



# Pipeline Coating Removal Technology in Pipeline Repair

February 2017



# Pipeline Coating Removal Technology

## Technology Applications

- Pipeline and Weld Seam Inspection
- NDE
- Pipeline Repair
- Brownfield Tie-in

# Work Scope Overview

## Phase 1: Dredging

- Its imperative that a 2 meter hole is excavated under the pipeline on a 3:1 slope to ensure that the clamp is successfully installed .
- This depth provides a sufficient distance between the seabed and clamp seals, which limits the risk of damaging the seals during installation

## Phase 3: Pipe Metrology

- Straightness and ovality of the pipe are crucial to the success of the permanent clamp installation.
- Straightness gauge is required for checking the straightness of the pipe.
- A temporary clamp is installed as a hard stop, which aids in the alignment of the permanent clamp during installation.

## Phase 2: Pipe Surface Preparation

- The permanent clamp requires a smooth finish on the pipe prior to clamp installation .
- Its required that all protective coating, surface rust and residue is removed prior to installation, up to 3 meters in length.
- All weld seams must be removed prior to clamp installation in order to create a seal on the section of pipe.

## Phase 4: Clamp Installation

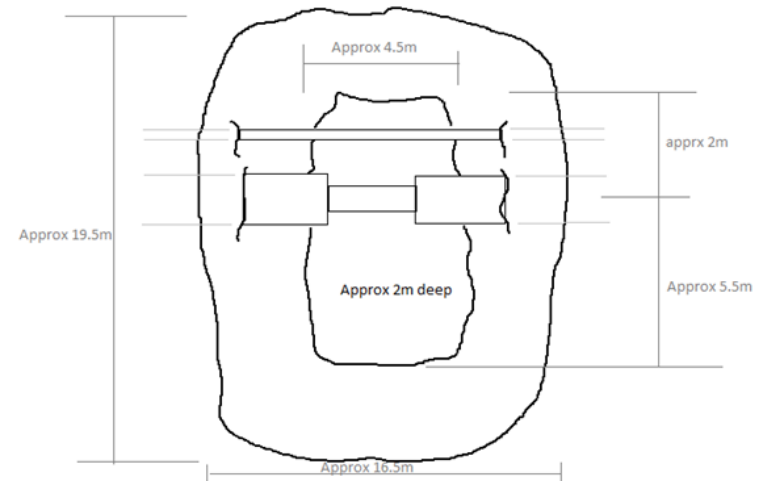
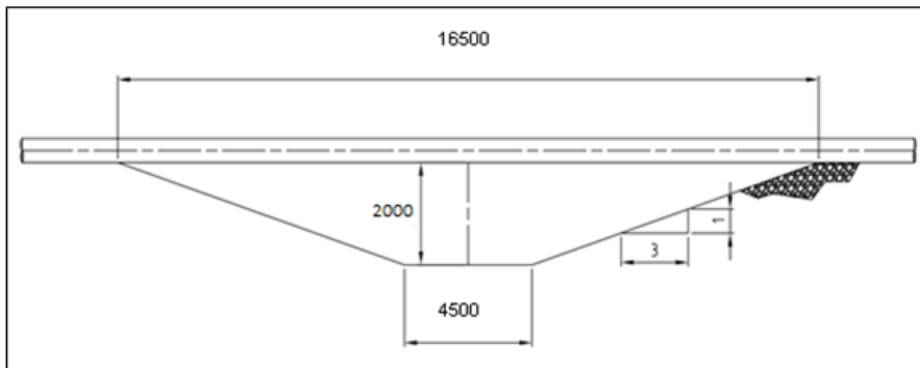
- The clamp installation is best supported by 2 ROVs, MSV with heave compensated crane and Oceaneering's permanent clamp installation frame.
- The permanent clamp installation frame allows for the safe installation of the permanent clamp onto the pipe.

# Dredging



- Provide sufficient access to full pipe circumference
- Allow for a 3:1 slope in seabed
- Dredged depth needs to provide sufficient clearance for further operations
- Where a pipeline repair clamp is being installed additional clearance for clamp seals, which limits the risk of damaging the seals during installation

