



Thrusters

Condition Monitoring in Azimuth Thrusters

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1. General
2. Monitoring hardware
3. Vibration analysis
4. Other systems
5. Conclusion

General

Classification

Classification societies give guidance for the monitoring and approval in their rules. In principle it is a question of Preventive Maintenance Program specified for Special Continuous Survey of Machinery.

ABS

Part 7 Section 14 Guidance for Survey Based on Preventive Maintenance Techniques (2003).

DNV

**Guidance for Condition Monitoring , Classification notes No. 10.2
January 2003
Appendix H. Condition monitoring for Propulsion and Position Thrusters**

What to monitor

Power train, gears and bearings

- vibration measurement (spectrum)
- load (rpm) from motor / frequency converter

Oil quality (sample)

- foreign particles
- water content

Propeller shaft seal, azimuth seal

- leakage

Stray current

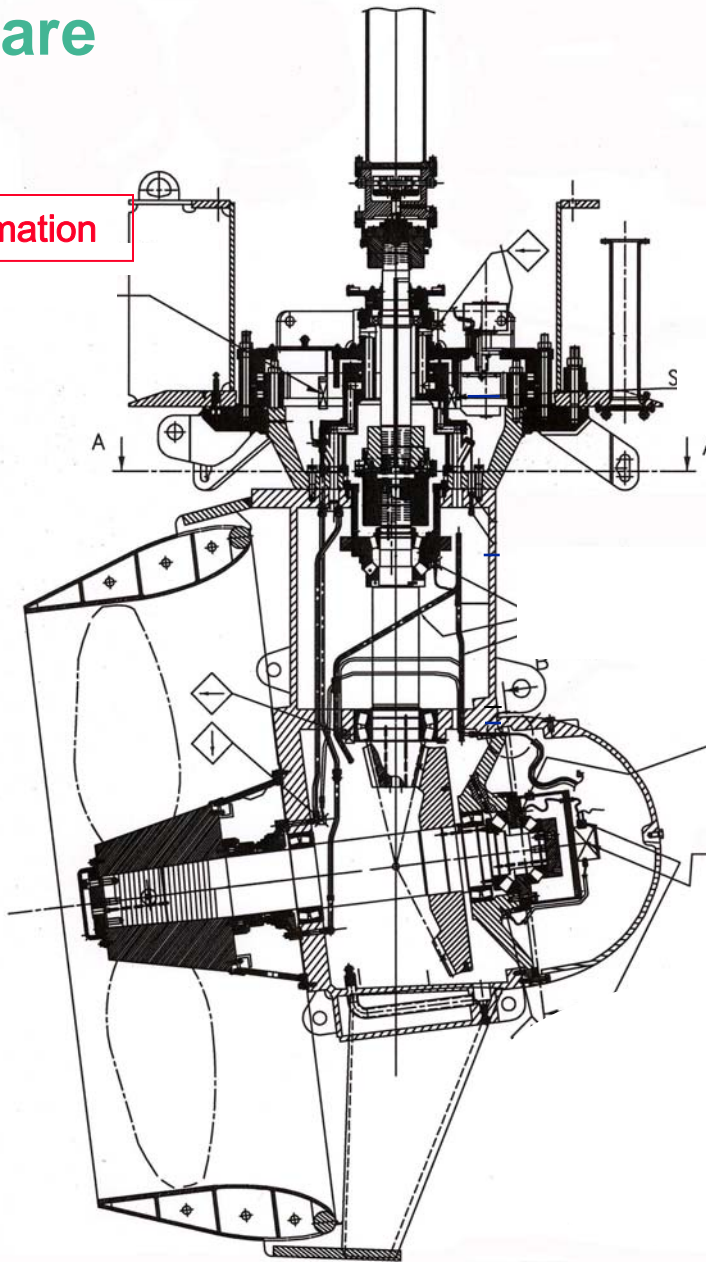
- ICCP

Monitoring hardware



Additional Information

Thruster
-rpm
-direction



Slip Ring Unit

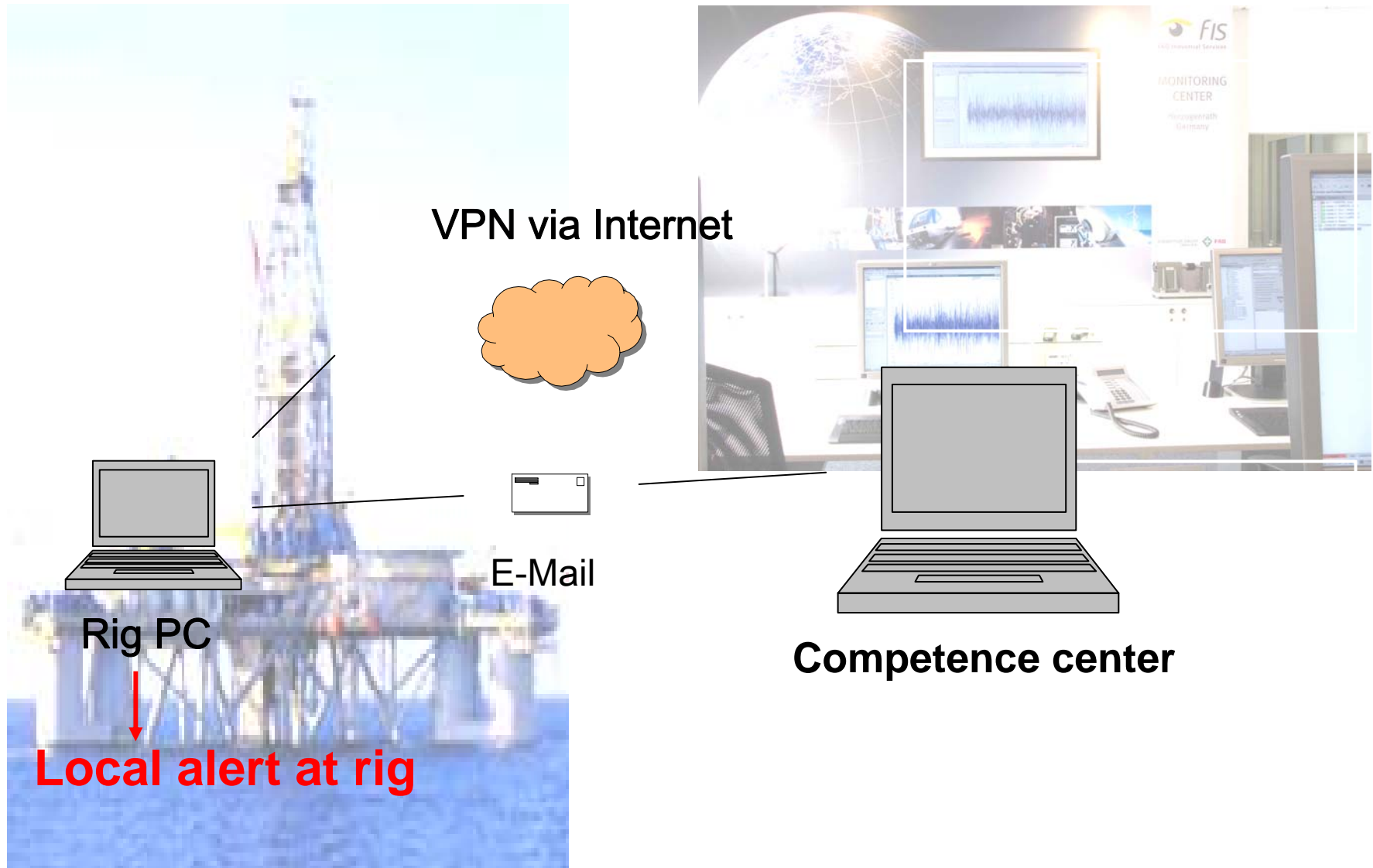
4/8 channel

4 Vibration sensors
inside thruster

