



Water Abrasive Suspension (WAS) Cutting Spread

Agenda

01

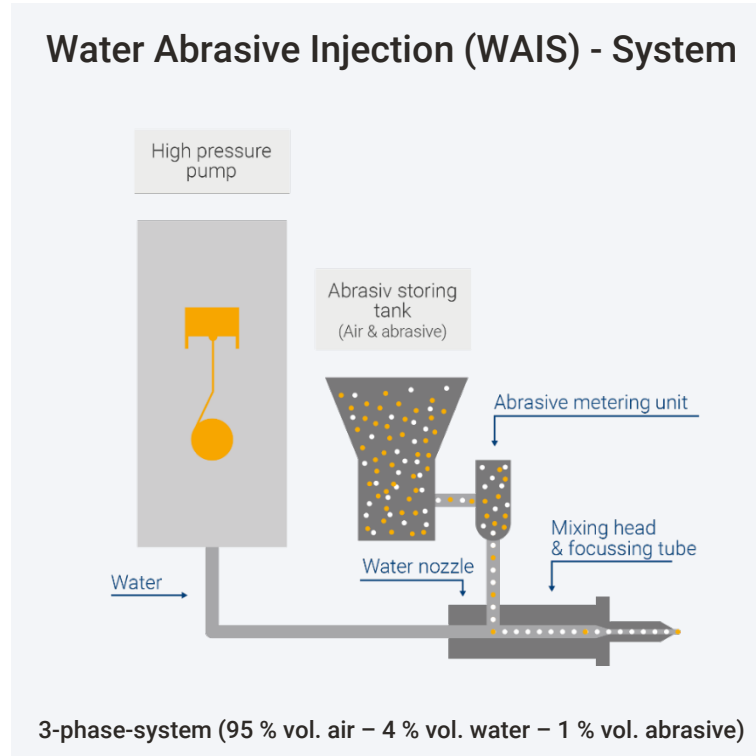
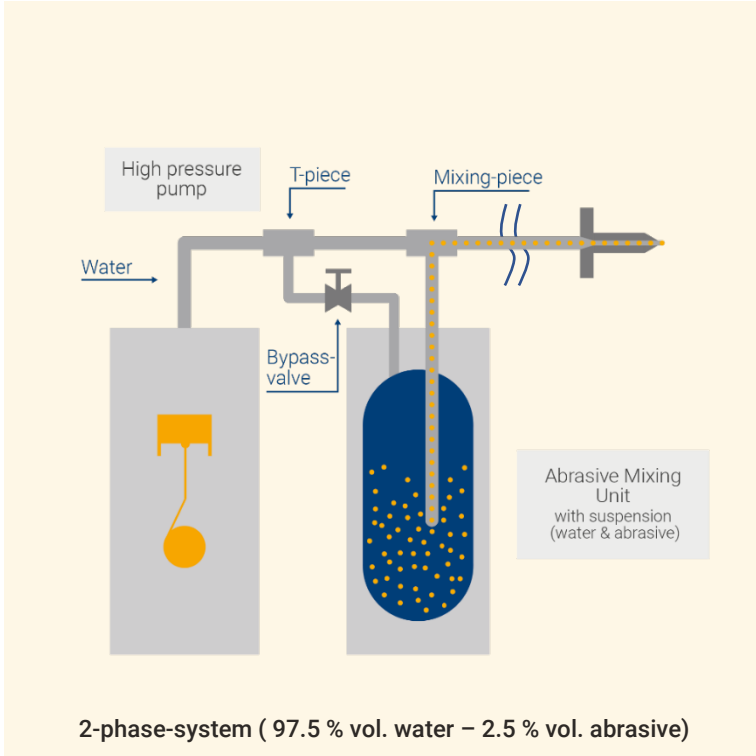
- WAS – Cutting equipment
- The technology
- What is WAS
- The equipment spread overview
- Cutting devices
- Cair
- Equipment tech specs
- 3S cut verification system
- Cutting examples
- Review, Q&A
- Thankyou

Waterjet cutting techniques

	WAS (discontinuous) Water Abrasive Suspension	Plain Water	WAIS Water Abrasive Injection
Technology	Cutting with Suspension (water and abrasive, both mixed before reaching the nozzle)	Cutting with plain water under high pressure	Cutting with water and abrasive injected at the nozzle
Pressure	up to 2,500 bar	up to 4,000 bar	up to 6,000 bar
Main Characteristics	no air, 3 times more performance, better jet focus, higher accuracy,	small performance (no abrasive!)	with air (= noise), problem to keep focus, wear out of focus pipe (= less performance)
Applications	Cutting thicker materials, composite materials, ceramics, etc.	Cutting of pizza, meat, cakes, fish, etc	Cutting thin plates
Markets	Mobile applications in sensitive areas (discontinuous cutting)	Food industry	Cutting table market (continuous cutting)

Water Abrasive Suspension (WAS) - System

Comparison of the two main techniques

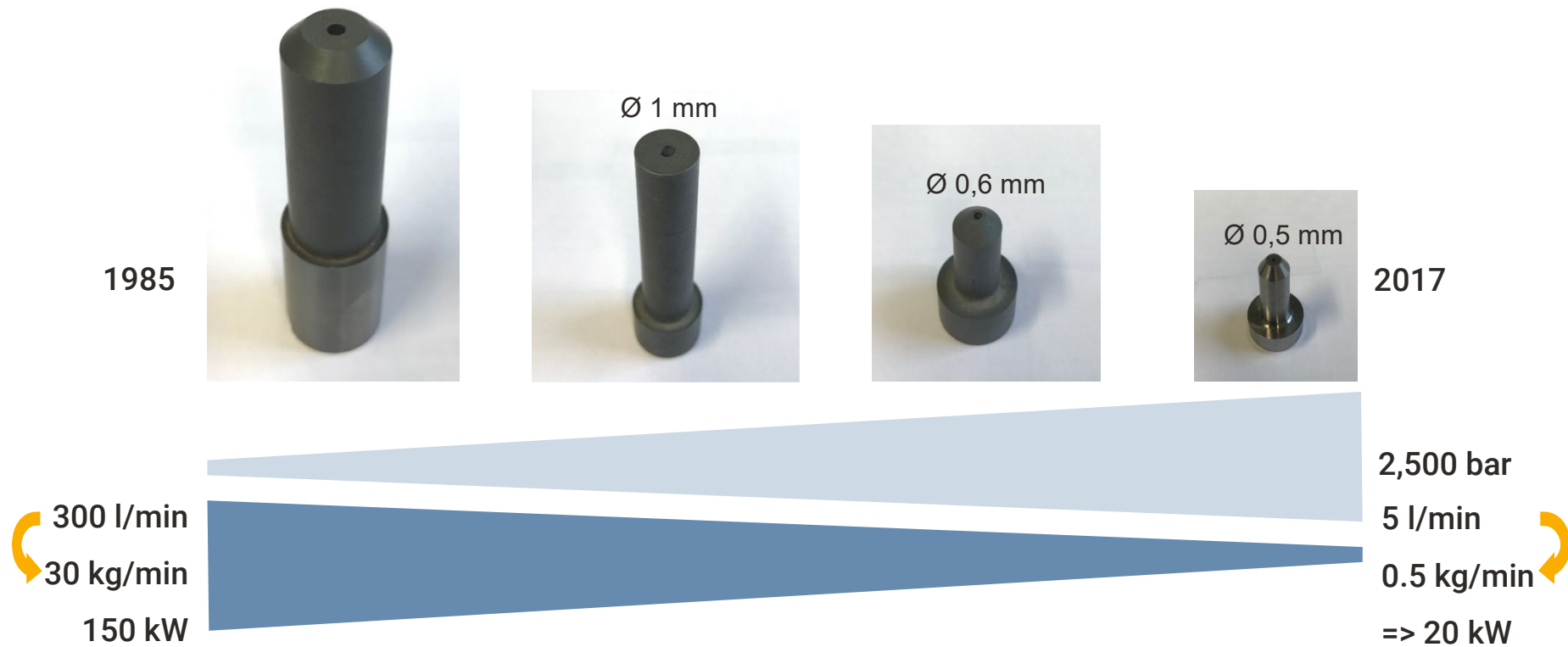


The WAS system is much more effective principally because there is no air in the jet!

WAS – The Technology

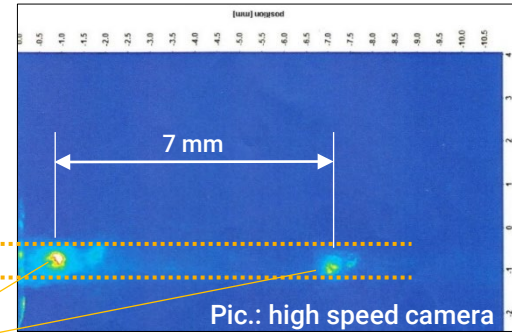
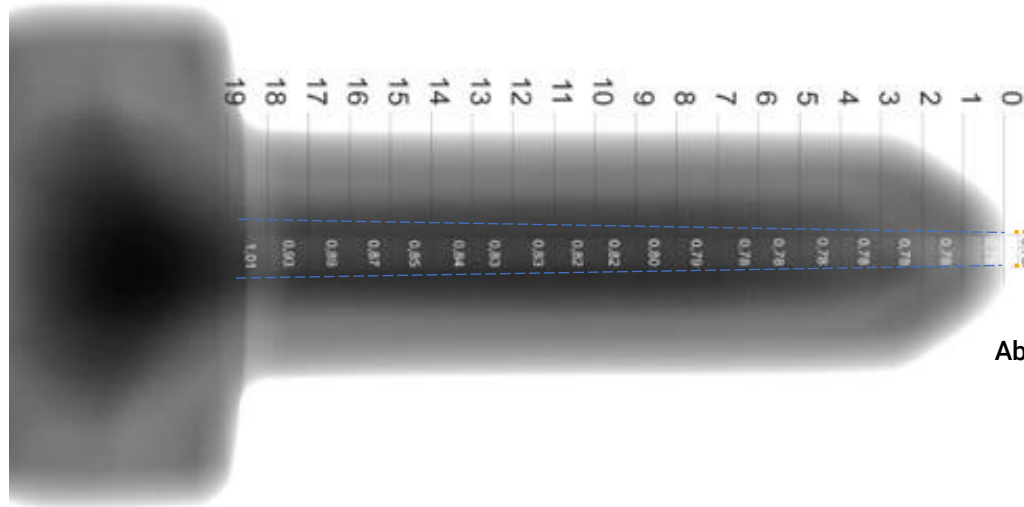


Pressure is speed, timeline of nozzle development



Velocity, Speed, Performance and Efficiency => “From a truck to a race car”