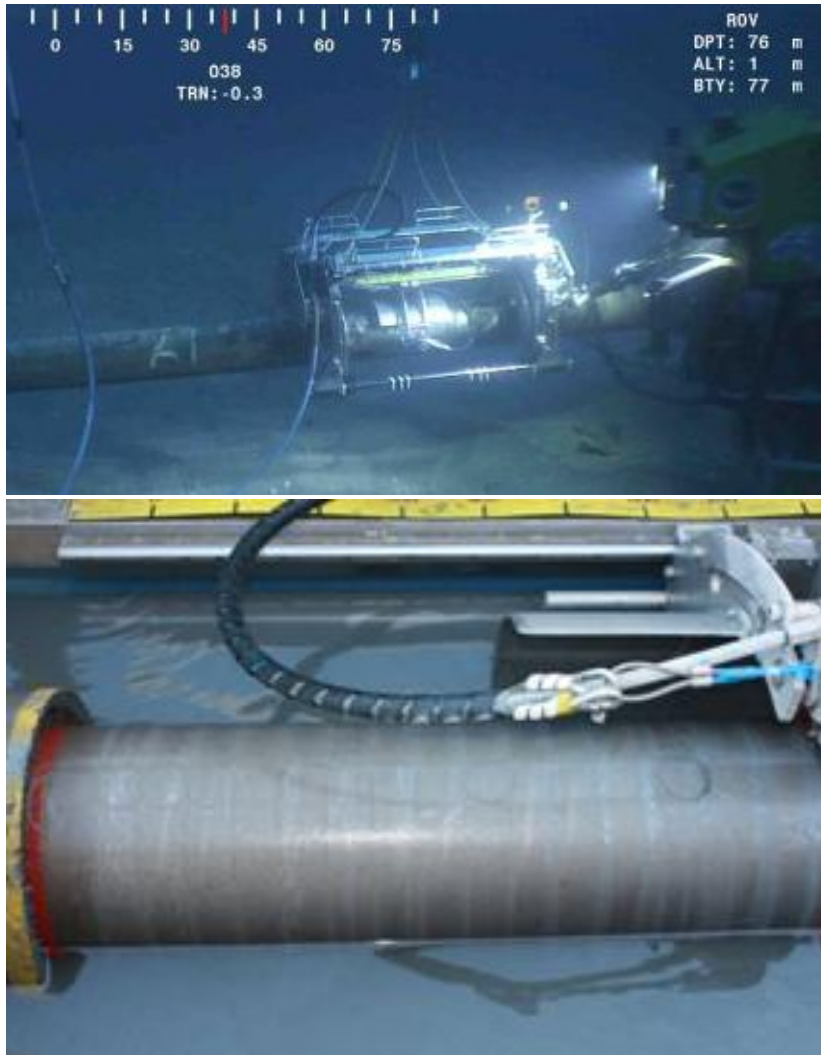
- 3:1 slope required for successful installation of ROV Clamp
- Approximately 350 cubes of total material to be moved for successful installation of ROV clamp
- 6" Diver Dredge will take 2.5 days vessel time
- 12" Subsea Dredge will take 1 day vessel time



