



James Fisher Mimic *Monitoring Your Future*

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James Fisher Mimic

Monitoring Your Future

Agenda

- ❖ Introduce James Fisher
- ❖ The benefits of Condition Based Maintenance
- ❖ Integration with AMOS
- ❖ Future product development

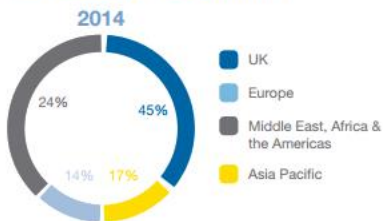


James Fisher and Sons Plc

- ❖ UK's leading Marine Services Company
- ❖ Track record of marine expertise spanning 165+ years
- ❖ Turn over in excess of £400M
- ❖ Publically listed on London Stock Exchange
- ❖ Employing over 2500 people in over 40 countries



Revenue by geography



James Fisher and Sons Plc



Offshore Oil Services

- Fisher Offshore
- Buchan Technical Serv.
- Monyana
- Air Supply
- Gjerde
- Reanco
- Scan Tech



Specialist Technical Services

- Fendecare Marine
- Straininstall
- RMS Pumptools
- Harsh Environmental
- JFIMS
- NDT Ltd
- JF Nuclear
- MB Faber



Marine Services

- JF Marine Services
- JF Shipping Services
- JF Crewing
- JF Defence
- **JF Mimic**
- JF Rumic

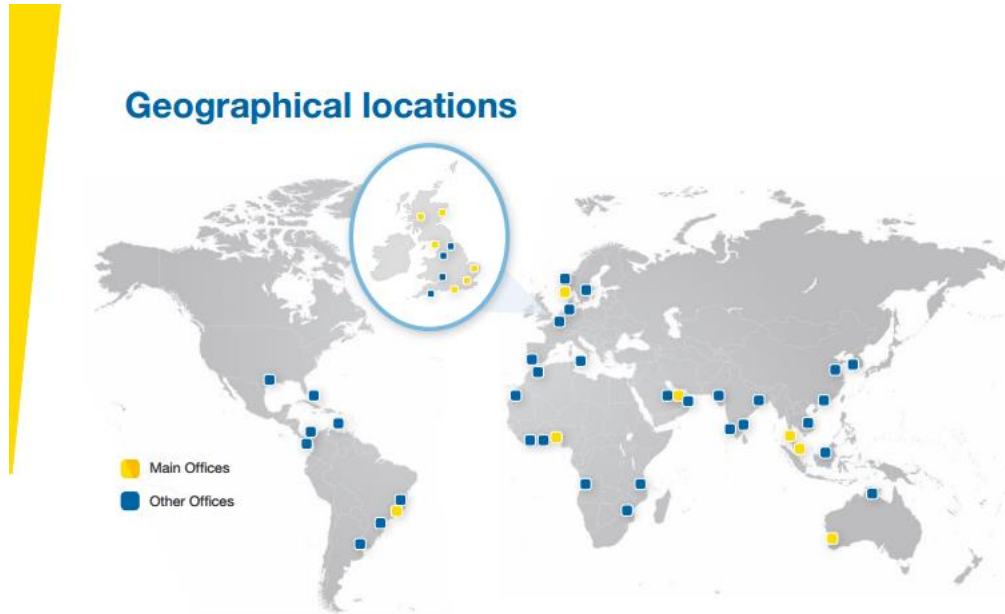


Marine Oil Services

- JF Everard



James Fisher and Sons Plc



A Global Organisation

- ❖ Annual growth
- ❖ Over 2500 employees
- ❖ A growing reputation for quality and reliability
- ❖ Continuing with expansion by internal growth and acquisition



James Fisher Mimic

- ❖ Over 25 years experience providing tailored maintenance solutions in the marine industry
- ❖ Provide unique condition monitoring software and services
- ❖ Provide cost effective condition monitoring solutions
- ❖ Mimic condition monitoring software in daily use on over 150 vessels worldwide
- ❖ Supporting clients and partners to improve the reliability of their assets and to reduce maintenance costs
- ❖ We have partnered with Spectec since 2006
- ❖ A growing list of Western Shipping company clients
- ❖ We provide:
 - CM Software, Thermographic (Infrared) surveys, Data Analysis, CM Consultancy, Turbo Charger monitoring services, VA and CM training, Oil analysis, CM related hardware, software and services.



Condition Based Maintenance

Is

... A recognised maintenance strategy that can be simply described as “maintenance when need arises”.

... This maintenance is performed after one or more indicators show that equipment is going to fail or that equipment performance is deteriorating.

... CBM is based on using real-time data to prioritize and optimize maintenance resources.

... Observing the state of the system is known as “Condition Monitoring”.



Condition Based Maintenance

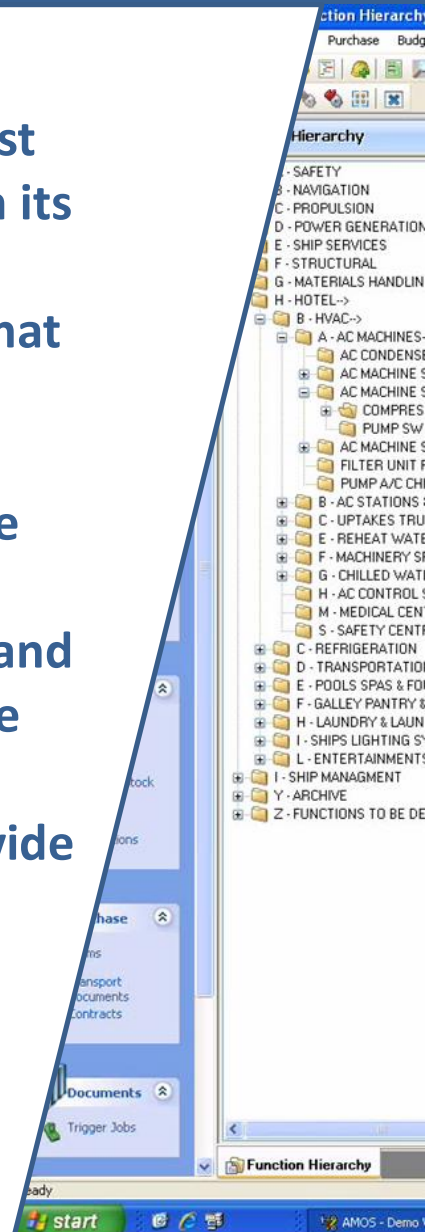
Unlike most providers of CM systems we understand that CM is just an element of CBM and therefore NOT a maintenance strategy in its own right.

Also CBM is just an element of the overall maintenance strategy that may include a mixture of calendar based and condition based maintenance tasks.

The controlling system for all maintenance should therefore be the vessel's CMMS – AMOS M&P.

With this in mind we integrated our software (Mimic) into AMOS and continue to advise that using the two systems in this manner is the best way forward.

But why change a proven strategy to CBM and what should it provide to you

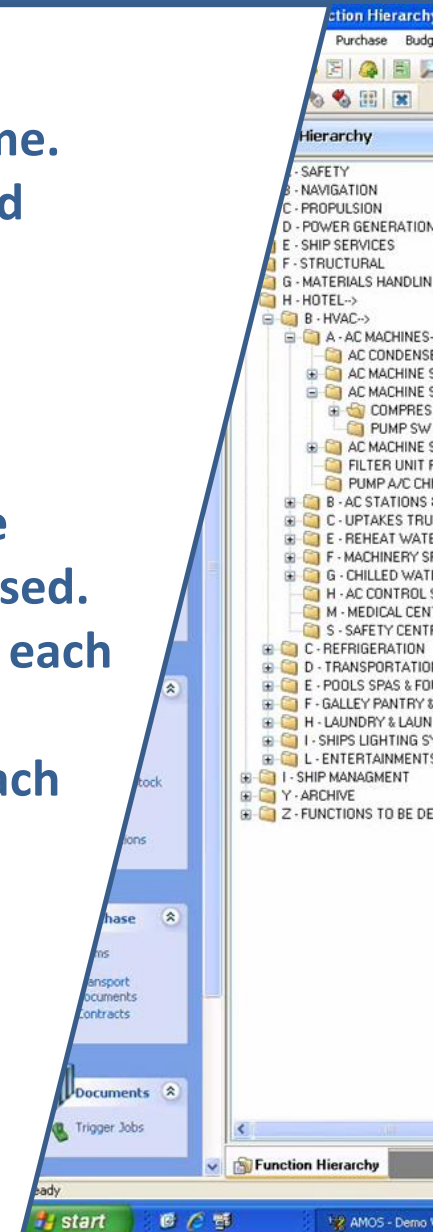


Mimic and AMOS

Owners need assurance that the maintenance is completed on time. Conducting Condition Monitoring, in the past, has been haphazard and unreliable.

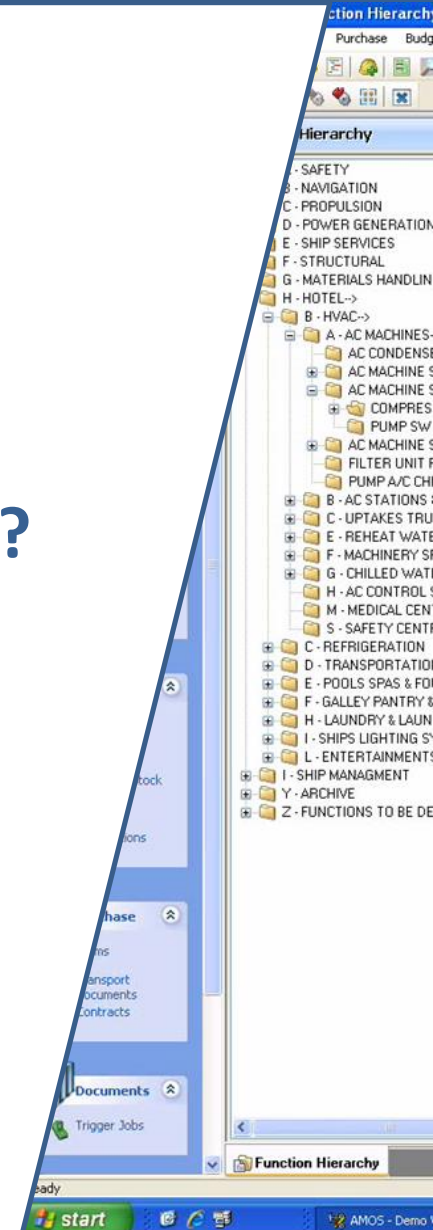
Integration of CM (MIMIC) into AMOS provides ...

- Confidence that condition monitoring tasks are scheduled and completed.
- Confidence that collected condition monitoring values that are outside of threshold levels are acted upon and defects recognised.
- Confidence that the correct level of information is provided to each individual at a level that is understandable and useable
- Confidence that the expectations of changing to a CBM approach are realistic and achievable.



Condition Based Maintenance

Sowhy change a proven strategy to CBM?
andwhat should it provide to you?

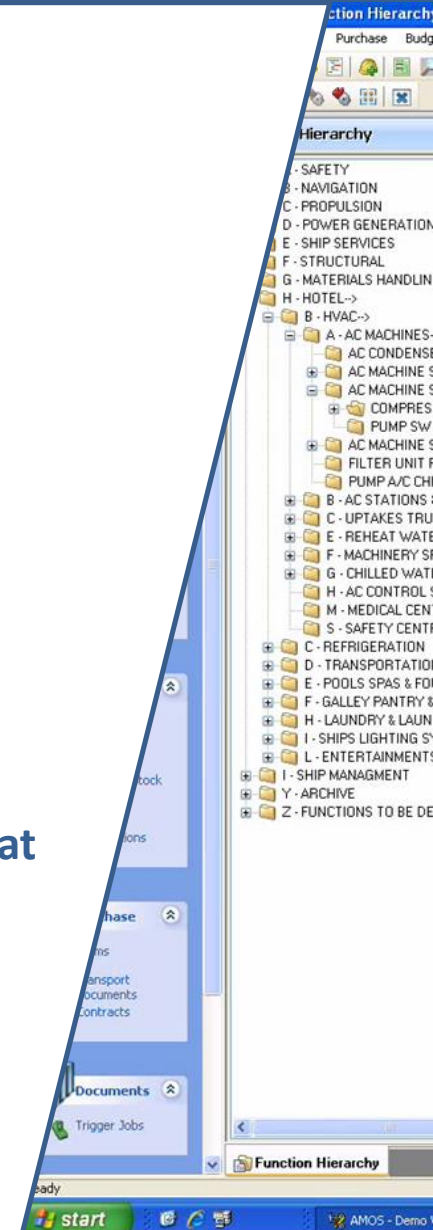


Condition Based Maintenance

Will ...

