

Condition Monitoring – Oil & Gas



Drilling – FPSO – Production Platforms

A collaborating partner

IKM Instrutek is a collaborating partner that focuses on quality, product range and expertise. IKM Instrutek supplies products and services to the shipping, offshore, industry and the public sector.

Our expertise ranges from process, test- and measuring instruments, maritime navigation, communication and condition monitoring.

The company was established in 1985. Its head office is in Larvik, with branch offices in Stavanger, Bergen and Ålesund.

The company has around 46 employees and a budgeted turnover of NOK 190 million. The company is part of the IKM group with around 2,450 employees and an budgeted turnover of approx. NOK 4,3 billion



A part of the IKM Group

IKM Instrutek is part of the IKM Group - a multidicipline sub supplier focusing primarily on the oil and gas industry. The IKM Group conducts business within the following five areas: Electrical/Instrument/ Process, Subsea/Completion/Commissioning, Engineering/Operations, Fabrication/Inspection and Rig/Downhole Services.

Focus on Growth is always the goal, and IKM's ambition is that even the most demanding customer shall choose IKM as their preferred business partner. All IKM companies are ISO-certified, and through internal revisions, audits, and continuous monitoring. IKM Corporate Group ensures that it meets and exceeds the needs of its customers and employees with respect to quality, health, safety and the enviroment.

Condition monitoring for offshore applications

IKM Instrutek is one of the few service and hardware suppliers for condition monitoring to the maritime sector that holds certifications from DNV GL, ABS and Lloyd as “approved service supplier for condition monitoring onboard ships and mobile floating units”.

We deliver turn-key projects and service agreements to ship owners, management companies, drilling rigs, FPSO's and OEM's all around the world.

IKM Instrutek is ACOEM ONEPROD's partner for the maritime sector world wide. Together with ACEOM ONEPROD's predictive maintenance solutions, we offer numerous advantages:

- Minimize downtime in port through early detection of faults, making it possible to pinpoint the components to be repaired.
- Reduce costs by planning the maintenance at the most suitable time with regards to operation, minimizing spare parts and repairing only what is broken.
- Proactive maintenance and root cause analysis.

IKM Instrutek and ACOEM ONEPROD offer a comprehensive range of certified products and services, ideally suited for the deployment of condition-based maintenance in the offshore and maritime industry:

- Qualified maintenance teams with over 15 years of experience in the sector.
- Worldwide scope, with ONEPROD's network of experts in over 65 countries (including France, Norway, Brazil, Malaysia, Australia, South Korea, Greece, Canada, South Africa, Spain, China and Russia).
- High-performance remote monitoring solutions, even in suboptimal communication conditions.
- Technical solutions for targeted monitoring of all critical machinery (propulsion systems, thrusters, generators, cranes, etc.).
- Customized solutions to each individual customer's needs and requirements.

IKM Instrutek deliver field services, analysis, hardware, engineering, implementation and preparation of CM classification for ships and mobile offshore units.

EAGLE online wireless online monitoring system

The EAGLE Wireless online vibration monitoring system is perfect for monitoring the critical machinery in a drilling tower and motors, pumps and fans onboard a FPSO and production platform.



Key features:

- ATEX Zone 0
- Slow speed machineries with SFI filter
- Minimal installation and commissioning time
- No need for cables
- Powerful
- Monitoring of operating condition (load, speed etc.)
- Easy and clear overview of alarms, trends and measurements result with NEST SUPERVISION and XPR software
- Up to five years of battery lifetime
- Fall protection and footstep protection system
- Embedded temperature sensors
- Standard industrial battery (can be change on site)

Drilling equipment

Monitoring the top drive, traveling block or crown block can often be challenging. The challenge is monitoring the “main bearing” of the top drive which runs at slow speed in drilling mode. Another challenge is to manually record vibration data or installing an online monitoring system without constantly working at height, running cables through the cable loops for the online monitoring system and spending a lot of extra time getting the data collected.