# Precision Dredging



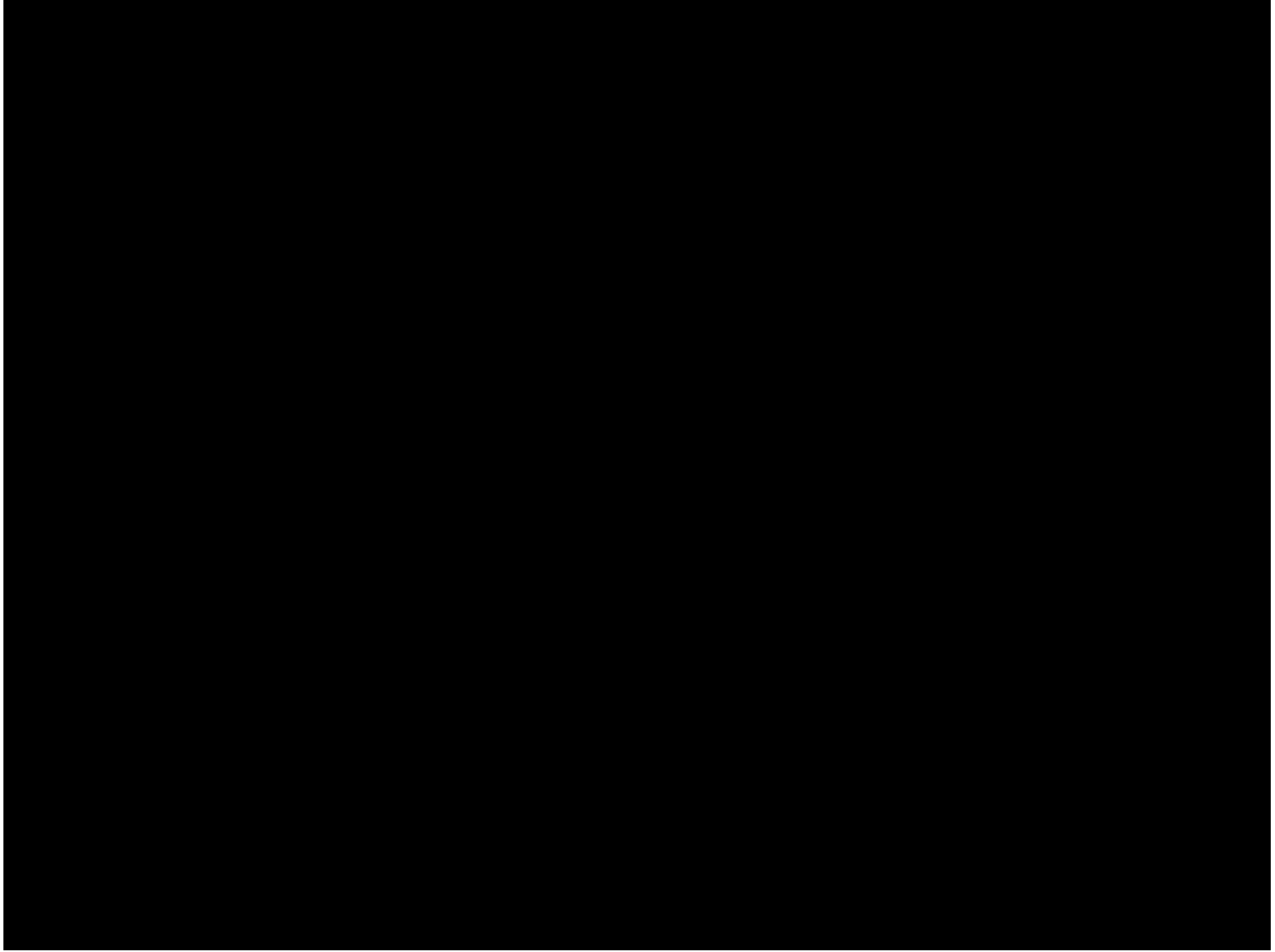
# Pipe Surface Preparation



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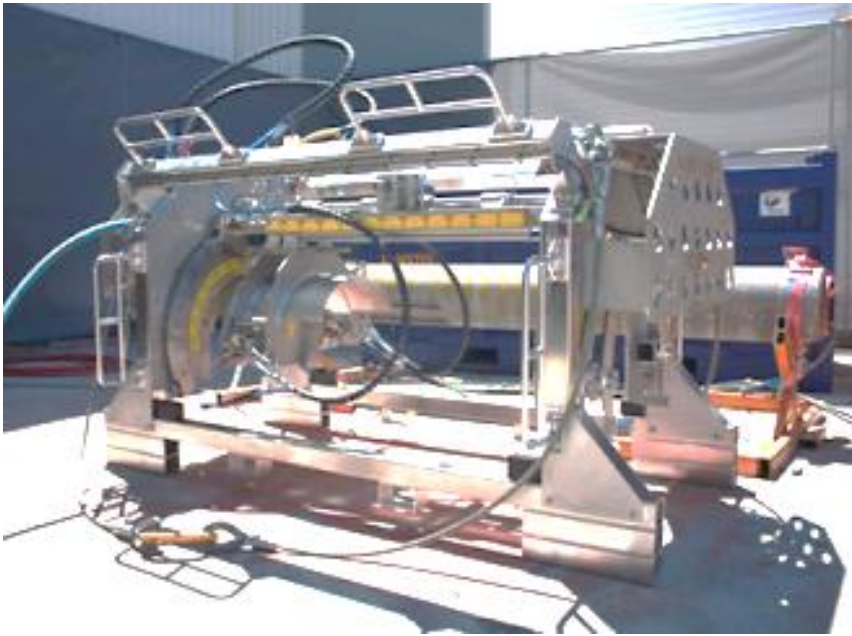
# PCRT Operations

