



COLD CORROSION MONITORING SERVICE

TREND MONITORING TOOL
FOR MODERN ENGINES



COLD CORROSION MONITORING SERVICE

COCKETT LUBRICANTS' SOLUTION FOR COLD CORROSION PREVENTION

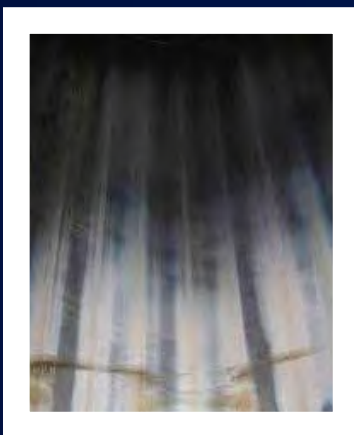
Cockett Lube Monitor provides the shipping industry with a unique piston underside oil analysis programme, Cylinder Cold Corrosion Monitoring System (CCMS) specifically dealing with 'cold corrosion'.

By monitoring parameters of piston underside oil, the CCMS is not only able to identify cold corrosion of cylinder walls; it provides the ship's engineer with early warning to be on the alert for 'cold corrosion'. It also has benefits for other main engine related processes such as optimisation of the cylinder oil feed rate.

CAUSES OF COLD CORROSION

This is a particular type of corrosive wear, caused by acid condensation resulting from a drop in engine operating temperatures and affect long strokes/super long strokes engines, particularly during slow steaming.

The iron particles formed by this process are then flushed from the engine by the cylinder oil. This leads to excessive liner wear and generates high corrective maintenance costs.



FOCUS ON PREVENTATIVE MAINTENANCE



MAIN FEATURES

- Identifies cold corrosion of cylinder liners
- Provides early warning to the Chief Engineer and the Technical department
- Provides comprehensive data on cylinder and rings operation
- Monitors wear condition of cylinder and rings
- Contributes to the optimisation of cylinder oil feed rate
- Monitors condition of stuffing box
- Identifies contaminants (e.g. water and system oil)
- Avoids over-lubrication of the main engine
- Monitors operating condition of the cylinder oil lubricants

BENEFITS OF CCMS

Cost and maintenance conscious owners and managers will find CCMS a flexible, user friendly and reliable tool to support preventive maintenance programmes or develop condition monitoring for their vessels.

- Allows considerable saving by focusing on preventive actions instead of costly corrective maintenance
- Minimises unscheduled down time of main engine
- Provides early warning before scheduled maintenance of main engine
- Optimises operating condition of modern main engines to reach safely desired load and speed requirements
- Extends components life
- Allows real and safe optimisation of cylinder oil feed rate
- Minimises contamination of system oil of main engine by monitoring stuffing box condition (leakages)
- Reduces potential renewal of system oil by monitoring contaminants
- Minimises wear of cylinder and rings as a result of ensuring proper heat transfer process between the piston and cylinder liner
- Overall contributes to reduce operational costs

MONITORING PARAMETERS

LUBRICANT PARAMETERS

Viscosity at 40°C	Viscosity is the single most important property of a lubricating fluid. The equipment will not perform as designed unless the lubricant is of the specified viscosity.
Viscosity at 100°C	
Viscosity Index	
Soot Content	Soot results from the incomplete combustion of the fuel and oxidation of the lubricant; it contributes to deposits such as carbon and sludge and also leads to a viscosity increase.
Flashpoint	Cockett Lube Monitor
Water Content	Cockett Lube Monitor
Total Basic Number	Water Content
Ferrography (PQI)	Water Content

ELEMENTS ANALYSIS

Wear

Lithium (Li)	CCMS target is to measure the quantity of each Wear Metal present at the bottom of the cylinder hence determining indications of cold corrosion.	
Vanadium (V)		
Sodium (Na)		
Boron (B)		Wear metals may be present as oxides, metal soaps or metal fines.
Potassium (K)		
Silicon (Si)		

Contaminants

Lithium (Li)	The results of CCMS Lube Monitor need to be interpreted studying the Trend for each considered wear element in order to take preventive actions in case of abnormal wear.
Vanadium (V)	
Sodium (Na)	
Boron (B)	
Potassium (K)	
Silicon (Si)	

Additives


Magnesium (Mg)	Additive metals (generally calcium, magnesium, phosphorus, sulphur and/or zinc) need to be differentiated from Wear Metals as should be identified Contaminants generated by leakage from the stuffing box.
Calcium (Ca)	
Antimony (Sb)	
Barium (Ba)	
Zinc (Zn)	
Phosphorus (P)	



COLD CORROSION MONITORING SERVICE



User friendly, flexible and reliable CCMS is designed to perform trend analysis, anticipate and control cold corrosion in modern 2-strokes slow speed marine engines. This fast laboratory based programme can easily be combined with Lube Monitor Classic (optimum lubrication, lube condition monitoring and preventive maintenance actions) using the specific labels and manuals included in all Lube Monitor Sample Kits.



