



KONGSBERG

Kongsberg Maritime Ltd

0480-6001 OVERHEAD LINE EQUIPMENT (OLE) INSPECTION CAMERA SYSTEM

Product Overview

Prepared by: Dan Williams
Business Development Manager

Date: 30/11/11

© Kongsberg Maritime Limited. "This document contains information confidential to Kongsberg Maritime Limited. Any disclosures or use of this information or any reproduction of this document or any part thereof for other than the specific purpose for which it is expressly intended is prohibited except as Kongsberg Maritime Limited may otherwise agree in writing."

Kongsberg Maritime Limited
Campus 1, Science and Technology Park, Balgownie Road, Bridge of Don, Aberdeen
AB22 8GT, Scotland

Tel: +44 (0) 1224 226500
Fax: +44 (0) 1224 226501
Email: info.km.systems.uk@kongsberg.com
www.km.kongsberg.com/cameras



CONTENTS

1.	0480-6001 WIRELESS POLE-MOUNTED OVERHEAD LINE INSPECTION CAMERA	3
1.1	CAMERA HEAD SPECIFICATIONS	4
	1.1.1 Electrical and Optical Specifications	4
	1.1.2 Mechanical & Environmental Specifications	4
1.2	LIGHTING PACK SPECIFICATIONS	5
1.3	POLE AND KNUCKLE JOINT ADAPTER CONNECTION	5
2.	BASE STATION	7
2.1	BASE STATION CHARACTERISTICS.....	7
2.2	SOFTWARE CHARACTERISTICS	8
3.	COMPANY INFORMATION	11
4.	PREVIOUS CCTV SYSTEMS DELIVERED.....	12
4.1	HIGH VOLTAGE INSPECTION CAMERA SYSTEMS.....	12
4.2	NUCLEAR POWER PLANT INSPECTION SYSTEMS.....	12
4.3	UNEXPLODED ORDNANCE (UXO) MONITORING SYSTEM	12
4.4	SEDCO 707 SEMI SUBMERSIBLE DRILLING RIG	12



1. 0480-6001 OVERHEAD LINE EQUIPMENT (OLE) INSPECTION CAMERA

Overhead Line Equipment (OLE) defects can result in service disruption and loss of rail income amounting to millions of Pounds/Euros, therefore regular inspection to identify, monitor and fix defects is required. Traditionally detailed inspection often necessitates the possession of the track, isolation of the OLE and expensive road/rail access equipment in addition to a disruption of service and associated costs. By revolutionising the inspection process using Kongsberg's live voltage 0480-6001 wireless overhead line inspection camera system, Rail companies can significantly reduce maintenance costs and avoid potential circuit failure and train service disruption.

The wireless pole mounted 0480-6001 OLE camera features a high-resolution 8 mega pixel stills/video colour sensor with close-up lens for accurate measurement and analysis, with a wireless RF transmission link to the base station. The camera features remotely-controllable motorised tilt, digital zoom and scaling/steady arms to ensure effective imaging regardless of the conditions. Image stabilisation and auto-focus are included as standard, to provide the maximum detail to the user with minimal adjustment, increasing survey efficiency.

The 0480-6001 camera has been designed and qualified to operate with live high voltage wires and the standard unit is designed and tested to withstand up to 29Kv AC. The camera head can be modified and tested to withstand higher voltages if required and a number of high visibility colour options are available. Each camera is supplied with a removable robust adjustable-output LED lighting unit.



**Figures 1 & 2 - Pole-mounted Inspection Camera, with scaling arms*



Figure 2- Complete O480-6001 Wireless inspection camera system with camera, lighting, base station and transit case



1.1 Camera Head Specifications

1.1.1 Electrical and Optical Specifications

Characteristic	Specification
Camera resolution- stills	8mp (3264x2448)
Camera resolution- video	VGA (640x480 at 15fps)
Angle of view	64° diagonal
Zoom ratio	4.25x (digital)
Image stabilisation	Yes
Autofocus	Yes
On-board DSP	For image processing and enhancement, colour correction, edge detection etc.
Connectivity	802.11g – 2.4GHz
Wireless Operating Range	Up to 100m
Run-time	5Hrs (typical)
Electro-Magnetic Compatibility	EN61000-6-2-2004 Emission EN61000-6-4-2007 Immunity
Battery Pack	Lithium-ion 14.4Ah Rechargeable (charger supplied). Lifecycle at least 400-500 charging cycles**
Steady/Scaling Arms	150mm as standard