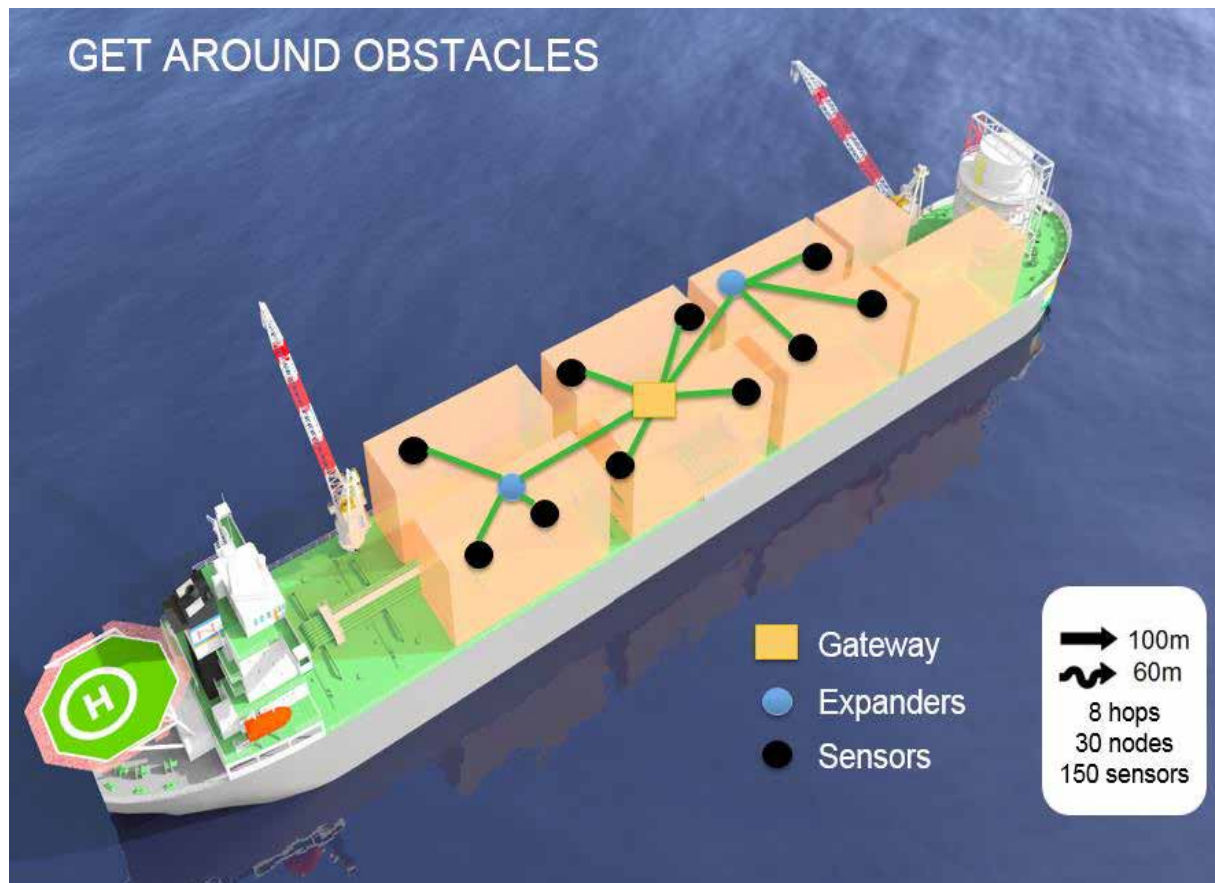
The EAGLE wireless online monitoring solution stands up to the challenge with safe and smart monitoring, high resolution data and no cables.



FPSO and production platforms

There are hundreds of pumps and motors onboard an FPSO and production platform, some more critical than others. Installing an online monitoring system will normally be expensive, that's why traditionally the crew has taken vibration data with a handheld data collectors.

With the EAGLE online monitoring system, you can quickly set up a powerful online monitoring system with no cables, at an affordable price.



MVX online monitoring system

The MVX Online monitoring system is one of the most powerful condition monitoring systems on the market. The system can measure all channels simultaneously and continuously. This system is perfect for drawworks, mud pumps and thrusters.

Drawworks

The drawworks are generally challenging to monitor. The slow speed in operation mode makes it hard for most systems to collect good vibration data. When the drawworks lift the top drive to top position, the time window is short and it is important to collect as much data as possible simultaneously. It is important to collect good data both in drilling mode and when the drawworks are run at full speed lifting the top drive.

