

ENGINEERING ONBOARD

AEC2

**Maintenance
Systems
Onboard**

@yachtly.crew



Yachtly Crew

@yachtly.crew

ENGINEERING ONBOARD AEC2

Maintenance Systems Onboard

Maintenance is one thing that keeps any mechanical equipment or machinery going. Whether it is a small machine or a large structure, efficient maintenance can help with prolonged life and reliability.

It keeps machinery up to date and is smooth running condition. Each machine on board a ship requires maintenance which has to be carried out at regular intervals of time or assessment of its condition.



Yachtly Crew

@yachtly.crew

ENGINEERING ONBOARD AEC2

Planned Maintenance

These systems are known as Scheduled or Preventative Maintenance Systems (PMS). This allows scheduling the maintenance to give maximum service life of components while at the same time minimising the frequency of breakdown, down time and operating cost of the machinery.



Yachtly Crew

ENGINEERING ONBOARD AEC2

Planned Maintenance

System scheduling

All PMS must have some form of time or condition base, which commonly is on or more, of the following.

- Calendar based
- (Running) Hours based
- Condition based



ENGINEERING ONBOARD AEC2

Breakdown Maintenance

No matter how good a Planned Maintenance System (PMS) is there will always be some element of unscheduled maintenance to perform. This may be due to unforeseen caused by:

- Badly manufactured or counterfeit parts (non OEM)
- Operating with poor quality fuel/oils



ENGINEERING ONBOARD AEC2

Breakdown Maintenance

- Operating outside of the design range of machinery.
- Badly carried out maintenance procedures

The above instances will normally result in random breakdowns, resulting in unplanned repairs that can have expensive impact on the charter or work programs.



ENGINEERING ONBOARD AEC2

Trend Analysis

- Regular watch-keeping and recording equipment data, performance and • This information can then be used to assess its present condition against the parameters is a requirement as we have seen from the engine room logbook.
- original or as new baseline when first installed - This is termed 'Trend Analysis' and can be used to predict failures and thereby plan replacement before they occur.



ENGINEERING ONBOARD AEC2

Vibration Analysis

- Vibration is a physical characteristic that presents itself in running rotating machineries and moving structures.
- Vibration can be induced by various sources, including rotating shafts, meshing gear-teeth, rolling bearing elements, rotating electric field, fluid flows, combustion events, structural resonance and angular rotations.
- Vibration is used for investigating the operational conditions and status of rotating machinery and structures.



ENGINEERING ONBOARD AEC2

Vibration Analysis

- Vibrations can be represented in different forms, including displacement, velocity and acceleration.
- Displacement describes the distance that the measuring point has moved.
- Velocity describes how fast the movement is.
- Acceleration is self-explanatory.
- The three types are all widely used, specifically acceleration, which offers the widest frequency range and is extensively applied for dynamic fault analysis.



@yachtly.crew

ENGINEERING ONBOARD AEC2

Condition Based Monitoring Techniques

- Vibration Analysis
- Oil Analysis by laboratory
- Endo/Boroscope Inpection
- X-ray/Ultrasound
- Trend Analysis
- Insulation readings and Megger testing
- Earth leakage
- Infra-red temperature detection/Thermographic surveys



Yachtly Crew

ENGINEERING ONBOARD AEC2

Condition Based Monitoring (CMS)

CMS is a less obtrusive /invasive assessment of machinery using trend analysis, records, historical data, sampling, taking readings and comparison to as new condition. It has many advantages, namely:

- Less damage
- Can be undertaken while machinery is running
- More cost effective
- Less breakdown/increased reliability
- Less manpower



@yachtly.crew

ENGINEERING ONBOARD AEC2

Lubricating Oil Analysis

- Water Contamination
- Viscosity / Density
- Metals present
- Microbacteria present
- Contaminants



Yachtly Crew

@yachtly.crew

ENGINEERING ONBOARD AEC2

EndoScope/Boroscope Inspection

Endoscope/Boroscope inspection of engines can be used to prevent unnecessary maintenance, which can become extremely costly for large engines or turbines.

They are also used in manufacturing of machined or cast parts to inspect critical interior surfaces for burrs, surface finish or complete through-holes.



Yachtly Crew

@yachtly.crew

ENGINEERING ONBOARD AEC2

Thermographic Surveys and Immediate Diagnosis

- Water Contamination
- Viscosity / Density
- Metals present
- Microbacteria present
- Contaminants



Yachtly Crew

ENGINEERING ONBOARD AEC2

Insulation Resistance Readings

The measured resistance indicates the condition of the insulation between two conductive parts. In a 3-phase motor this would be between the windings and the casing. The higher the reading the better. Regular readings are taken to trend analysis and pick up early problems as a result of lower readings.



ENGINEERING ONBOARD AEC2

Nut Locking Arrangements

A Nyloc Nut, also referred to as a nylon-insert lock nut.

Various Lockin Arrangements

- Loctite
- Tap Washer
- Split Washer
- Double Nut
- Wire Locking
- Split Pin



ENGINEERING ONBOARD AEC2

Practical Identify suitable working clothes and PPE

The main reference to identify
suitable working clothes is

COSWOP

This would include:

- Hard Hat
- Goggles
- Ear defenders
- Overalls
- Gloves
- Safety shoes / boots