*Typical' means a value that may change in the course of operation, often due to the operating environment or system aging

1.1.2 Mechanical & Environmental Specifications

Characteristic	Specification
Tilt Range (Electrically driven)	+30° from horizontal; does not affect measurements
Connections	1-off 4-pin connector (Charging)
Housing Material	High-impact moulded plastic
Size (HxWxD)	120x160x142mm
Weight	1.925 Kg (Including Steady arms)
Mounting	Quick-release
Environmental Parameters	Rating IP68 (2m)
Operating Temperature	-10 to +40°C
Storage Temperature	-10 to +50°C (up to 1 week) -10 to +35°C (long term)
High Voltage Resistance	29kV (15 minutes wet or dry)



1.2 Lighting Pack Specifications

Characteristic	Specification
Technology	Solid-state White LED
Light Output	Up to 40 Lumens
Run-time (typical)	High: 6Hrs Med: 28Hrs Low: 48Hrs
Weight	0.1Kg
Battery Pack	Lithium Ion 0.6Ah rechargeable /replaceable (charger supplied). Lifecycle 500-600 Cycles**

**Providing the battery manufacturer's usage guidelines are followed

1.3 Pole and Knuckle Joint Adapter Connection

The camera head has an end cup design which can be clipped on to the end of a client supplied fibre glass pole or angled knuckle adaptor. These must be certified for high voltage use. An example of this arrangement can be seen below:

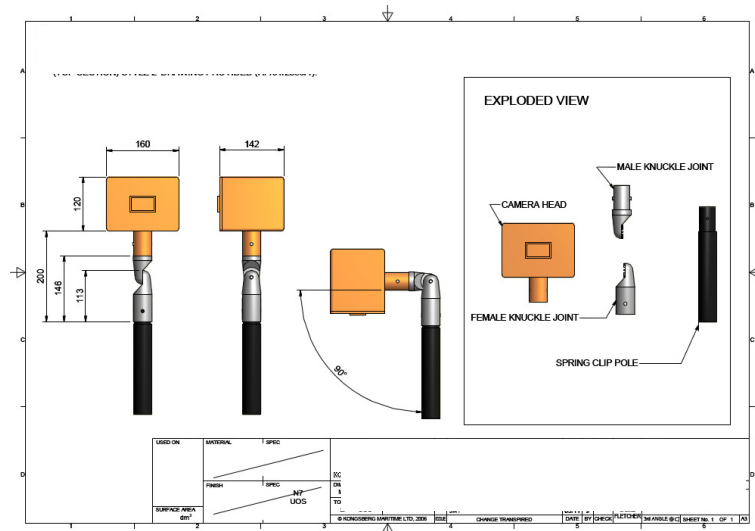


Figure 3 – Camera head and knuckle and pole adapter connections

N.B It may be possible to source a similar knuckle adaptor from Network Rail's subcontract manufacturer.



*Figure 4 - O480-6001 Example system usage**



*Figure 5 - O480-6001 Example Camera head positioning**



*Figure 6 – Example wire inspection image**

*Images Courtesy Of Network Rail who have thirty O480-6001 camera systems in use in the UK



2. BASE STATION

The base station is a PC-based control and display unit, with user friendly camera control interface and an accurate measurement software package that is capable of recording and displaying live video and stills from the camera and the GPS coordinates of the inspection site. The base station is capable of analysing the video feed from the camera in order to measure down to greater than 0.1mm accuracy, and uses the images captured to automatically document the inspection run in a full-colour text document with screenshots and analytical data including GPS coordinates and wire measurements.

Simple operation (via touch-screen or trackpad/keyboard) allows the user to quickly and efficiently record single images and video, control the tilt movement, perform measurements and generate comprehensive reports with the minimum of training and configuration time. The latest battery technology allows the laptop and wireless receiver to operate for approximately nine hours between charges, with minimal weight.

2.1 Base Station Characteristics

Characteristic	Specification
Brand	Panasonic Toughbook
Model Number	CF-19RHRC
Format	Convertible- Laptop or Tablet
Screen	10.4" Sunlight-viewable TFT
Run-time	9Hrs (typical)
Weight	3.64Kg (in harness)
Qualification	MIL-STD-810G for water, dust, shock and vibration
Environmental Parameters	Rating IP65
Operating Temperature	0 to +40°C
Storage Temperature	-10 to +50°C (up to 1 week) -10 to +35°C (long term)

*Typical' means a value that may change in the course of operation, often due to the operating environment or system aging

The base station is installed in an ergonomic chest harness, providing a stable and comfortable working platform to the user. This chest harness shall also contain the battery pack and wireless interface used to link to the camera head. When not in use, the base station, camera unit and lighting pack(s) will be stored in a rugged peli case, along with chargers, cables and a quick-reference guide to operating the system. This case shall be suitable for transportation as well as longer-term storage.