Mud pumps

The mud pumps create a complex vibration signature with electric motors, strokes from the pump and the power transition between pump and motor. It is important to be able to sort out and filter the essential data. Reliable alarms, trends, correct diagnostics and recommendations is essential to get right.

Thrusters

Is your rig depending on the thrusters. The dynamic positioning system (DP) is at the heart of the drilling operation. Thrusters running at DP is constantly changing load and speed. To be able to collect good data sets, create valuable trends and reliable alarms you need a powerful and smart monitoring system. It is important that the system only keeps data recorded above certain load and speed conditions. If the machine changes the condition in the middle of data recording it needs to trash the data.



Key features:

- Powerful and fast
- Slow speed machineries with SFI filter
- Measures all channels simultaneously and continuously
- Monitoring of operating condition (load, speed, running modes etc.)
- Easy and clear overview of alarms, trends and measurements result with NEST SUPERVISION and XPR software
- Can measure and communicate with other sensors such as oil particles, torque, temperature and other
- Expandable
- ATEX Zone 2

FALCON handheld data collector

The Falcon vibration data collector is the most innovative and easy to use data collector on the market.

The data collector is especially developed for non-expert users, but at the same time it has plenty to offer the expert user.

The FALCON Essential is a perfect instrument to implement on board a vessel.



Key features:

- Easy to use
- Choose from wireless and wired sensors (three-axis)
- Fastest data collector on the market.
- Slow speed machineries with SFI filter
- FALCON models can be upgraded with more functions and software (Essential, SMART and EXPERT)
- Embedded camera, stroboscope, pyrometer, QR code reader, audio comments recorder and more
- Easy and clear overview of alarms, trends and measurements result with NEST SUPERVISION and XPR software
- Robust design, rubber grip for better handling, and anti-shock resistance
- Large color touch screen, even possible to operate with gloves
- USB, WiFi, Ethernet/Internet
- ATEX Zone 2

Nest Supervision & XPR

Status of machine health for your entire fleet in one view.

