



## **Thrusters**

# **Condition Monitoring in Azimuth Thrusters**

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*October 9-10, 2007*



**Rolls-Royce**

# 2007 Dynamic Positioning Conference Houston, October 9-10

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## 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

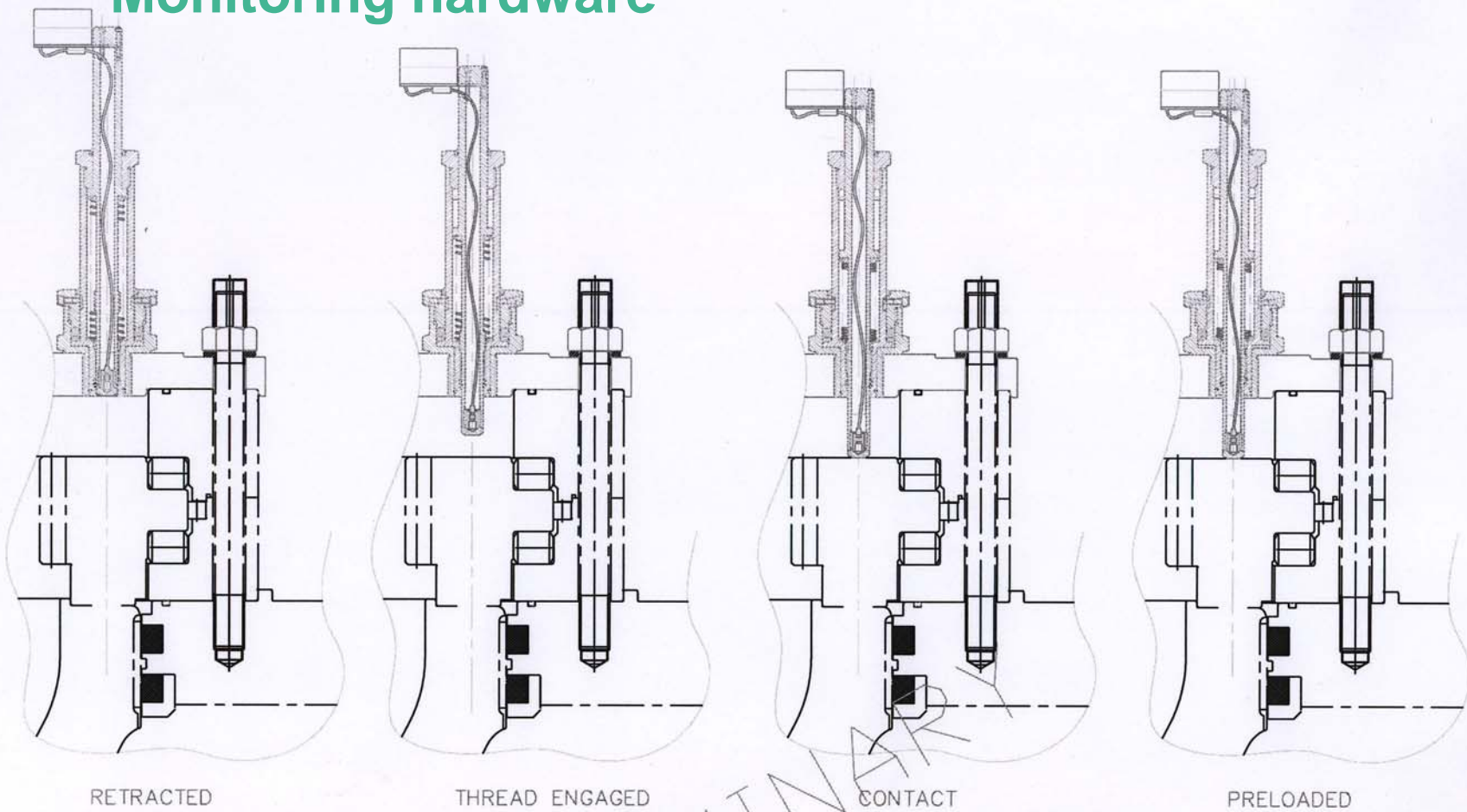