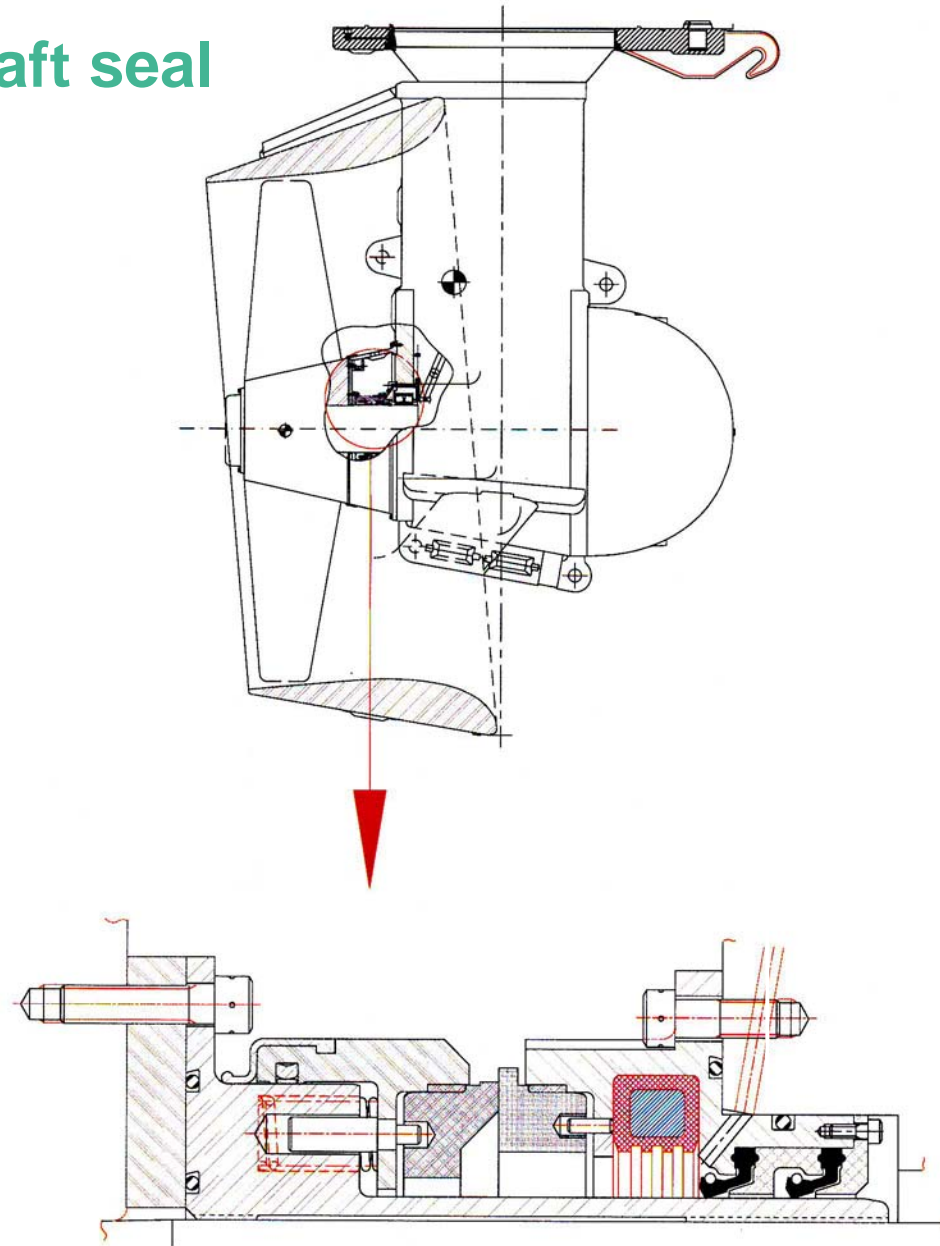
Vibration analysis

- Measured vibration spectrum analysed with specified software
- Trends
- Prognosis
- Recommendation for actions
- Link to vessel / rig maintenance program
- Alert in case of an irregularity
- 6 accelerometers
- Possibility to connect also temperature transmitters and other 4 – 20 mA or 0-10 Volt signals
- Spectrum measurement up to 10 kHz Fmax and Envelope spectrum available
- Time wave form measurement
- Trending parameters and alarm bands available
- Load and speed information to be supplied as 4-20 mA signal per Thruster