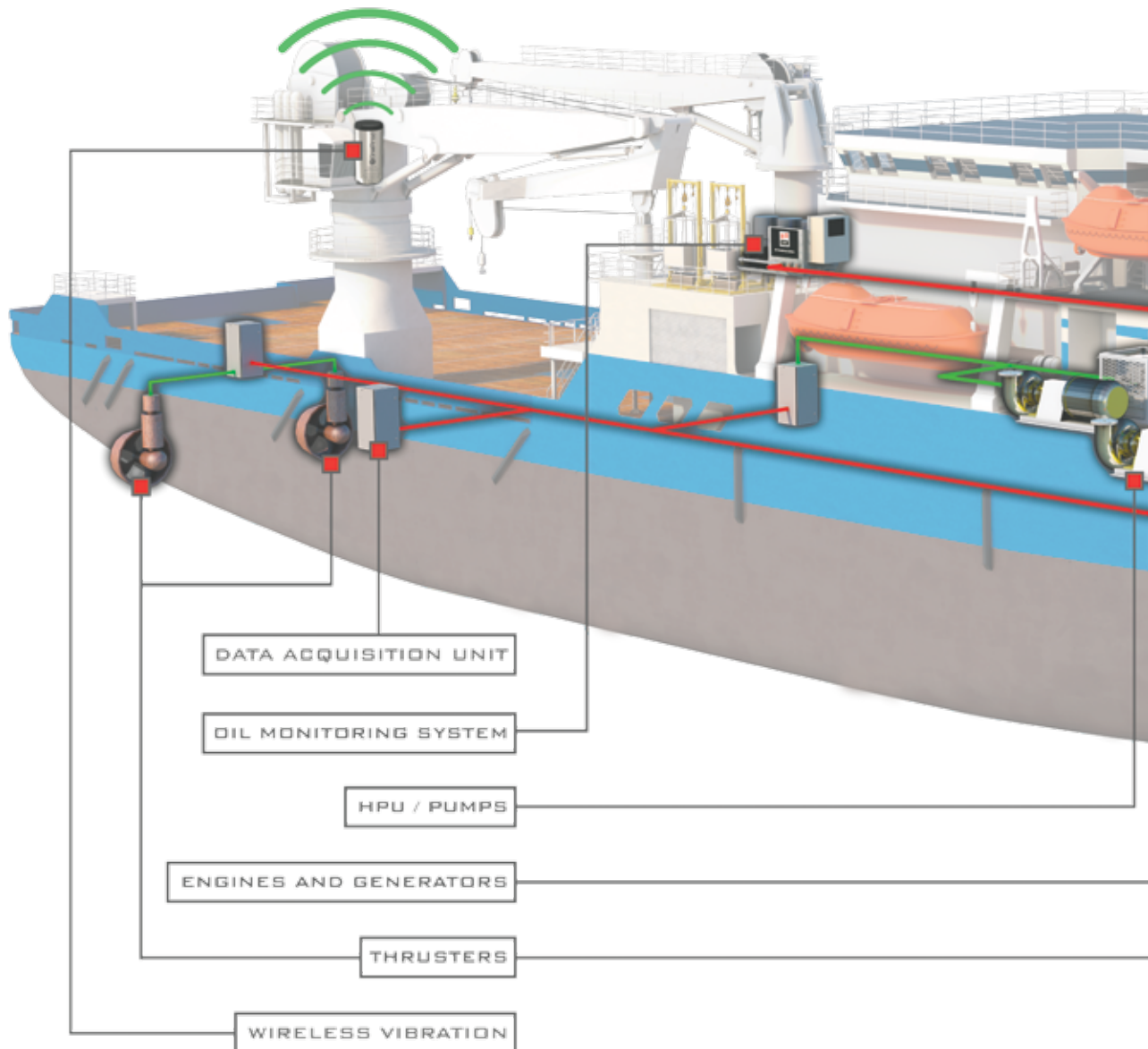
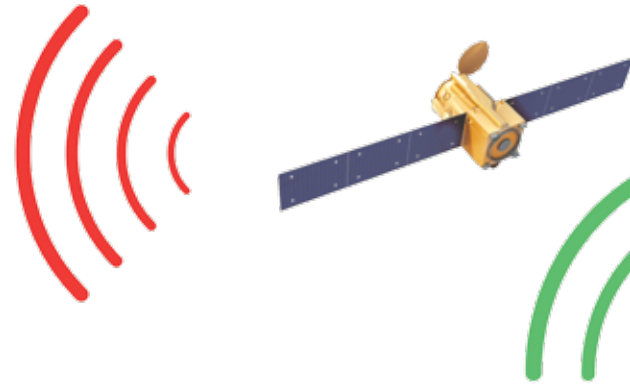
ONEPROD introduces SUPERVISION, a new generation of web based software applications dedicated to smart condition monitoring. Relying on 30 years of experience, SUPERVISION offers the users complete control of their surveyed groups of machines. Very intuitive and definitely visual, SUPERVISION makes condition monitoring available to any level in responsibility and expertise. At first glance, the displayed synthetic view provides explicit information about the machines' health status with a simple internet connection from any location on the globe.

With SUPERVISION, ONEPROD is revitalizing condition monitoring and offers unrivalled simplicity and efficiency for a better productivity.

Welcome onboard to the world of smart condition monitoring.

