Internal High Pressure Water Abrasive Suspension Cutter

This spread was specifically developed to support **decommissioning operations**, utilizing the Water Abrasive Suspension (WAS) method for internal cutting of subsea piles or pipes. The process works by mixing abrasive garnet with high-pressure water inside the Abrasive Mixing Unit (AMU). The resulting abrasive-laden suspension is then delivered via high-pressure hose to the cutting nozzle mounted on the appropriate cutting device. Powered by a High Pressure Pump (HPP), the system creates a high-velocity water stream that harnesses the kinetic energy of suspended abrasive particles to perform precise internal cuts.

This cold-cutting technique effectively erodes the target material in a narrow, controlled area—much like a fluid grinding wheel—without generating heat or sparking, making it especially safe for use in hazardous or explosive environments. OCS currently operates **three types of cutting devices** tailored for different pile diameters:

- **Downhole Cutting Head 1 (DCH1):** Suitable for up to 20” OD piles/pipes.
- **Downhole Cutting Head 3 MK3 (DCH3 MK3)**: Suitable for 30" to 72" OD piles/pipes.
- **Pile Cutting Head MK2 (PCH MK2)**: Suitable for 16" to 36" OD piles/pipes.

Each cutting tool is integrated with essential sensors that transmit real-time cutting parameters to a **control unit**, which works in tandem with the **3S Cut Verification System**. This setup allows operators to **remotely monitor and control** the cutting process with high precision, enhancing operational safety and efficiency.

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Downhole Cutting Head 1 (DCH1)

The DCH-1 is a compact and highly efficient internal cutting tool engineered specifically for cutting piles and multistring casings up to 20 inches in outer diameter. What sets the DCH-1 apart is its ability to operate in tight internal spaces, requiring a minimum inner diameter of just 5.8 inches—a unique capability that makes it ideal for cutting thinner piles and conductor casings where conventional cutting tools cannot be deployed effectively.

Designed for ease of deployment and precise performance, the DCH-1 integrates seamlessly into OCS's broader abrasive cutting spread. Its lightweight profile and adaptability allow it to be mobilised quickly, making it especially suitable for confined or shallow access locations where space and handling constraints are a concern. The DCH-1 is frequently selected for decommissioning scopes that demand surgical precision and minimal disruption to surrounding infrastructure.

Downhole Cutting Head 3 MK3 (DCH3 MK3)	
Application Area :	Piles and Multistring casings up to 508mm (20") max. solid wall thickness
Outer Diameter of Inner Pipe :	7"
Rotation speed :	39.5° – 395°/hr
Minimum Inner Pipe Diameter :	147 mm (5.8")
Working dimeter of Nozzle :	103mm (4.1")
Maximum pressure for WAS (Water Abrasive Suspension) :	2,500 bar
Cutting nozzle	UW Ø 1 mm
Drive	Hydraulic
Allowable temperature for operation and storage	0 ~ 50 ℃
Overall Length	Approx. 3,350 mm
Gross Weight	Approx. 100 Kg

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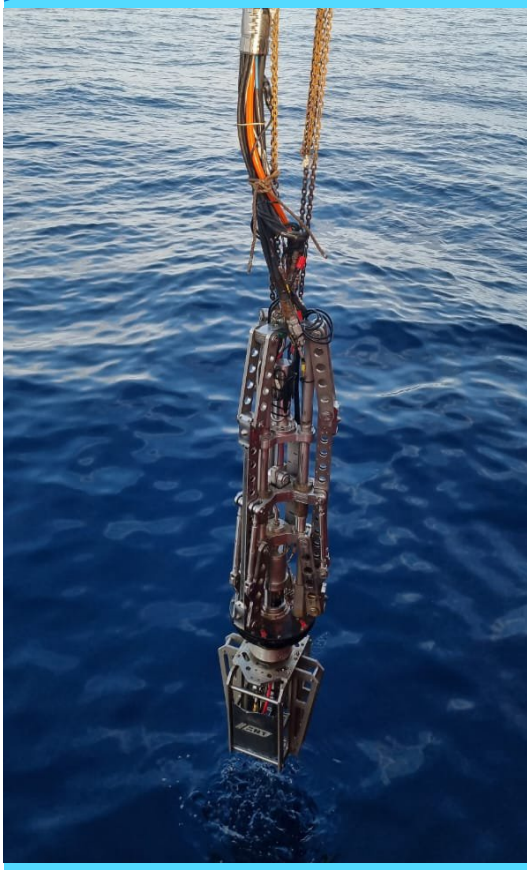