- ❖ Improve availability
- ❖ Improve company's reputation
- ❖ Improve safety
- ❖ Improve reliability
- ❖ Optimise maintenance costs
- ❖ Reduce overall spares holdings and costs
- ❖ Reduce number of strip downs
- ❖ Reduce maintenance induced failures
- ❖ Reduce Insurance costs

To enable this, a Condition Monitoring regime needs to be established that allows these benefits to be obtained.

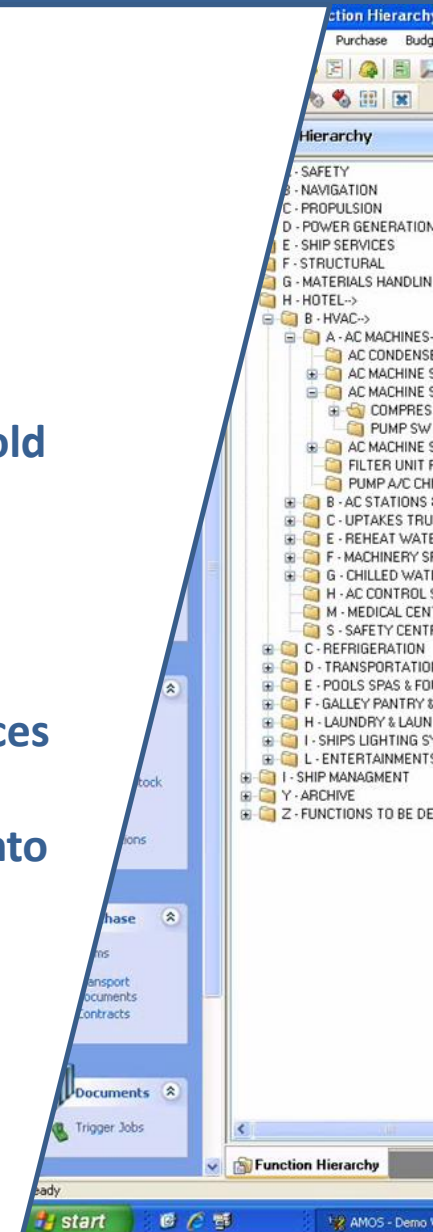


Condition Monitoring

Needs to be ...

- ❖ Cost effective
- ❖ Appropriate to the asset and its criticality
- ❖ Considered, measurable and periodic (P-F curve)
- ❖ A measurable parameter that is indicative of condition
- ❖ Definable in terms of threshold value (different to operational threshold values)
- ❖ Simple and intuitive
- ❖ Auditable
- ❖ Adjustable
- ❖ Inclusive of modern technology and integration of different data sources

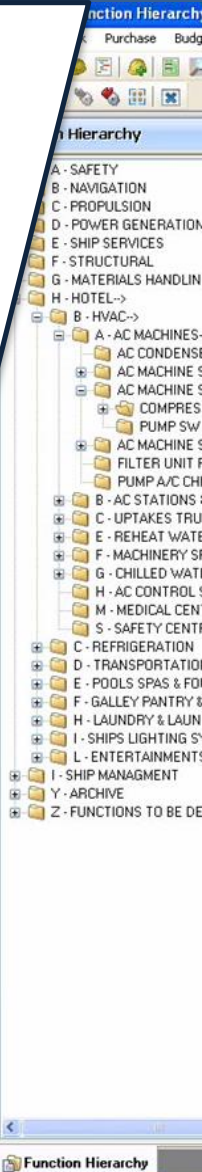
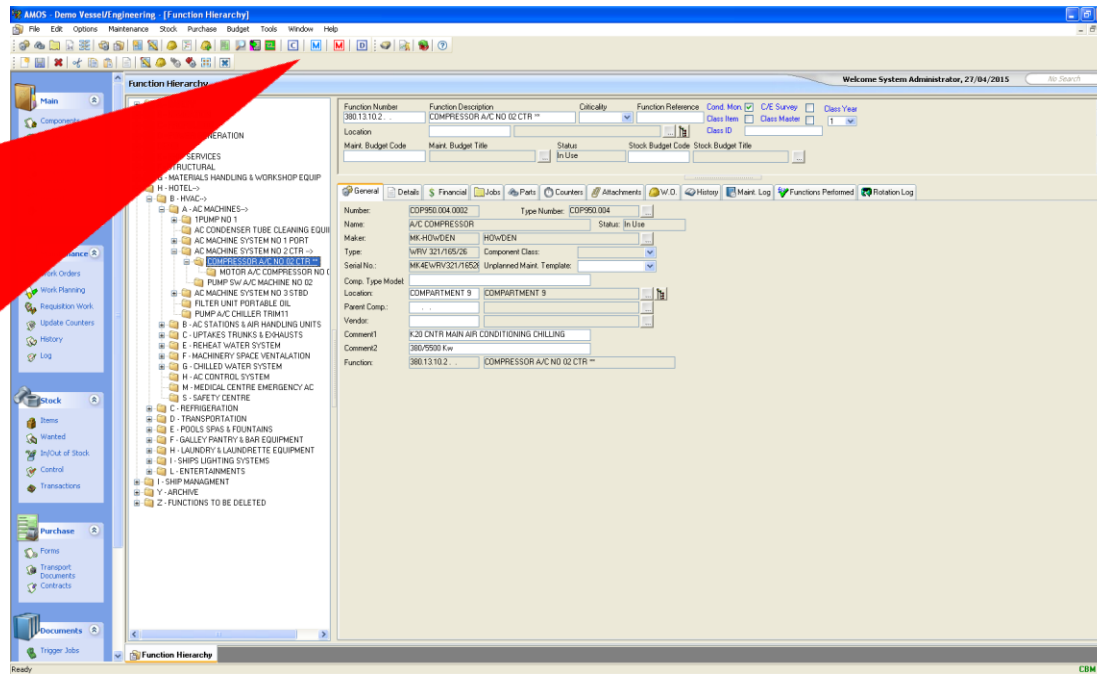
The Mimic Condition Monitoring system, integrated and embedded into AMOS, provides the right solution.



Information displayed

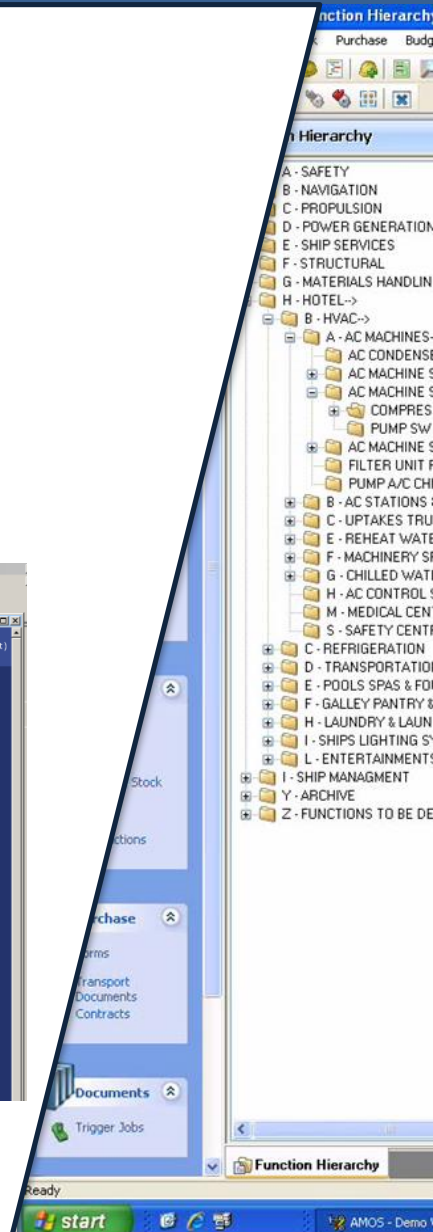
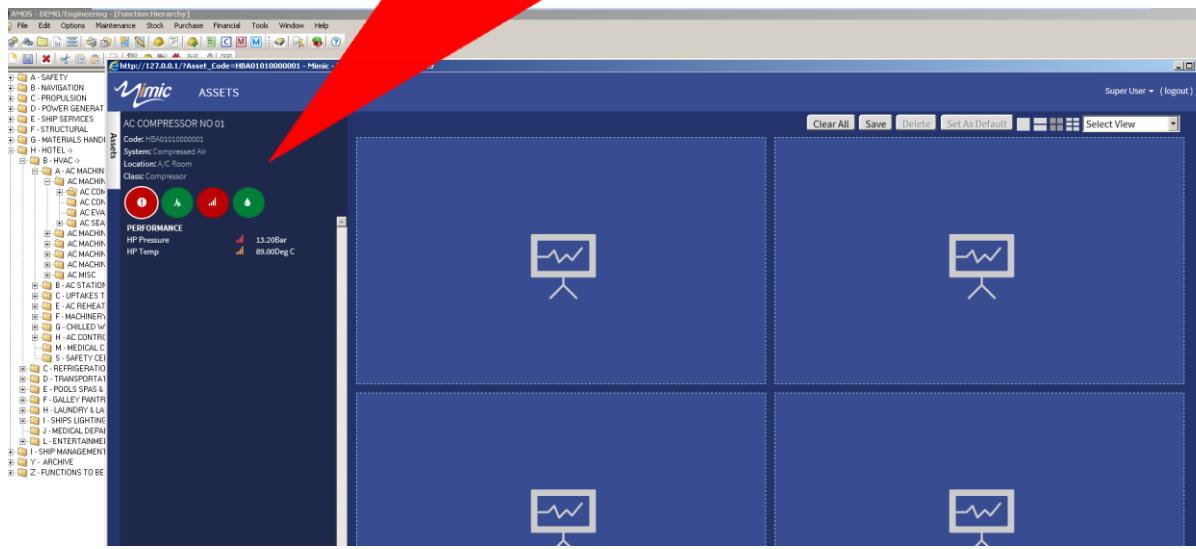
It is a fundamental requirement to be able to view the condition monitoring information and an individual machines status without leaving AMOS

To do this you have
One button to press

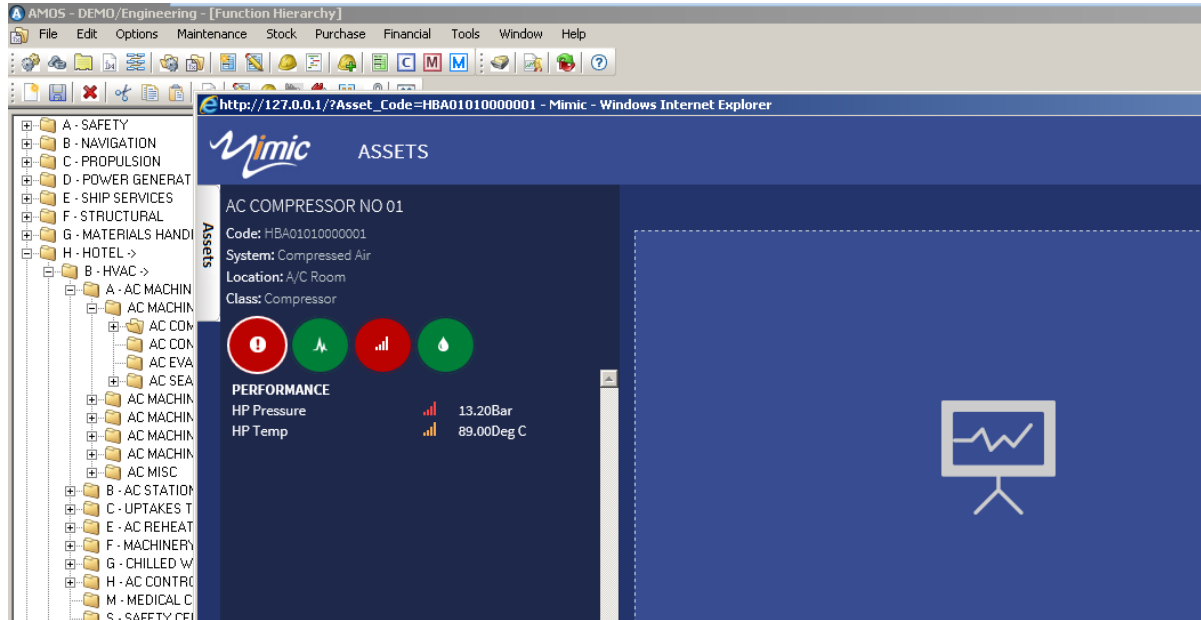


Information displayed

This calls the condition dashboard for the chosen asset and displays the relevant information.