Video

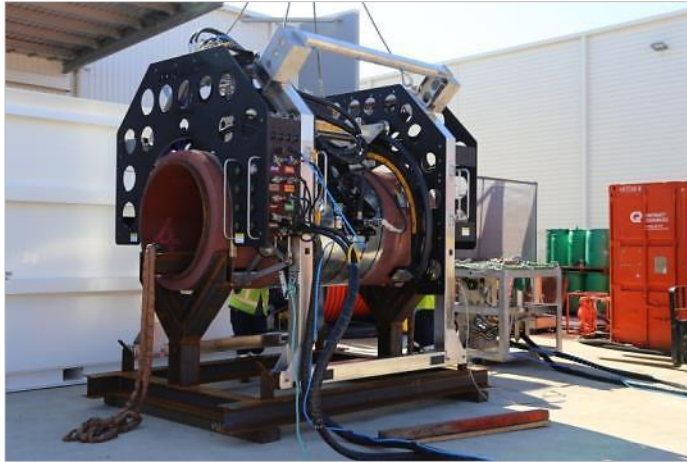




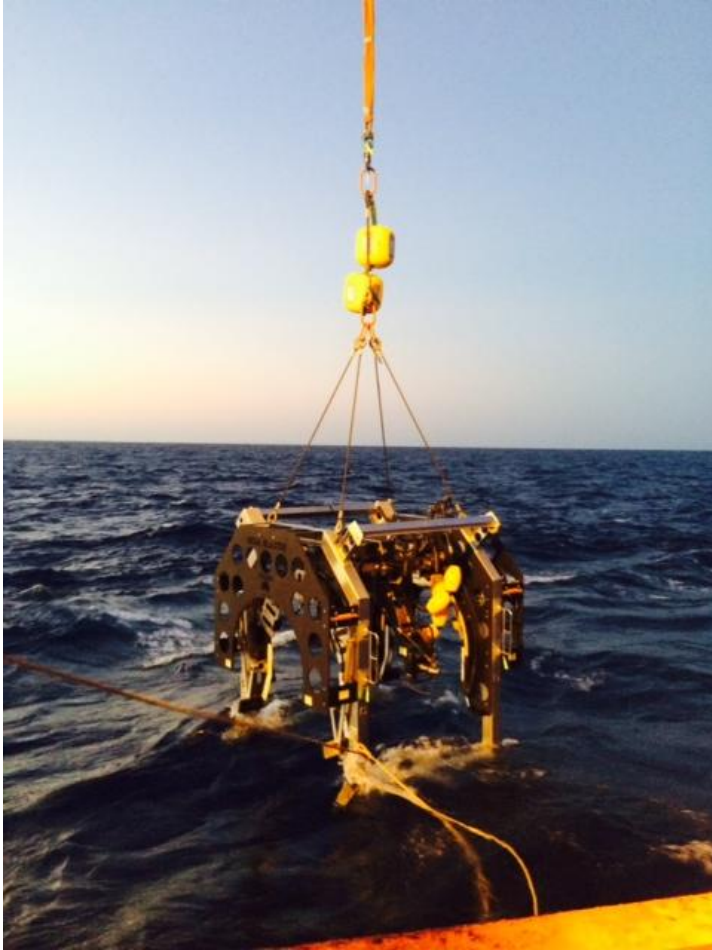
# Protective Coating Removal Tool



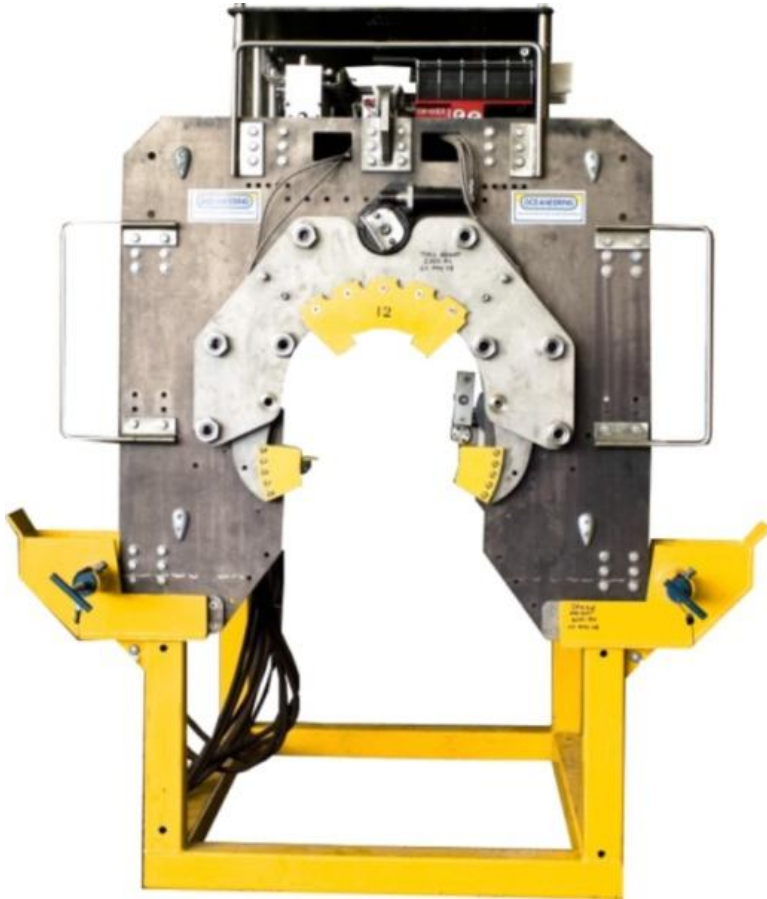
# Protective Coating Removal Tool



# PCRT Operations



# Weld Seam Removal Tool



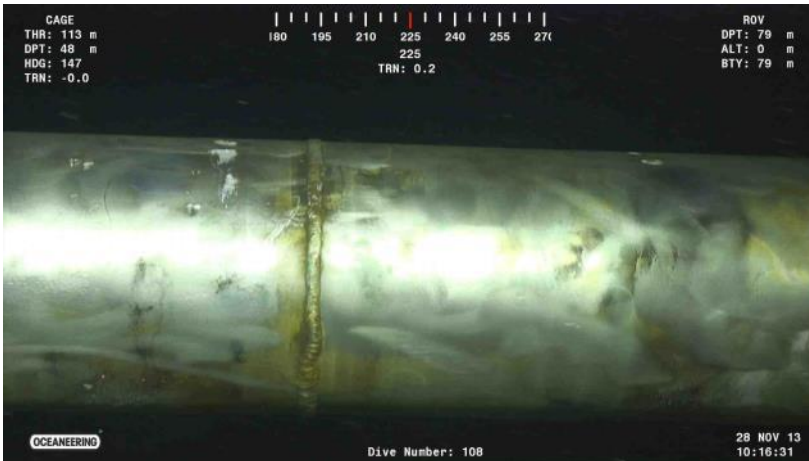
## Key Features

- Capable of removing variety of coatings as well as weld seam (up to 5mm thick)