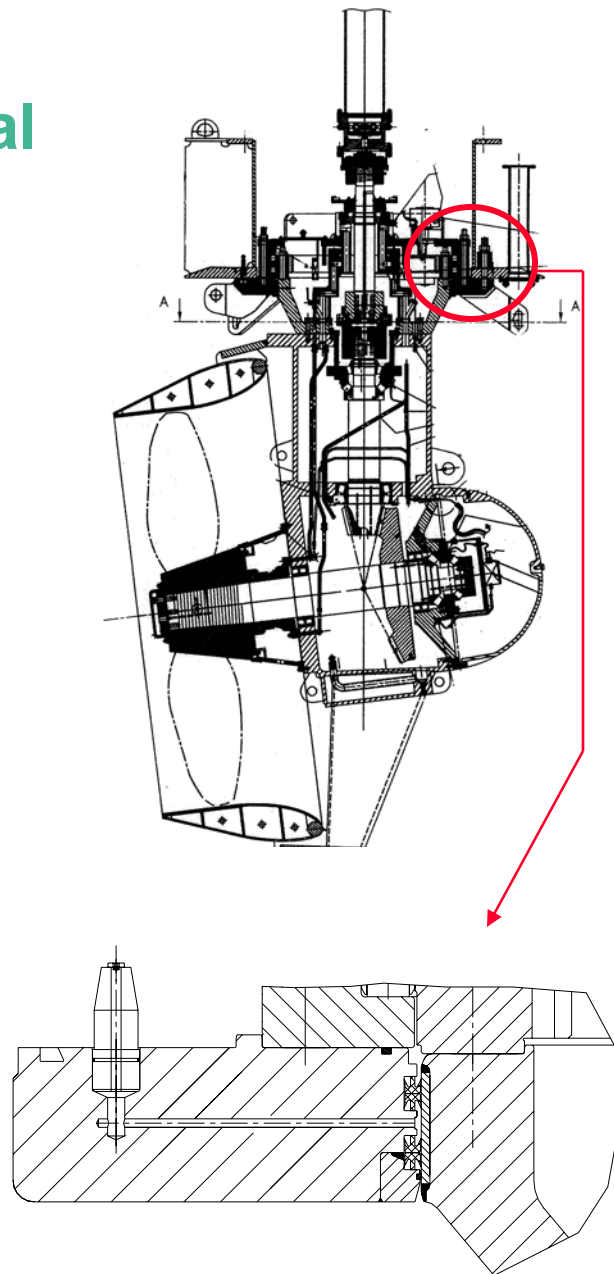
Communication



Propeller shaft seal monitoring



Azimuth seal monitoring



Optional Condition Monitoring

Monitoring unit RR X1 extra channels used for oil condition monitoring

Examples:

- **Control of oil quality**
 - water content
 - viscosity
 - conductance
 - temperature
- **Optical particle counter**
- **Water content**
 - in lubrication hydraulic and steering hydraulic oil