### Propeller shaft seal, azimuth seal

- leakage

### Stray current

- ICCP

# Monitoring hardware



PRELIMINARY

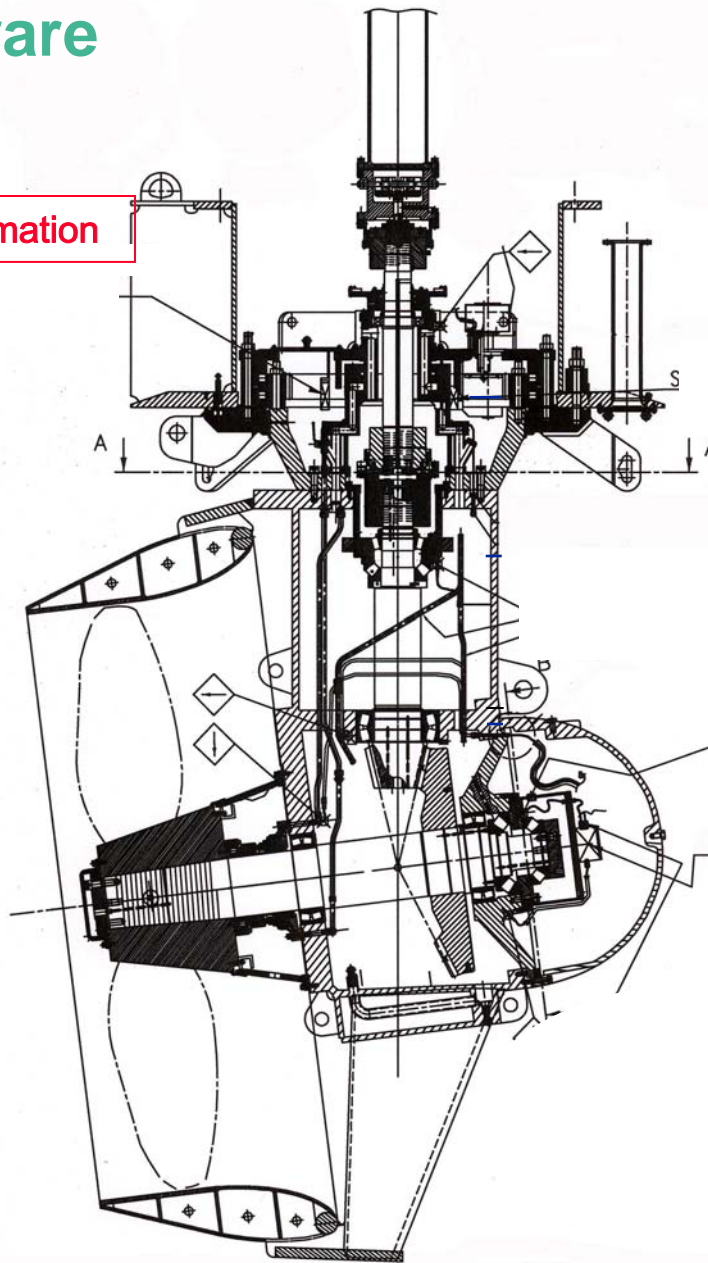
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Roll-Royce Marine AS, dep.: Propulsion - Ulstein N-6065 Ulsteinvik, Norway Tel: +47-700-14000		Drawing number 218276			
		Based on	Mass(g)		
		Form:			