Nozzle, from pressure to speed



Abrasive particle

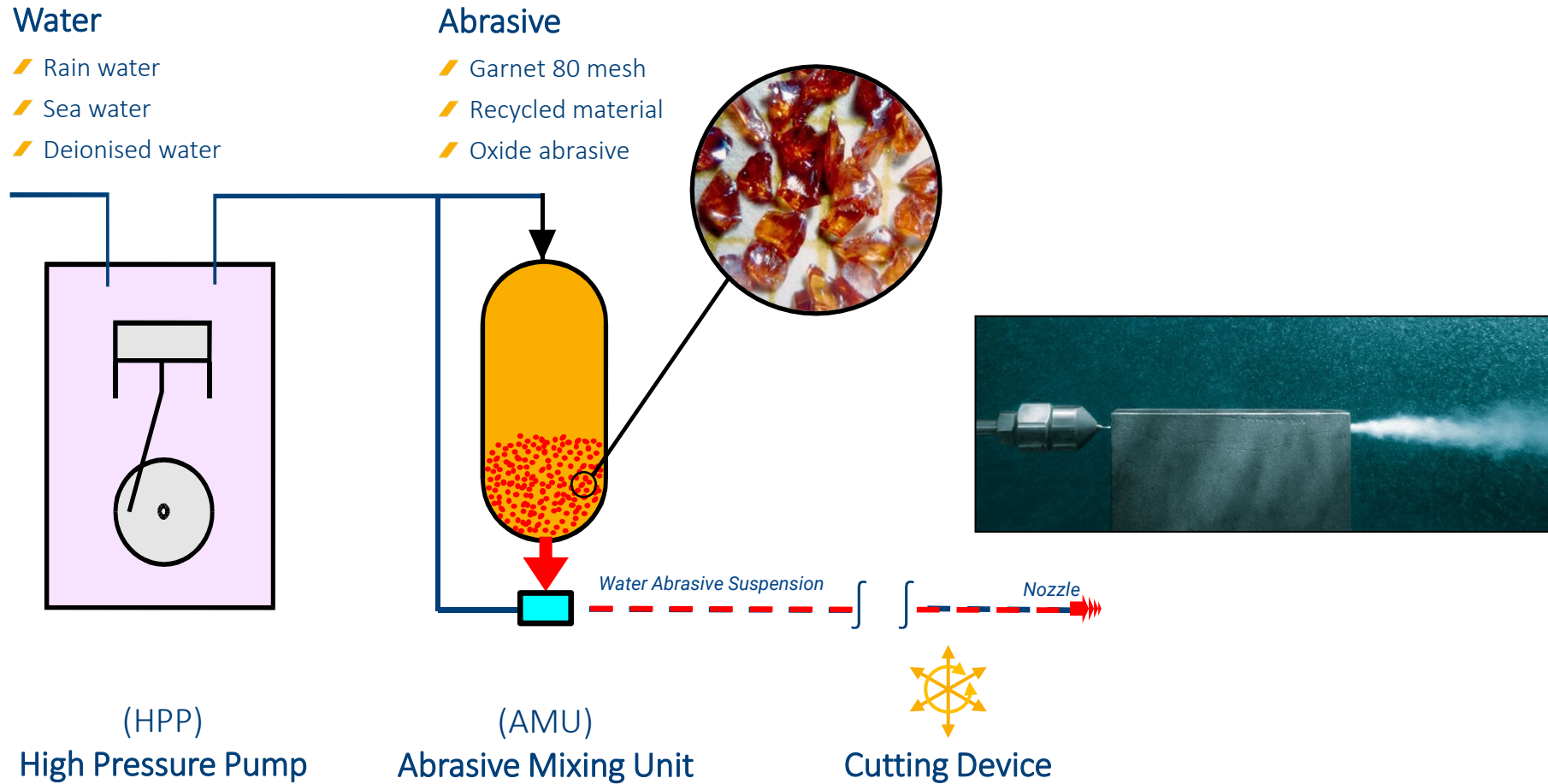
Onboard Abrasive Suspension at 2,500bar => effectively accelerated to high speed
=> particle speed up to 680 m/sec



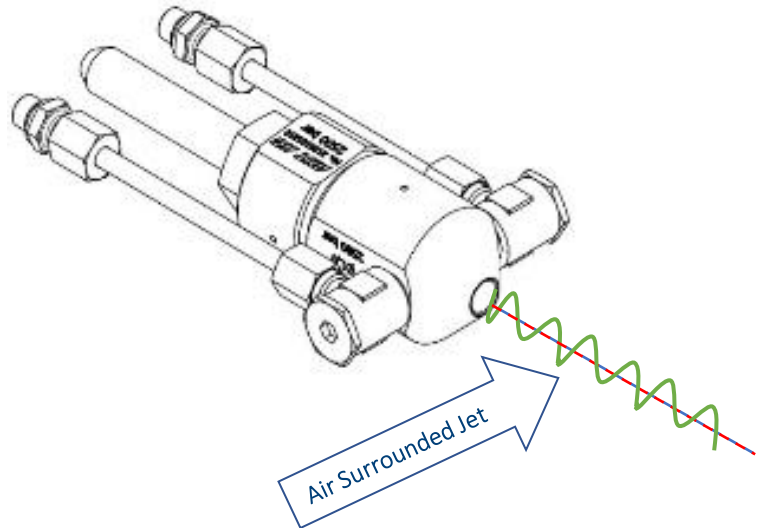
A large offshore oil rig with a complex yellow and white steel structure, situated in the middle of a blue ocean under a blue sky with scattered white clouds. The rig has multiple levels, pipes, and a crane. A semi-transparent blue diagonal overlay covers the right side of the image.

WAS-Water Abrasive Suspension

Water Abrasive Suspension (WAS) Technology



Key Features



- Most powerful & precise jet at 34,800 psi / 2,400 bar
 - Optional dewatering module
 - Air surrounded jet
 - High cut quality: fully grouted (performance according to water depths see CCC)
 - Verified and proven water depth = 150 m, with dewatering module up to 250 m
 - 3S cut verification system
- real time cut verification



► NOTICE

Performance und verification can just be achieved when casing(s) (single + multistring) are set-up in accordance to API-standards, grouted and/or connected to each other. Use the casing cut calculator to plan the rotational speed of the cutting tool during operation. Nothing contained in casing cut calculator (CCC) constitutes advice. Access is granted for guidance purposes only and only for qualified process engineers. Users must use their own professional judgement, knowledge and expertise when deciding whether it is appropriate to apply them to any particular scenario. The CCC is a guide only and may not be appropriate for use in all situations or settings. It also does not guarantee any specific outcome, result or benefit. ANT gives no warranties for the accuracy, currency, reliability or completeness of the calculator.

A large, complex offshore oil rig structure, primarily yellow and white, stands in the middle of a deep blue ocean under a clear blue sky with scattered white clouds. The rig features multiple levels of decks, a central derrick, and various pipes and structural beams. A semi-transparent blue diagonal overlay covers the right side of the image.

The Equipment Spread

ANT AG manufactures turnkey offshore spreads for cold cutting of subsea and topside structures based on highly efficient Water Abrasive Suspension (WAS) cutting technology.

Our Solution

- ✓ Turnkey WAScutting spread
- ✓ Small footprint
- ✓ Modular tools
- ✓ Smart monitoring system
- ✓ High quality materials
- ✓ Reliable and proven technology

Your Advantages

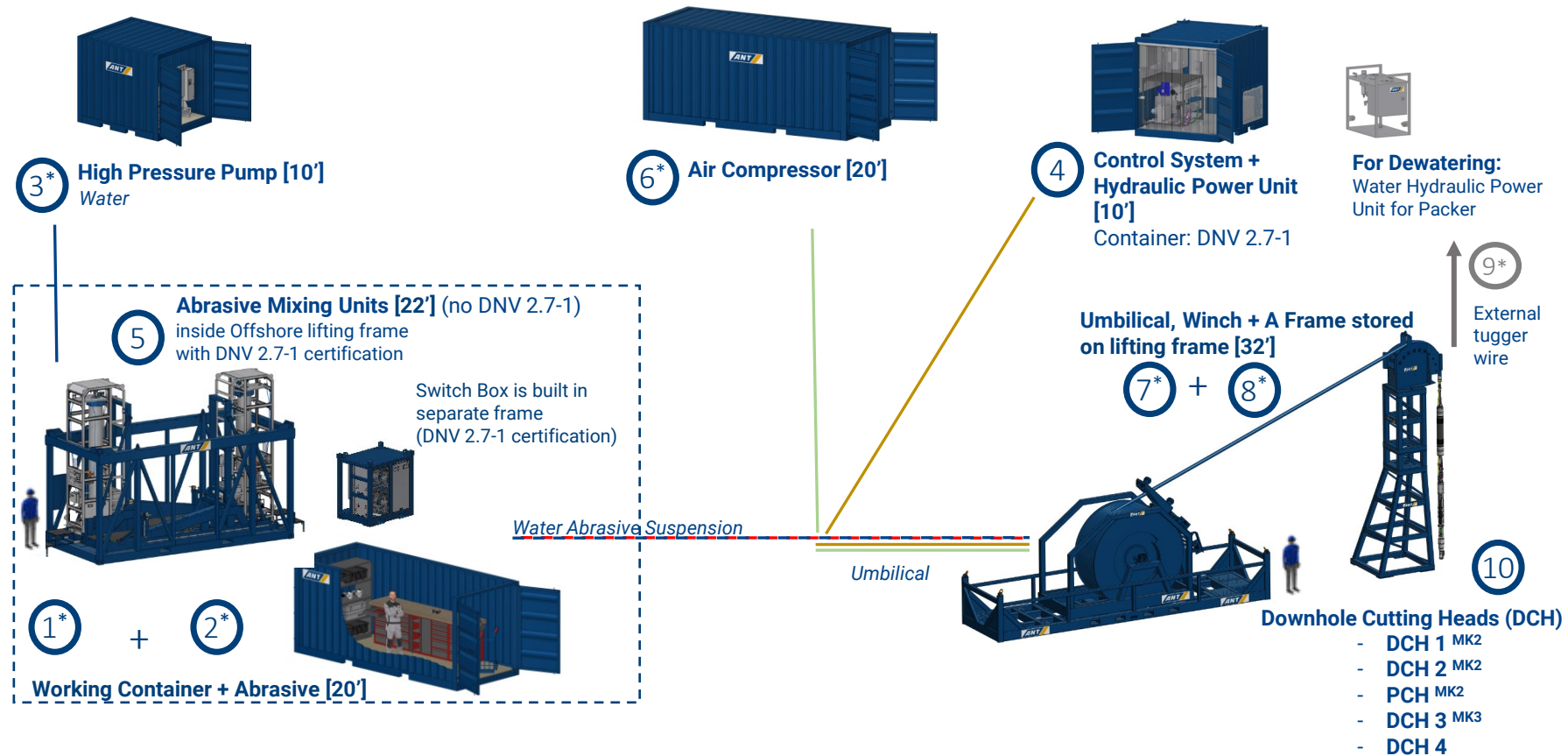
- ✓ Control and feedback
- ✓ High flexibility
- ✓ Time savings
- ✓ Cost reduction
- ✓ Maximum safety