**COLD CORROSION MONITORING SYSTEM
MARINE ENGINES CYLINDERS (CCMS)**

ACTION

CAUTION

NORMAL

Lubricant Condition Rating:

Client
Vessel
IMO Number





Equipment Information
Machinery Unit
Equipment Make
Equipment Model
Equipment Serial Number
Oil Grade

	1	2	3	4	5
Sample Information					
Sample No.					
Report Date (dd/mm/yy)					
Date Received (dd/mm/yy)					
Sampling Date (dd/mm/yy)					
Country of Dispatch					
Cylinder Unit Number					
Sampling Point					
Equipment I/O (l/r)					
2-Stroke Running Hours					
Water Crown Run (hrs)					
Water Ring Run (hrs)					
Daily Make Up (Litres)					
Cylinder Oil Feed Rate					
Reason for Sampling					
Lubricant Condition Rating					
Lubricant Parameters					
Viscosity, cSt@40 C					
Viscosity, cSt@100 C					
Viscosity Index					
Soot Content (%)					
Flashpoint @150°C					
Water Content (wt%)					
Total Base Number (mgKOH/g)					
Acid Number (mgKOH/g)					
Elements Analysis, ppm					
Wear					
Iron (Fe)					
Copper (Cu)					
Aluminium (Al)					
Tin (Sn)					
Lead (Pb)					
Molybdenum (Mo)					
Nickel (Ni)					
Chromium (Cr)					
Thiophene (Ti)					
Silver (Ag)					
Contaminants					
Lithium (Li)					
Vanadium (V)					
Sodium (Na)					
Boron (B)					
Potassium (K)					
Silicon (Si)					
Other Elements					
Magnesium (Mg)					
Calcium (Ca)					
Antimony (Sb)					
Barium (Ba)					
Zinc (Zn)					
Phosphorus (P)					

ITS Comments:

LUBE MONITOR Recommendations:

Graphs:

WHO ARE WE? COCKETT OVERVIEW

Through its many years of successful maritime operations, Cockett Group has shown unwavering commitment to the shipping industry combining thought leadership, innovative spirit and maritime knowledge to bring valuable and customised alternatives to its customers, answering needs and providing real added value globally.

With an unparalleled network of offices situated in key shipping locations worldwide, Cockett Group is in the best possible position to offer owners and managers the local support needed where and when required.

With excellence in service as a focal point, Cockett Group's expert teams have selected the best network of suppliers to offer optimal and cost effective marine lubricants deliveries as well as technical services.



MARINE LUBRICATION SERVICES

Cockett Group is recognised for its strong brand which represents quality and reliable fuel supplies and provision of global fuel solutions to the Maritime Industry.

Cockett Group focuses on the requirements of the shipping industry offering expert lubricant solutions and adding value to owners and managers worldwide:

- **Selecting** the best global network to provide a combination of smooth and cost efficient lubricant supplies
- **Advising** on the optimal lubrication solutions globally
- **Supporting** your operations 365 days a year, 7 days a week, 24 hours a day with expert customer and delivery services
- **Contributing** to your vessels optimal and preventive maintenance through expert and customer friendly Lube Monitor Technical Services

