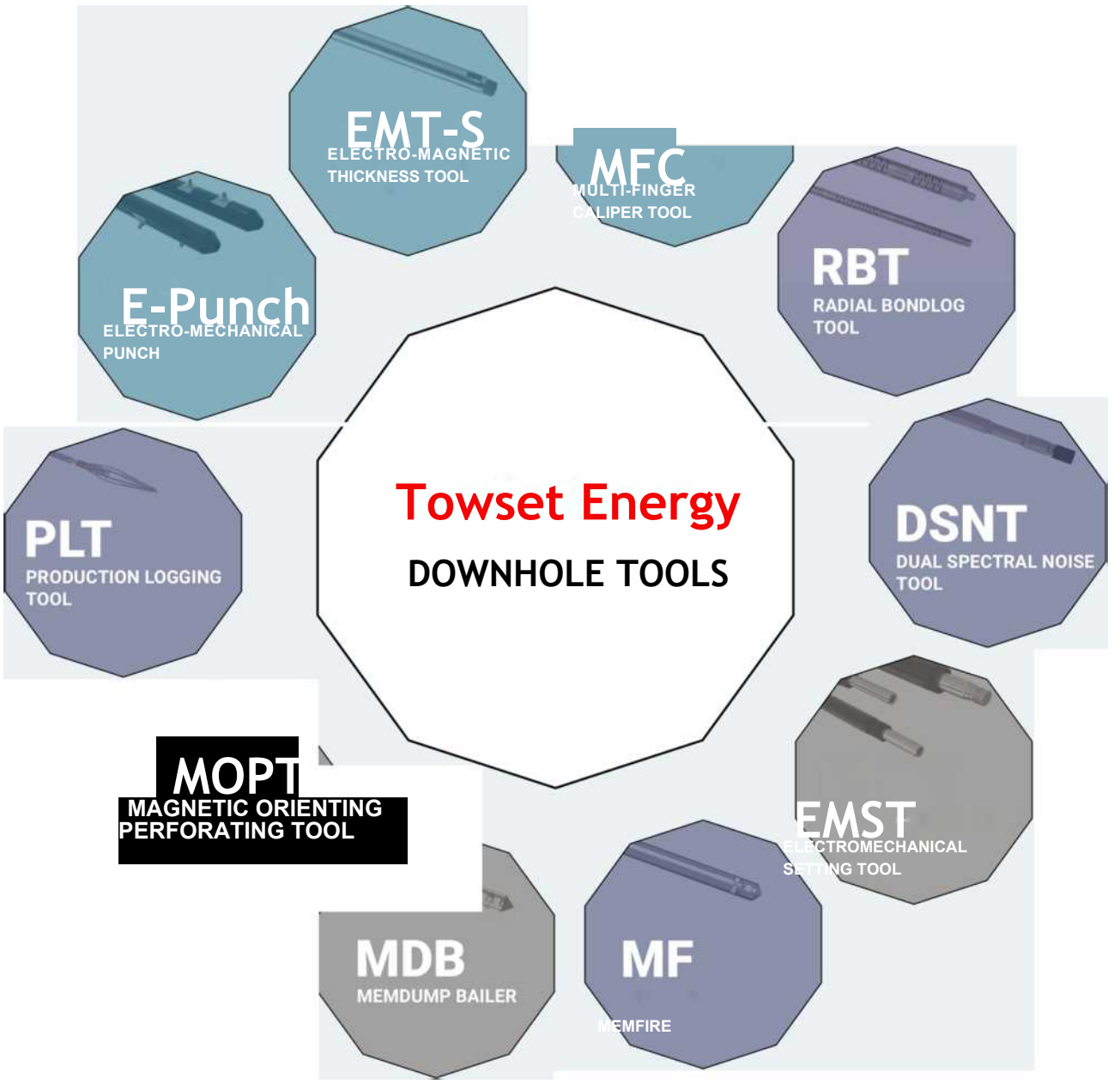
TOWSET ENERGY

Well Tools Catalogue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Towset Energy

TECHNICAL DATASHEET

ELECTRO-MAGNETIC THICKNESS TOOL (EMT-S)

ELECTRO-MAGNETIC THICKNESS TOOL (EMT-S)

The Electromagnetic Thickness Tool - Scanning (EMT-S) is designed to detect the damage of tubulars by calculating the remaining wall thickness and corrosion extent. By measuring the phase shift of an induced electromagnetic field, it can accurately indicate the column structure and location of other objects in concentric pipe. High resolution and fast sampling enable EMT-S to scan tubular geometry to provide positional location of nonconformities.