Our Solution: Overview & Setup

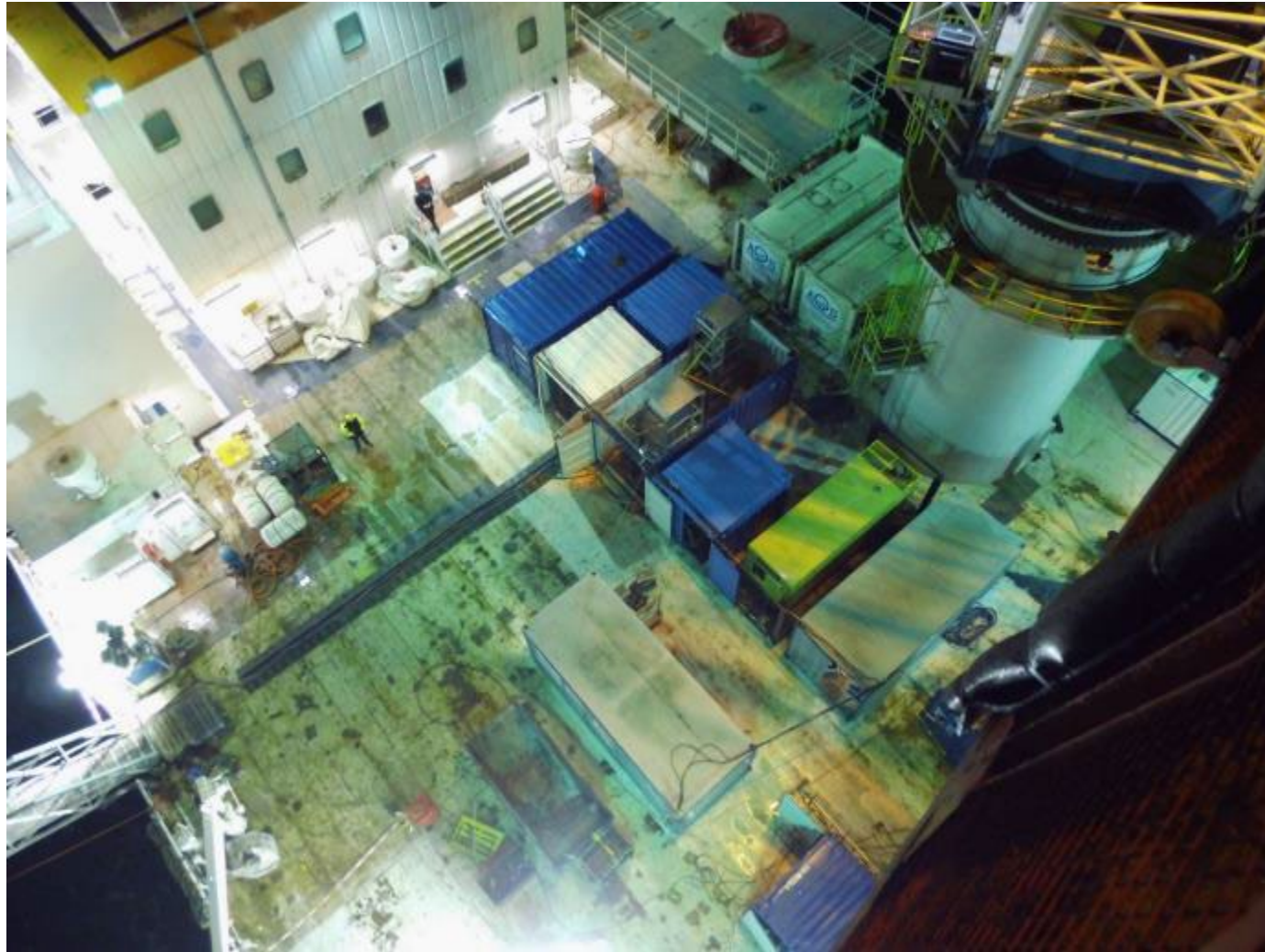


Our integrated systems can be individually tailored to your needs.

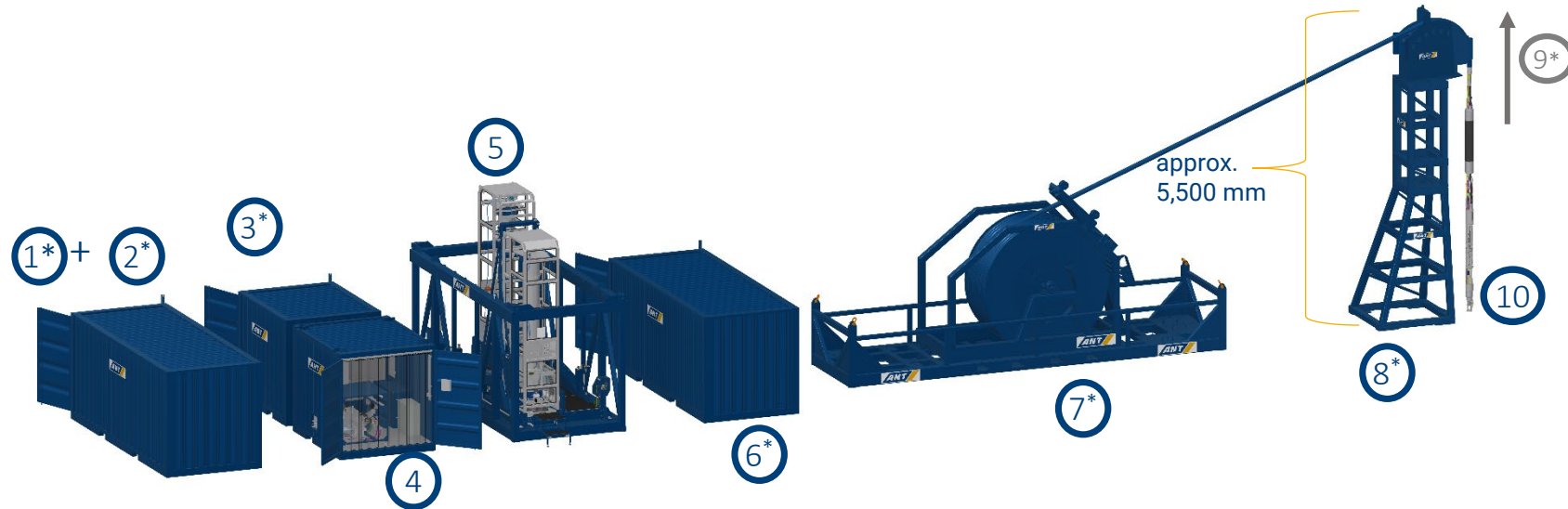


* Can be provided by customer

Skid for DCH/PCH Storage and Transportation available
(Info: no DNV 2.7-1)



Our Solution: Overview & Footprint

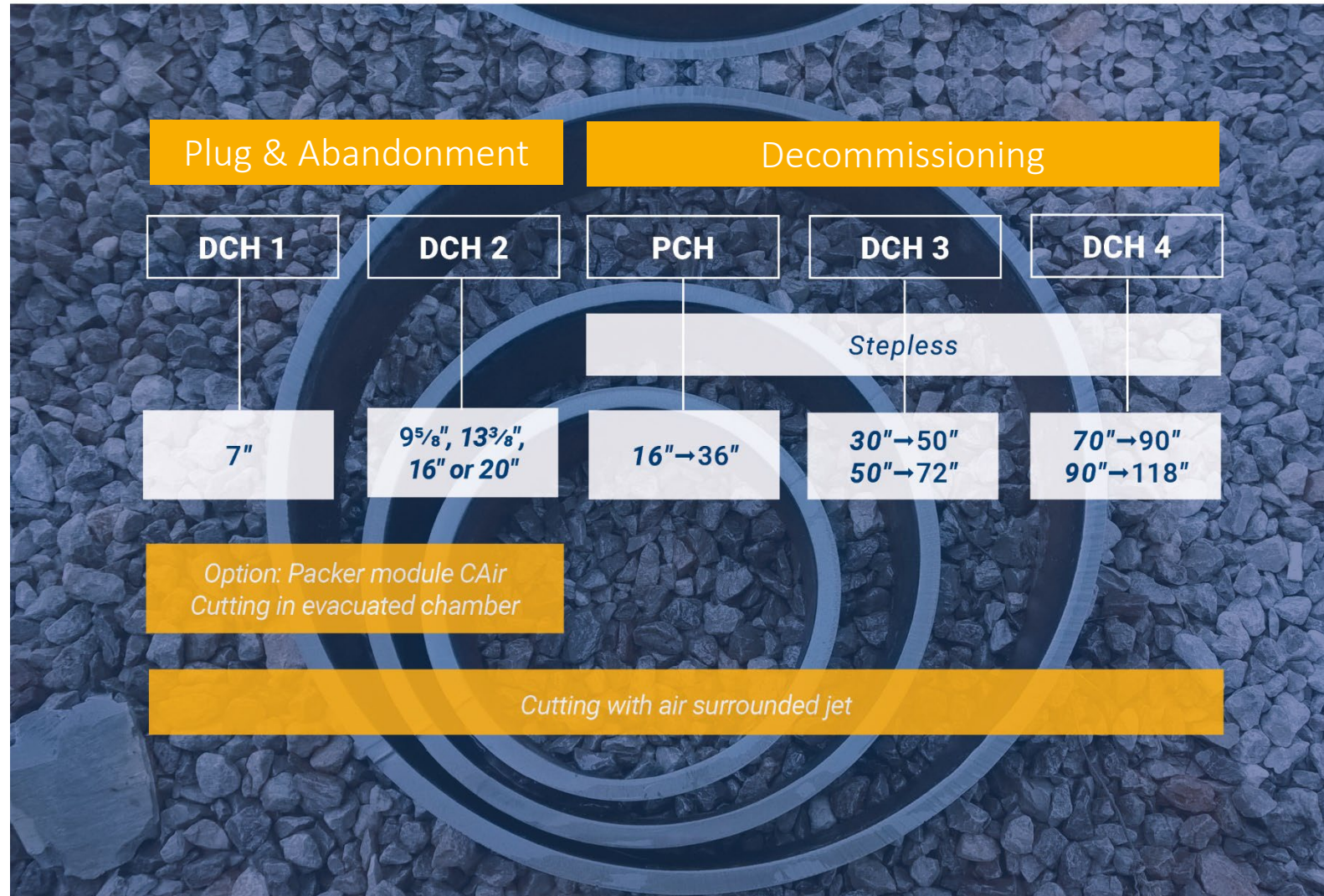


Item	Container size	Weight approx.
1. Working Container * + 2. Abrasive 4 tons [20'] *	20' Container, ~14 m ²	3.1 tons + 4 tons
3. High Pressure Pump [10'] *	10' Container, ~7m ²	8.0 tons
4. Control System + Hydraulic Power Unit [10']	10' Container, ~7 m ²	7.3 tons
5. Abrasive Mixing Unit`s Lifting frame (2x AMUs, Lifting Device, Frame, HPU (with external Switch Box))	22' Lifting Frame, ~20 m ² Switch Box: ~1 m ²	18.4 tons
6. Air Compressor [20'] *	20' Container, ~14 m ²	12.9 tons
7. Winch*, Umbilical + 8. A Frame / Gooseneck *	32' Lifting Frame, ~24 m ²	19.1 tons
Summary full spread	Total footprint: ~87 m² (~1000 sq feet)	Total weight: ~73 tons
9. External tugging wire e.g. lifting device*		
10. e.g. Downhole Cutting Head (DCH) 1 and/or 2, mounted on Skid	Skid: ~ 3.2 m x 0.72 m x 0.95 m Storage container provided by customer	0.45 tons (each)