Downhole Cutting Head 3 MK3 (DCH3 MK3)

DCH3 MK3 was developed and built for the application as cutting unit of WAS jet cutting equipment. The application area is limited to underwater pipes and piles in vertical position, where the DCH3 is clamped in the inside. Then start the mechanism with cutting head, which includes the nozzle, rotates and fulfills the radial cut. The clamping mechanism and the movements of the cutting nozzle are hydraulically driven. The DCH3 MK3 must be controlled from safe distance. Integrated sensors enable the cut evaluation from the screen in Control unit.

Downhole Cutting Head 3 MK3 (DCH3 MK3)			
Range of pipe/casing for cutting :	30 to 50 in and 50 to 72 in (OD) based on configuration		
Maximum water depth to operate :	150 m		
Rotation speed :	90.5° – 905°/hr with DCH3 Standard Drive train (i=2560)		
Maximum cutting depth or wall thickness of pipe/casing :	102mm (4 in)		
Maximum pressure for WAS (Water Abrasive Suspension) :	2,500 bar		
Air supply :	Maximum pressured at 35 bar and maximum flow rate 30 m^3/min, oil free		
Drive :	Hydraulic driven with function on Stepless clamping, endless rotation of the cutting head unit, stepless extension of the nozzle holder		
Cutting nozzle :	UW Ø 1 mm		
Material	Structural and body part made of stainless steel and aluminium, c/w skid for storage and transportation purpose		
Allowable temperature for operation and storage :	0 ~ 50 °C		
Dimensions (DCH3 only) :	Configuration	Diameter (mm)	Approx. Length (mm)
	30” – 50”	654	2865
	50” – 72”	1104	2949
Dimensions (DCH3 with skid) :	3300 (L) x 1500 (B) x 1500 (H) mm		
Gross Weight (DCH3 only) :	Configuration	Approx. Weight (kg)	
	30” – 50”	690	
	50” – 72”	820	
Gross Weight (with skid) :	1,100 kg		

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Pile Cutting Head MK2 (PCH MK2)

PCH MK2 was developed to cut underwater pipe/piles in a vertical position underwater, PCH MK2 must be lowered into a pipe/pile and clamped to hold the position. Same mechanism with DCH3 MK3 for cutting operation with nozzle. The PCH MK2 will be operated from a safe distance controlled via the Operating System from Control Unit. Integrated sensors enable the cut evaluation from the screen in Control unit.

Pile Cutting Head MK2 (PCH MK2)	
Range of pipe/casing for cutting :	16 to 36 in (OD)
Maximum water depth to operate :	150 m
Rotation speed :	395° – 3,950°/hr with Standard Drive train (at hydraulic oil flow rate 0.6 – 6 L/min)
Maximum cutting depth or wall thickness of pipe/casing :	102mm (4 in)
Maximum pressure for WAS (Water Abrasive Suspension) :	2,500 bar
Air supply :	Maximum pressured air supply at 35 bar and maximum flow rate 13 cu.m/min, oil free
Drive :	Hydraulic driven with function on Stepless clamping, endless rotation of the cutting head unit, stepless extension of the nozzle holder
Cutting nozzle :	UW Ø 1 mm
Material :	Structural and body part made of stainless steel, c/w skid for storage and transportation purpose
Allowable temperature for operation and storage :	0 ~ 45 °C
Dimensions (PCH only) :	Total diameter Ø336 mm, Overall length approx. 3,000 mm
Dimensions (PCH with skid) :	3500 (L) x 700 (B) x 960 (H) mm
Gross Weight (PCH only) :	490 kg
Gross Weight (PCH with skid) :	672 kg

Internal High Pressure Water Abrasive Suspension Cutter

Control Container (For Control Unit and HPU)