- Utilises custom milling head
- Integrates to ROV of opportunity for 24V power and hydraulics
- Tool operation via laptop / software controls topside
- Current standard designs for pipe sizes from 10" to 24"
- Can be provided with buoyancy to assist operations

# Weld Seam Removal



# Pipe Surface Finish

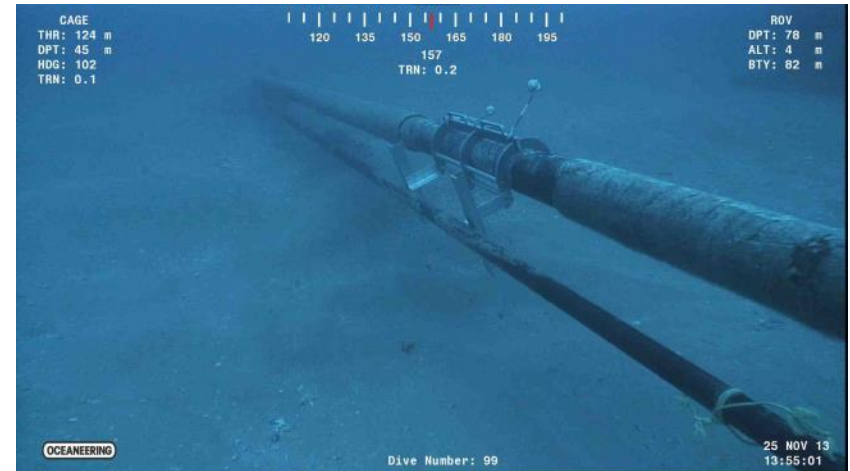
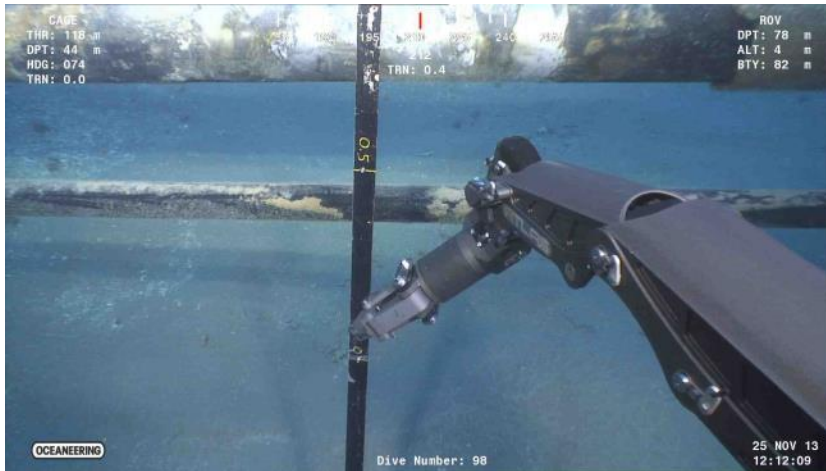