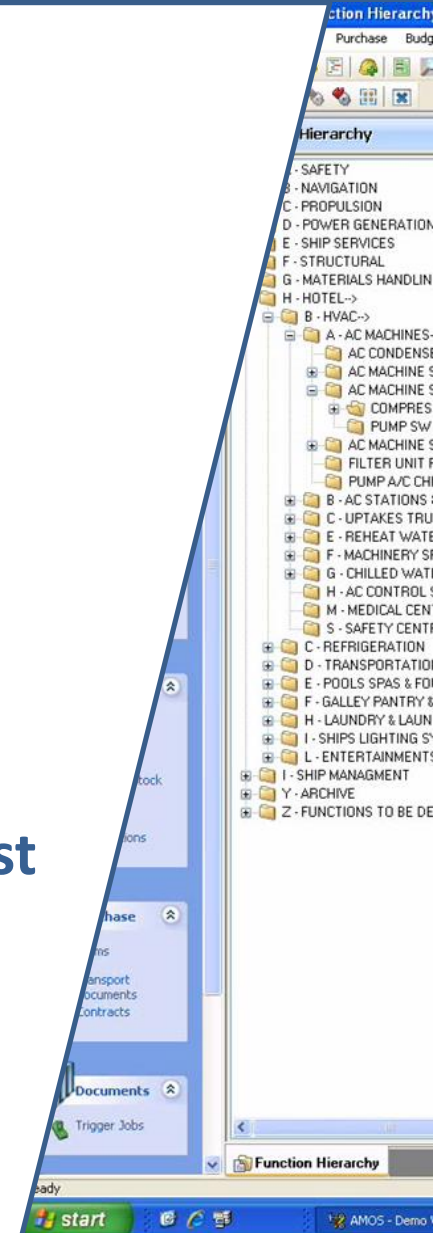


The Mimic Dashboard



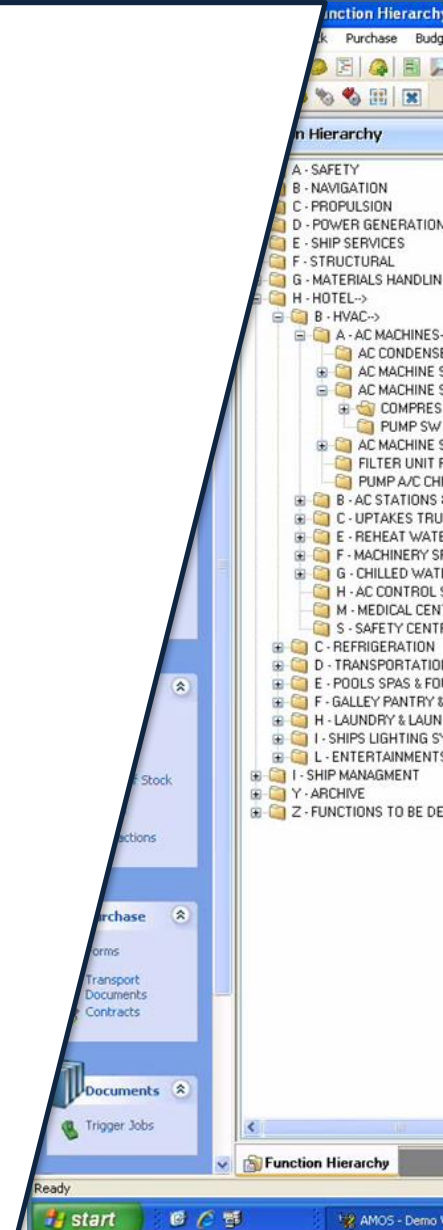
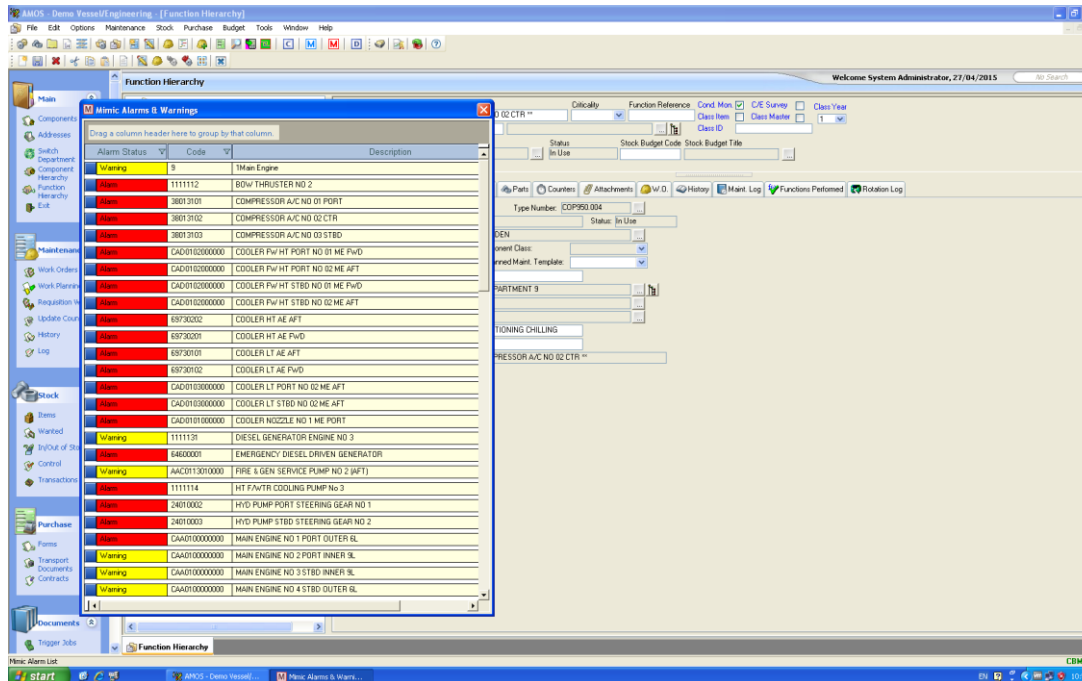
Brings the Condition Monitoring Data into AMOS with just one button press

Mimic Users do NOT need specialist training on a new software product.



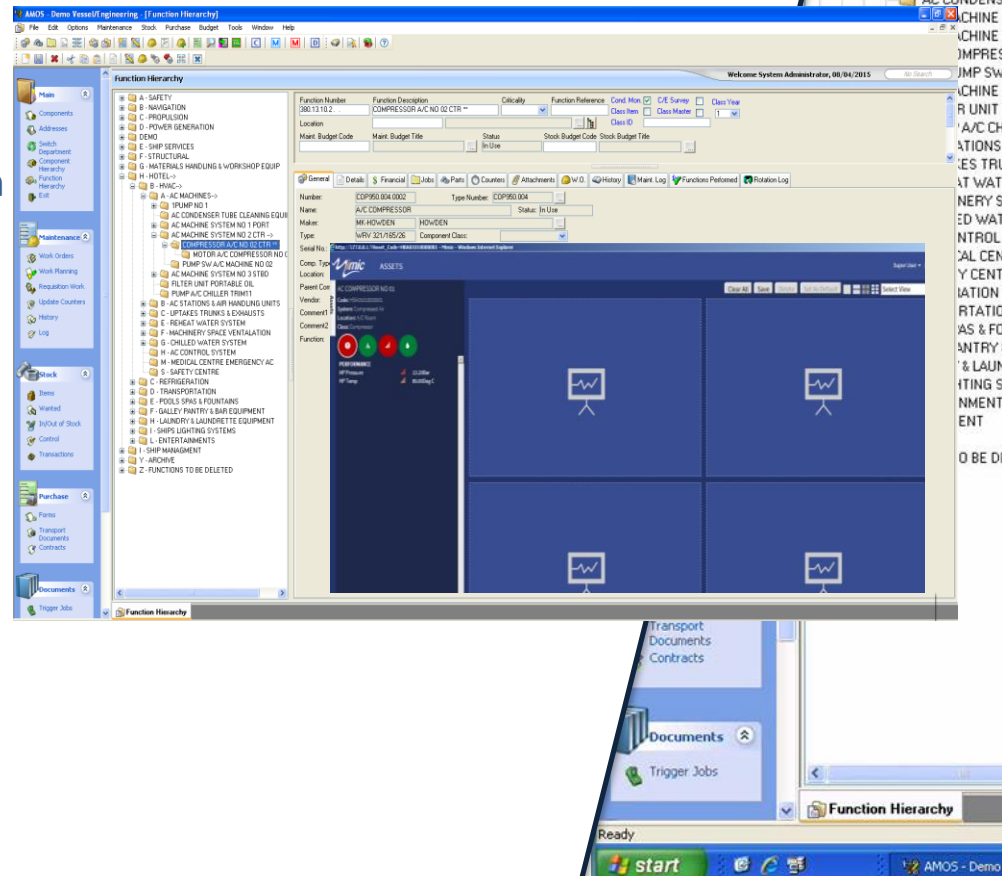
Information displayed

- ❖ The AMOS MIMIC interface also allows users to access a list of all assets displaying condition related threshold exceptions.



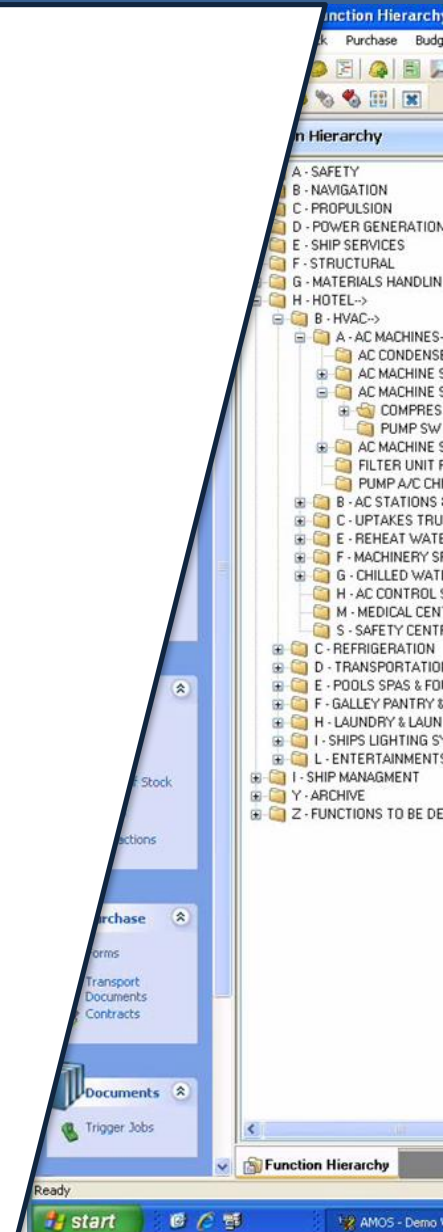
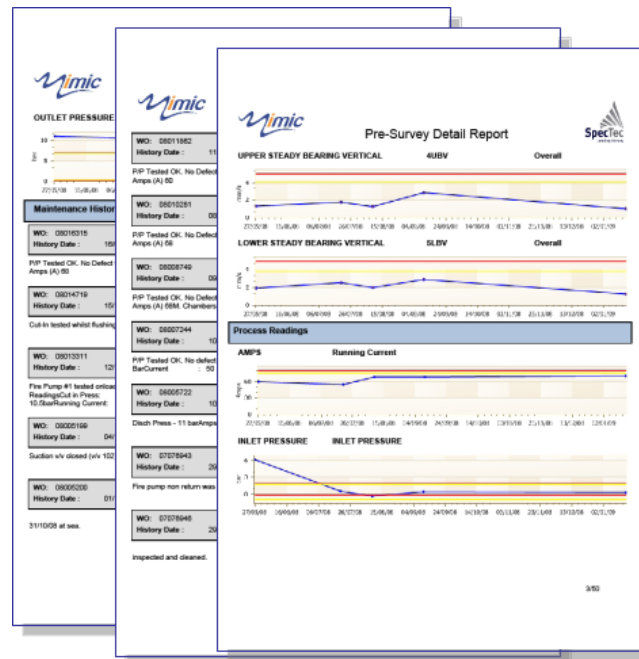
Information displayed

- ❖ Integration to AMOS
 - Creates a single Maintenance Management System
 - Reduces training burden for Users
 - Promotes “joined up thinking” by crew
 - Allows simple access to information when making maintenance decisions
 - Ensures data collection tasks are undertaken
 - Automated work order system ensures that monitored exceptions are not overlooked/ignored
 - Full replication to the land based CMMS
 - Allows full auditability, control and accountability



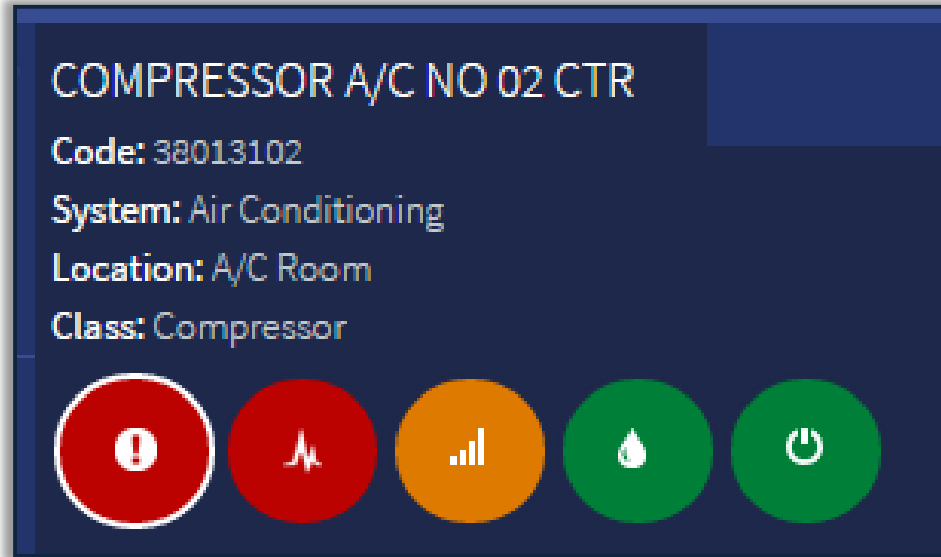
Information displayed

- ❖ It also allows for the simple creation of a Class report. This gathers all of the condition data along with maintenance history and publishes a combined report.