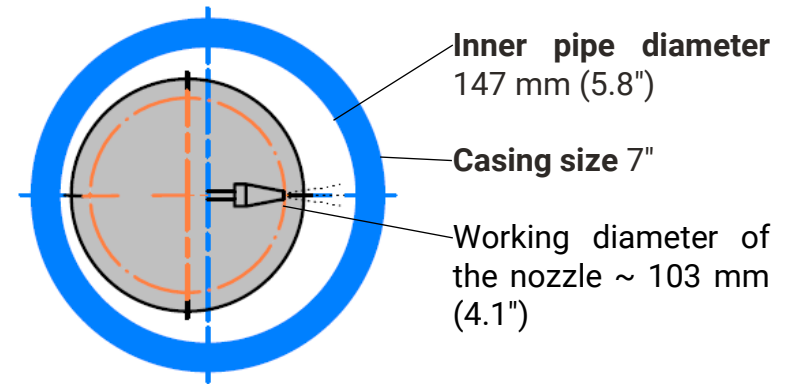
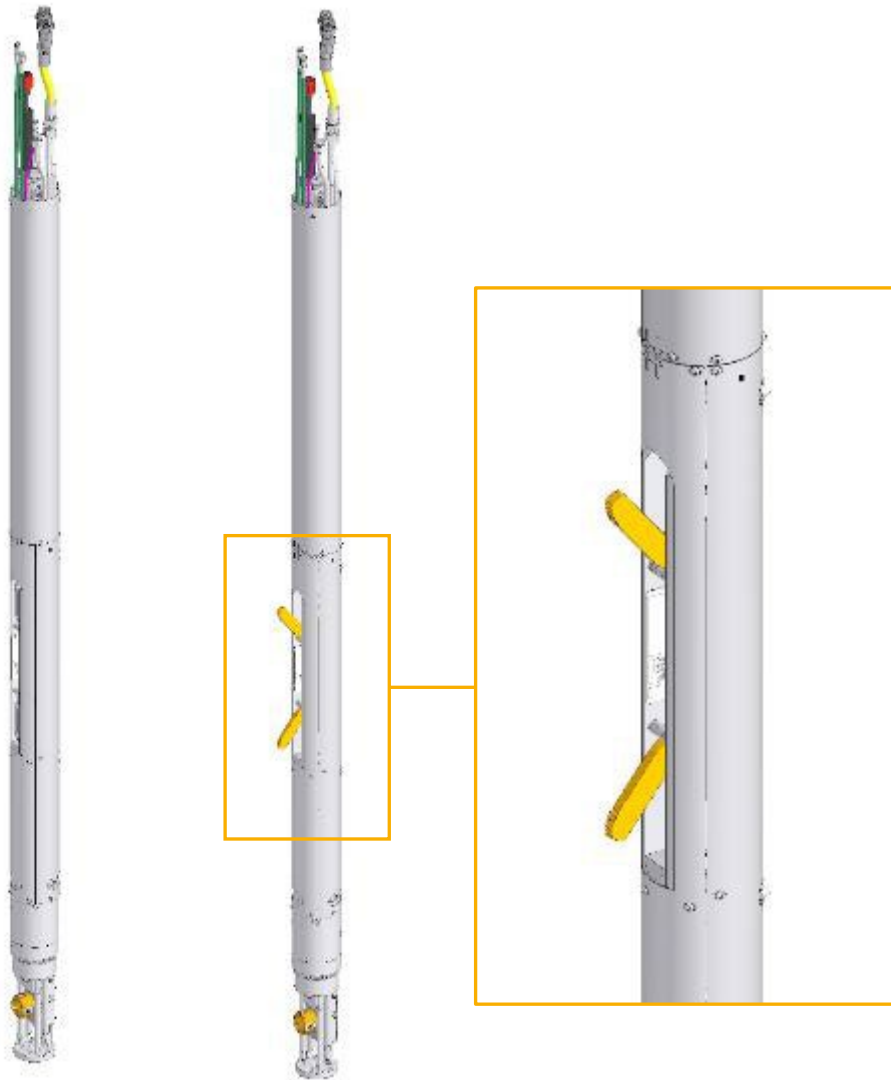
* Can be provided by customer

Cutting Devices





Downhole Cutting Head 1 - DCH 1^{MK2}



2006/42/EC



2014/34/EU: II 3G IIB T3

Info: NO DNV 2.7-1

The new generation of our Downhole Cutting Head (DCH) 1^{MK2} for cuts of multistring casings with smallest inner casing of 7". The DCH 1^{MK2} may be upgraded to the CAir System which improves cutting efficiency.

Operational Parameters

Application area	Pipes and multistring casing up to 508 mm (20") max. solid wall thickness*
Outer diameter of inner pipe	7"
Minimum inner pipe diameter	147 mm (5.8")
Standard nozzle holders for casing	7"
Drive	hydraulic
Rotation speed	39.5 - 395 °/h
Material	Structural and body parts made of stainless steel
Weight	approx. 105 kg (220 lbs)
Overall length	approx. 3,350 mm (132")
Underwater working depth	< 150 m (492 ft)*
Standards	Machinery Directive 2006/42/EC ATEX Directive 2014/34/EU (Zone 2)

Skid for storage and transportation available (Info: no DNV 2.7-1)

*Depends on CCC

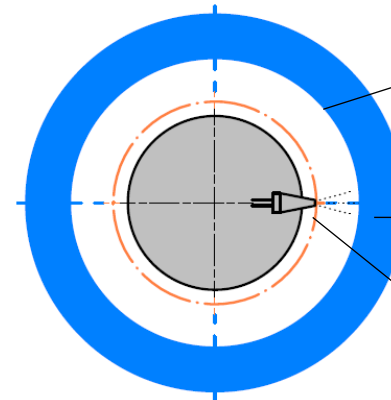


2006/42/EC



2014/34/EU: II 3G IIB T3

Info: NO DNV 2.7-1



Inner pipe diameter 200 mm (7.9"), 310 mm (12.2"), 369 mm (14.6"), 471 mm (18.6")

Casing size 9 5/8", 13 3/8", 16" and 20"

Working diameter 160 mm (6.3"), 270 mm (10.6"), 338 mm (13.3"), 430 mm (16.9")

Nozzle holder

- 1: 9 5/8"
- 2: 13 3/8"
- 3: 16"
- 4: 20"



2006/42/EC



2014/34/EU: II 3G IIB T3

Info: NO DNV 2.7-1

The new generation of our Downhole Cutting Head (DCH) 2^{MK2} for cuts of multistring casings with smallest inner casing of 9 5/8". Due to the new stepless clamping an extraordinary wide range of casings can be cut with one single tool. To assure the known high quality cut of ANT, different nozzle holders are available for several casing sizes.

Operational Parameters

Application area	Pipes and multistring casing up to 508 mm (20") max. solid wall thickness*
Outer diameter of inner pipe	9 5/8", 13 3/8", 16", 20"
Minimum inner pipe diameter	200 mm (7.9"), 310 mm (12.2"), 369 mm (14.6"), 471 mm (18.6")
Standard nozzle holders for casing	9 5/8", 13 3/8", 16" und 20"
Drive	hydraulic
Rotation speed	39.2 - 392 °/h
Material	Structural and body parts made of stainless steel
Weight	approx. 214 kg (472 lbs)
Overall length	approx. 3,100 mm (122")
Underwater working depth	< 150 m (492 ft)*
Standards	Machinery Directive 2006/42/EC ATEX Directive 2014/34/EU (Zone 2)

Skid for storage and transportation available (Info: no DNV 2.7-1)

* Depends on CCC



2006/42/EC

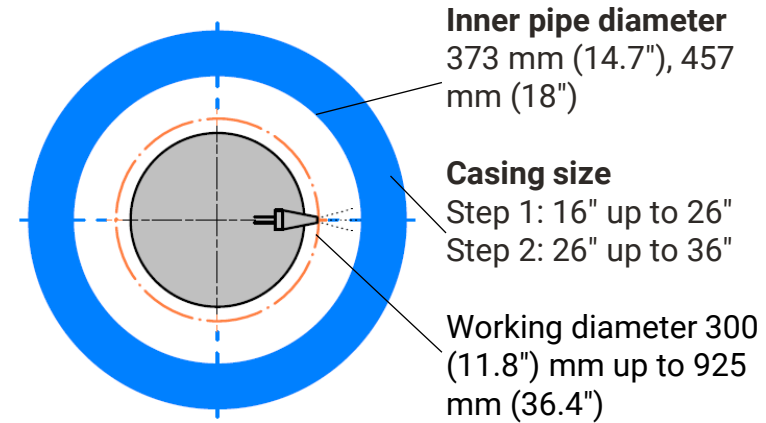


2014/34/EU: II 3G IIB T3

Info: NO DNV 2.7-1



Nozzle holder
1: 16" to 26"
2: 26" to 36"



2006/42/EC



2014/34/EU: II 3G IIB T3

Info: NO DNV 2.7-1

The Pile Cutting Head (PCH)^{MK2} developed by ANT is applicable in the area of abandonment of offshore structures. The applicational area covers the Water Abrasive Suspension (WAS) cutting of single piles.