# Monitoring hardware



Additional Information

Thruster  
-rpm  
-direction



Slip Ring Unit

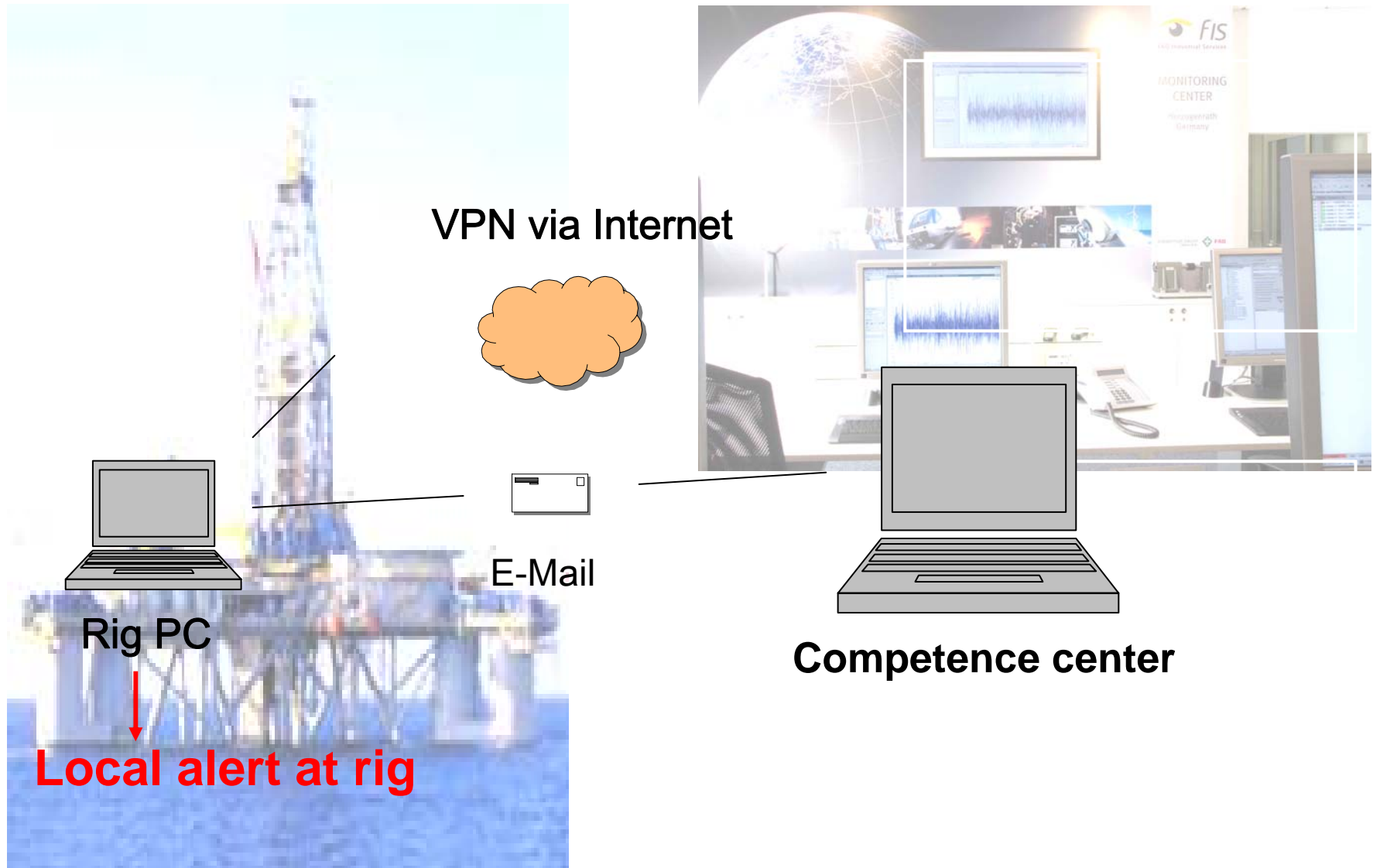
4/8 channel

4 Vibration sensors  
inside thruster