Applications

- Measure the remaining wall thickness of concentric casing in one run
- Determination of the type(s) of damage: pits, penetrations, cracks in transverse or longitudinal plane
- Determination of inner casing penetration
- Locating inner and outer collars in concentric casing
- Wellbore temperature logging

Features

- Compact Design
- Ability to adjust decay time window during logging to capture the response of outer casings.
- High resolution
- Through-tubing screening
- Stainless steel scanning
- Well completion monitoring: Corrosion progress and repeatability

ELECTRO-MAGNETIC THICKNESS TOOL (EMT-S)

Specifications	
Diameter	1-11/16” (43mm)
Maximum temperature	350°F (175°C)
Maximum Pressure	15,000psi (100MPa)
Length	78.74" (200mm)
Materials	H2S Tolerant
Logging Speed	20 ft/min (350m/hr)
Weight	201b (9kg)
Measurement Range	2 1/2”-12 3/4” (63- 324mm)
Measurement Accuracy	0.02" (0.5mm) Single Pipe 0.06” (1,5mm) Double Pipe
Minimum Axial Detectable Length	1.5” (40mm) Single Pipe 2” (50mm) Double Pipe
Minimum Tranversal Detectable Length	1/6 of the perimeter
Thickness Range (Maximum)	.5" (12mm) Single Pipe 1” (25mm) Double Pipe

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MULTI-FINGER CALIPER TOOL (MFC)

MULTI-FINGER CALIPER TOOL(MFC)

The Multi-Finger Caliper Tool has been designed to provide the most accurate Pipe ID caliper measurements in the industry. The high quality output data allows for 3-D imaging and calculation of corrosion, penetration, or scale deposition. The MFC tool can be combined with some other of our well integrity tools using a Wireline Telemetry Cartridge(SRO) or Downhole Memory Cartridge(Memory). All MFC tools have a built-in orientation sensor that allow for relative bearing and deviation data correction. Temperature correction is hardware based so no software drift files are needed. The mechanical design allows for easy finger replacement in the field.

Applications

- Tubular damage analysis
- Perforation mapping
- Quantification of scale build up and corrosion
- Accurate location mapping of holes and anomalies
- Large casing (up to 21”) inspection with extension kit

Towset Energy TECHNICAL DATA SHEET

MULTI-FINGER CALIPER TOOL (MFC)

Specifications

Diameter	1-11/16’’ (43mm)
Maximum temperature	350“F(175°C)
Maximum pressure	15,000psi (103MPa)
Length	57.48" (1460mm)
Fingers	24
Voltage	18VDC
Current	25mA
Motor Current	<300mA
Pipe Range	1-3/4” to 7”
Accuracy	±0.03"
Vertical Resolution	0.082"
Radial Resolution	0.003”
Finger Force	0.75lbs-1.25lbs(.34kg-.57kg)
Inclinometer	±4.5o

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DUAL SPECTRAL NOISE TOOL (DSNT)

The Dual Spectral Noise Tool (DNST) is used to detect the incoming noises in the wellbore generated at different spectral frequencies from different sources. By analyzing the frequency spectrum, the nature of fluids may be determined and leaks can be located. Dual receivers allow the tool to reduce the effect of road noise while logging and also provide redundancy for stop checks. Noise logging is applicable to oil/gas/water wells. It increases the success rate of locating leaks and channeling in tubulars. When combined with temperature and flow rate measurements, extensive quantitative interpretation can be performed. Real time monitoring combined with the ability to save the audio to digital file provides ability to meet greater compliance regulations.