Operational Parameters

Application area	Pipes / piles up to 102 mm (4") solid wall thickness*
Outer diameter of inner pipe	Step 1: 16" up to 26", Step 2: 26" up to 36"
Minimum inner pipe diameter	Step 1: 373 mm (14.7"), Step 2: 660 mm (26")
Standard nozzle holders for casing	stepless
Drive	hydraulic
Rotation speed	395 - 3,950 °/h
Material	Structural and body parts made of stainless steel
Weight	approx. 480 kg (1,058 lbs), 490 kg (1,080 lbs)
Overall length	approx. 3,450 mm (136")
Underwater working depth	< 150 m (492 ft)*
Standards	Machinery Directive 2006/42/EC ATEX Directive 2014/34/EU (Zone 2)

Skid for storage and transportation available (Info: no DNV 2.7-1)

* Depends on CCC

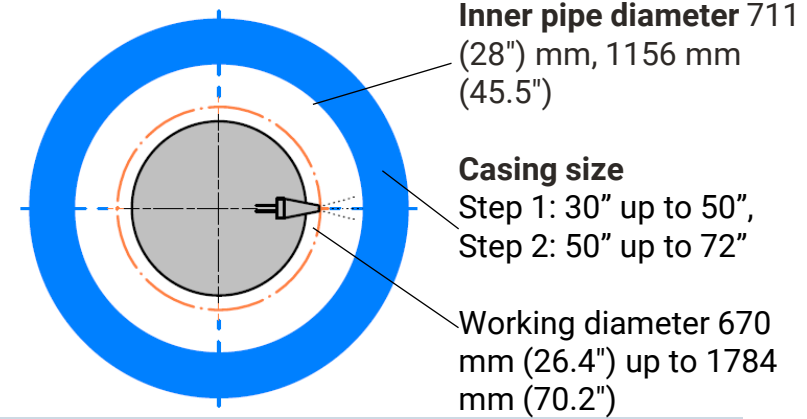
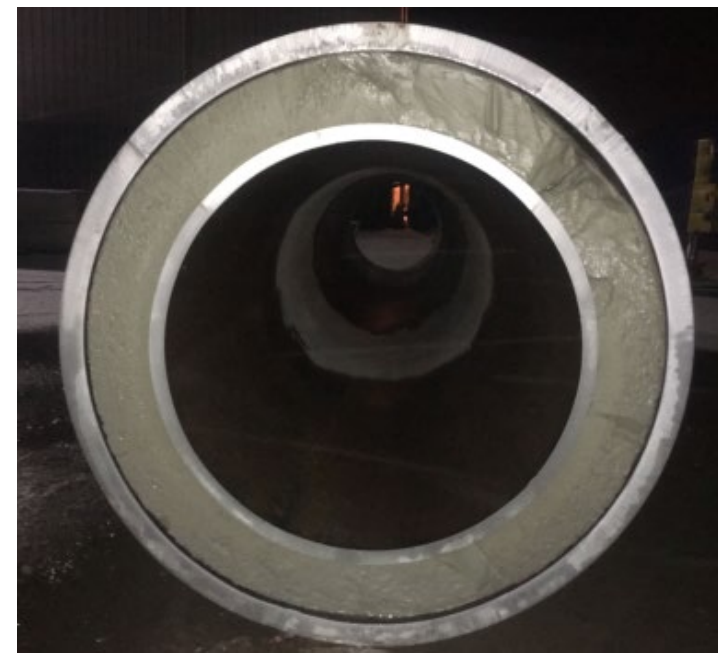


2006/42/EC



2014/34/EU: II 3G IIB T3

Info: NO DNV 2.7-1



2006/42/EC



2014/34/EU: II 3G IIB T3

Info: NO DNV 2.7-1

The Downhole Cutting Head (DCH) 3 MK3 developed by ANT is applicable in the area of abandonment of Offshore structures. The application area covers the Water Abrasive Suspension (WAS) cutting of casings and single piles.

Operational Parameters

Application area	Pipes / piles up to 102 mm (4") solid wall thickness*
Outer diameter of inner pipe	Step 1: 30" up to 50", Step 2: 50" up to 72"
Minimum inner pipe diameter	Step 1: 711 (28") mm, Step 2: 1156 mm (45.5")
Standard nozzle holders for casing	stepless
Drive	hydraulic
Rotation speed	90.5 - 905 °/h
Material	Structural and body parts made of stainless steel / aluminium
Weight	approx. 690 kg (1,521 lbs), 820 kg (1,808 lbs)
Overall length	approx. 3,300 mm (130")
Underwater working depth	< 150 m (492 ft)*
Standards	Machinery Directive 2006/42/EC ATEX Directive 2014/34/EU (Zone 2)

Skid for storage and transportation available (Info: no DNV 2.7-1)

* Depends on CCC

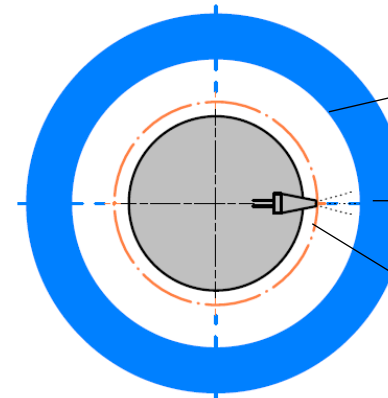


2006/42/EC



2014/34/EU: II 3G IIB T3

Info: NO DNV 2.7-1



Inner pipe diameter
1,267 mm (49.88")

Casing size
Step 1: 70" up to 90",
Step 2: 90" up to 118"

Working diameter
1,660 mm (65.4") up
to 2,830 mm (111.4")



2006/42/EC



2014/34/EU: II 3G IIB T3

Info: NO DNV 2.7-1

The Downhole Cutting Head (DCH) 4 developed by ANT is applicable in the area of abandonment of Offshore structures. The application area covers the Water Abrasive Suspension (WAS) cutting of casings and single piles.

Operational Parameters

Application area	Pipes / piles up to 102 (4") mm solid wall thickness*
Outer diameter of inner pipe	Step 1: 70" up to 90", Step 2: 90" up to 118"
Minimum inner pipe diameter	1,267 mm (49.88")
Standard nozzle holders for casing	stepless
Drive	hydraulic
Rotation speed	90.8 - 907.9°
Material	Structural and body parts made of stainless steel
Weight	approx. 2,705 kg (5,965 lbs), 3,020 kg (6,658 lbs)
Overall length	approx. 4,560 mm (180")
Underwater working depth	< 150 m (492 ft)*
Standards	Machinery Directive 2006/42/EC ATEX Directive 2014/34/EU (Zone 2)

Skid for storage and transportation available (Info: no DNV 2.7-1)

* Depends on CCC



2006/42/EC



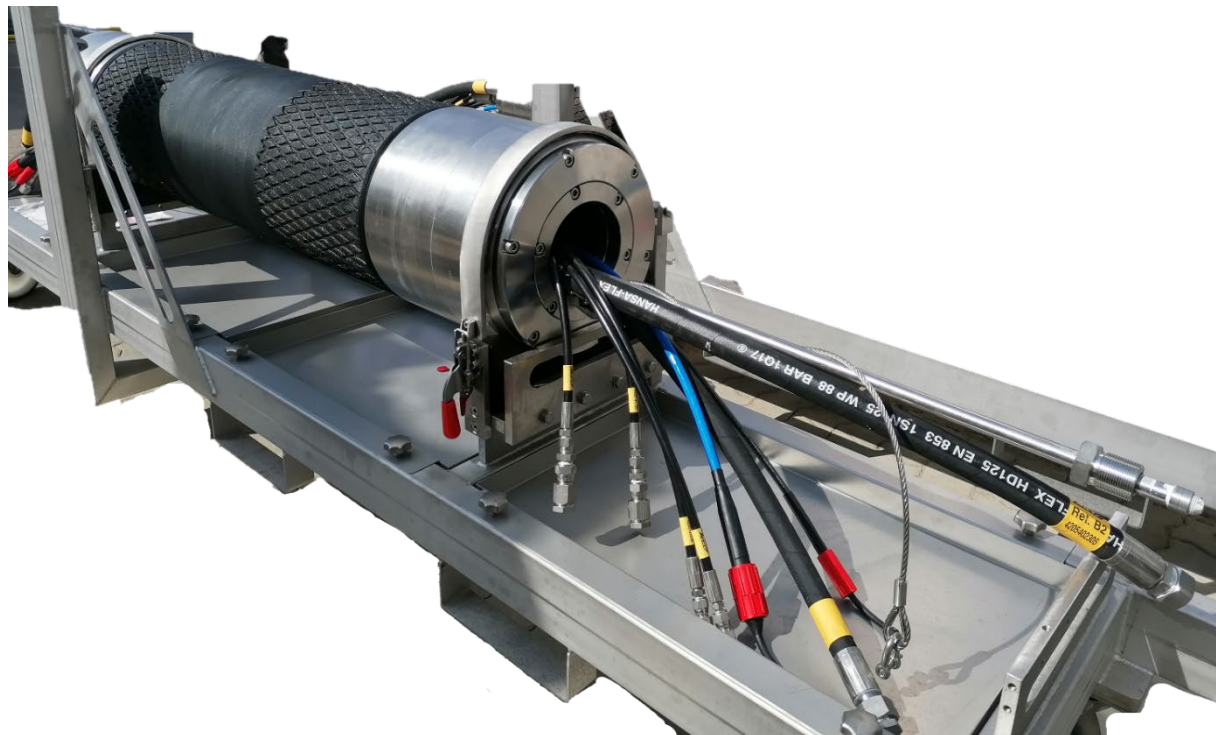
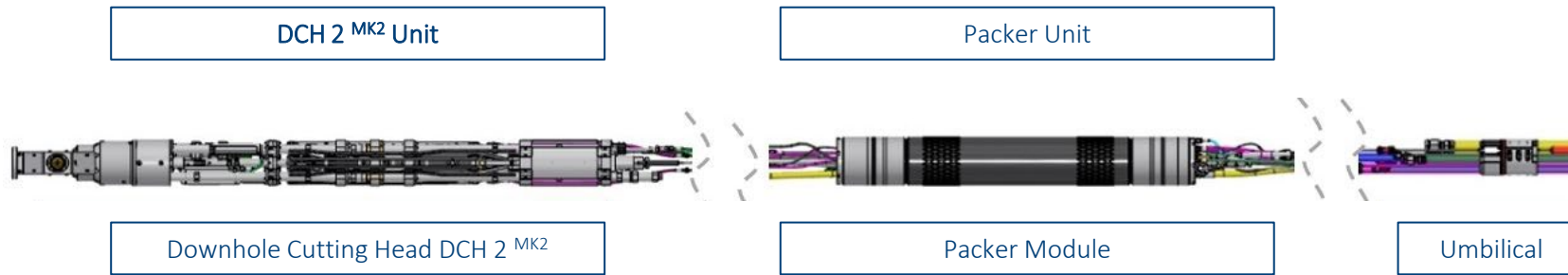
2014/34/EU: II 3G IIB T3

Info: NO DNV 2.7-1

CAir system



The CAir System for DCH 1 & 2



The DCH 1 ^{Mk2} and DCH 2 ^{Mk2} are also available with the CAir (Cutting in Air) System. The packer, located at the top end of the Cutting Heads, can be inflated by means of pressurized air and seals inside the casing. After inflation, water is displaced from the cutting area. Faster cuts in even bigger depths are possible.