Control Container (For Control Unit and HPU)	
General Description :	10ft DNV 2.7-1 Offshore CSC Container c/w slings and shackles, Air Conditioning Unit
Operation System :	"3S Cut Verification System" PLC with touch panel HMI, which provide real-time data for monitoring and controlling cutting operation performed by a DCH or PCH. Main feature included Cutting result, Cutting quality, Cutting Parameter, Sensor amplitudes and Rotational ganging. The sensor reading can be recorded to a file for reference use.
Hydraulic Power Unit (HPU) :	HPU HS202003028 Viereck & Co. c/w skid and shock absorber at legs for DCH3 MK3 and PCH MK2 operation, including pressure gauge panel for monitoring
Dimensions :	2991 (L) x 2438 (B) x 2591 (H) mm
Gross Weight :	3,700 kg

Spooler with Umbilical Reel

Control Container (For Control Unit and HPU)	
Umbilical Length :	115 m
Spooler with Umbilical Reel Gross Weight :	10,000 kg
Spooler with Umbilical Reel Dimension :	4,873 (L) x 3,100 (B) x 3,480 (H) mm
Drive :	Hydraulic
HPU Gross Weight :	3,500 kg
HPU Dimension :	2,520 (L) x 1,200 (B) x 2,040 (H) mm

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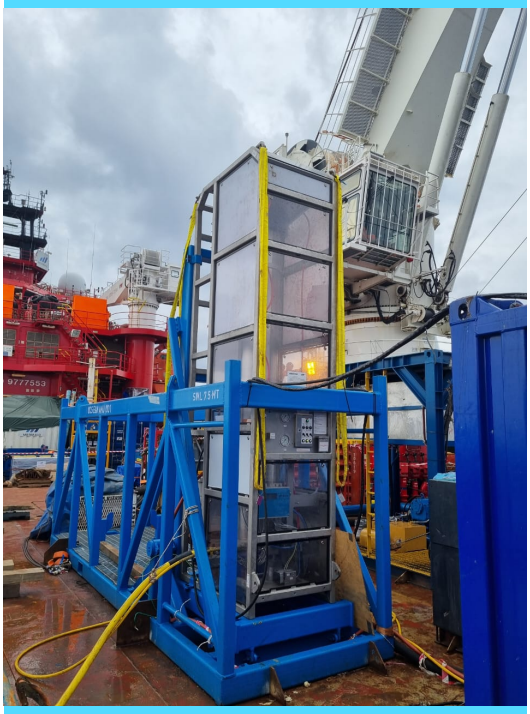

Abrasive Mixing Unit (AMU) 2500-100 MK2

AMU function for admix an adjustable amount of abrasive suspended in water from a high pressure reservoir to a high pressure water jet. Then abrasive suspension is pumped to the cutting device along a high pressure hose.

Abrasive Mixing Unit (AMU) 2500-100 MK2	
Skid Frame :	AMU mounted in steel frame with upending function to switch between vertical or horizontal orientation during operation or transportation purpose respectively
Abrasive type :	HPX 80, with concentration 10% by mass
Mixing Hopper :	Capacity Volume at 100L (26 Us gal), maximum of 200 kg of abrasive garnet, Including Vibrator and sieve with 4mm mesh size for abrasive filtering. The abrasive discharge rate can be adjusted between 0 and 5 kg/min.
Range of cutting nozzle :	Between 0.6 mm and 1.0 mm
Maximum working pressure :	2400 bar (34,800psi)
Pressure Valves Operation :	Pneumatic
Operator panel :	At both Filling side and cutting side for pump, valves, etc. controlling
Dimensions :	AMU only (Vertical) 1495 (L) x 1075 (B) x 4150 (H) mm
	AMU (horizontal) with Upending frame 6058 (L) x 1860 (B) x 2454 (H) mm
Gross Weight :	4,200 kg for AMU in empty condition
	7,820 kg for AMU with Upending frame
Connection	
HP Water inlet :	M26 x 1.5, 9/16“-18 UNF LH
HP Suspension outlet :	M36 x 2 / M20 x 1.5 LH
Pneumatic supply :	DN8, minimum pressure 8 bar (116 PSI), Minimum flow rate 300 L/min (11 CFM)
Fresh water supply :	1/2“, minimum pressure 6 bar, 87 PSI, Minimum flow rate 50 L/min (13 US gal/min)

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