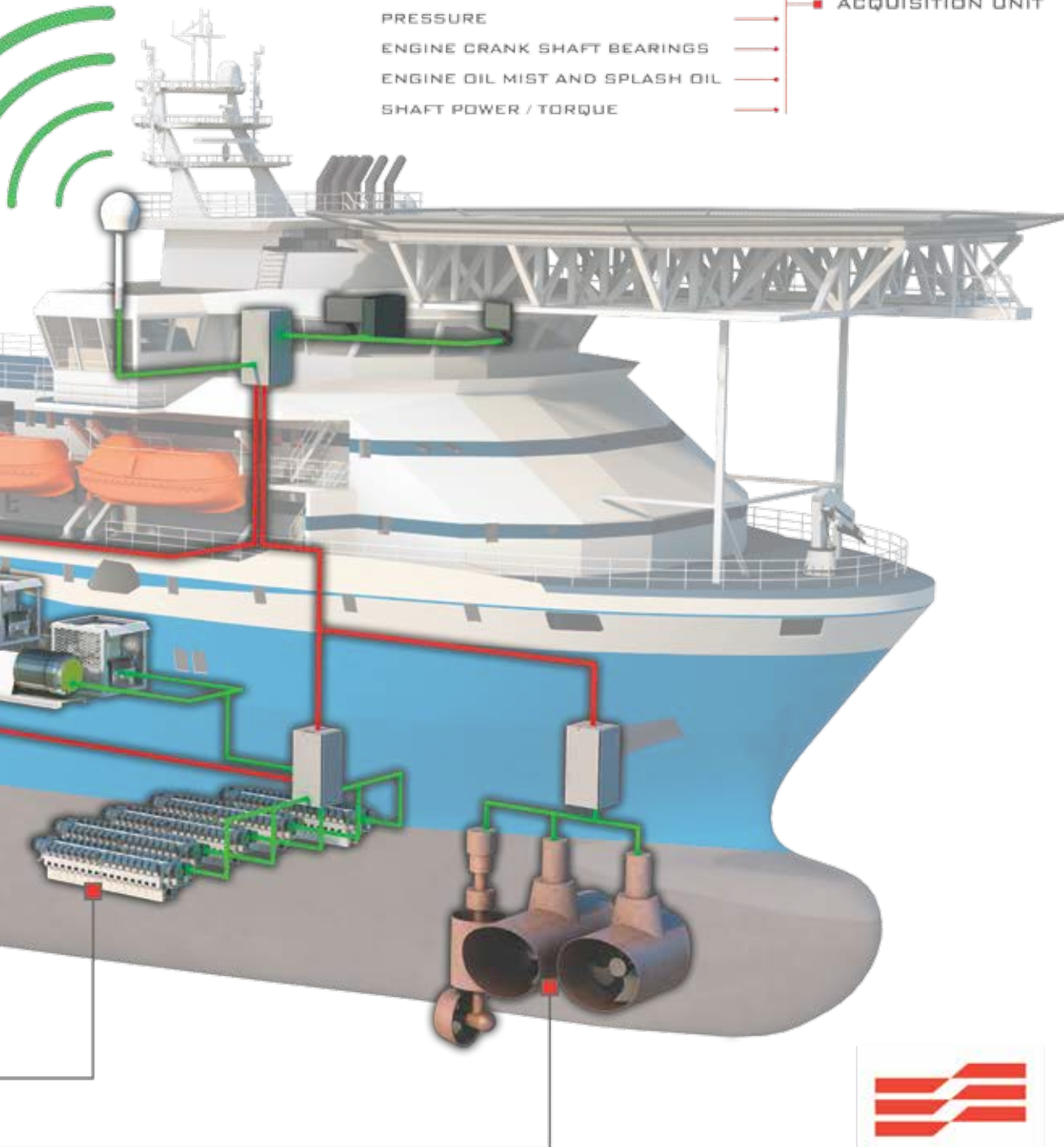
Key features:

- Alarm Status
- Trends and development
- All your condition monitoring in one CMS platform
- Vibration monitoring, oil monitoring, electrical monitoring, temperature, possess parameters and more
- Report and recommendations from IKM Instrutek (last expert analysis under each machine based on analysis from XPR software)
- Web logon
- One site for trends, alarms and expert analysis reports
- Online or Offline systems
- Intuitive user interface
- Vibration analysis for expert users



SENSOR INSTALLATION ON MACHINERY

VIBRATION	→	
ULTRASOUND	→	
OIL MONITORING SYSTEM	→	
TEMPERATURE	→	
PRESSURE	→	■ ACQUISITION UNIT
ENGINE CRANK SHAFT BEARINGS	→	
ENGINE OIL MIST AND SPLASH OIL	→	
SHAFT POWER / TORQUE	→	



Data transfer and remote databases

No negative influence on existing satellite/internet connection.

IKM Instrutek and ACOEM have developed a communication tool for vessels that have limited internet connectivity/bandwidth. The size of data packages is so small that it will not cause any disturbance or problems with the network or internet connection onboard the vessel. The system can use email, FTP server or other means of data transfer. The system can for example send an email minimum once, or several times each day, with the latest measurement data. Alarms are communicated immediately.