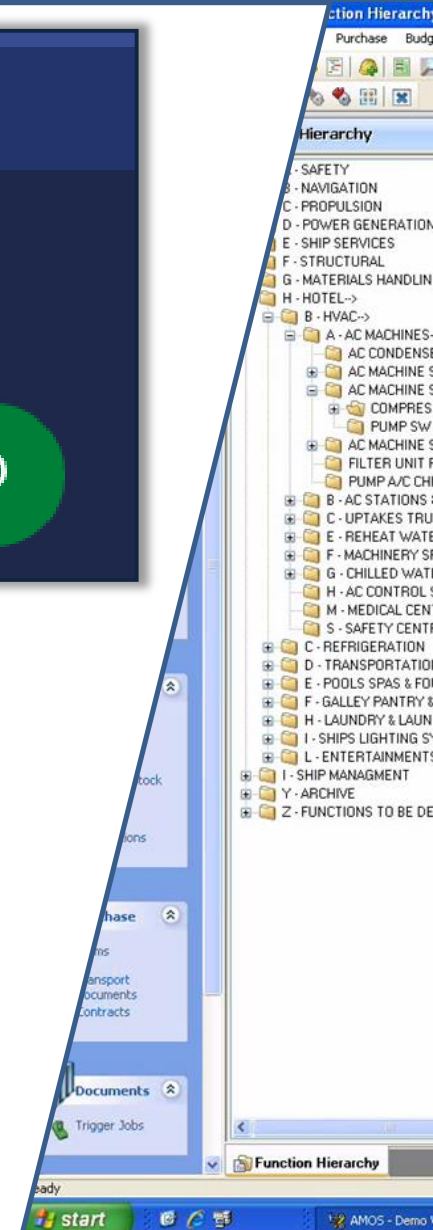
The Mimic Way

We believe that Condition Monitoring should start by using those sensors that are already installed such as



- pressure, speed, flow, load, current, power, differentials, averages, exhaust temperatures, fluids added/used, bunkers/fuel used, fridge gas usage, potable water quality, breathing air quality, hydraulic fluid contamination.
- Also, advantages should be sought from simple arranged condition tests such as speed of steering gear from hard over to hard over, time taken to fill an empty air reservoir or time taken to pre-lubricate an engine prior to start up.

Using these sensors and the intelligent use of monitoring processes and/or operations creates NO additional cost but starts to provide the benefits.





The screenshot shows the Mimic software interface. On the left, a tree view lists various assets, with 'COMPRESSOR A/C NO 02 CTR' selected. An orange arrow points from this asset in the tree to a large central panel. This panel displays the following information:

- COMPRESSOR A/C NO 02 CTR**
- Code: 38013102**
- System: Air Conditioning**
- Location: A/C Room**
- Class: Compressor**

Below the text, there are five circular icons representing different data types: a red circle with a white exclamation mark (warning), a red circle with a white pulse line (vibration), an orange circle with a white bar chart (performance), a green circle with a white flame (oil analysis), and a green circle with a white power button symbol (status).

On the right side of the interface, a 'Function Hierarchy' tree is visible, listing various system components such as SAFETY, NAVIGATION, PROPULSION, SHIP SERVICES, STRUCTURAL, MATERIALS HANDLING, HOTEL, HVAC, AC MACHINES, AC STATIONS, UPTAKES, REHEAT, MACHINERY, CHILLED WATER, AC CONTROL, MEDICAL CENTRE, REFRIGERATION, TRANSPORTATION, POOLS SPAS & FOOD, GALLEY PANTRY & LAUNDRY, SHIPS LIGHTING SYSTEMS, ENTERTAINMENT, SHIP MANAGEMENT, ARCHIVE, and FUNCTIONS TO BE DEVELOPED.

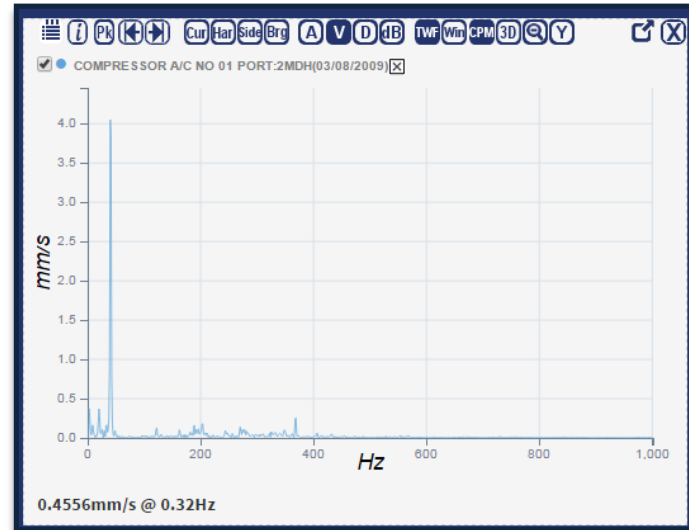
The Mimic Dashboard

Brings together ...

- ❖ Vibration data
- ❖ Process and performance data
 - Pressures, temperatures, speed, load, position, angle, time, flow, etc etc
- ❖ Oil analysis results

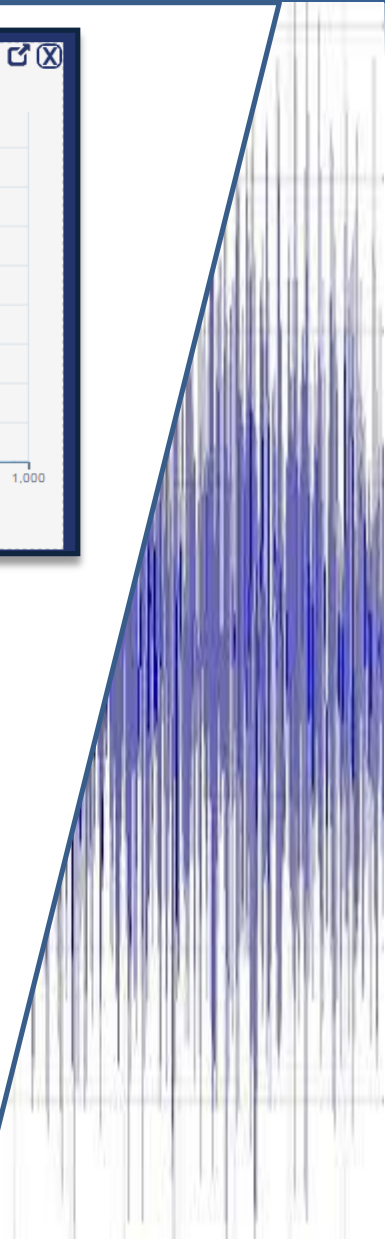
The Mimic Way

We also believe that
Condition Monitoring should
be more than vibration
signature analysis!



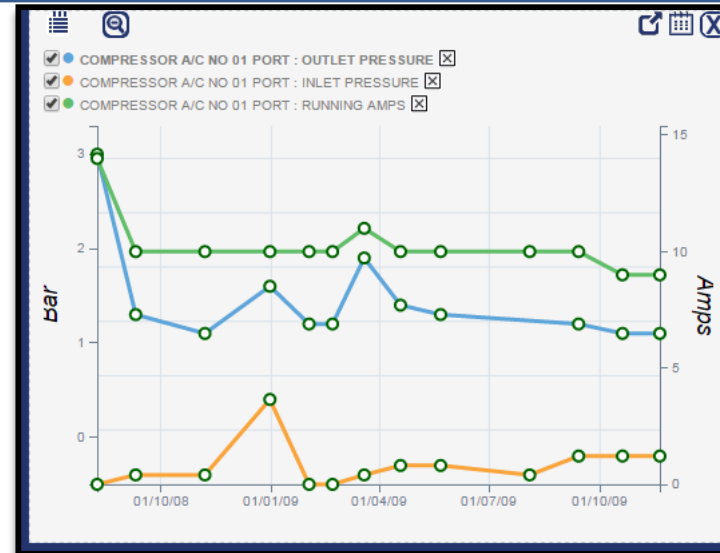
- Mimic does provide vibration analysis tools and the ability to undertake a vibration monitoring regime.
- It provides comprehensive vibration data collection specifications that enable full FFT or time wave form data to be recorded.
- It provides detailed analysis tools and screens that are intuitive to use and helpful to the experienced and/or trained analyst.
- For those who are not suitably experienced then Mimic also breaks down the vibration spectra to those components considered as “root cause” for vibration problems, such as imbalance, mis-alignment and looseness.

..... and it also provides.....



The Mimic Way

**We also believe that
Condition Monitoring should
be more than vibration
signature analysis!**

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Performance Data

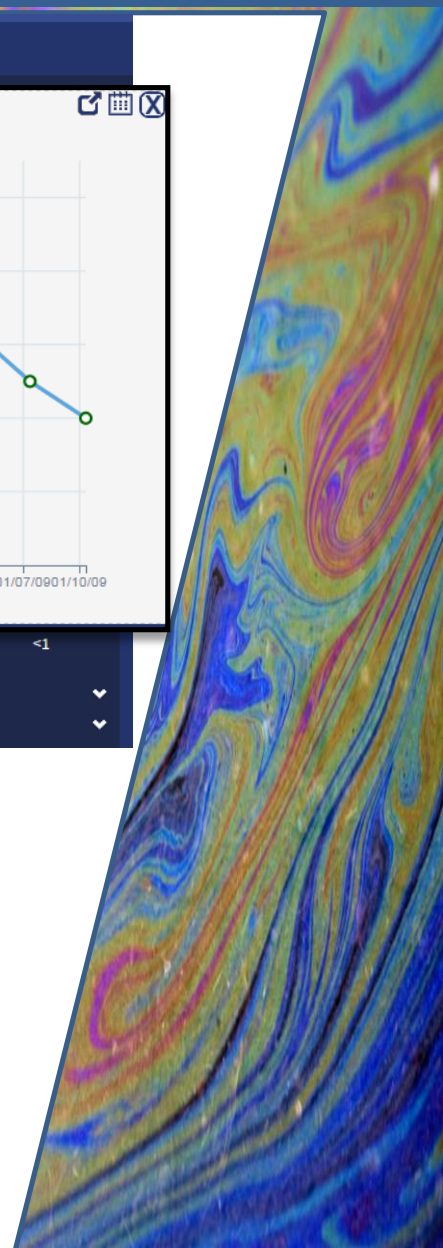
- Performance and process data is collected and trended and used to make condition based decisions.
- An inbuilt calculation engine allows Mimic to produce additional channels of data, such as the temperature difference across a heat exchanger, allowing intelligent use of existing data.
- Numerous channels can be overlaid to provide in depth analysis.
- Channel source data can be anything that is a number.