# Pipe Metrology



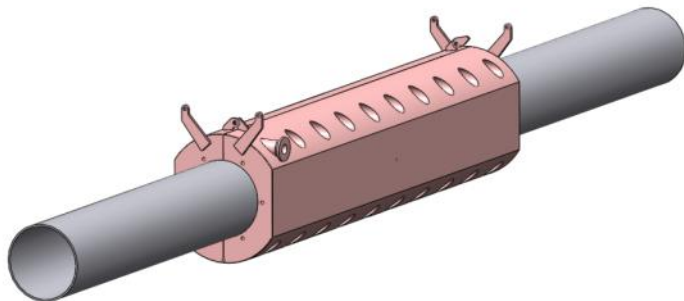
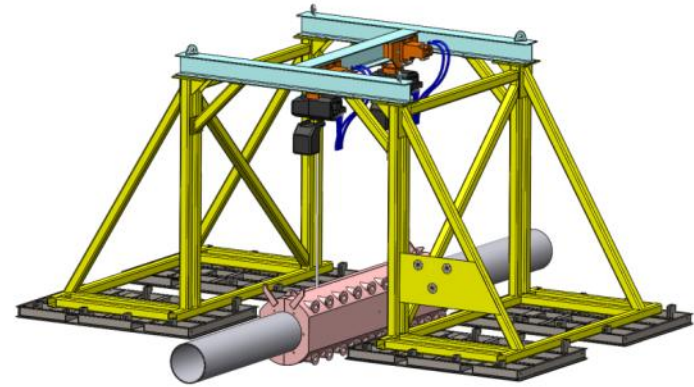
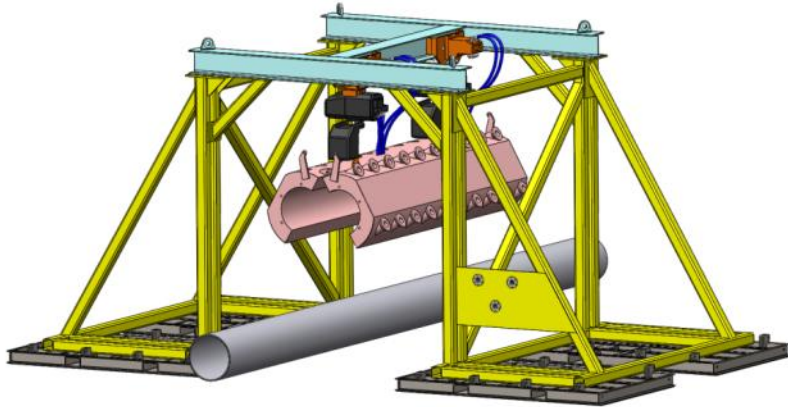
- The straightness of the pipe is crucial to the success of the permanent clamp installation.
- Straightness gauge is required for checking the straightness of the pipe.
- A temporary clamp is installed as a hard stop, which aids in the alignment of the permanent clamp during installation.