Operational Parameters

	DCH 1 ^{Mk2} CAir	DCH 2 ^{Mk2} CAir
Packer size for smallest tubing / casing (API)	Standard Packer: 7"	
		Standard Packer 1: 9 5/8" - 13 3/8" Standard Packer 2: 16" - 20"
Smallest inner casing bore	5.8"	8 1/2 "
Standard nozzle holders for casings	7"	9 5/8 " , 13 3/8 " , 16" , 20"
Weight	462 lb	838 lb
Overall DCH and packer length	189"	189 in
Underwater cutting depth	820 ft and more	820 ft and more
Degrees per hour	39.5 - 395 dph	39.2 - 392 dph
Max. wall thickness to verify (fully grouted)	up to 20"*	
Wall thickness to indicate (fully grouted)	24" and more*	
Drive	Hydraulic driven & endless rotation	
Standards	Machinery Directive 2006/42/EC ATEX Directive 2014/34/EU (Optional, Zone 2)	

Skid for storage and transportation available (Info no DNV 2.7-1)

*Depends on CCC

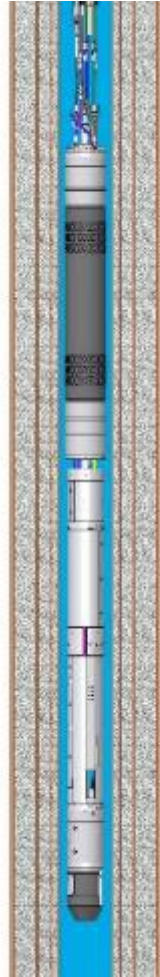


2006/42/EC



2014/34/EU: II 3G IIB T3

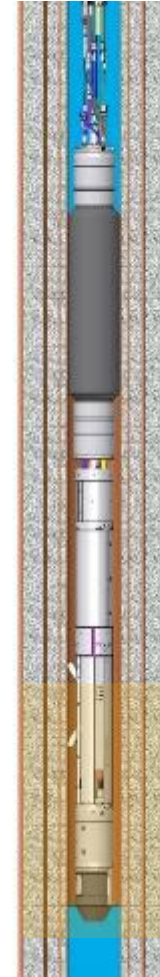
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Deploying the DCH



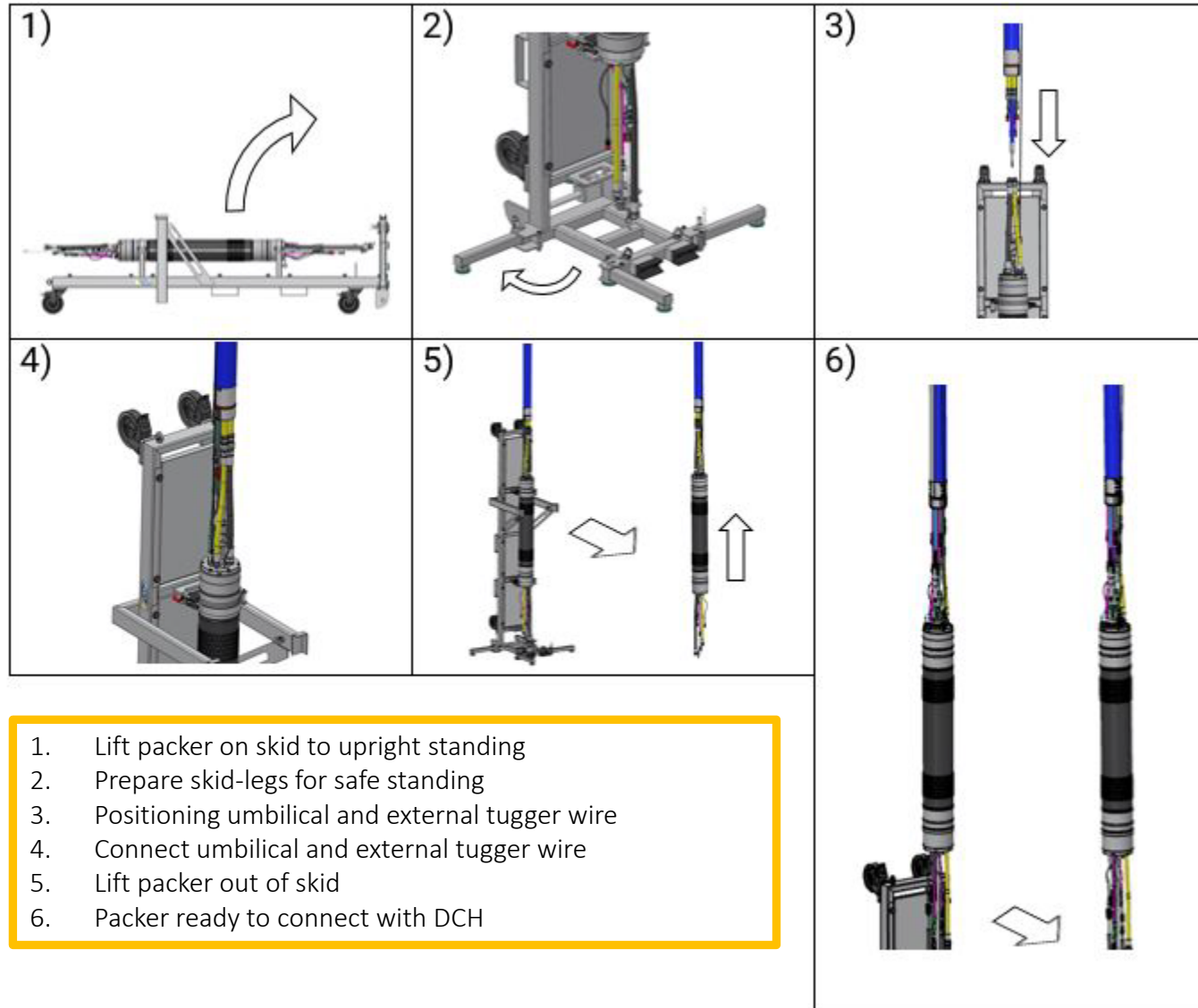
Inflating the Packer

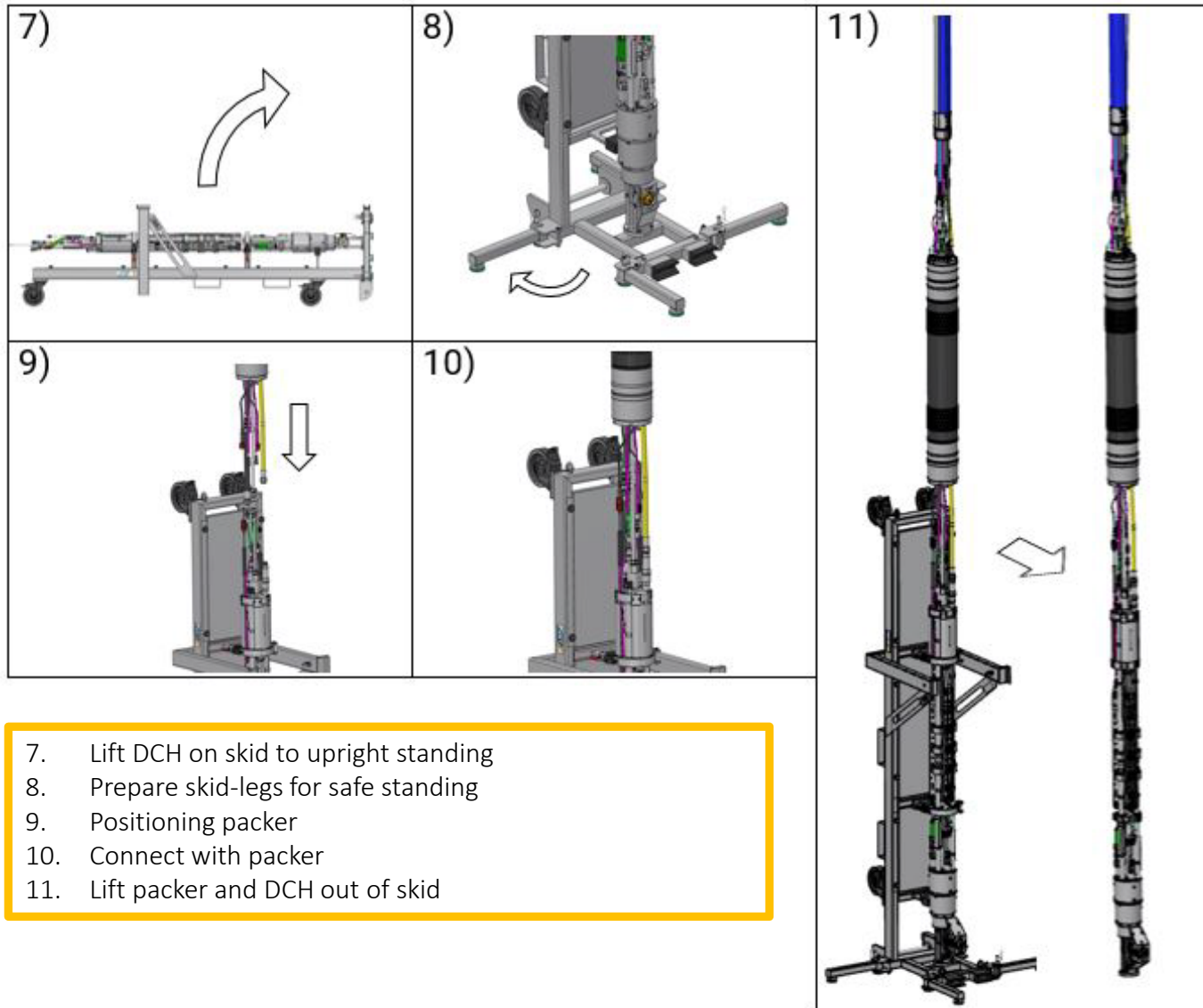


Displace liquid below packer by pumping air through umbilical



Performing the cut





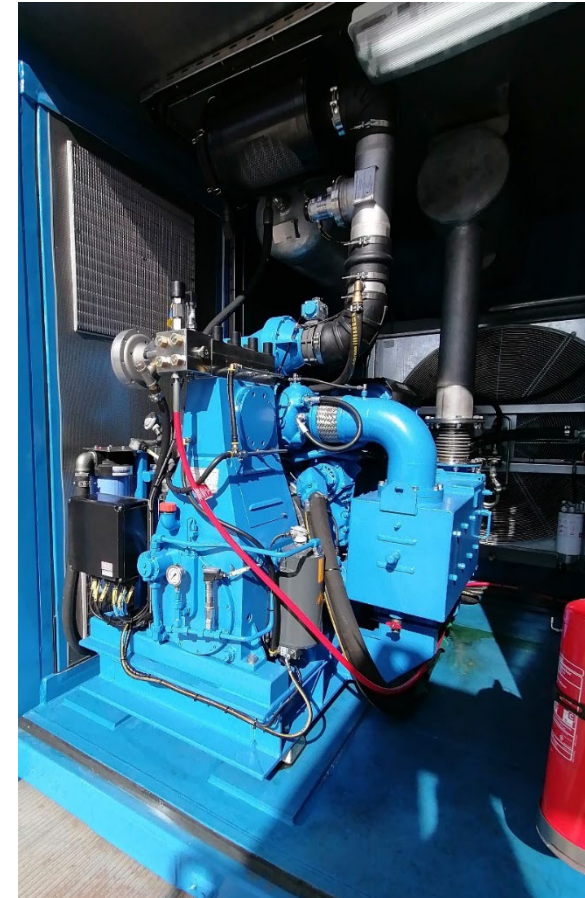
A large, complex offshore oil rig structure is shown against a blue sky with scattered white clouds. The rig is primarily yellow and white, with a dense network of steel beams, pipes, and platforms. It is situated in the middle of a deep blue ocean. A semi-transparent blue diagonal overlay covers the right side of the image, and the text 'Equipment technical descriptions' is written in white across the center-left of this overlay.

Equipment technical descriptions

Technical Details

Container size:	10'
Weight approx.	8,000 kg empty
Maximum working pressure	2,400 bar
Maximum water flow	36 l/min @ 1,950 RPM
Water supply	min. 4 bar, min 55 l/min
Engine diesel engine	max. 257 kW @ 2,300 RPM
High pressure connection outlet	M26x1,5 – 9/16 - 18 UNF LH
Air supply	min. 8 bar, min. 300l/min.