The measurement data and latest alarms can therefore also easily be viewed by the technical staff onshore by using NEST supervision (IKM Instrutek, ship owner or technical management).

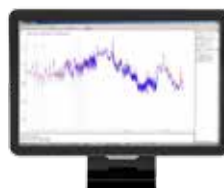
Floating rig 1



Vessel 1



Vessel 2



IKM Instrutek
Analysis, prognostics and reporting

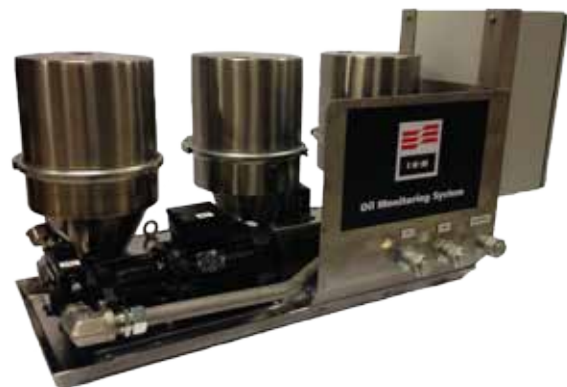
Vessel management
Alarm and trend with NEST SUPERVISION

Oil Monitoring System

The Oil Monitoring System (OMS) can be delivered with a filtering system for oil maintenance. This is in addition to the standard Oil Monitoring System (OMS)

The Oil Monitoring System (OMS) includes a contamination sensor (particle counter), moisture and temperature sensor for various fluid medias. It is built up with a pump and control system that sample a fixed amount of oil continuously. This way the trend and data are comparable at all time. The system stores historical data and all data are available in the control panel as trends and historical events and alarms. Alarm levels can easily be adjusted in the menu. Trend values and alarms are also available on Modbus or can easily be collected with a USB memory stick.

All systems are delivered as "PLUG & PLAY" easy to install systems.



Oil Monitoring Sensor:

The inline contamination sensor automatically measures particulate contamination, moisture and temperature levels in various fluid medias. It is designed specifically to be mounted directly to systems, where ongoing measurement or analysis is required, and where space and costs are limited.

- 8 channel contamination measurement
- Measures the following international standard formats; ISO 4406:1999, NAS 1638, AS 4059E and ISO 11218
- Moisture and temperature sensing
- Data logging and 4000 test result memory
- Multicolour LED and remote alarm signals
- Robust die cast aluminium construction
- RS485, MODBUS, CANBUS communication protocols as standard

SDT Ultrasonic

Ultrasonic technology provides precise and cost-effective solutions in leak detection, tightness testing, predictive maintenance and automatic quality control.

SDT International is regarded as the world's leading manufacturer of measuring instruments using ultrasonic and other technologies. Its success is based on a history of providing effective solutions to specific problems.

The return of investment is normally extremely short.



Key features:

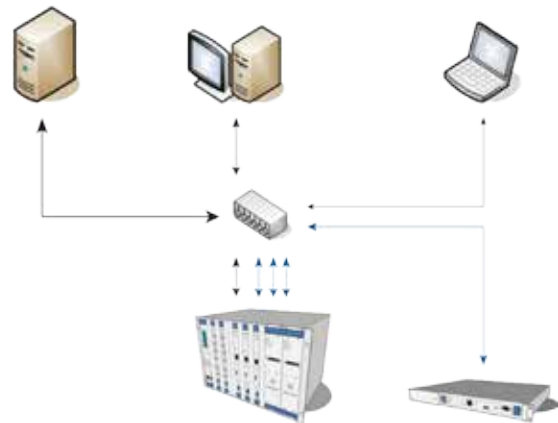
- Slow speed bearings
(slewing bearings on thrusters and cranes)
- Compressors and reciprocating machinery
(leak detection, valves, bearings etc.)
- Stem leaks and steam traps
- Diesel engines (leak detection, valves etc.)
- Hydraulic cylinders
- Hatch cover tightness testing
- Leak detection
- Electrical applications
(corona detections, tracking etc.)
- Valves and piping
- Pump cavitation
- Current flow in bearings
- Bearing condition and lubrication

Machinery protection systems

Some machines such as gas turbines and compressors are so critical that condition monitoring is not enough. This can be because of safety, operations, running conditions or other.

