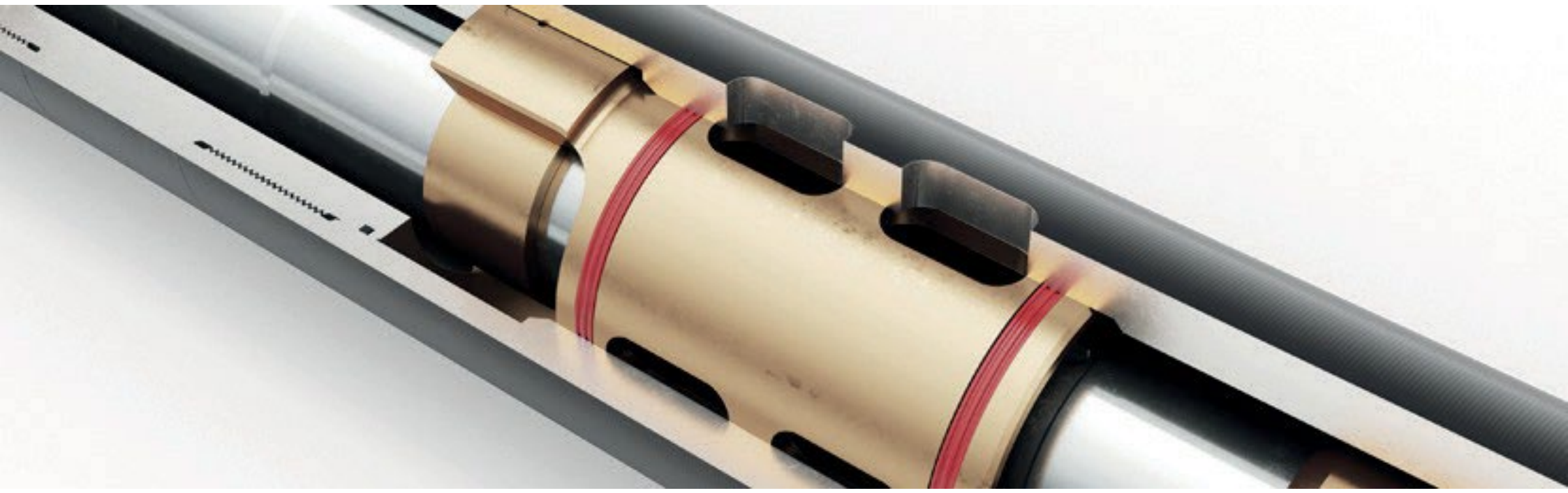
X-treme HAMMER

Universal stuck-object extraction system



X-treme HAMMER is the world's most powerful, most controllable and most versatile stuck-object extraction system. It is simple, rapid and robust and is operated and controlled instantly using only conventional rig systems.

It is the superior alternative to jars in the BHA for preventing and remedying stuck-pipe incidents, and is the ideal solution for fishing interventions and planned P&A operations.

X-treme HAMMER is powered by the HydroVolve INFINITY engine to generate and deliver intense vibration and rapid impact force to liberate stuck objects. It utilises the PolyVolve swivel to allow immense overpulls to be applied to stuck objects at the same time as delivering intense, high energy vibro-impact extraction forces. This combination is designed to deliver swift stuck object extraction thereby minimising downtime and increasing operational success.

X-treme HAMMER is recommended as a superior direct substitution for drilling jars in any Bottom Hole Assembly (BHA), and is especially suited to tophole applications, complex intermediate sections and complex 3D and/or extended reach drilling (ERD) applications. It is also designed to deliver the bond-breaking forces required to extract casing in P&A applications, where sticking due to cement or solid settlement is likely, and when used in fishing operations, it provides the ultimate control, flexibility and raw power required to ensure the highest chance of success.

Operator Benefits

- **Unimaginable extraction power on hand for planned and unplanned operations**
- **Full instantaneous, simple control of HAMMER force and speed from surface**
- **Instant and rapid activation where speed is the key to success**
- **Rapid intense action delivers friction reducing vibration and bond breaking axial impact**
- **Highest chance of recovery in stuck-pipe incidents when run in the BHA**
- **Superior alternative to drilling and fishing jars**
- **No surface recoil: ideal for shallow drilling, P&A and fishing operations**

Operating guide to use

X-treme HAMMER is a simple and robust system which requires only conventional rig systems to operate and control its function.