# Straightness Gauge & Depth





# Permanent Clamp Installation Frame



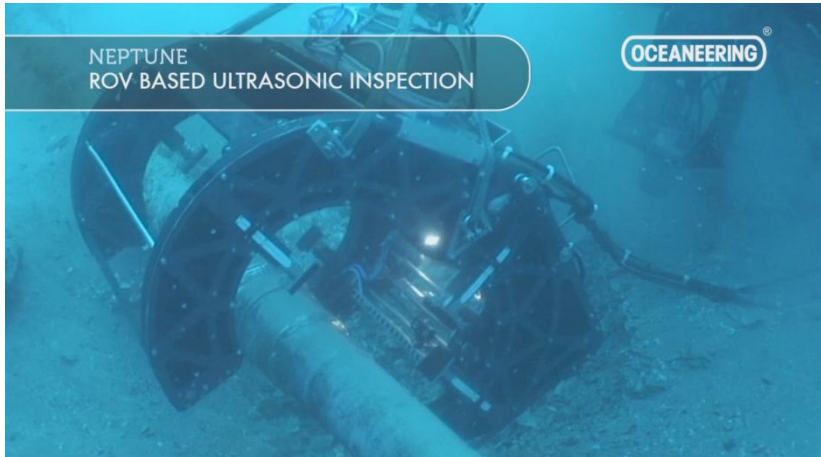
# Permanent ROV Clamp



# Permanent ROV Clamp



# Pipeline Inspection Equipment



## Neptune Tool

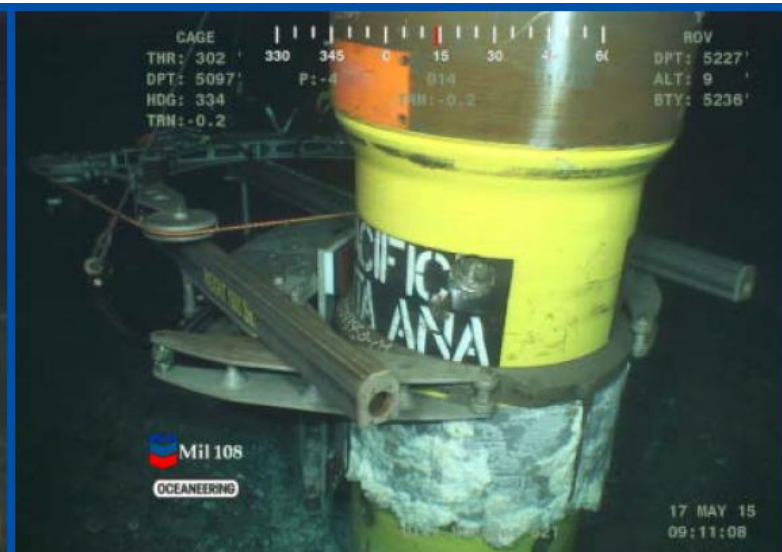
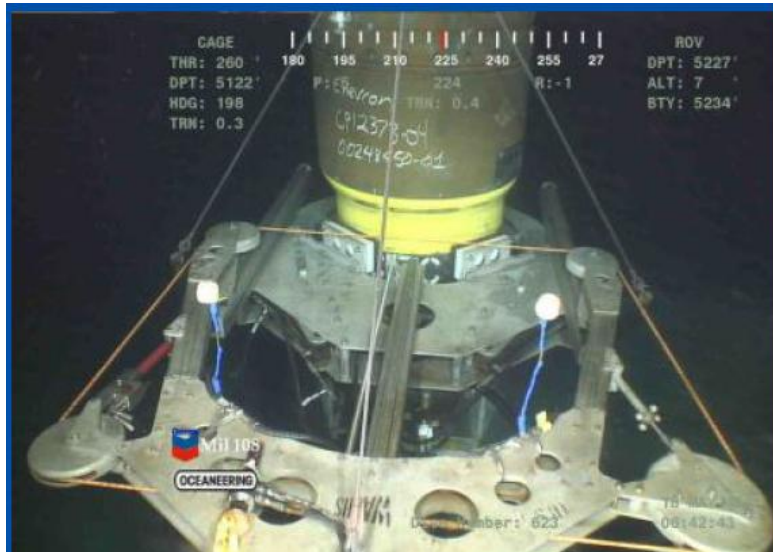
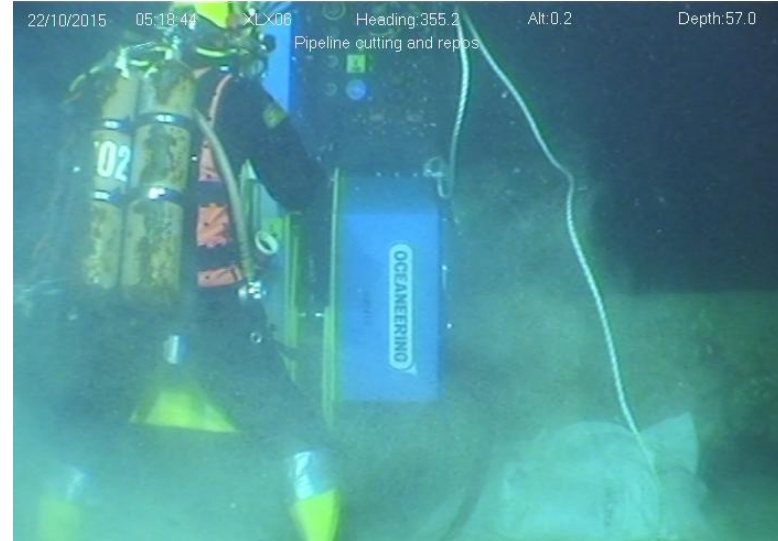
- UT thickness scanner able to move radial and laterally around the pipe to map pipe thickness integrity