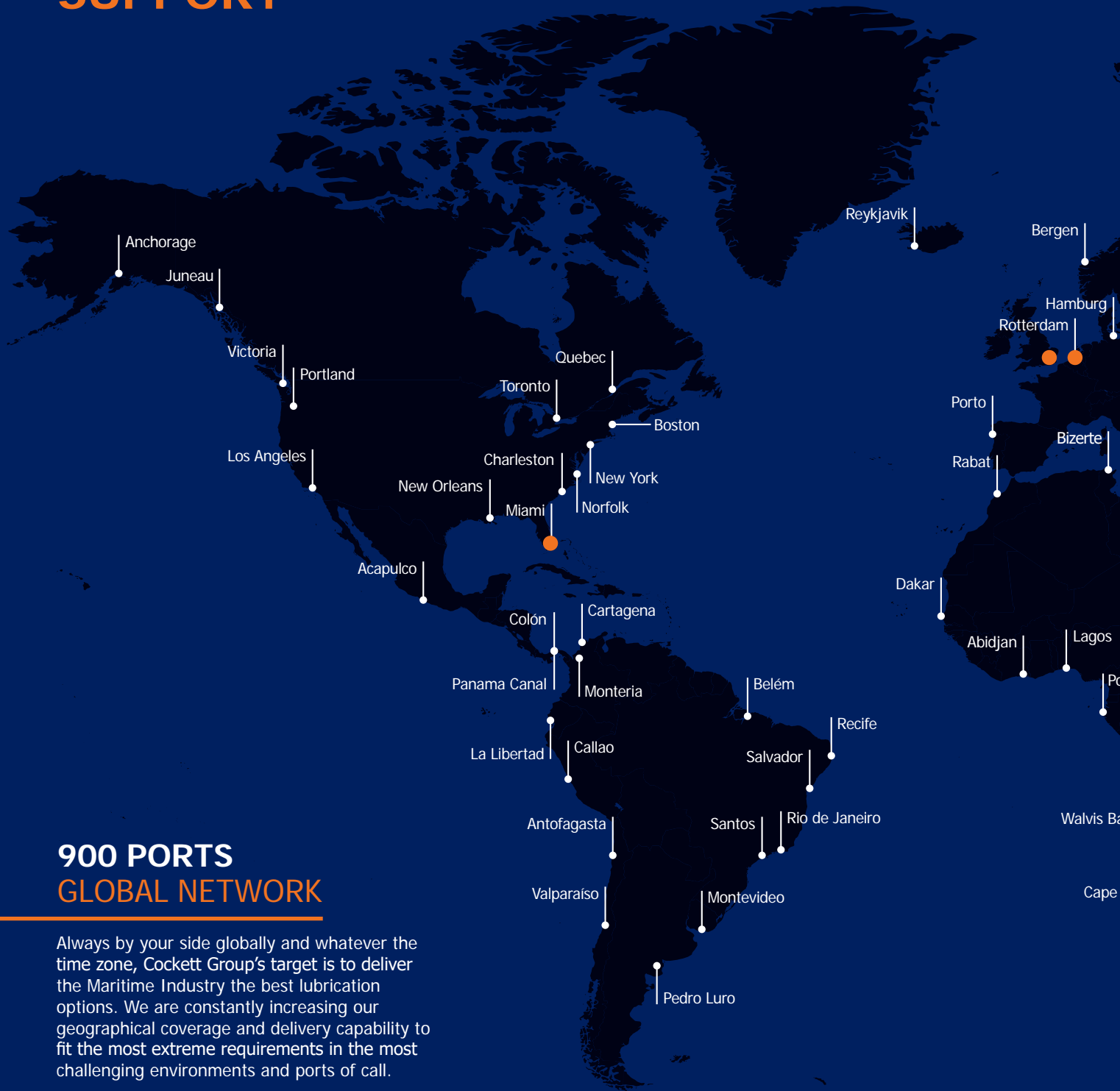
Lubrication for marine engines, as well as auxiliary machinery on board is exposed to increased complexity resulting from evolving technology, ever more stringent regulations, fuels supply evolution, environmental requirements, a drastic reduction of product availability in ports of call and a reduction of geographical coverage of traditional supply networks.

In this complex environment, providing operational and cost effective lubrication solutions has become critical to fleet operations management.

Cockett Groups's culture of reliability, cooperation and excellence in service makes it the partner of choice for owners and managers seeking peace of mind, cost-effective budgets, safe and smooth vessel operations.