Applications

- Location of production interval and productivity evaluation
- Fluid identification and flow rate evaluation
- Inspection of the channeling behind casing, leaks, backflows, sand production, and effect of packers

Features

- Record the value of the sensors in the device memory.
- Start recording at the specified time.

. Start recording after the specified time.

- Algorithmic recording with the creation of breaks.
- Algorithmic recording with creation of different settings for time intervals.
- Less environmental hazard.

Towset Energy TECHNICAL DATA SHEET

DUAL SPECTRAL NOISE TOOL(DSNT)

Specifications

Diameter	1-11/16'' (43mm)
Maximum Temperature	350°F (175°C)
Maximum Pressure	15,000psi (103Mpa)
Length	33.29" (846mm)
Materials	H_2S Tolerant
Logging Speed	15ft/min (300m/hr), station
Weight	30lb (13.7kg)
Operating Frequency	100Hz 12.7KHZ
Frequency Resolution	100Hz
Audio Output Format	Mp3 (Optional)

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ELECTRO-MECHANICAL SETTING TOOL (EMST)

The EMST is a unique electro-mechanical downhole setting tool, capable of delivering up to 90,000 lbs of linear force which can be used to set, or un-set, wellbore devices in a wide range of tubing and casing sizes.
EMST is suitable for use on any conveyance method including slickline, digital slickline, electric line, and coiled tubing.

Description

The EMST is governed by an electronic controller that outlines the operational parameters of the tool. Once an initiation command has been acknowledged by this controller then the EMST will activate. Electrical power is supplied from the alkaline battery pack and is routed to a small dc motor, which provides a high-speed, low torque input into a gearbox. The gearbox takes this high speed, low torque input and generates a low speed, high torque rotational output. This rotational output is coupled to a linear actuator mechanism, which converts the rotational movement to linear movement, and in turn, pulls the slick rod slowly upwards.

Applications

Installation of wellbore devices such as:

- Bridge-plug
- Packers
- Valves
- Cement retainers
- Downhole gauges

Features

- Less equipment and personnel required
- Less time required for transport and rigging
- Quick turnaround time
- Independently powered.
- Non-aggressive setting sequence (Good for older tubing/casing)
- Less environmental hazard

TECHNICAL DATA SHEET

Towset Energy **ELECTRO-MECHANICAL SETTING TOOL (EMST)**

Specifications

Outside Diameter	2.125”	3.6"
Maximum Operating Pressure	15,000 psi	15,000 psi
Maximum Operating Temperature	135“C [275°F] up to 6hrs, 225°C [437°F] up to 6hrs with external flask.	
Length	48”	48”
Stroke Length	10”	10”
Nominal Force [Maximum]	30klbs [40klbs]	60klbs [90klbs]
Setting Speed	0.57minute	0.57minute
Upper Connection	1-1/16"-10 UN S.R. (slickline)l -3/16”-12 UN GO (E-Line) 1-5/8’’- 6 Reg Acme Box (Perforating)	
Lower Connection.	Outer 2.000”- 10 Stub Acme Pin Inner 11/16"-16 UN Box Equivalent to Owen 2.125” MSST	Outer: 3.500”- 6 Reg Acme Pin Inner: 2.000”- 6 Reg Acme Pin Equivalent to Baker #20
Length	48”	48”

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ELECTRO-MECHANICAL PUNCH (E-Punch)

Electro Mechanical punch is a retrofittable hydraulic assembly that is used to quickly and safely punch communication holes in tubing and casing.

It utilizes a hydro-mechanical system to safely punch up to a maximum of 8 communication hole in a single deployment. It does not require jarring or explosive to operate, it will effectively penetrate through the tubing with a simple electronic command.