ATEX II 3G IIB T3
DNV Lifting Appliances 2.7-1



High Pressure Pump

Painting of container
Standard DIN EN ISO 12944 C5-M

*Can be provided by customer (incl. all required auxiliaries)

Technical Details

Container size	20'
Weight approx.	12,900 kg
Pressure	max. 40 bar
Flow	min 15 m ³ /min
Power, ness.	340 kW
Engine	Scania diesel
Engine speed	1,800 1/min
Engine power	405kW
Ambient temp, min.	-10°C
Ambient temp, max	+45°C
Noise level	105 dB(A)

DNV Lifting Appliances 2.7-1

Painting of container
Standard DIN EN ISO 12944 C5-M

*Can be provided by customer

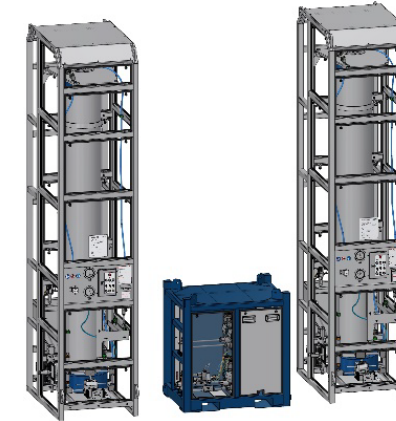


Technical Details

AMU 2500-100^{MK2}	
Max. working pressure	2,400 bar (34,800 PSI)
Water flow	29.4 l/min
Cutting time (one filling)	70 min
Pressure vessel	100 l (200 kg abrasive)
Weight empty	4,200 kg (9,259.4 lbs)
Size (L x W x H)	1,400 x 900 x 4,056 mm
Hopper capacity.	100 l (200 kg abrasive)
Hydraulic power at nozzle	125 kW
Switch Box^{MK2} (unit to allow optimized semi continuous cutting)	
Weight empty	391 kg (862 lbs)
Size (L x W x H)	809 x 1,272 x 1,239 mm
Connections	
High pressure water inlet	M26x1.5, 9/16"-18 UNF LH
Suspension outlet	M36x2, M20x1.5 LH
Pneumatic	min. 8 bar; min. 300 l/min
Clear water	½", min. 6 bar; min. 50 l/min
Standard	
AMU and Switch Box	ATEX Group II 3G IIB T3
Switch Box	DNV Lifting Appliances 2.7-1
AMU	Frame design acc. DIN EN 1993



AMU 2500-100^{MK2}



AMU TWIN with Switch Box

Painting of Switch Box frame

Standard DIN EN ISO 12944 C5-M



Switch Box^{MK2}

Technical Details

Lifting Unit consists of Lifting Frame, Lifting Device and HPU (Hydraulic Power Unit)

Container size:	22' Lifting Frame
Size (Transport, L x W x H)	6,490 x 2,970 x 3,350 mm
Size (Operation, L x W x H)	6,490 x 2,970 x 4,730 mm
Total weight incl. 2 AMUs	18,000 kg (39,683.2 lbs)
Protective cover	Tarpulin
Electrical connection	380-415 VAC 50Hz / 440-480 VAC 60Hz
Control voltage	24V DC
Operating pressure	160 bar
Control unit / control panels	Separate panel for each AMU

Standard
ATEX II 3G IIB T3
DNV Lifting Appliances 2.7-1

Click here to watch video!

<https://www.youtube.com/watch?v=irJvur8l8Q>



Lifting Unit

Painting of Lifting Unit
Standard DIN EN ISO 12944 C5-M



Lifting Unit with 2 AMUs

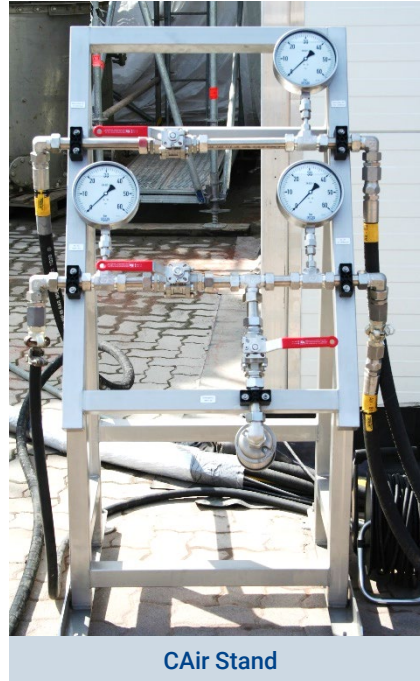
Technical Details

Hydraulic Power Unit for Water

Size (L x W x H)	570 x 360 x 570 mm
Weight:	33 kg (72.8 lbs)
Air drive pressure	0.5 – 5.0 bar
Max. pressure	50 bar
Pressure ratio (i)	01:11
Flow capacity per cycle	66,4 ml
Air drive inlet:	1/2" FNPT
Water inlet & outlet port:	1/2" FNPT (12-L)

Control Unit

CAir stand for Packer (Dewatering) System



CAir Stand



Hydraulic Power Unit for water

Info: NO DNV 2.7-1

Technical Details

Size (L x W x H)	1,240 x 820 x 1,292 mm
Weight power pack:	419 kg (923.8 lbs)
Pump	Gear pump 2 off (2 lines)
Tank capacity	100 l
Pressure	140 bar
Flow	max. 12 l/min (line 1) max. 3.5 l/min (line 2)
Drive electric	(4 kW) 380 V / 16 A

Standard
EU Machinery Directive

ATEX II 3G IIB T4 (X) Ta = 0°C to 40°C



Technical Details

Nominal length	100 m (328 ft)
Min. bending radius	350 mm (13.8")
Umbilical – Umbilical connections	up to 250 m (820 ft)
To keep tool weight	external lifting device (tugger wire) is required

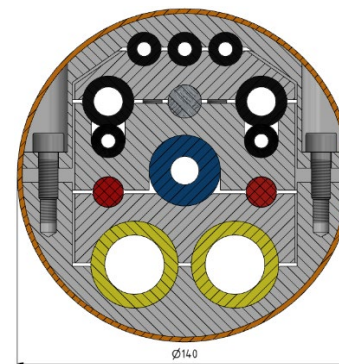
Each umbilical consists of

- High pressure hose, max. operation pressure 2,500 bar, ID = 12.7 mm.
- Track rope (Ø14 mm) to take umbilical weight. Valid for connected umbilical's up to 250 m (820 ft).
- Two electric sensor cables (3S-System, Rotary Encoder).
- Five hydraulic hoses 200 bar, NS6 mm.
- Two hydraulic hoses 200 bar, NS 12 mm.
- Two pneumatic hoses 35 bar, NS 25 mm.
- Protective coating (Velcro®).
- End brackets of stainless steel (1.4571 / 1.4404).
- Rubber centralizer covered with shrink hoses any five meter.

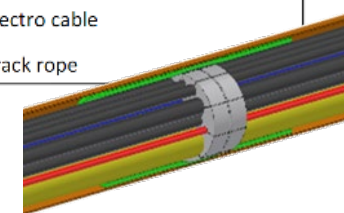
Note: The umbilical is not a lifting gear for the DCH/PCH.



Umbilical XL



- High pressure hose (Jet Cutting)
- Pneumatic hose
- Hydraulic hose
- Electro cable
- Track rope



Technical Details

Container size:	32'
Weight	19,100 kg (42,108.3 lbs)
Max. Power	30 kW
Power supply	380 VAC/ 50 Hz
Drum rotation	5 RPM
Drive	Hydraulic driven
Capacity	Pull force 2 t / 1 layer 110 m umbilical / 1 layer
Standard	
Base Frame	DNV Lifting Appliances 2.7-1
Gooseneck + Umbilical reel winch	EU Machinery Directive

Click here to watch video!

<https://www.youtube.com/watch?v=xHtmtgkYDmc>



Above: Gooseneck and Umbilical Reel Winch (seperate view) Info: NO DNV 2.7-1

Below: Transport with Base FrameStand



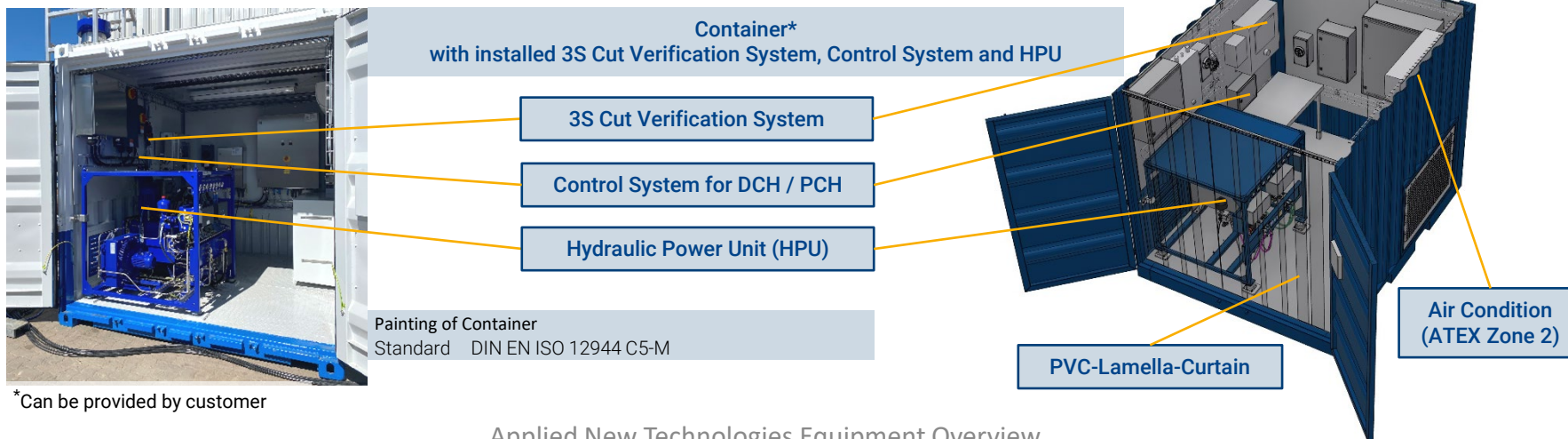
Painting

Standard DIN EN ISO 12944 C5-M

*Can be provided by customer

Technical Details

Control system for DCH/PCH (for installation in a DNV container)	
Operation	Via control cabinet and control panel
Power supply	400 VAC / 60 Hz (3P+N+PE)
Control voltage	24V DC
Switch Box control Touch panel to control the Switch Box with the AMUs	
Container / size* (for installation of Control System, 3S Cut Verification System and Hydraulic Power Unit (HPU))	10' open door operation (unmanned) Standard DNV Lifting Appliances 2.7-1 Option ATEX II 3G IIB T3