Hammer features three modes of operation.

1) ‘Hibernate’ mode

The HAMMER is locked in a hibernating MID-STROKE position allowing force and torque transmission through the tool.

2) ‘HAMMER-Active’ mode

The HAMMER is unlocked into the UP-STROKE position allowing overpull, rotation and impacting through the tool.

3) ‘Down-jar’ Mode

The HAMMER is unlocked into the DOWN-STROKE position following application of a sufficiently large triggering force to deliver a downward jarring impact.

Operation of the HAMMER is very simple:

1. Pull up to activate the HAMMER to disengage the drive splines and engage the PolyVolve swivel bearing.
2. Initiate drill pipe rotation at desired speed.
3. Pick up hook-load on the stuck object to the desired overpull.
4. Initiate flowrate to the desired rate/pressure to deliver the desired impact and vibration action.
5. Vary the rotational speed, overpull and pump rate and pressure to achieve the optimal extraction force and vibration regime for the application.

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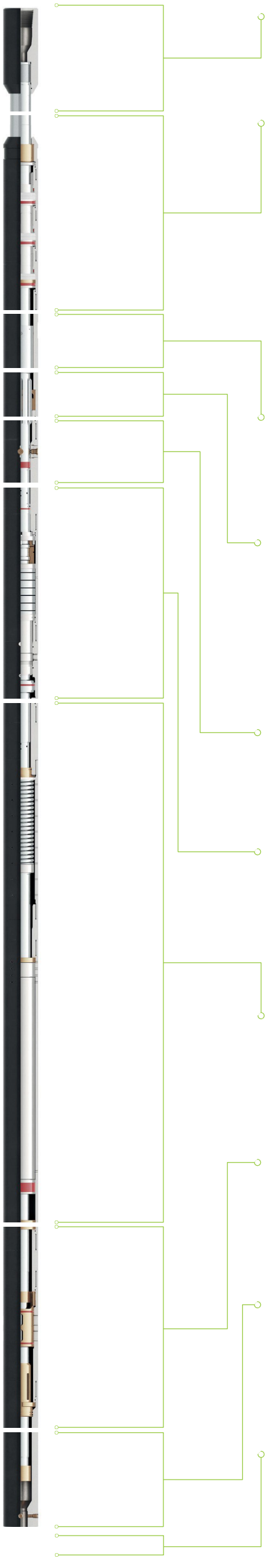
Technical features



Premium Connection Sub
X-treme HAMMER can be dressed with any standard or premium threaded connection, removing the need for cross-overs.

PolyVolve Swivel Module
The POLYVOLVE swivel allows high pulling forces to be applied to the stuck-object via the HAMMER device whilst allowing the rotation required to operate the INFIFNTY engine to deliver the HAMMER impact.

POLYVOLVE is a modular, stackable, polymeric thrust bearing swivel capable of withstanding ultra-high thrust forces whilst rotating for extended periods in extremely hostile conditions.

POLYVOLVE delivers a proven and unrivalled thrust load bearing capability, is impervious to wellbore fluids and debris and can operate comfortably at high temperatures.

Jar Head
X-treme HAMMER features a conventional linear jarring mechanism which allows both upward and downward jarring to be delivered through the ‘Jar Head’, providing operators with an extra level of comfort and confidence.

Drive Spline
A precision high-torque drive spline provides the torsional drive force required for both drilling operations and fishing tool manipulation.

The drive spline is disengaged in the Active mode for HAMMER operations but self-aligns into reengagement when the HAMMER is returned to Hibernate mode. The drive spline remains engaged in the down-jar mode.

Pressure Relief Module
A pressure relief module is fitted to the HAMMER to prevent over-pressuring of the HAMMER during operation thus preventing potentially excessive HAMMER forces from being delivered through the X-treme HAMMER to the stuck object.

Mechanical Mode Selector Module
The mechanical mode selector module allows the operator to switch between the three modes: Hibernate, HAMMER-Active and Down-Jar.