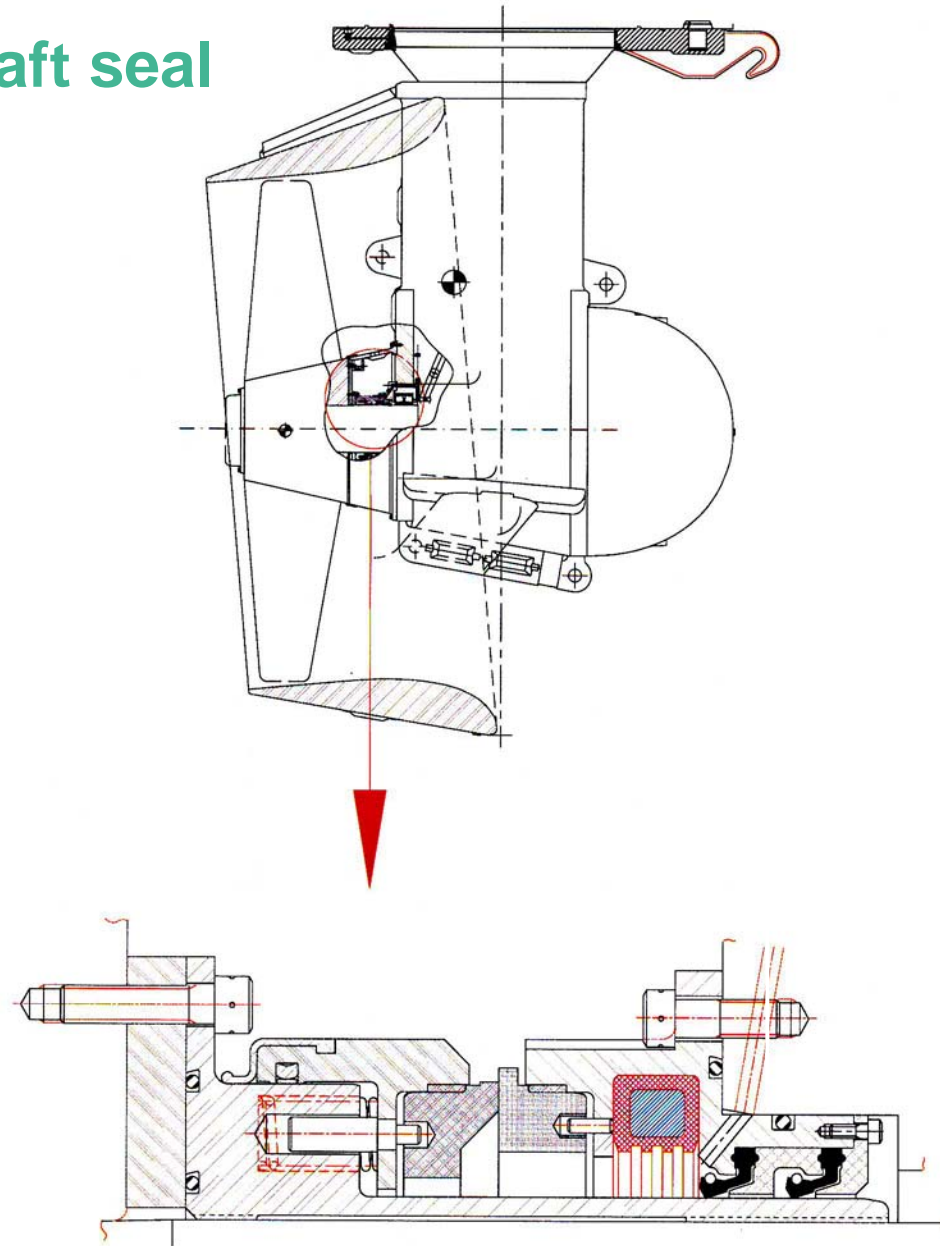
## Vibration analysis

- 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

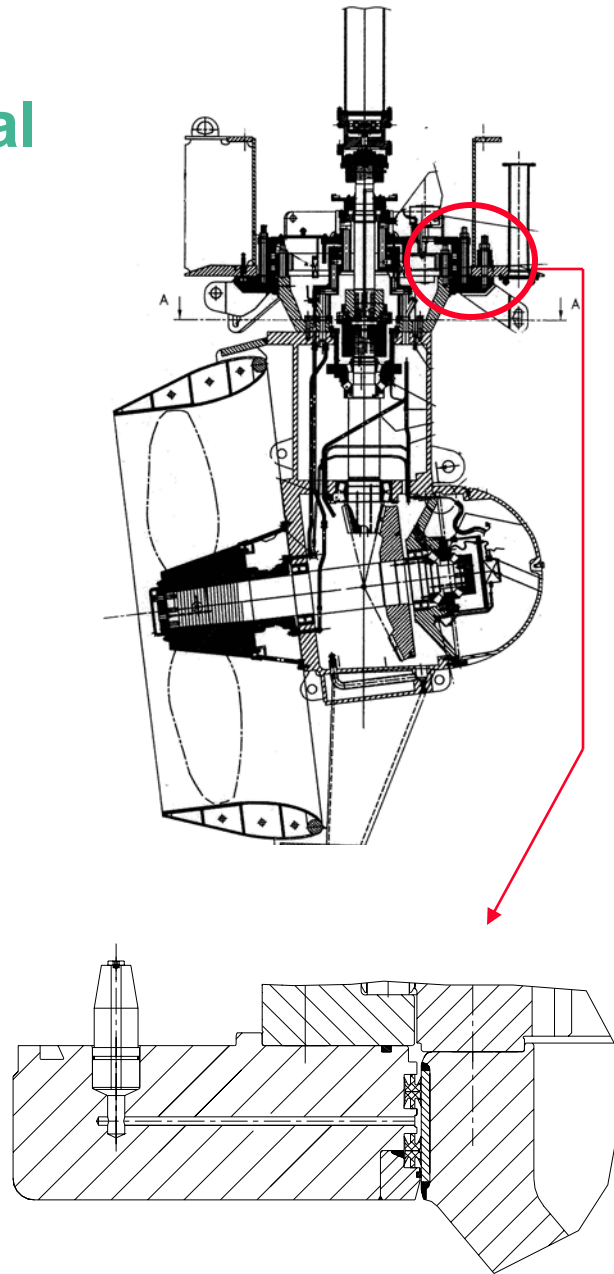