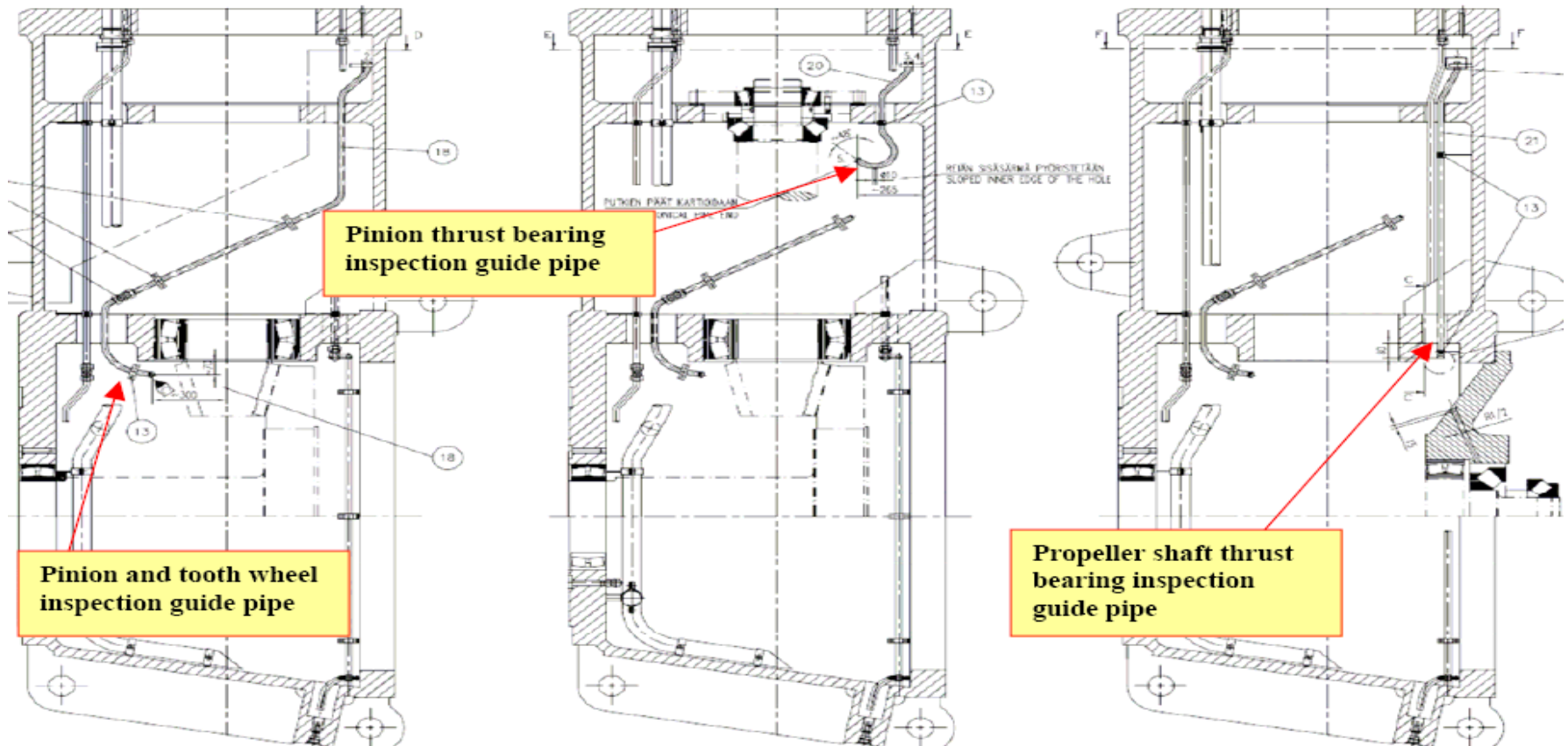


Stray current

- **In addition to ships ICCP system there can be own ICCP system for thruster unit. This system monitors the condition of cathodic system of the thruster giving sign of possible stray current problem.**

Endoscope pipes

- Example: UUC&UUS 6001,7001



Conclusion

Condition monitoring:

- **targeted to monitor critical components: bearings, gear wheels, slewing rings**
- **targeted to monitor systems: propeller shaft seal, azimuth seal, lubrication, steering**
- **can include whatever information from ship systems to support land based problem solving**

To develop condition monitoring systems is an ongoing process.



Thank you