This is a mechanical trigger device with the UP-STROKE and DOWN-STROKE trigger values being preset prior to deployment.

HAMMER Module
The HAMMER module houses the HAMMER mass, the anvil and the return spring.

The Hammer is powered into striking contact with the anvil using the INFINITY engine. The HAMMER is returned to its starting position by the spring.

HydroVolve INFINITY Module
The HydroVolve INFINITY module is the power source used to propel the HAMMER mass to generate the vibro-impact. HydroVolve INFINITY uses the drill pipe rotation to open and close the inlet and exhaust valves to allow pressurised fluid within the drill string to propel the HAMMER mass.

Flow Management Module
A flow management module is fitted to the lower portion of the HAMMER. This allows the correct pressure and flow regime to be diverted into the INFINITY depending upon the application. This can either be an arrangement of flow chokes or may optionally include the EvoFLO ball-valve module.

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Technical specification

Tool Size	4.75”	4.75"	6.5"	8.25"	8.25"
Assembly Number	**HVHA-04750-002**	**HVHA-04750-001**	**HVHA-04750-001**	**HVHA-08250-001**	**HVHA-08000-004**
Applications	Fishing, Drilling	Fishing	Fishing, Drilling	Fishing, Drilling	Fishing
Outside diameter, in [mm]	4.75 [120.7]	4.75 [120.7]	6.500 [165.1]	8.25 [209.6]	8.25 [209.6]
Inside diameter (EvoFlo open), in [mm]	1.56 [39.7]	2.06 [52.4]	2.378 [60.4]	2.81 [71.4]	3.00 [76.2]
Length, ft [m]	36.4 [11.10]	36.4 [11.10]	38.3 [11.67]	41.0 [12.50]	41.9 [12.78]
Weight, lbs [kg]	1,676 [760]	1,531 [695]	3,132 [1,420]	5,512 [2,500]	5,509 [2,499]
Nominal weight, lb/ft [kg/m]	46.0 [68.5]	42.1 [62.6]	81.8 [121.7]	134.4 [200.1]	131.4 [195.6]
Pump-open area, in^2 [cm^2]	7.79 [50.3]	6.85 [44.2]	16.67 [107.5]	27.39 [176.7]	18.27 [117.9]
Top connection	NC38 Box	NC38 Box	NC50 Box	6-5/8 REG Box	6-5/8 REG Box
Bottom connection	NC38 Pin	NC38 Pin	NC50 Pin	6-5/8 REG Pin	6-5/8 REG Pin
Torsional yield, ft-lb [Nm]	17,500 [23 700]	17,500 [23 700]	44,000 [59 600]	85,000 [115 200]	56,900 [77 100]
Tensile yield, lbf [t]	440,000 [200]	445,000 [202]	900,000 [408]	1,200,000 [544]	1,200,000 [544]
Overpull limit when impacting, lbf [t]	194,000 [88]	195,000 [89]	300,000 [136]	500,000 [227]	500,000 [227]
Metallurgy	CrMo Low Alloy				
Temperature, °F [°C]	40 - 400 [4 - 204]				
Bore to annulus flow per revolution, US Gal [L]	0.34 [1.3]	0.34 [1.3]	1.04 [3.9]	2.39 [9.0]	2.39 [9.0]
RPM range when impacting, RPM	0 – 125				
Maximum differential pressure when impacting, psi [bar]	1,500 [103.4]				
Impact frequency, Hz	0 – 8.3				
Impacts per string revolution	4				
Maximum string rotations when impacting	50,000				
Maximum number of impacts	200,000				
Maximum circulating hours	150				

Technical advantages

- **Intense axial impact and vibration = rapid bond-breaking and early release**
- **Reduced static friction = better weight transfer to the stuck point.**
- **Rotation and circulation = better wellbore condition**
- **No setting down to re-cock = continuous upward operation**
- **No accelerator or associated HWDP = no large swab or surge effect**
- **Versatile operation = ideal for both HWU and rig operations**
- **No recoil = kind to surface equipment.**
- **Shorter & lighter BHAs = reduced risk of stuck pipe incidents**
- **Improved drilling hydraulics = reduced swab and surge & lower ECD**

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