ROCM PRO

SPECIFCATION SHEET

Introduction

The ROCM (Remotely Operated Cleaning Machine) is designed around an in-house concept, which makes the vehicle the ideal platform for cleaning and removal of sea debris and sediment from inside cooling water intake pipelines, culverts, outfalls and sewer pipes.

The system removes the debris from the culvert by using hydraulically operated brushes. The debris is pumped as slurry through a flexible hose to a discharge location. The vehicle itself is mounted on tracks. The vehicle is controlled from the surface using state of the art hard and software techniques.
In the present configuration the ROCM is capable of cleaning culverts up to a maximum width and height of 2400mm and a length of approx. 450mtr

Technical Information

ROCM commercial advantages

- Low risk, no human (diver) intervention for normal cleaning operations
- Operates in contaminated areas
- Shut down periods can be kept to a minimum or can even be omitted
- No dewatering required
- System can be operated with a minimum team of three operators
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ROCM technical advantages

- Adjustable cleaning speed (typically 5m/hr)
- Capability to transport the crushed and slurry material over long distances
- Video and photographic images displayed real-time
- Manual or software pre-set control of the brush arms

Principle of operation

- ROCM is deployed by crane at the desired location
- The operator steers the vehicle slowly to the entrance of the culvert
- Upon arrival of the vehicle at the entrance, the brush arms are positioned and the shredder engaged
- The vehicle crawls slowly forward whilst its arms make a swinging movement over the culvert walls
- The marine growth and other debris are collected using a swinging shredder and subsequently transported to
- the discharge location with the aid of a dredge pump via a five inch flexible discharge hose

Deployment of the ROCM

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Specifications

Dimensions
Length: 6200 mm
Width: 1200 mm
Height: 2125 mm
Weight: 9,500 kg
Depth rating 25 msw

Construction
Steel welded beam frame

HPU
135 kW Subsea electric-hydraulic power pack 3300 V AC 3 phase 50Hz

Hydraulics
2x Parker PV plus 180cc 270 l/min

Performance
Forward max. : ≥ 200m/hr
Forward min. : ≤ 1.35m/hr
Forward (cleaning) : ≥ 5m/hr
Reverse : ≥ 240m/hr
Gradient : ≤ 10 deg.

Propulsion
Tracked Skid: five tonnes Traction Force

Manipulator/tools
Optional

E-POD
SS Steel

Auto functions
- Auto speed
- Brushing
- Collision prevention

Camera
- 1x Front mounted Bowtech
- 1x Aft mounted Bowtech

Lights
4x 250W 230V individually dimmed

Pan & Tilt
2x Sea tools

Altimeter
2x Simrad PA 500

Umbilical winch
Fitted at the rear of the vehicle

Controls
- Constant Tension (CT)
- Constant speed (pay out pay in)
- Distance Counter

Slipring
Focal oil filled:
- 8x 3300 V 20A
- 5x 1000V 6A
- 6x data
- 2x multimode fibre optic

Umbilical
Length: 450 m
Breaking strength: 24,000 kg
Strength member: Steel armoured

Spooling device
Chain driven level wind mounted in front of the winch drum

Cleaning system
- 2x hydraulic side arms & brushes
- 1x hydraulic top arm & brush

Shredder
2 in opposite direction rotating cutter disks

Water/sludge pump
1x 65 kW centrifugal

Deployment & Recovery
Mobile Crane or Cantilever

Control cabin
Length: 6100 mm
Width: 2440 mm
Height: 2400 mm
Weight: 5,400 kg

Workshop cabin
Length: 6100 mm
Width: 2440 mm
Height: 2400 mm
Weight: 7,000 kg

Debris discharge hoses
HDPE five inch

Power requirements
280 VAC 50 Hz
Max. load 210kW / 250 kVA

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Control Unit
The fully air-conditioned control unit, a standard ISO 20 foot container, is divided into a transformer / switchgear room and a control room.

Monitoring
The cleaning process is monitored and controlled by the operator of the ROCM from a control desk situated incontrol room. The operator acquires and processes all the necessary information using at least the following sensors:

- Camera's, that show views of the vehicle
- A profiling sonar
- An altimeter that measures the vehicle's position in – and alignment with – the culvert and or pipe
- An odometer, which measures the travelled distance and calculates the speed

Winch
The vehicle is connected to the control cabin via a steel armored umbilical that is stored on the umbilical winch fitted at the rear of the vehicle.
The winch is driven by a reduction gear and hydraulic motor and also drives the integrated spooling device.

Arms and Brushes
he arms - located on front of the vehicle – are fitted with rotating brushes that clean the sealing and the sidewalls of the culvert. The arms are positioned using hydraulic cylinders in order to produce a pre-defined brush force against the wall and to furthermore provide a
swinging circular movement along the ceiling and the sidewalls. The side force is achieved by pressure control of the related cylinder. The rotating brushes are mounted at the end of the arms and are driven by fixed volume hydraulic motors. The position of the arms is monitored via angle transmitters in the centre of the hinges
and a control system prevents collision of the arms while moving.

Track System
The function of the tracks is to support and to drive the vehicle at a certain speed. With the tracks moving in the same direction, the vehicle may be steered forward or backward; rotating around the axis of the vehicle is effected when each track moves in separate direction; speed is regulated by the speed of the tracks. Both tracks, depending on the characteristics of the bottom, are capable of producing a total of approx. five tonnes of traction force.

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Shredder
The shredder is mounted at the front of the vehicle just behind the top side brushes. A wheel and slide plate supports the shredder at the bottom side.
The effective weight of the shredder is reduced by a constant pressure in its hydraulic lifting cylinder.
The shredder comprises two cylindrical cutters fitted with steel cutting blocks, which rotate in opposite directions in order to achieve the crushing of the marine growth (e.g. mussels) or debris. The maximum dimension of the debris to be transported is approx. 70 x 70mm2. The maximum torque of the cylinder cutters is set to 1000Nm at P=160bar at 60rpm.
The shredder swings between the vertical walls in continuous bottom contact. The swinging motion is produced via hydraulic cylinders placed on both sides of the arms connecting shredder head with the swivel part.
In the event an obstacle occurs or a deviation should take place, the shredder can be lifted using the hydraulic cylinder in the centre on the swivel part. The hydraulic cylinder can be activated by hand from the control panel. The cylinder pressure is pre-set, but can be overruled by hand. The cylinder connects the shredder systems arm to the frame of the vehicle. The vertical angle is measured and monitored.
From the shredder, debris and water is transport via the debris/water chamber on top of the shredder along a vacuum dirty water hose to the centrifugal water pump.
The mixture of water and debris (slurry) is thus taken into the dredge pump and transported to the discharge location via the discharge hose.

Redundancy
The entire system is backed up by a second identical ROCM system.

View on site of the five inch discharge hose reels

Collection of debris slurry into temporary stilling basin

Drying of the debris slurry prior to removal