In such cases, a machinery protection system can monitor the critical parameters (such as vibration levels) of the machine, and shut it down immediately if levels exceed predefined limits.

IKM Instrutek performs engineering, installation, commissioning and after-service for all MEGGITT Vibro-Meter range of products within vibration and combustion monitoring solutions.



Key features:

- Flexible hardware (one module does all)
- Absolute and relative vibration
- Dynamic pressure
- Casing expansion
- Temperatures, Positions, Levels
- Complete sensor range, conditioners, boxes, cables
- Galvanic separation units
- Trends and condition monitoring
- All technologies fully integrated in the system

FIELD Services

IKM Instrutek delivers field services. We have a world-wide service network and are approved by DNV GL, ABS and Lloyds as service supplier for condition monitoring onboard ships and mobile floating units.



Field services:

- Vibration measurements and analysis of rotating machinery
- Machine diagnostics and prognostics
- Field balancing
- Trouble shooting
- Vibration measurements on structures
- Acoustic measurements
- Comfort measurements (vibration and acoustics)
- Ultrasonic measurements and inspections
- Laser alignment of rotating machinery (shaft alignment)
- Geometric laser measurements
- Thermography (electrical)
- Thermography (gas detection)
- Consulting and inspections

Condition monitoring analysis

From our offices in Bergen and Larvik, we monitor and follow up service contracts for vessels worldwide.



Services:

- Vibration analysis
- Ultrasonic analysis
- Machine diagnostics
- Machine prognostics
- Reporting and recommendation according to customer maintenance plan and strategy
- Remote trouble shooting on rotating machinery

Certificates

Quality, expertise, approval and certificates.

IKM Instrutek is a specialist company certified and approved within many different fields. Specific certificates and approvals for different products and services are available upon request.

Certificate No. 8026400219
Page 1 of 1

LR **Approval of Service Suppliers**

Office: Bergen
Date of Issue: 14 May 2014
This is to certify that: IKM INSTRUTEK AS
(Location: 26, N-1247 Lark, Kviknesveien 22, NO-2027 Askvoll, Norway) (hereinafter referred to as "Supplier")

Tel: +47 3368 5100 Fax: +47 3368 5101 Email: servicecert@lr.no

having been assessed positively in accordance with the requirements of LR's Register Procedures for Approval of Service Suppliers as Supplier from the address listed above for the provision of:

Condition Monitoring

Service Suppliers Engaged in Condition Monitoring of Machinery on board Mobile Offshore Units and Ships, classed by the society.

This approval is conditional upon the Supplier maintaining the documented scheme, as audited by any member of LR's Register Group and hereby approved, and notifying LR's Register in writing of any change to the scheme including any change of personnel, equipment or procedures.

This certificate is issued to the Supplier and subject to the Supplier complying with the necessary conditions.

This certificate is valid until: 14 May 2017

Bergen

E. Strand
Senior Surveyor
A subsidiary of LR's Register Group Limited

LR's Register (Group Limited), its affiliates and subsidiaries and their respective officers, employees or agents are, individually and collectively, referred to in this document as LR's Register. LR's Register assumes no responsibility and shall not be held to be liable for any loss, damage or expense caused by reliance on the information or advice in this document or for any other reason, whether or not caused in whole or in part by the negligence of any member of LR's Register Group.

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NPS Folder No: 264.1-003248

DNV

DET NORSKE VERITAS

APPROVAL OF SERVICE SUPPLIERS

Certificate No.: **OSL-13-4656**

THIS IS TO CERTIFY THAT

IKM Instrutek AS
LARVIK, Norway

is granted acceptance for

Service Suppliers Engaged in Condition Monitoring of Machinery Onboard Mobile Offshore Units and Ships, classed by the Society, in accordance with Approval Programme No. 416

This Certificate is valid until **2016-04-12**

Issued at **Haug** on **2013-05-14**

for Det Norske Veritas AS

Tore Røed Andersen
Head of Section

Jan Bühring Andersen
Principal Surveyor
Machinery Systems

This Certificate may be cancelled if:

1. The supplier provided false data deliberately submitted out of the results of the inspection.
2. The supplier has found any deficiencies in the inspected operating systems of the service supplier.
3. The firm has failed to inform any other changes having effect on the quality of the service rendered.
4. The conditions listed in the approval are changed without prior approval.