The Mimic Way

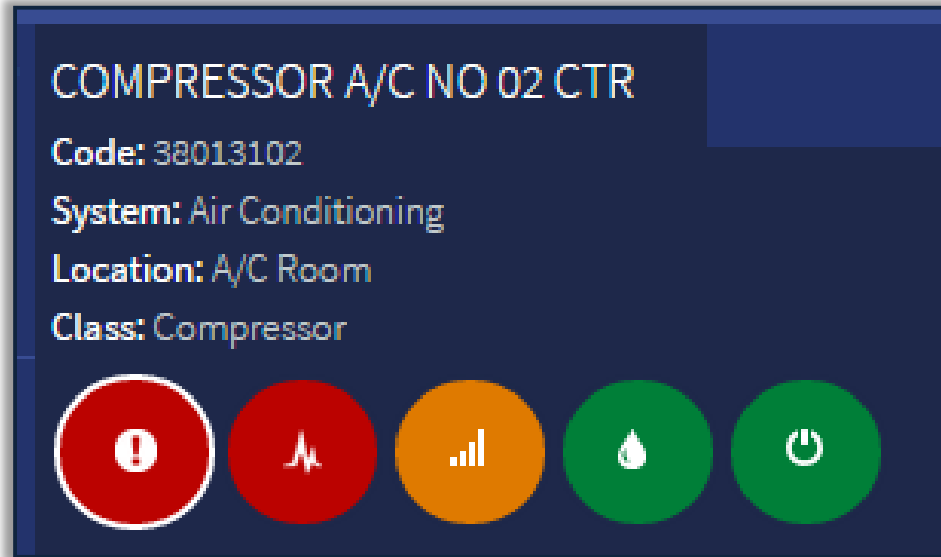
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Condition Monitoring should
be more than vibration
signature analysis!

Oil Analysis Reporter

- Most owners have an Oil Analysis Programme provided by an outside vendor.
- Mimic can use the results of their analysis to bring the data into a Mimic format, to be used in the same way as vibration and performance data.
- Fluid details along with element values can all be individually trended.



The Mimic System



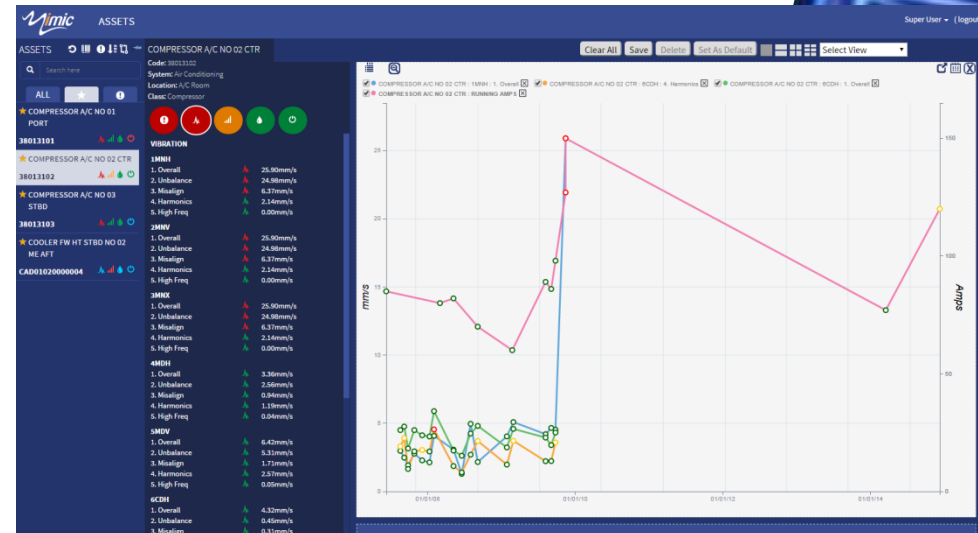
The Mimic Dashboard

- ❖ Each recorded, calculated and displayed channel can have discrete threshold levels.
- ❖ The dashboard has a simple “traffic light” system based on the threshold values.
- ❖ The **!** Sign on the dashboard allows Users to quickly view all exceeded thresholds on an individual asset
- ❖ A higher level filter button (not shown here) allows the same but for all assets within the Mimic database that are currently displaying threshold exceptions.
- ❖ Thresholds can be set to trigger on high going, low going or banded



Information displayed

- ❖ Various levels of drill down
 - Asset list
 - Dashboard
 - Trend plots
 - Multiple channel trend plots
 - Vibration overall trending
 - Vibration frequency band trending
 - Vibration spectra (with analysis tool set)
 - Vibration Waterfall spectra
- ❖ Full replication of data to ashore
 - Provides all data and complete functionality to shore side personnel



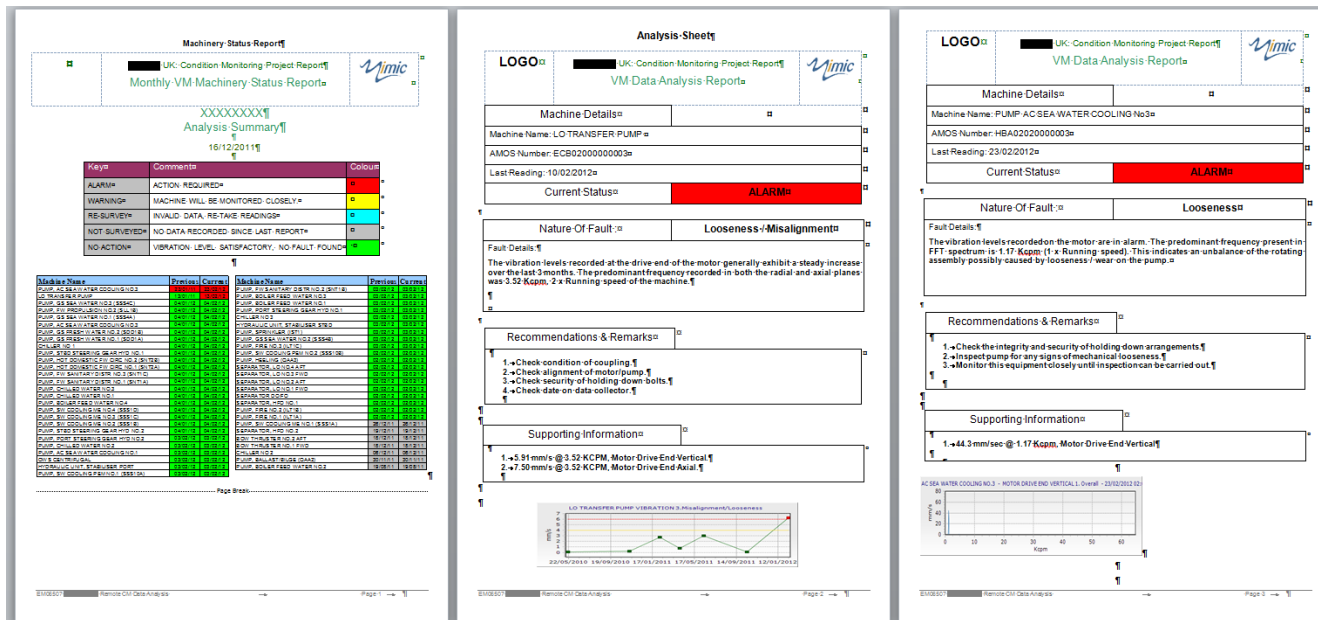
The Mimic System - Data Analysis

- ❖ Understanding the collected data is a fundamental requirement.
- ❖ Mimic has simple drill down access to the data that starts with the traffic lights and ends with complex spectral analysis of vibration signatures.
- ❖ Features, functionality and tools are provided to assist. Mimic also replicates the data to the owner's shore office to allow advise and assistance for data analysis.
- ❖ JF Mimic also provide an analysis service (based on single alerts, monthly or quarterly data back ups). Providing analysis of root cause and recommended actions to rectify.

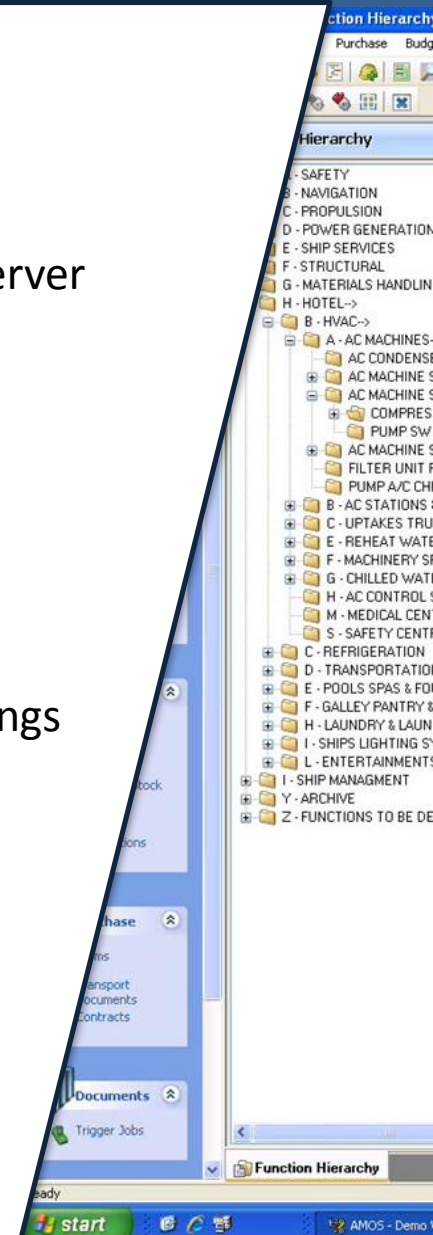
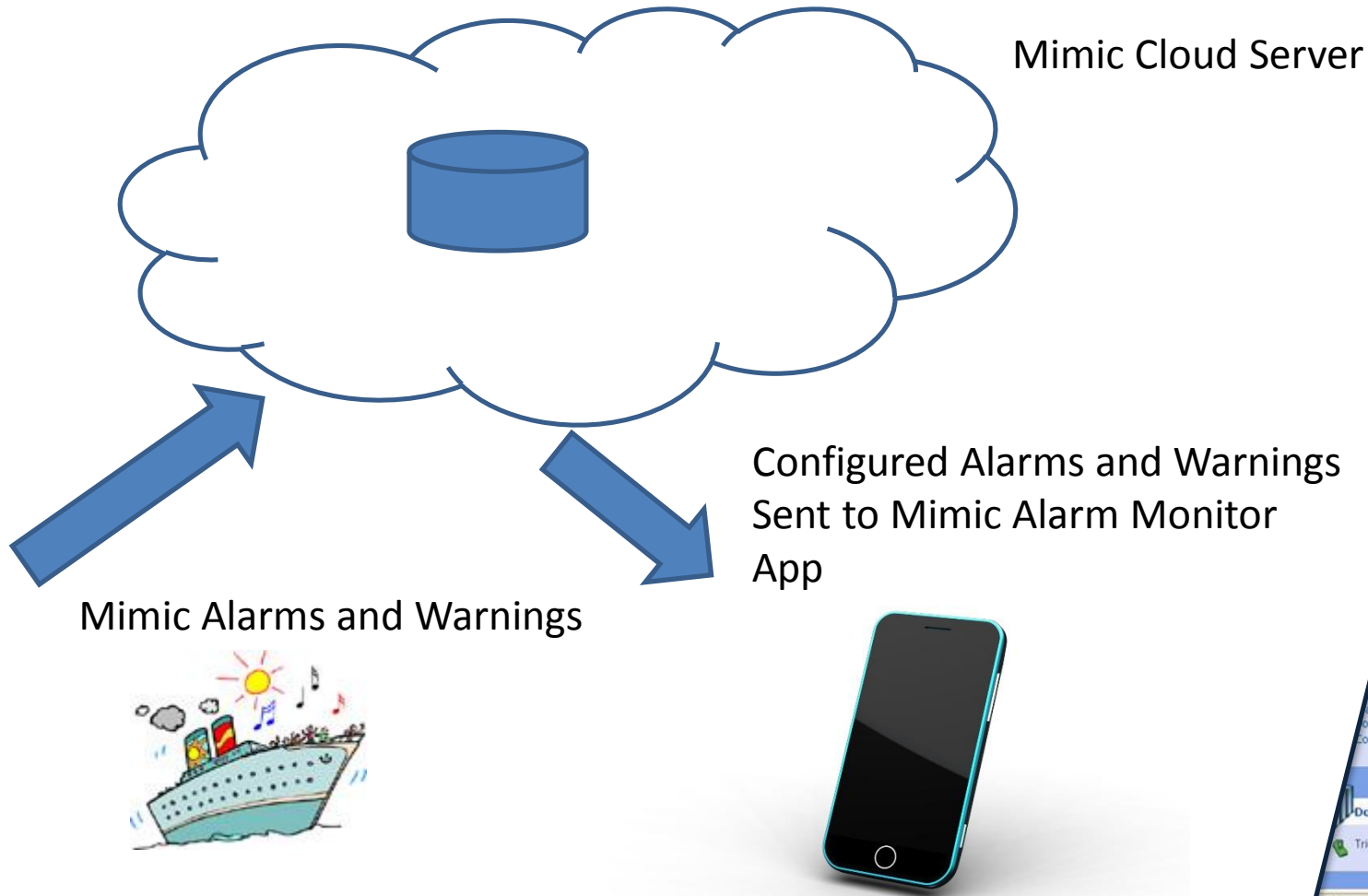