2.2 Software Characteristics

Characteristic	Specification
Measurement Accuracy	0.1mm or better
Supported Functions (not exhaustive)	<ul style="list-style-type: none"> -Live/recorded video playback and comparison -Multiple still image and video export formats supported -Intervalometer function -Annotation of images to highlight features of interest -Measurement accuracy greater than 0.1mm – sub-pixel measurement capability- Measurement statistics- log and identify trends across a survey
Automated Report generation	Yes
Report format	Rtf, pdf, spreadsheet, etc.
GPS Logging	Yes
Remote tilt control	Yes (through software)

The measurement software is Modified-Off-The-Shelf (MOTS) and as such license to copy/redistribute shall remain with the software manufacturer. Kongsberg Maritime Ltd shall not impose restrictions on the measurement software and grant customers Licence to adapt the reporting templates, however, the software manufacturer's conditions shall still apply (regarding redistribution and so on). Configuration files for the customisation of the reporting process, developed with the customer, constitute part of the camera system and ownership of these files shall rest with the Customer upon contract fulfilment.



Figure 7- O480-6001 Base Station, Harness and Camera Control Graphical User Interface*



Figure 8 - Simple to use camera control software and extremely detailed high resolution wire image sample. High quality video can also be recorded*

N.B Once the image capture button is pressed the image is uploaded within seconds wirelessly to the remote base station (Up to 100m a way) and then automatically launches the measurement software (If required) – see figure 7

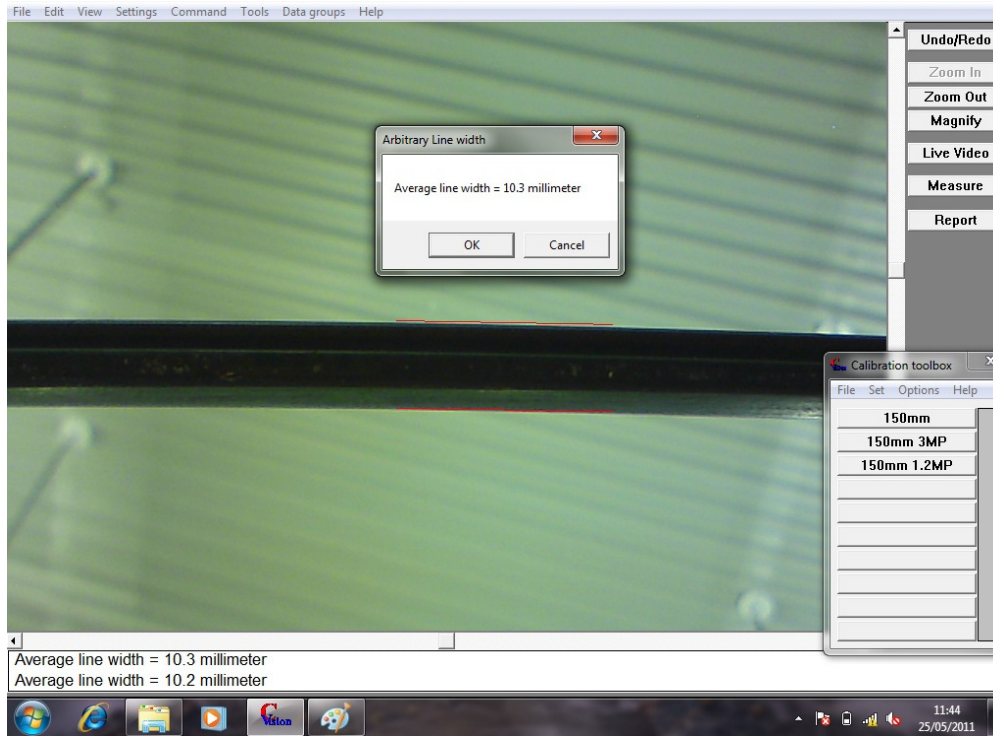


Figure 9 – Highly accurate calibrated measurement software capable of wire diameter measurements of within 0.1mm Picture and measurements can then be uploaded into a customised report template – see figure 8*