Features

- Modular design
- Electronic control
- Punch phasing ability
- Surface testable
- Non-explosive
- Built-in safety system
- Emergency disconnect
- Slickline/ E-line conveyance

Specifications	
Maximum temperature	275°F(135°C)
Minimum operating temperature	14°F(-10°C)
Maximum pressure	15,000 psi (1034 bars)
Max. internal hydrostatic pressure rating (when constrained)	30,000 psi (2068 bars)
Maximum tensile rating	E-Line PCM Housing: 25,000lb (11.34 Tonne) at GO Box thread. Slickline PCM Housing: 30,000lb (13.61 Tonne) at Sucker Rod thread.
Emergency shear ring disconnect value	20,000lbs
Minimum Hydrostatic pressure to be deployed within	200psi
Maximum Number of Punch Heads per operation	3 or 8, depending on the type of Punch Head being used
Compatible Tubing Weights	6.40lb.ft. to 23.0lb.ft.
Compatible Tubing Materials	Minimum yield strength of 80,000psi

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MEMDump Bailer (MDB)

The MEMDump Bailer is unique in its application for completing tasks previously accomplished with explosives. Our gravity feed bailer system provides the ability to dump cement, acid, molted plastics, etc. without the use of explosives.

Description

The MEMDump Bailer system is a microprocessor-based tool which combines three major assemblies, the Battery Section Electronic Control Section and Valve Section. The Valve Section is used to hold the material being ‘dumped’ in the bailer body. Once the time Window has opened, Temperature Threshold is reached and there is no Turbulent Motion, the valve will open allowing the material in the bailer body to dump out of the tool.

Numerous safety features are also incorporated in the MEMDump. These features include a Time Window, Temperature Thresholds, and Turbulent Motion circuitry coupled with several other fail-safe internal proprietary hardware mechanisms.

Features

- No explosive necessary
- High Temperature Rating
- More runs in a shorter time
- Ability to cross over to multiple sizes of bailer barrels
- Audible signal to indicate tool operation and status
- Three (3) Safeties

Specifications

Largest Diameter	2.00" (5.08 cm)
Length	60.8” (1.54 m)
Weight	18 lbs. (8.2Kg)
Maximum Pressure	15,000 psi (103,000 kPa)
Accuracy	Time ± .05%
Power	18.0v (5 'C' cell Lithium)
Operating Temperature	32°F to 320°F (0°C to 160°C) * *350°F Option available

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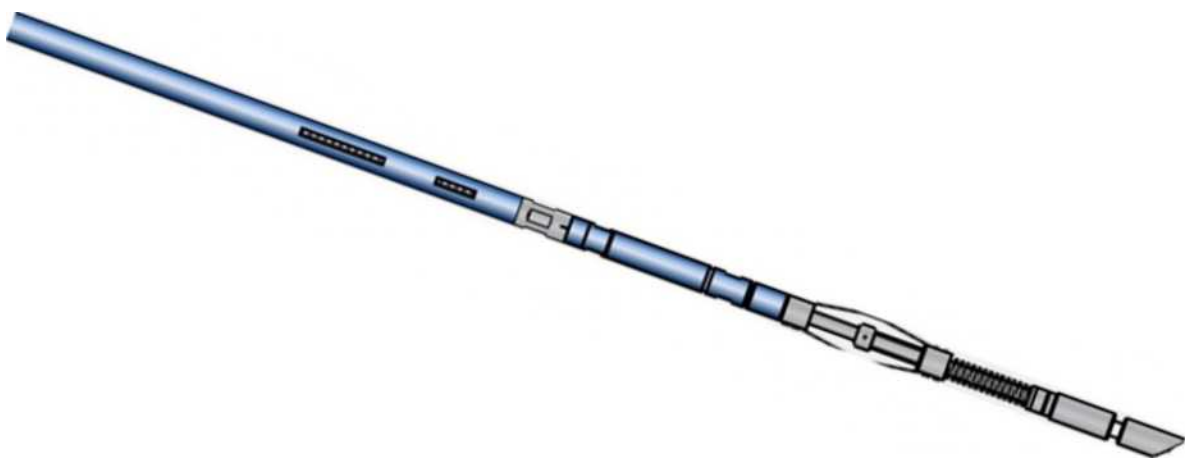
MAGNETIC ORIENTING PERFORATING TOOL (MOPT)



Magnetic Orienting Perforating Tool (MOPT) positions zero phased perforating guns to perforate a string of pipe without hitting the adjacent strings of pipe in the same well.