Remote Analysis

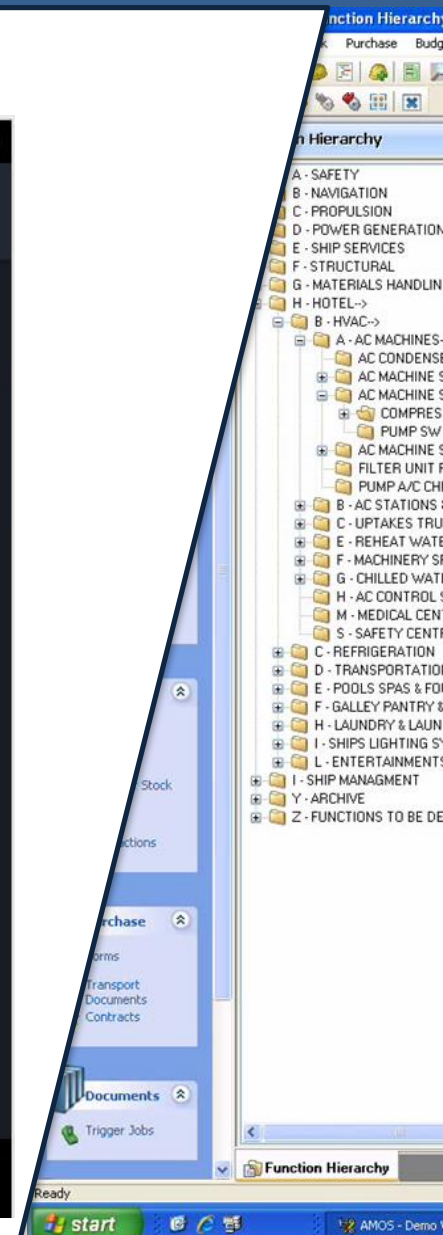
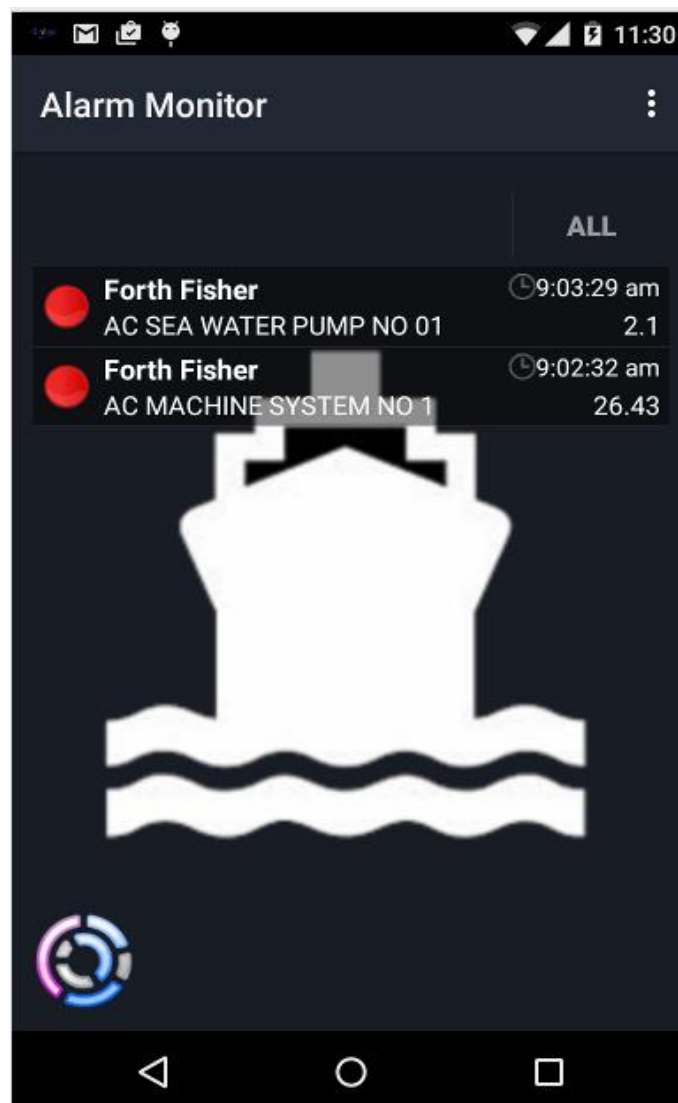
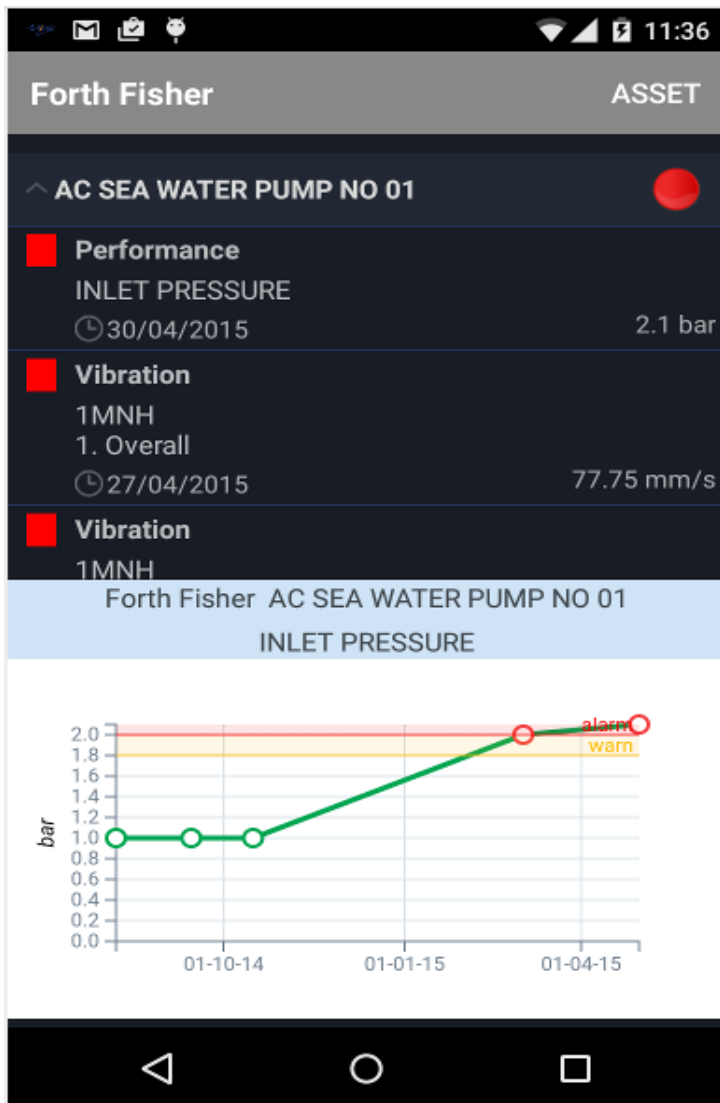
- ❖ Via replication we (that is James Fisher) are able to offer a detailed Analysis Service for the complex vibration signature data.
- ❖ This allows Owners to get the benefits from vibration monitoring without having to expend endless resources on training and retaining trained staff.



Remote Analysis



Remote Analysis



The Mimic System - Data Acquisition

The Mimic Hand Held Data Collector

- ❖ Used for both performance/process data along with vibration signatures.
- ❖ Simple and easy to use
- ❖ Provides all of the information required to conduct condition monitoring
- ❖ Does not require detailed training and does not contain additional features that are rarely, if ever, used.



The Mimic System - Data Acquisition

Fixed and Integrated Data Collection

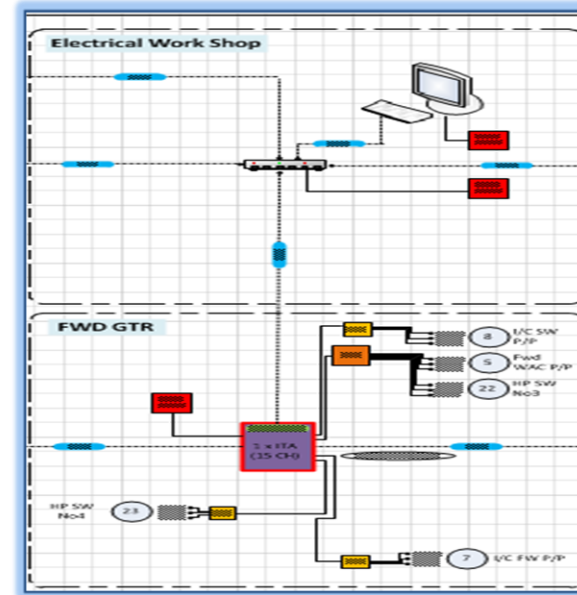
- ❖ Used for performance/process data, oil analysis reports and vibration signature collection.

Performance and Process

- ❖ Integration with existing sensor signals.
- ❖ Installation of new sensors
- ❖ Integration with platform management systems, control systems etc.

Oil Analysis reports

- ❖ We work with the existing oil analysis vendor to create a (Mimic system) recognisable file that is produced and provided by the vendor when ever oil analysis results are sent to the vessel.
- ❖ The file is transferred to the Mimic database and data is automatically extracted by Mimic.
- ❖ Mimic then displays the results onto the dashboard and Mimic viewer.