# Pipeline Repair Tooling

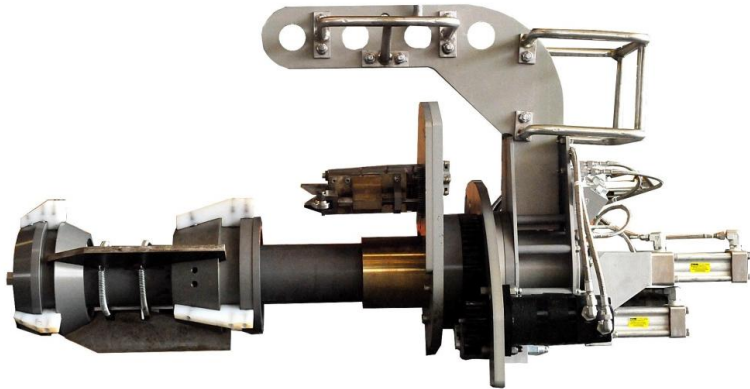
## Diamond Wire Saws

- Diver or ROV Operated
- 4" to 56" Diamond Wire Saws



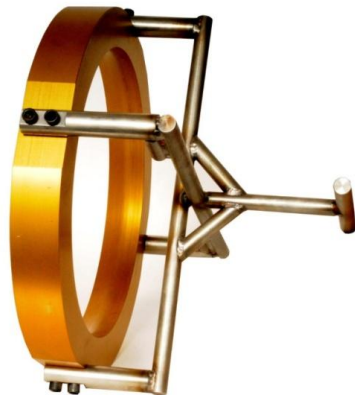
# Pipeline Repair Tooling

## Preparation Tooling



## Pipe End Preparation Tool

- Designed to remove burrs from OD and ID of pipe after cut is made
- Ensures clamp seals are not damaged during clamp installation



## Ovality Gauge

- Go-No-Go type gauge
- Used to verify pipe ovality prior to installation of a connector
- Critical to ensure proper sealing of many grip and seal type connectors

# Pipeline Repair Tooling

## Ancillary ROV Tooling



# System Integration Tests





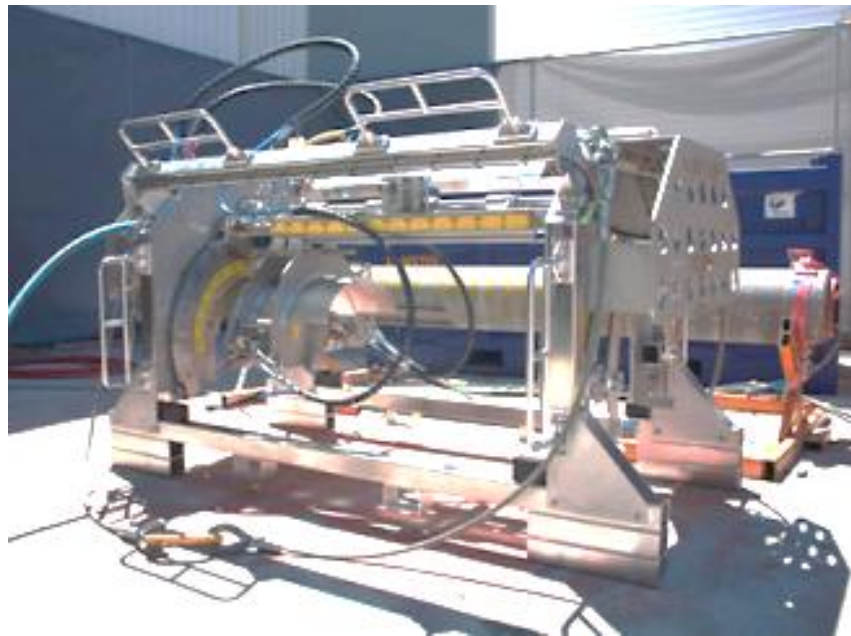
# Pipeline Repair Track Record

## ROV Tooling Pipeline Repair Track Record:

- Malaysia Pipeline Repair – 2016
- Hess Pipeline Repair – 2015
- Australia Pipeline Repair – 2015
- Australia Pipeline Repair – 2013
- Hess Pipeline Repair ROV Tooling Suite – 2011
- Perdido Oil Export Connection Tooling Suite - 2009
- Williams Pipeline Repair ROV Tooling Suite - 2007
- Mars Pipeline Repair ROV Tooling Suite - 2006

# Questions?

Thank you for your attention





Connecting What's Needed with What's Next™