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Maintenance Strategies of Offshore Structures

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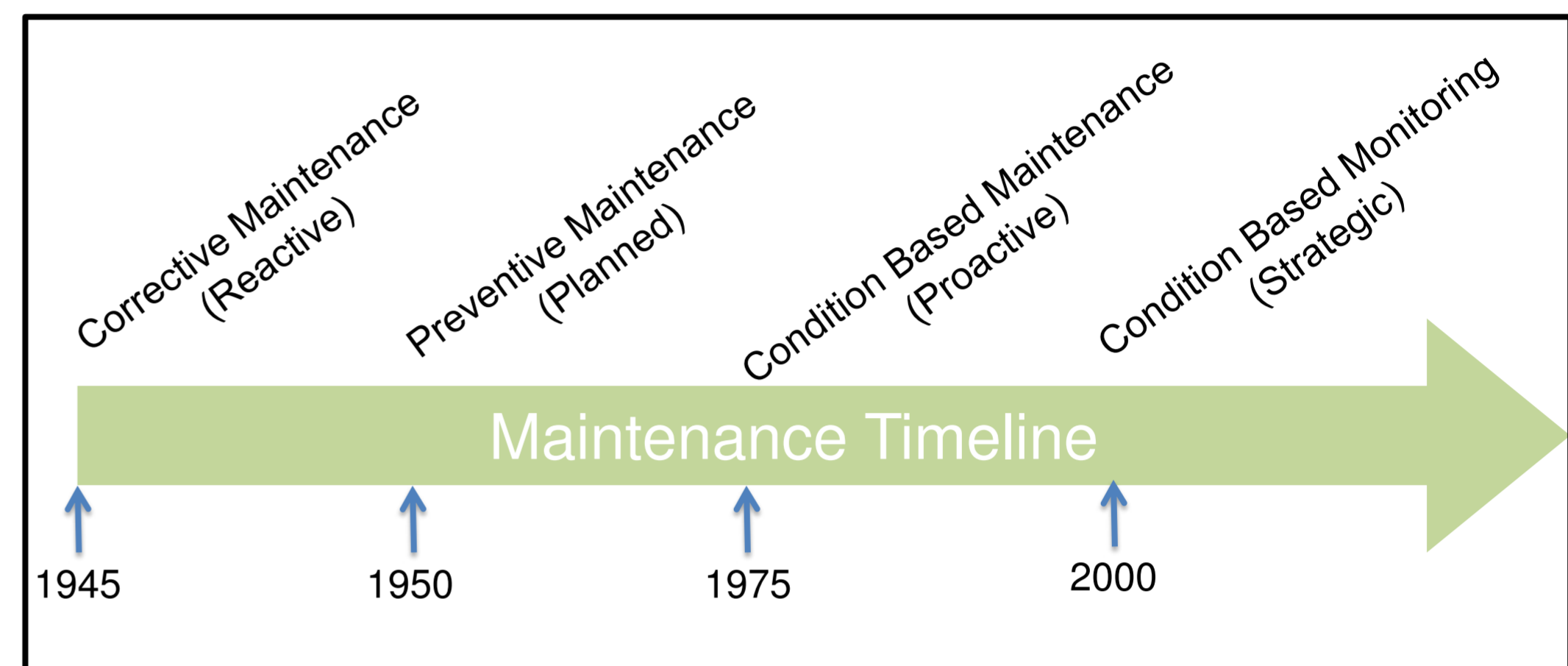
Background

The operational environment of the day-to-day industrial applications has more complex and pretentious structure, while their business effectiveness and efficiency is influenced by factors such as time, financial constraints, technology, innovation, quality, reliability, and information management. Maintenance costs consist a large part of asset management costs and a reduction in these expenditures can significantly improve business's savings and entire operational performance.

Project Aim & Objectives

The main aim of this project is the research and development of an innovative, optimised and adaptive algorithm dealing with on-board machinery, which purposes the integration of equipment condition prognosis and health degradation assessment, supporting the decision making for maintenance scheduling in long term business asset management. The objectives structuring the proposed aim of this research are as follows:

- Explore existing condition monitoring (CM) methodologies and applications from the maritime and offshore industry specifying common developments, and gaps
- Investigate the various equipment condition forecasting methods for scheduling maintenance plan and fault tolerance control
- Propose the appropriate feature extraction and selection option for long term condition prognosis
- Compare and evaluate the most suitable performance assessment methods for non-stationary machinery conditions and propose the most efficient for accurate long term predictions
- Investigate and propose the most effective and accurate degradation assessment technique for single or multiple component evaluation
- Apply the selected methods in a singular designed model filtering signal data by forecasting multiple step ahead positions

Maintenance Timeline

Corrective Maintenance (Reactive) — 1945
Preventive Maintenance (Planned) — 1950
Condition Based Maintenance (Proactive) — 1975
Condition Based Monitoring (Strategic) — 2000

Condition Monitoring Procedure

START
↓
Asset Audit
↓
Data Collection
↓
Condition Detection
↓
Diagnosis
↓
[Prognosis]
Feature Extraction
↓
Feature Selection
↓
Performance Assessment
↓
Remaining Lifetime
↓
Decision Making
↓
FINISH

Mechanical, Electrical and Oil & Product Quality Measurements

- Temperature
- Pressure
- Fluid Flow
- Vibration displacement/velocity/acceleration
- Current
- Voltage
- Insulation resistance
- Product physical properties
- Product dimensions

Internet
Periodic Data Summary
Report onshore
Database
Data Exchange & Fusion
Measurements using sensors
Real-time Data Collection
Analysis Centre
ALARM
Decision Making

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