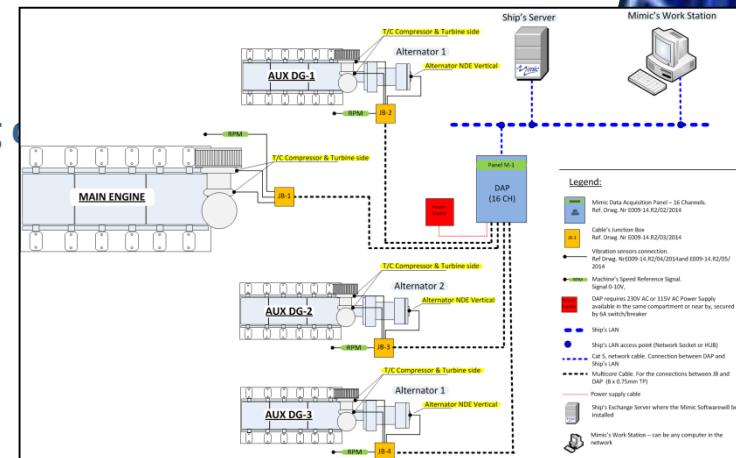
The Mimic System - Data Acquisition

Fixed and Integrated Data Collection

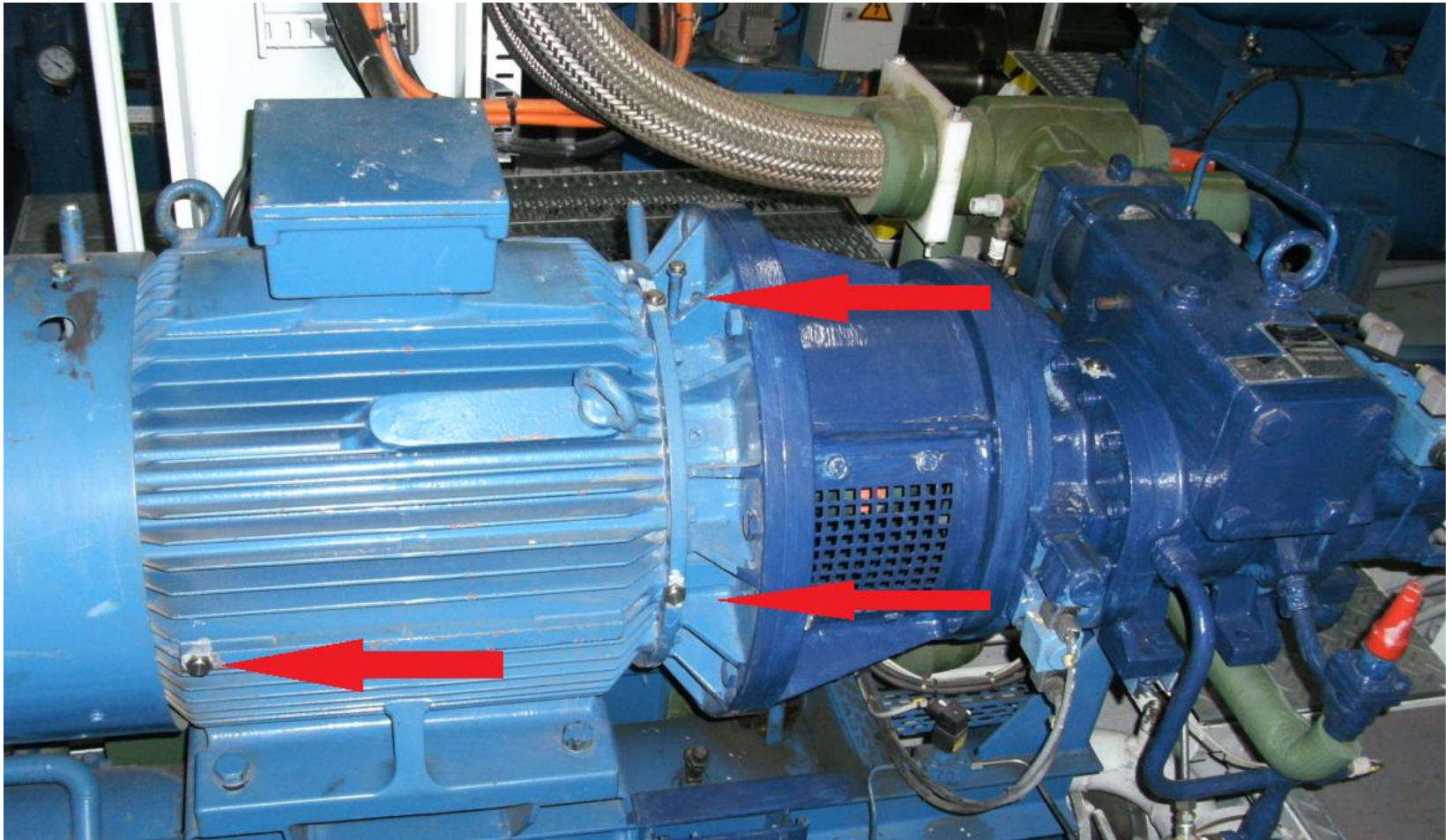
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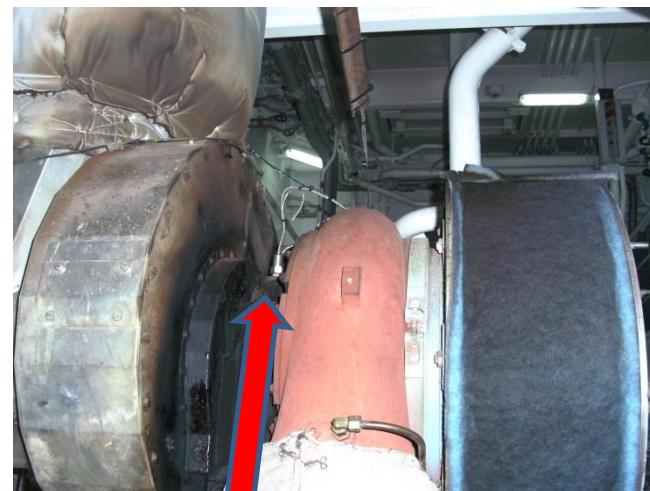
Vibration Monitoring

- ❖ Vibration sensors are installed at each nominated measurement position Sensors are connected to Data Acquisition panels
- ❖ DA panels are connected via existing or dedicated networks to the Mimic software
- ❖ Mimic utilises a rules based architecture to decided when is the optimum time to collect vibration data: reducing the GIGO/RIRO scenario Online monitoring
- ❖ Online monitoring reduces the continual training burden for data collector use
- ❖ Online monitoring ensures good quality data at the appropriate frequency



Fixed Monitoring





Vibration Sensors

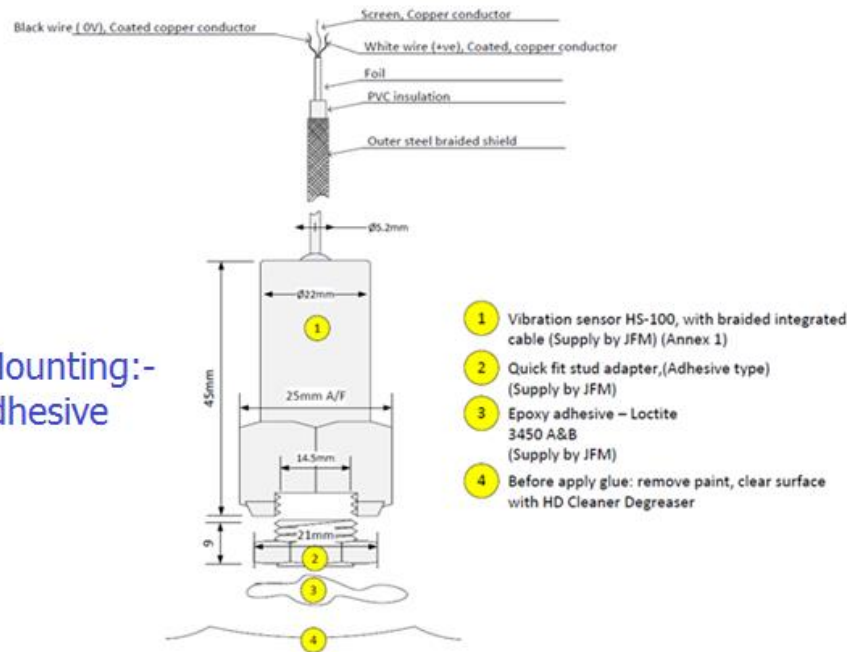


Data Acquisition

Fixed Vibration sensors

Vibration sensors are fixed to each nominated measurement position

Sensor Mounting:-
Epoxy Adhesive

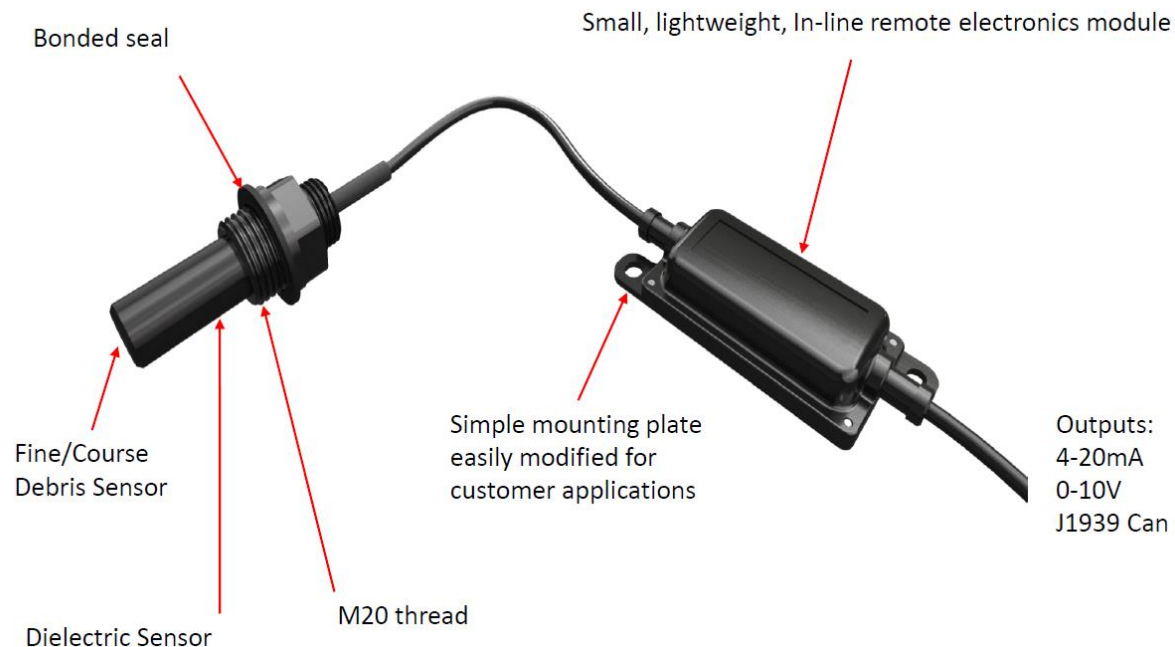


Data Acquisition

Condition data

Mimic can utilise on line sensors and monitoring devices, such as

Oil condition



Data Acquisition

Condition data

Mimic can utilise on line sensors and monitoring devices, such as

Hydraulic Fluid contamination



Data Acquisition

Condition data

Mimic can utilise on line sensors and monitoring devices, such as

Motor and Electrical System Condition



Data Acquisition

Condition data

Mimic can utilise on line sensors and monitoring devices, such as

Diesel Doctor



Data Acquisition

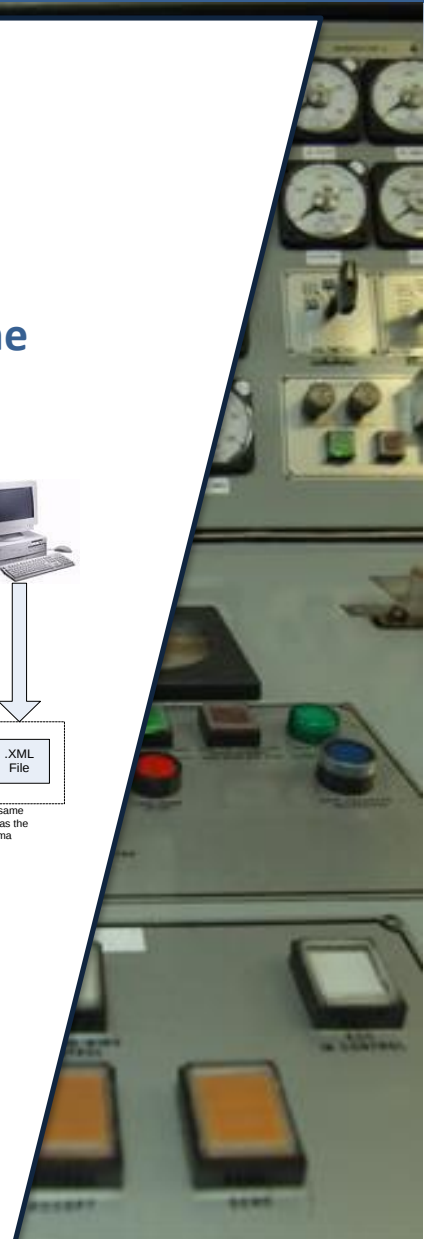
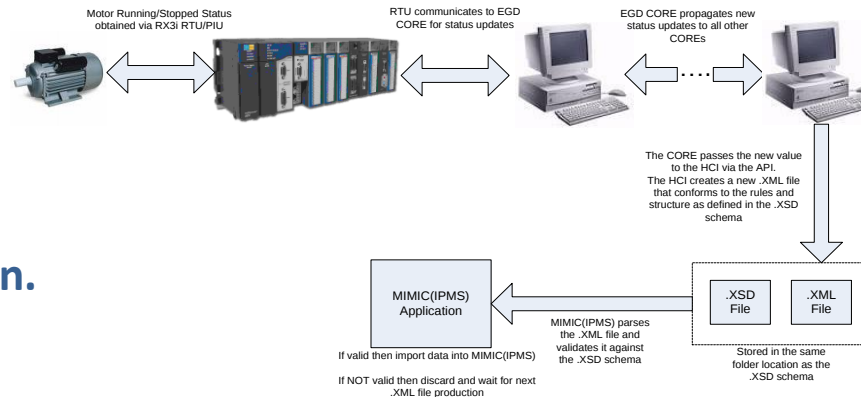
Performance data

Can be entered using the hand held data collector, but best way is via the already installed platform management system

Mimic and Vessel Control Systems integrated

Providing Mimic with a link to
>1000's channels of information.

Automated data collection allows the condition monitoring system to provide maintenance related alerts and alarms so that maintenance mitigation can be taken before a machinery operational or safety related alarm happens.