*Figure 10 – Example automatic wire survey report template including GPS and wire measurement information. Report templates can be easily customised to suit each client**



3. COMPANY INFORMATION

Kongsberg Maritime Ltd is a member of Kongsberg Gruppen (KONGSBERG) and is a world leader in the design and manufacturer of underwater video and imaging products and harsh environment Marine CCTV systems to the Offshore Oilfield, Maritime, Scientific and Defence sectors. Key credentials including:

- Formed in 1977 as Osprey Electronics, joined Simrad/KONGSBERG Group in 1992
- Over 30 years CCTV design, manufacturing & commissioning experience
- Supplied over 200 CCTV systems and 10,000 underwater video cameras
- Market leading video technology designs, including some of the highest performing low light camera technologies for military and commercial use
- Highest product quality, reliability & price-performance levels
- Flexible in-house design, engineering and manufacturing
- Well established worldwide distribution and support capability
- Large systems and projects delivery, integration, commissioning and support capabilities for both vessel builds and refit projects

Kongsberg Maritime Ltd (KML) employs over 150 staff across four modern custom facilities located in the UK, including its head quarters and a state of the art training facility in Aberdeen, a camera manufacturing plant in Wick and a sales and service office in Waterlooville. All facilities have been assessed to BS EN ISO 9001:2008 by British Standards Institute Ltd (BSI). In Global terms, Kongsberg Gruppen (KONGSBERG) was founded in 1814 and creates and delivers high-technological solutions for people that operate under challenging conditions on the oceans, in the deep sea, in the defence and in space. KONGSBERG provides increased safety, security and performance for companies that operate under such extreme conditions.

In 2010, KONGSBERG had a turnover of NOK 15.5 billion, and the Group had 5,681 employees in more than 25 countries, including Norway, The Netherlands, USA, Korea, China, Canada, Italy, Spain and Singapore and has agent and customer support representatives throughout the rest of the world.

Established Customers Include:

Offshore/Hydrographic

- Acergy
- Aker
- Atwood
- Diamond Drilling
- Fugro
- Gardline
- Oceaneering
- Pride
- SMD, SAAB/Seaye
- Schilling
- Sonsub/Saipem
- Subsea7
- Technip
- Transocean
- Triton Group

Marine Research

- CEFAS
- DAFS/MAF
- Irish Marine
- JAMSTEC
- KORDI
- Oceanlab
- NOC Southampton
- SAMS
- Serpent Project
- Various Universities

Defence

- Australian Navy
- BAE Systems
- Chinese Navy
- Curtiss Wright
- Earl Industries
- General Dynamics/ Electric Boat
- Indian Navy
- Korean Navy
- Lockheed Martin
- NASSCO
- NATO
- Raytheon
- Singapore Navy
- UK Navy
- US Navy (NAVAIR)



4. PREVIOUS CCTV SYSTEMS DELIVERED

Kongsberg Maritime Ltd has designed, manufactured and delivered over 200 marine and land based harsh environment integrated CCTV and video systems. A few interesting examples include:

4.1 High Voltage Inspection Camera Systems

Kongsberg Maritime Ltd has delivered thirty custom designed wireless high voltage OLE (Overhead Line Equipment) Inspection camera systems to Network Rail in the UK. The advanced camera system enables preventative fault finding and significant safety & efficiency improvements.



4.2 Nuclear Power Plant Inspection Systems

Kongsberg Maritime Ltd has delivered over thirty extremely robust OE16-100a and OE18-100a portable pole mounted inspection systems to leading Nuclear Powerplants in the UK (including Sellafield and Dounreay).



4.3 Unexploded Ordnance (UXO) Monitoring System

Still in operation with the British armed forces around the Globe, Kongsberg Maritime Ltd's UXO Monitoring System provides distributed sensor technology for enhanced planning, execution and monitoring of UXO render safe procedures. The system comprises of a monitoring station, 500m communications link and forward deployable elements, including: an Acoustic Sensor, Chemical Agent Sensor, Temperature Sensor and Remote Video Camera System.



4.4 Sedco 707 Semi Submersible Drilling Rig

Kongsberg Maritime Ltd has recently delivered an expandable 24 camera CCTV system of EExd hazardous area, and marine type safe area, stainless steel camera's situated throughout the vessel. These were controlled by either the drillers EExp hazardous area control station or safe area controllers located within the accommodation module utilizing the customers existing fibre optic cables for video, control and power needs.