**GLOBAL AND
365/7/24
CUSTOMER SUPPORT**

GLOBAL CUSTOMER SUPPORT

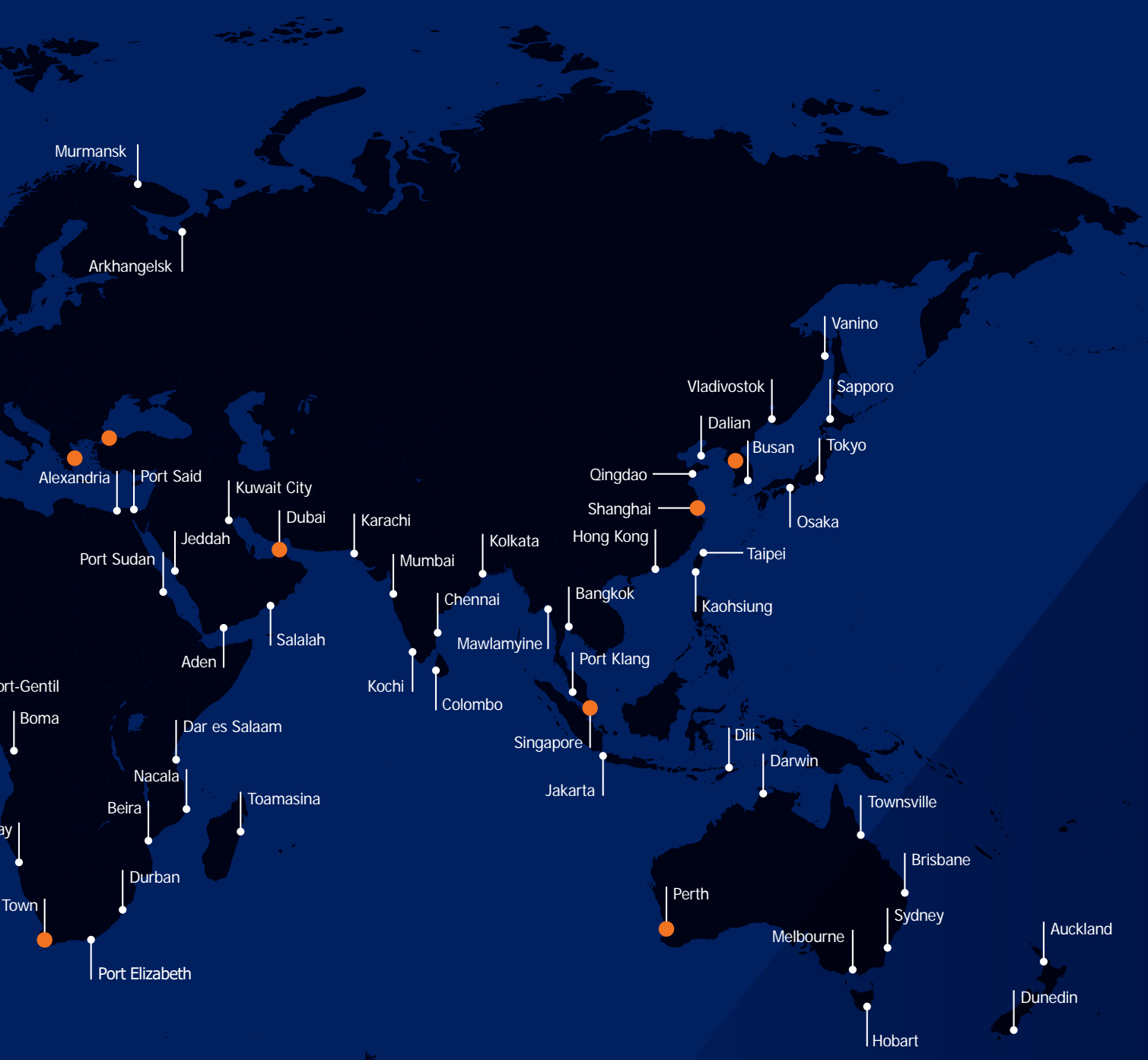


900 PORTS GLOBAL NETWORK

Always by your side globally and whatever the time zone, Cockett Group's target is to deliver the Maritime Industry the best lubrication options. We are constantly increasing our geographical coverage and delivery capability to fit the most extreme requirements in the most challenging environments and ports of call.

Cockett Group's 11 offices are present around the globe from UK and USA, to China, Singapore and Australia, to offer you their unique network of selected partners and suppliers. We are always ready with our cost effective, reliable and expert lubrication solutions wherever and whenever your vessels may call.

● COCKETT OFFICES



From long term contractual offers to emergency supply, from specific technical support to remote logistics customised operation, there is always a Cockett Group solution to fit your need and one of our experts alongside you when you need it most.

DEMANDING OPERATIONS

365 / 7 / 24

Always at your side -
anytime, anywhere



LUBRICANTS

As an established global value added marine fuel reseller, the inclusion of our lubricant division in the Group allows the Cockett Group to provide a 'one-stop-shop' for ease of purchasing while maintaining the quality of services and reliability associated with the brand.

Our dedicated team of lubricant experts brings depth of technical knowledge as well as the widest global supply network to cater for our customers' most demanding requirement.

They provide technically sound and cost-effective alternatives globally among a selection of the best lubricant products available on the market, while ensuring smooth and 'right-on-time' delivery operations.

**GIVING CONSISTENT
AND IMPROVED SERVICE**



**WORLDWIDE
COVERAGE**

**MARKET
KNOWLEDGE**

**TEAM OF
EXPERTS**





Asia Pacific



+65 6732 2225
+971 5 5410 4869

Mediterranean Zone



+30 694 3020 001
+39 331 892 7920

North West Europe & Americas



+39 331 892 7920

Middle East & India



+971 5 5410 4869

Global Technical Services



+31 6 5706 8951
+971 5 5410 4869

Global Email Address



lubes@cockett.com