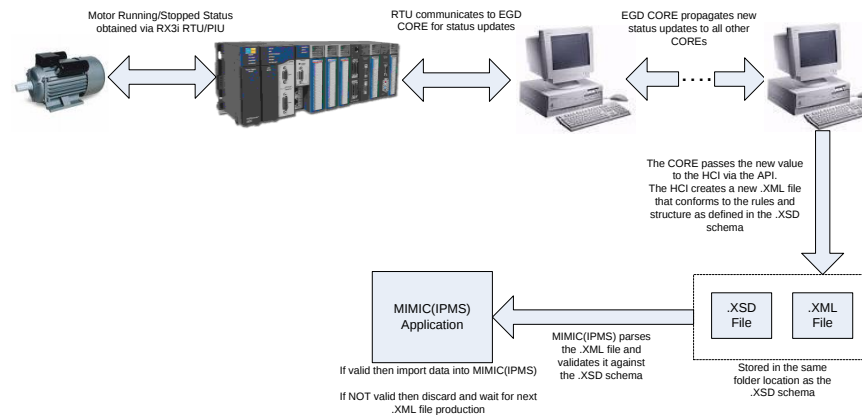


Data Acquisition

Performance data

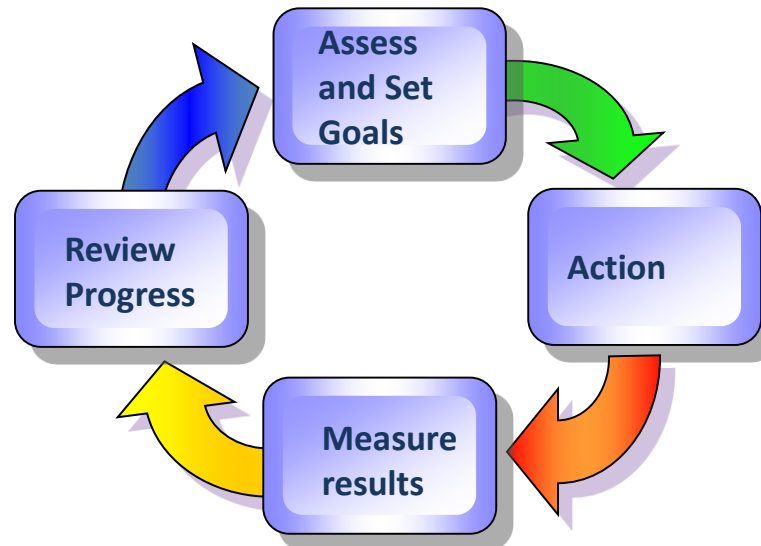
Typical data collected:

- ❖ Heat exchanger inlet and outlet temperatures
- ❖ Speed and load (power curves)
- ❖ Pump load and pressures (pump curves)
- ❖ Propeller pitch angle and load
- ❖ Engine exhaust temperatures
- ❖ Refrigerant gas temperatures
- ❖ Fresh water usage



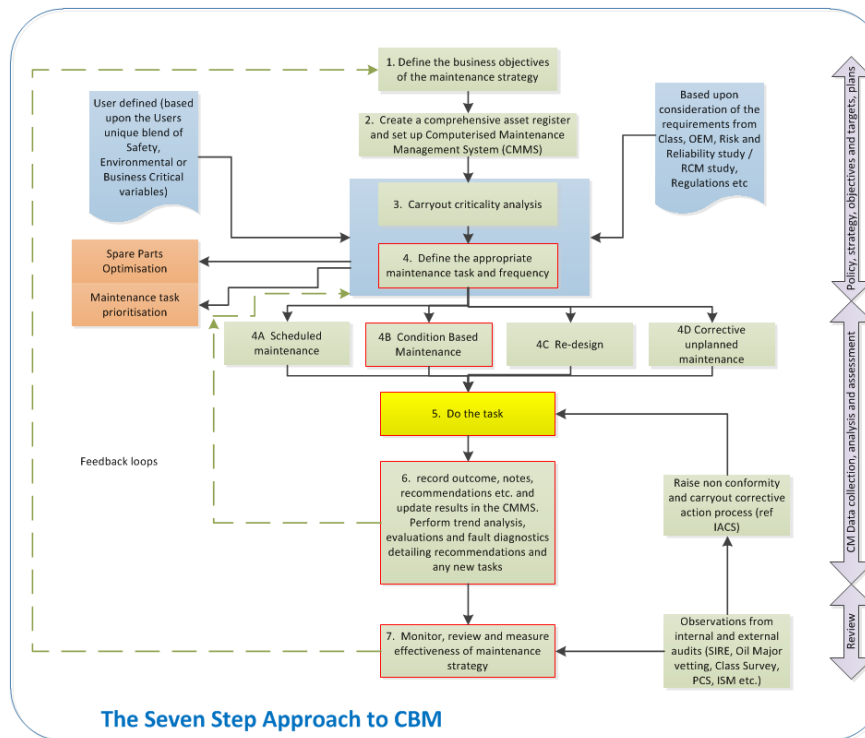
A brief word regarding Set Up

- ❖ Changing a complete vessel to CBM can be complex and requires commitment and resource.
- ❖ BUT ... CBM can provide benefits for just one asset and instigating on one asset can be simple and cost effective
- ❖ JFM have helped many owners and partners on the road towards obtaining these benefits by helping them to choose 10 or 20 worse performing assets and creating a monitoring programme that is achievable and effective.
- ❖ This usually takes 6 months for the benefits to be measurable.



A brief word regarding Set Up

- ❖ Changing to a CBM strategy does have a structured approach. JFM can help owners to develop their strategy from the initial 10 assets into a detailed and beneficial process that complies to Class and IMO requirements.



The Future

- ❖ We are currently working on a number of projects that ensure that Condition Based Maintenance, Condition Monitoring and Mimic satisfies the shipping industry long into this century

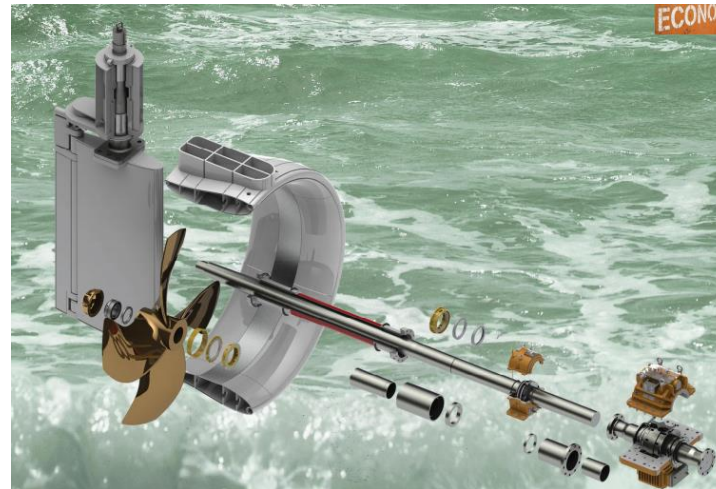


The Future

- ❖ We are currently working on a number of projects that ensure that Condition Based Maintenance, Condition Monitoring and Mimic satisfies the shipping industry long into this century

Wartsila Shaft Seal Monitoring

- ❖ We are working with Wartsila to create a shaft seal monitoring system that will enable owners to extend the docking requirement for a vessel and to avoid environmental penalties.
- ❖ The system will provide a continuous display to the crew and allow early intervention when problems begin to occur.

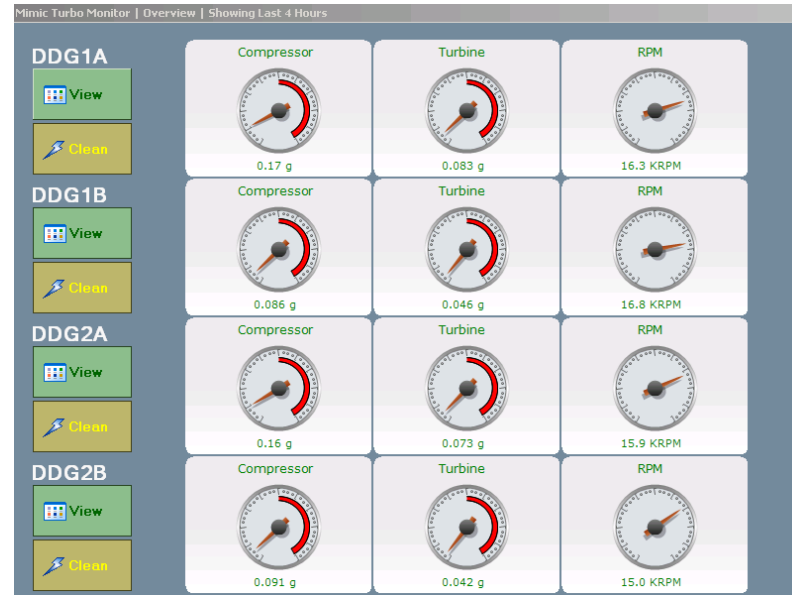


The Future

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On Line Turbo Charger Monitoring

- ❖ We are continuing to develop our world leading Turbo Charger monitoring system.
- ❖ Can be used to detect the very early signs of turbine faults providing the time for the crew to undertake mitigating action to avoid catastrophic failures.



The Future

- ❖ We are currently working on a number of projects that ensure that Condition Based Maintenance, Condition Monitoring and Mimic satisfies the shipping industry long into this century

Energy Monitoring

- ❖ JFM have linked in with BAE Sea Systems to provide Energy Monitoring of vessels.
- ❖ Uses inputs from ships navigation systems, engine and shaft power and the vessel's energy usage.
- ❖ JFM and BAE provide a combined solution to both voyage management and energy efficiency unrivalled in the market



The Future

- ❖ We are currently working on a number of projects that ensure that Condition Based Maintenance, Condition Monitoring and Mimic satisfies the shipping industry long into this century

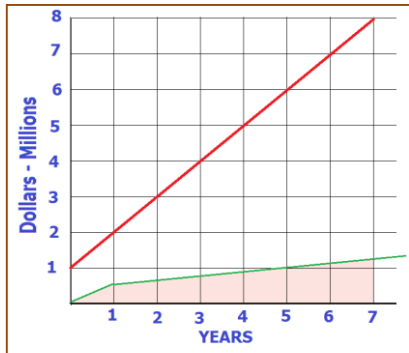
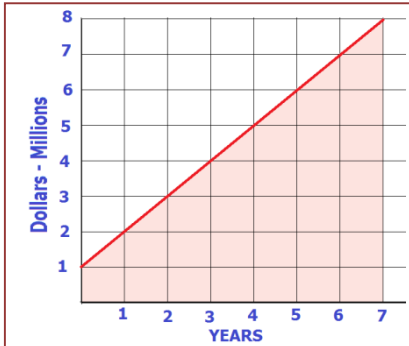
Bluetooth Accelerometers

- ❖ Provides a reduction in handheld data collection devices by using Android and IOS platforms.
- ❖ Allows simple cell phones to be used for data collection



Condition Based Maintenance

❖ Is it worth it? – A real SUCCESS Story!

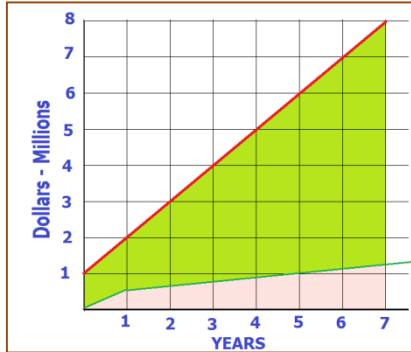


- ❖ A cruise line company had a major financial problem due to a high number of turbo charger failures.
- ❖ They had to budget for \$1,000,000 per year based on a failure rate of 4 TC's.
- ❖ Installing JF Mimic's TC monitoring units has allowed the failure to be identified before a catastrophic failure occurs.
- ❖ Resultant repair cost, per TC is \$25K rather than the catastrophic failure cost of at least \$250,000
- ❖ The cost of installation and the expected 4 failures is shown opposite.

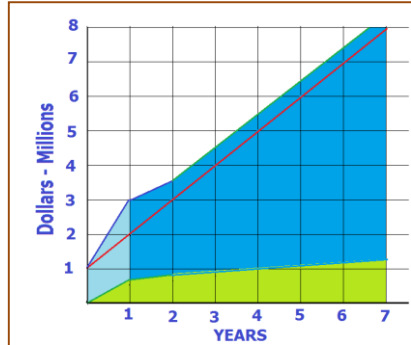


Condition Based Maintenance

❖ Is it worth it? – A real SUCCESS Story!



- ❖ The predicted savings over a 7 year period is shown in green and amounts to \$6,500,000
- ❖ Compared to the cost of TC monitoring which is less than \$1 per TC per day!



- ❖ The TC monitoring commenced some 29 months ago.
- ❖ Since that time there have been 13 failures.
- ❖ The cost would have been \$3,250,000
- ❖ To date the total cost has been \$705,000 (with \$380,000 being the CapEx cost)



James Fisher Mimic

Monitoring Your Future

The benefits of Condition Based
Maintenance within AMOS

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