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall accept responsibility. It shall accept to its fullest extent of damages. However, the compensation shall not exceed the amount of the fee paid for the inspection for the service in question provided that the inspection, compensation and other matter (DNT's liability, in the present "Det Norske Veritas" shall mean the Foundation "Det Norske Veritas" as well as its subsidiaries, divisions, offices, employees, agents and any other entity or entity of Det Norske Veritas.

Det Norske Veritas AS, Veritasveien 1, NO-1303 Hønsås, Norway. Tel: +47 67 97 90 00 Fax: +47 67 97 90 11 (Engelsk) and 140 301 0000 (norsk) www.dnv.com

Form No.: 20-000 Rev. 01/01/2008

ABS

Certificate Number: 8026400219
ABS Form Office: Bergen, Norway
Date: 17 September 2014
Service Provider's address: Kviknesveien 22, NO-2027 Askvoll, Norway
Service Provider's Web Site: www.instrutek.no

Online recorded online, the certificate register on: 17 September 2017
For publication regarding the recognition, see the ABS web site: www.abs.org

Certificate of Service Recognition

This is to Certify that

IKM Instrutek AS

having been audited by ABS and having given a satisfactory practical demonstration of the services listed below, is recognized by ABS as a Service Provider to provide services which ABS recognizes may rely on to make decisions affecting classification or statutory surveys.

Condition Monitoring

It is the responsibility of the Service Provider to ensure, train and qualify persons in the service provided. If the service involves approval from manufacturers, the service provider is responsible to obtain written consent from the manufacturer and maintain any service records up to date. The personnel who will conduct the service are to have proper identification and, if allowed, be listed on the company's web site prior to service. The products and materials used in the service are to be listed on the company's web site. The ABS office issuing this certificate is not responsible for changes in the management of the company, its employees, products and materials or for any other changes made.

Notes: Please refer to the ABS web site: www.abs.org for any comments regarding the services provided.

Service Recognition: **Condition Monitoring**

Tore Lofth, Surveyor

Service Provider's Contact: 3368 5100
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Classification authority. Certified by the National Institute of Technology within:

- ISO 9001 The most recognised standard in the world for quality assurance.
- NS-EN ISO 14001 The most recognised standard in the world for environmental management.
- OHSAS 18001 Internationally recognised standard for the Working Environment Act and the Internal Control Regulations.



Classification authority Certified by DNV GL within condition monitoring, and radio control (GMDSS and AIS).



Classification authority. Certified within condition monitoring, radio control (GMDSS and AIS) and VDR APT.



Classification authority. Certified within condition monitoring, radio control (GMDSS and AIS) and VDR APT.



Classification authority. Certified within condition monitoring, radio control (GMDSS and AIS) and VDR APT 2019.

Norwegian
Maritime Authority

On behalf of the Norwegian Maritime Authority we are authorised to perform radio control (GMDSS and AIS) of Norwegian ships and foreign vessels in Norwegian waters.



Safety testing and certification of electrical materials. Certification by Nemko within electro-thermography.



Maritime purchasing organisation. We are a member of Incentra and in 2014 we received the "Supplier of the year" award from Incentra's members.



Member's association that works for openness and responsibility in the global extractive industry.



Supplier register and qualification solution used by purchasing agents in the Nordic transport sector.



Achilles JQS is qualified as a supplier to the oil industry in Norway and Denmark.



Supplier register and a qualification system used by the Nordic energy sector.



A supplier register and a service for qualification used by purchasers in the Norwegian oil and gas sector.



Supervision of companies offering post and telecommunication services. Certified by the Norwegian Communications Authority as a radio installation contractor.



Recycling company for the collection, recycling and environmentally-appropriate processing of electrical and electronic waste.



Return scheme for packaging, plastic packaging, packaging cartons and drink cartons.

ITAR

The International Traffic in Arms Regulations (ITAR). We are authorised to supply ITAR regulated products.



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