# Communication



# 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

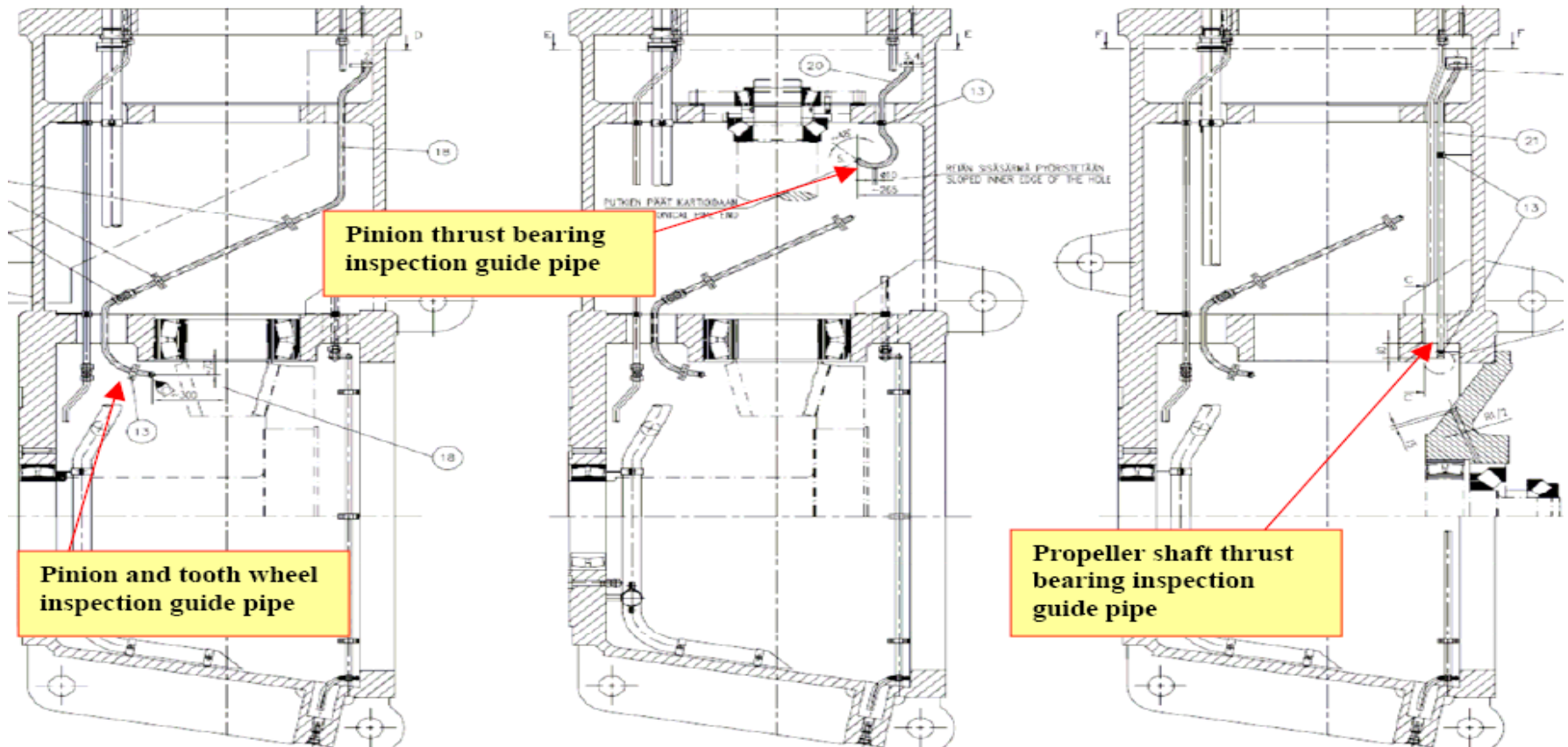


## Stray current

- **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