It is ideal for wells completed with multiple strings of tubing or for control line avoidance when perforating externally wired casing.

Applications

- Oriented perforation
- Oriented tubing punch

Features

- Compact design
- Operates directly from SDS Warrior Well Logging System
- Telemetry data - 40 samples per second measured parameters
- Borehole inclination and gravity high side of perforating gun orientation from the vertical up to 35°
- Metal mass measurements to detect collar or other magnetic anomalies in the pipe or casing

. Continuous cable head voltage and internal tool temperature updates

Specifications

Measurements:

Angular Metal Mass - Position Resolution	+/-5°
Vertical Resolution (in.)[cm]	12 [30.48]
Metal Mass - Collars & Casing Thickness Anomalies	Scaleable
Well Bore Inclination Accuracy- Vertical up to 35°	+/-2.5°
Gravity High Side - Vertical = 0°	+/-180° from Vertical
Gravity High Side Accuracy	*+1-2°*
Temperature Sensor Internal- Range (°F)[°C]	-25- 375 [-32- 190.5] +/-1°
Logging Speed (ft/min)[m/min}- Metal Mass	Recommended Max: 60 [18.29]
Logging Speed (ft/min)[m/min} - Angular Measurement	Stationary
Mud Type - Weight	Air, Gas or Liquids - No Limitations

Environmental:

Operating Temperature Range (°F)[°C]	-25-+365 [-32-+185]
Maximum - Heat/Cool Range “/Minute (°F)[°C]	5.4 [3]
Vibration (3 axis) Operational Sweep Frequency (50- 1000 Hz)	30 G RMS
Shock (Z- axis)	1000 G, .05 mS.
Shock (X- Y axis)	1000 G, .05 mS.

Mechanical:

Outside Diameter (in.)[cm]	1.750 [4.445]
Length (in.)[cm]	71.75 [182.25]
Weight (lbs)[kg]	24 [10.87]
Material	High Strength Nonmagnetic Stainless Steel
Pressure Rating (psi)[MPa]	18,000 [124.1]
Max Tension (lbf)[kN]	60,000 [267]
Top - Bottom Connection	1-3/16 in. GO Box - 1-3/16 in. GO Pin

Electrical:

Operating Voltage Range (VDC)	+45 to +150
Maximum Input Voltage (VDC)	+175
Operating Current (mA)	65
Transmitted Data	Telemetry
Transmitted Data Rate	40 Frames/Sec
Auxiliary Lower Tool Input	N/A
Cable Type	Single or Multi-Conductor

PRODUCTION LOGGING TOOL (PLT)

Production Logging Tools consist of a combination of different sensors and ancillary tools. The PLT tools can be combined with any tool in the GDT bus Suite using a Wireline Telemetry Cartridge(SRO) or Downhole Memory Cartridge(Memory). All tools can be combined in any order to facilitate well specific requirements.

Applications

- Monitor well efficiency
- Production Diagnostics
- Analyze production profile by zone
- Monitor well stimulations
- Well mechanical integrity analysis
- Time lapse logging
- Verification of well treatments
- Analyze injection profile by zone
- Detect Leaks

Features

- Fast Temperature Response
- High Resolution Pressure Sensor
- Long Battery Life (single "C" cell)
- 1 sec sampling rate
- USB / RS232 Data Retrieval . Large Memory Capacity
- Easy Setup and Programming
- Rugged and reliable
- Compatible with MS Windows 7/Vista/ XP/NT/2000

Towset Energy

TECHNICAL DATASHEET
PRODUCTION LOGGING TOOL (PLT)