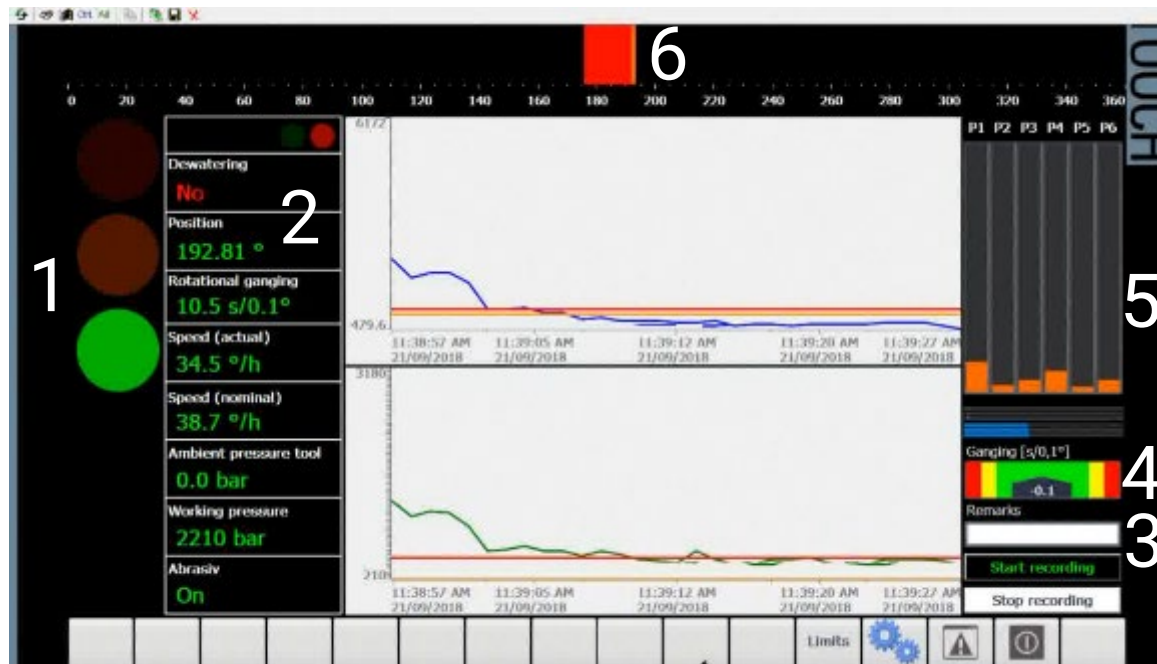
A large offshore oil rig with a complex yellow and white steel structure, situated in the middle of a blue ocean under a clear sky. The rig has multiple levels, a central tower, and various pipes and ladders. A semi-transparent blue diagonal overlay covers the right side of the image.

3S Cut Verification system

Technical Details

PLC	<ul style="list-style-type: none">• Siemens S7• Siemens Touch Panel
Sensors	<ul style="list-style-type: none">• Cut verification sensors• Level probe• Water level probe• Position• Actual speed• Target speed• Working pressure• Rotational ganging• Ganging
Power supply	400 VAC / 60 Hz (3P+N+PE)
Control voltage	24V DC
Standard	ATEX II 3G IIB T3





Cutting result **6**
Real time performance feedback at the actual cutting position

Sensor amplitudes **5**
Displays the particular signal amplitudes of the sensors

Rotational ganging **4**
Shows the speed evenness of the actual cutting feed motion

Cutting quality **1**
Signals the cutting grade via traffic light

- Red = no cut
- Yellow = incomplete cut
- Green = good cut

Cutting parameters **2**

- Absolute angle of the cutting position
- Planned & actual rotational speed
- Water depth
- Working pressure

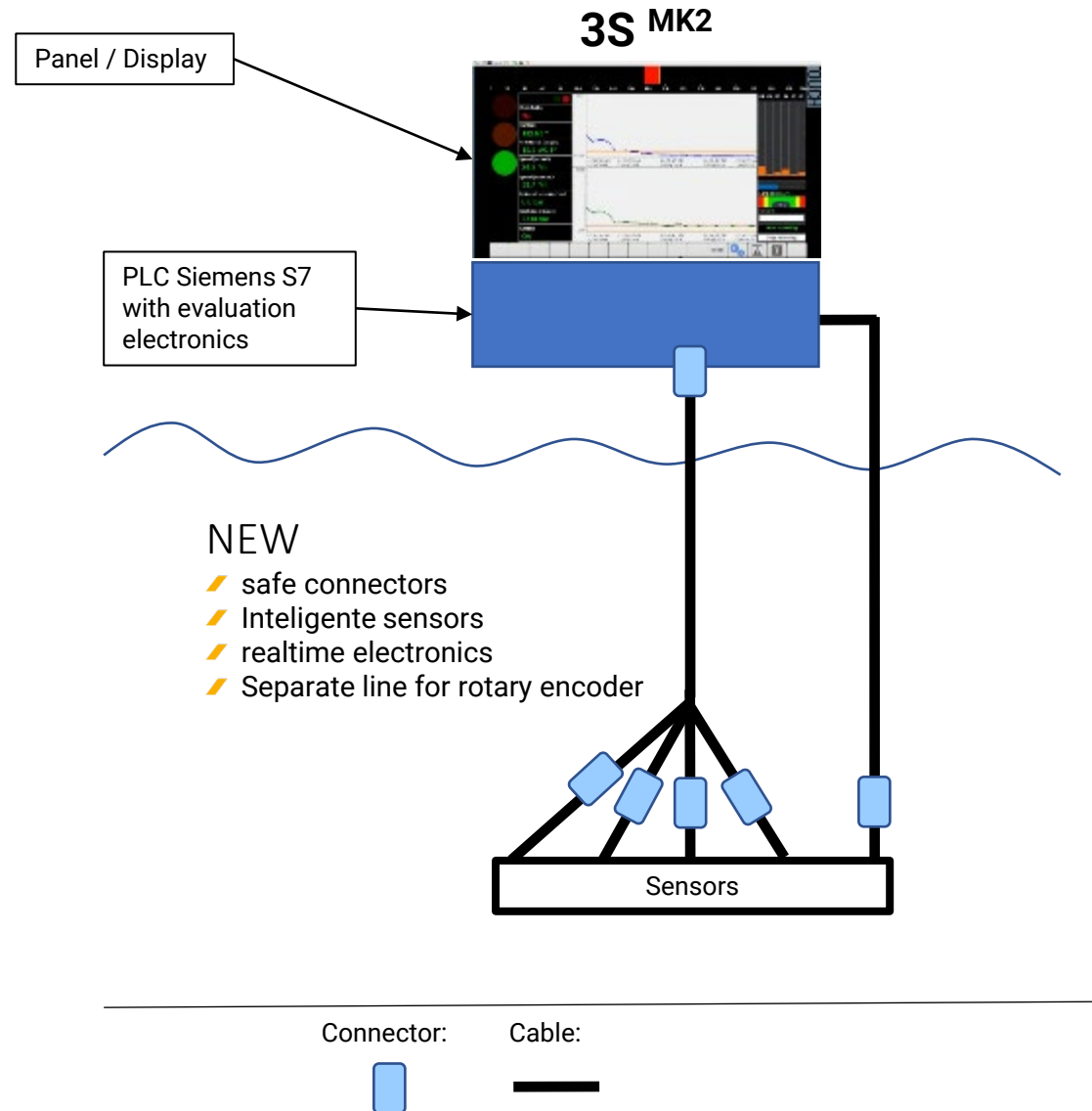
Log window **3**

- Reports the sensor readings
- After starting a task, measurements are logged to a file



► NOTICE

Performance und verification can just be achieved when casing(s) (single + multistring) are set-up in accordance to API-standards, grouted and/or connected to each other. Use the casing cut calculator to plan the rotational speed of the cutting tool during operation. Nothing contained in casing cut calculator (CCC) constitutes advice. Access is granted for guidance purposes only and only for qualified process engineers. Users must use their own professional judgement, knowledge and expertise when deciding whether it is appropriate to apply them to any particular scenario. The CCC is a guide only and may not be appropriate for use in all situations or settings. It also does not guarantee any specific outcome, result or benefit. ANT gives no warranties for the accuracy, currency, reliability or completeness of the calculator.



Cutting Examples



Submerged multi-string casing – DCH 2



- ✓ Mock-up test
- ✓ Water depths 15' / 4m
- ✓ Total eccentric casing setup

CASING	SIZE IN "
1	9 ⁵ / ₈
2	13 ³ / ₈
3	20
4	30

- ✓ Not cemented
- ✓ Average cutting speed 40°/h
- ✓ Cutting time 9h

Multi-string casing – DCH 2



- /// Mock-up test
- /// Water depths 15'/ 4m
- /// Centric casing setup

CASING	SIZE IN "
1	13 ³ / ₈
2	20
3	26
4	30

- /// cemented
- /// Average cutting speed 100°/h
- /// Cutting time 3.5h

Submerged multi-string casing – DCH 2



- Offshore job in the Chinese Sea, Bohai Bay
- Water depths 60' / 20m
- Eccentric casing setup

CASING	SIZE IN "
1	13 ³ / ₈
2	20
3	30

- cemented
- Average cutting speed 60°/h
- Cutting time 8h
- Even out of limit** (NO inner casing), the cut still was successful
- Experienced Operator analysed the signals and reacted quite well

Submerged multi-string casing – DCH 1



- Field test in the GoM
- Water depths 130' / 40 m
- Eccentric casing setup

CASING	SIZE IN "
1	7
2	13 ³ / ₈
3	26
4	30

- Not cemented
- Average cutting speed 60°/h
- Cutting time 6h
- Even out of limit** (not fully grouted), the cut still was successful
- Experienced Operator analysed the signals and reacted quite well

Submerged multi-string casing – DCH 2



- Offshore job in the GoM
- Water depths 60' / 20m
- Eccentric casing setup

CASING	SIZE IN "
1	7
2	10 ³ / ₄
3	16
4	36

- Partly cemented
 - Average cutting speed 60°/h
 - Cutting time 6h
 - Even out of limit** (not fully grouted), the cut still was successful
- Experienced Operator analysed the signals and reacted quite well

Submerged multi-string casing – DCH 2



- Offshore job in the GoM
- Water depths 60' / 20m
- Eccentric casing setup

CASING	SIZE IN "
1	13 ³ / ₈
2	18 ⁵ / ₈
3	36

- Inner annulus partly! cemented
- Average cutting speed 40°/h
- Cutting time 9h
- **Even out of limit** (not fully grouted), the cut still was successful
- ➔ Experienced Operator analysed the signals and reacted quite well

Submerged multi-string casing – DCH 1



- Offshore job in the GoM
- Water depths 60' / 20m
- Eccentric casing setup

CASING	SIZE IN "
1	7 ⁵ / ₈
2	10 ³ / ₄
3	16
4	36

- Partly cemented
- Average cutting speed 30°/h
- Cutting time 12h
- Even out of limit** (not fully grouted), the cut still was successful
- Experienced Operator analysed the signals and reacted quite well

Q&A

Thankyou

Oil- and Gas



Industry



Nuclear Power



EOD/IEDD





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