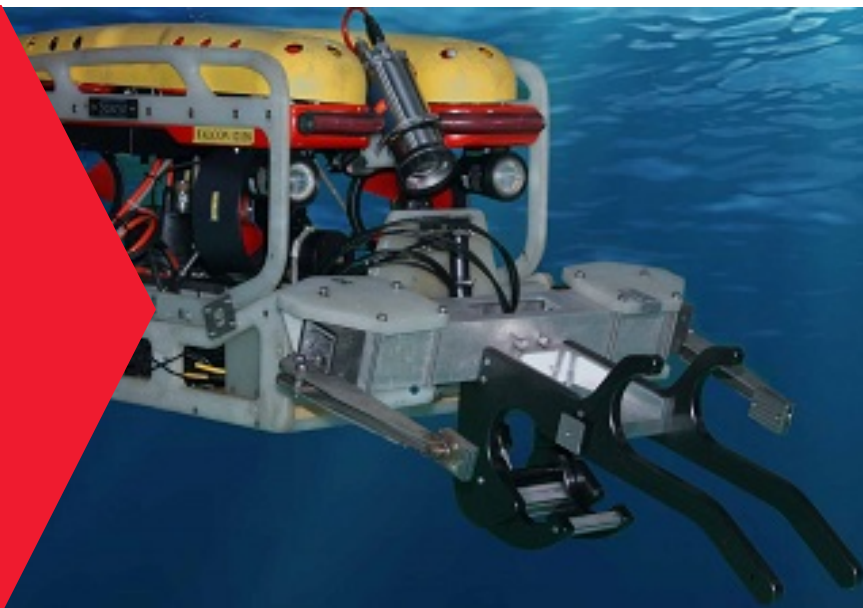


## About

Film-Ocean is an independent subsea contractor providing ROV inspection and intervention services. We specialise in providing innovative, cost effective subsea solutions to the global oil and gas industry and have an extensive track record in performing subsea integrity inspections on floating and fixed structures from the asset or support vessel with a fleet of high specification ROV's.

## Chain Measuring System



## Product Overview

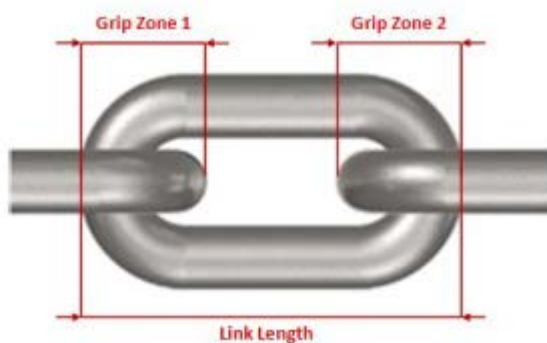
Film-Ocean conducts chain measurement using its patented chain measuring tool that is classified by ABS, BV, DNV-GL and Lloyds. The equipment has been used on FPSO's globally to provide cost effective, real time results that can be used to quantify the mooring systems performance. Both interlink and link lengths can be measured accurately with repeatable results. Our specifically developed marker clips can be placed on individual chain links at pre-determined depths, this allows monitoring for wear/corrosion and any changes tracked year on year.

The key benefits/advantages of the system are:

- Results are recorded in real time allowing for in-field project driven decision making
- Significantly reduced project costs due to no onshore data processing
- Class accredited by ABS, BV, DNV and Lloyds
- High pressure hydraulic system and precision contact points requires minimal marine growth cleaning saving operational time

# Chain Measuring System Specification

During each engagement measurements are recorded for both interlink areas as well as the link length. In addition to these dimensions both the parallel bar diameters are recorded using an additional tool. This measurement is taken either side of the mid-point of the bar to avoid the flash but weld area.



Measurements are recorded for Grip Zone 1 and Grip Zone 2 in the above illustration in Film-Ocean bespoke software package

Measurements are recorded using very accurate linear variable displacement transducers (LVDT). The hydraulic pressure of the individual cylinder used during each reading is also recorded to ensure the same force is being applied between the calibration and actual readings. All data output is displayed and recorded directly by bespoke software.

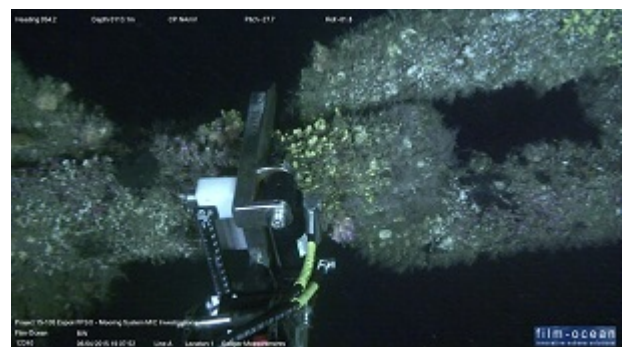
- 4 bi directional hydraulic feeds @ 150bar minimum 2 litres per minute flow rate
- 1 bi directional hydraulic feed with fail safe feature to allow return to tank in the event of power or communications loss @150bar minimum 2 liters per minute flow rate

This equipment can be deployed on studlink or studless chains with a range of industry standard bar diameters. Depending on the mooring chain type and size there may be a requirement to engineer components for our chain measurement system for the relevant mooring system design.

Prior to measuring there is no requirement to remove soft marine growth from the mooring chain links for accurate readings to be taken. If there is a large build-up of hard marine growth this would potentially affect the ability of the tool to engage on the chain links, should this be the case there may be a requirement to clean the chain prior to measuring.

In addition to the chain measuring tool a separately deployed bar diameter measuring tool is used. This tool is fitted with additional contact points to allow for the depth of corrosion pits to be accurately measured.

The system can be used on all of Film-Ocean's ROV fleet with the exception of the Micro Class ROV systems, it can also be integrated onto a 3rd party ROV system if required. If used by a 3rd party ROV system a manipulator arm should be available to hold the tool and the following services are required.



Example of bar diameter measuring tool in use on catenary chain