Operating Specifications

Pressure Rating	15,000 psi
Housing Material	Inconel 718* (sour)
Master Controllers	Power Requirements
Memory	
• Voltage	12.0V-15.6V (4 cell pack)
• Current (max)	200mA
Surface Read Out	
• Voltage	125V-175V @ Cable head
• Current (max)	100mA
Communications	Rs232 / USB
Data Acquisition Memory PLT	
• Memory Size	128 Mb
• Sample Rate	1,2,5, or 10 samples/sec
• Logging Time	Standard PLT (8 sensors) at 1 sec sample for 135 hours
SRO PLT	
• Sample Rate	10 samples/sec

Temperature Range	-40°F to 350°F [-40°C to 177°C]

Dimensions	**1.0 OD**	**1.374 OD**	**1.688 OD**
Master Controllers			
• Memory/ Battery Housing	N/A	2.50ft	2.11ft 2.50ft
• SRO Controller (Telemetry)	2.11ft		2.11ft
Sensors			
• Casing Collar Locator	N/A	1.41ft	N/A
• Gamma Ray/ CCL	3.23ft	2.91ft	2.91ft
• Gamma Ray	N/A	2.20ft	N/A
• Pressure (Sapphire)	1,09ft	N/A	N/A
• Press/Temp (Sapphire)	N/A	1.00ft	1.07ft
• Press/Temp (Quartz)	N/A	1.50ft	N/A
• Temperature	1.11ft	N/A	N/A
• Capacitance	1,25ft	1.39ft	N/A
• Acoustic Density	N/A	1.39ft	N/A
• Continuous Flowmeter	N/A	1.32ft	N/A
• Full Bore Flowmeter	2.60ft	2.25ft	N/A
• In line Flowmeter	N/A	1.21ft	N/A
• X-Y Caliper	N/A	3.32ft	N/A
• Roller Centralizer	N/A	2.58ft	2.70ft

Performance Specifications

Acoustic Density	
Range	± 200 rps
Operating Diameter	1.81" minimum Caged Spinner
Resolution	0.1 rps
Accuracy	±2%
Threshold • In line • Caged • Full bole	8ft/min (oil flow) 4ft/min (oil flow) 2ft/min (oil flow)

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Range	-40°C to 177°C
Resolution	0.005°C
Accuracy	±0.5°C

Gamma Ray

Detector Type	Scintillation
Resolution	>1.1 counts/ API
Range	0- 10,000 API

Pressure

Range	Sapphire Quartz 15,000 psi	15,000 psi
Resolution	0.003% F.S.	0.00006%
Accuracy	±0.05% F.S.	±0.03% F.S.

Acoustic Density X-Y Caliper

Sensor	Vibrating Element Range	2.0 to 9.0 inches
Range	0-2g/cc Resolution 0.001 g/cc	±0.02 inches
Resolution	Accuracy	±0.1 inches
Accuracy	±0.03 g/cc **Accelerometer**	
	Range **Fluid Caoacitance**	±5g
Resolution	0io/₀ Resolution	0.01 g
WHI Accuracy	2% (range 0%-30%) Ac°Ura°y	±0.1 g
	5% (range 30% - **Pressure B** 60%) Range	**ulkhead** 15,000 psi

Casing Collar Locator Roller Centralizer

Detector Type	Electromagnetic	Range	1.4 to 8.2 inches

RADIAL BONDLOG TOOL (RBT)

The RBT is equipped with one transmitter and two receivers constructed out of piezoelectric crystals. The near receiver, located 3Ft from the transmitter, is constructed of an 8-sector radial sensor. The primary amplitude is constructed from radial signals at the near receiver while the Variable Density Log is constructed from the far receiver. The RBT can be deployed in deviated holes and combines easily with any of the Towset Energy well integrity tools. The tool is comprised of H2S resistant materials throughout. The RBT tool has a built-in orientation sensor that allows for relative bearing and deviation data.

Applications

- Provide quantitative analysis of cement bond in eight 45 degrees segments for identification of channels in cement
- Identification of intervals of uniform bonding and detection of cement quality in casing sizes from 4 $^{1}/_{2}$ to 10 % inches
- Quantitative analysis of cement bond to casing
- Qualitative analysis of cement bond to formation

RADIAL BONDLOG TOOL (RBT)

Specifications

Diameter	1 11/16" (43mm)	2 7/8” (73mm)
Maximum Pressure	15,000 psi (103Mpa)	15,000 psi (103Mpa)
Maximum Temperature	175°C (350°F)	
Length	114.3” (2902mm)	93.1” (2368mm)
Receivers	6 (60 Deg)	8 (45 Deg)
Voltage	18 VDC	18 VDC
Current	82 mA	50mA
Transmitter / Receiver Type	Piezoelectric	
Casing Range	1 %” - 7” (45-177.8mm)	4 ½ - 10 ¾” (114-273mm)
Logging Speed	35ft/min (11m/min)	35ft/min (11m/min)

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PARAGON II RETRIEVABLE PACKER (PIIP)

The Paragon II Retrievable Dual Seal Bore (RDSB) Tubing Packer is specifically designed to be installed inside of an oil or gas well's production tubing. Its high utility design makes it suitable for a wide variety of thru tubing packer applications. This specialized packer is designed to drift through commonly used tubing features, such as safety valves and Landing Nipples and set anywhere in the production tubing or production liner in mono bore configured wells, it utilizes a specialized (RDSB) design that incorporates caged slips located below a multi-durometer sealing stack for enhanced retrievability. It is normally conveyed into the well using wireline, coil tubing, or jointed pipe. It can be retrieved by applying upward strain or jarring action using slick or braided wireline, coil tubing or jointed pipe. This version is currently rated API 11 Dl V5 or V5, 5000 psi at 300 degrees Fahrenheit. It is currently offered for tubing sizes from 2 3/8"- 5 !4.

Applications

- Thru-tubing gas lift system installations
- Velocity string installations
- Straddle packs (tubing patch)
- Gravel Pack Packer, Gauge, Choke or Shut-in Valve hang-offs
- Thru-tubing cement retainer
- Retrievable Bridge Plug

Features

- Complies with API 11D1 specifications
- One-trip installation, one-trip retrieve Tubing Packer
- Straight pull to release, no downward manipulation required, (slickline retrievable)
- Packer element tested to API V5,V3,V0 testing validation
- Capable of setting in corrosion resistant alloys and high tensile tubulars such as:
  13Cr, Hyper chrome, Inconel, and Q-125,S-135
- Modular Gage Rings allow for optimizing seal gap
- Large ID/OD ratio for larger flow area
- Dual Bore design allows for full unrestricted ID on sealing accessories
- Bi-directional caged slips located below the packing system provides increased retrievability
- Release mechanism is not affected by hanging weight or differential pressures allowing reduction of the required release forces to aid wireline retrieving
- Once Packer is released, the tool is locked in the release position allowing the ability to work up and down once released and not reengage slips.

Ultra-High Expansion (UHX) Sealing Solutions

With industry-leading expansion and high-pressure, in-flow deployment capability, our UHX solutions help to solve a range of complex plugging, sealing and isolation challenges in a variety of wells.

For wells with narrow restrictions or with small diameter completion tubing, this technology provides the ideal expansion ratio and strength to deliver a reliable seal in lower sections of the well, that may be up to three times wider in diameter.

These outstanding solutions are suited to completion, production optimization and abandonment applications in oil and gas wells and enable the repurposing of wells for carbon capture and gas storage by enabling the plugging of the lower completion.
Flexibility in the design of the packers, pack offs and plugs makes the range suitable for a variety of well configurations and tubing/casing/liner sizes.

They can be run on either slickline or electric line and set using powered setting tools, or run on coiled tubing and set using flow activated running tools.

Applications

- Zonal Isolation
- Permanent Hanger
- Plug and Abandonment
- Carbon Capture, Utilization and Storage (CCUS)

Features

- Ultra high expansion ratios.
- Industry leading pressure rating + expansion ratio
- Expandable Inconel metal mandrel/element with NBR/HNBR, Viton or FFKM packing element.
- Flexible deployment options with standard setting tools.
- M-Bubble element is highly resilient to pressure cycling.