23RD ANNUAL

NAUTICAL SYSTEMS GLOBAL User Conference

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Industry Insight: Condition Monitoring & Condition Based Maintenance

John Hathaway

11/7/2023

Presented by

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John Hathaway

Director, Product Management

I joined ABS in 2007 from an NS customer to influence the direction of our products. Product is my passion – continuously improving our fleet management suite to solve the key business needs of our customer

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Condition Monitoring & Condition Based Maintenance

- Overview
- Recent Enhancements & Key Features
- API
- Demo New Features

Condition Monitoring & Condition Based Maintenance

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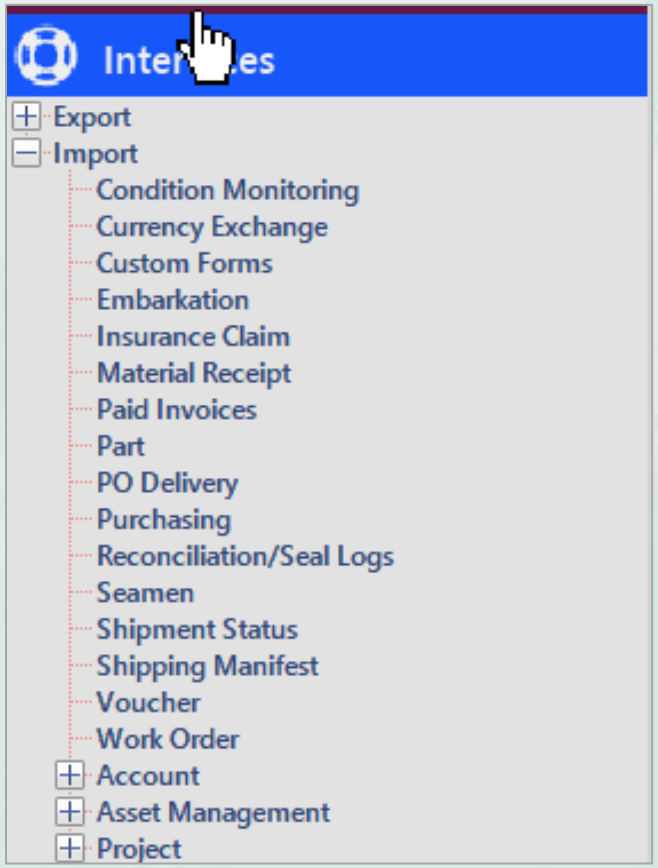
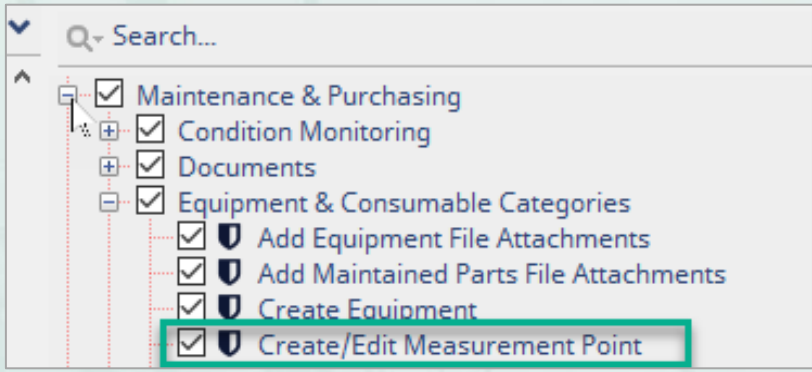
Condition Monitoring

- Condition Monitoring (CM) and Condition Based Maintenance (CBM) are practices used to track Machinery Health and running efficiency of equipment which in turn can influence maintenance schedules and condition-based maintenance/repair work.
- Manage condition monitoring types like Vibration Monitoring, Oil Analysis, Megger Readings, Infrared Thermography, etc
- Define status as reported by vendor or as defined by your organization (ie Poor, Good)
- Optionally – define measurement points for readings per equipment (vs 6.5.27)
- Configure your equipment to automate action based on condition
- Record condition
  - via condition report –provided by vendor as a summary of equipment health
  - via planned job – you capture reading and system interpret the condition and proposes action

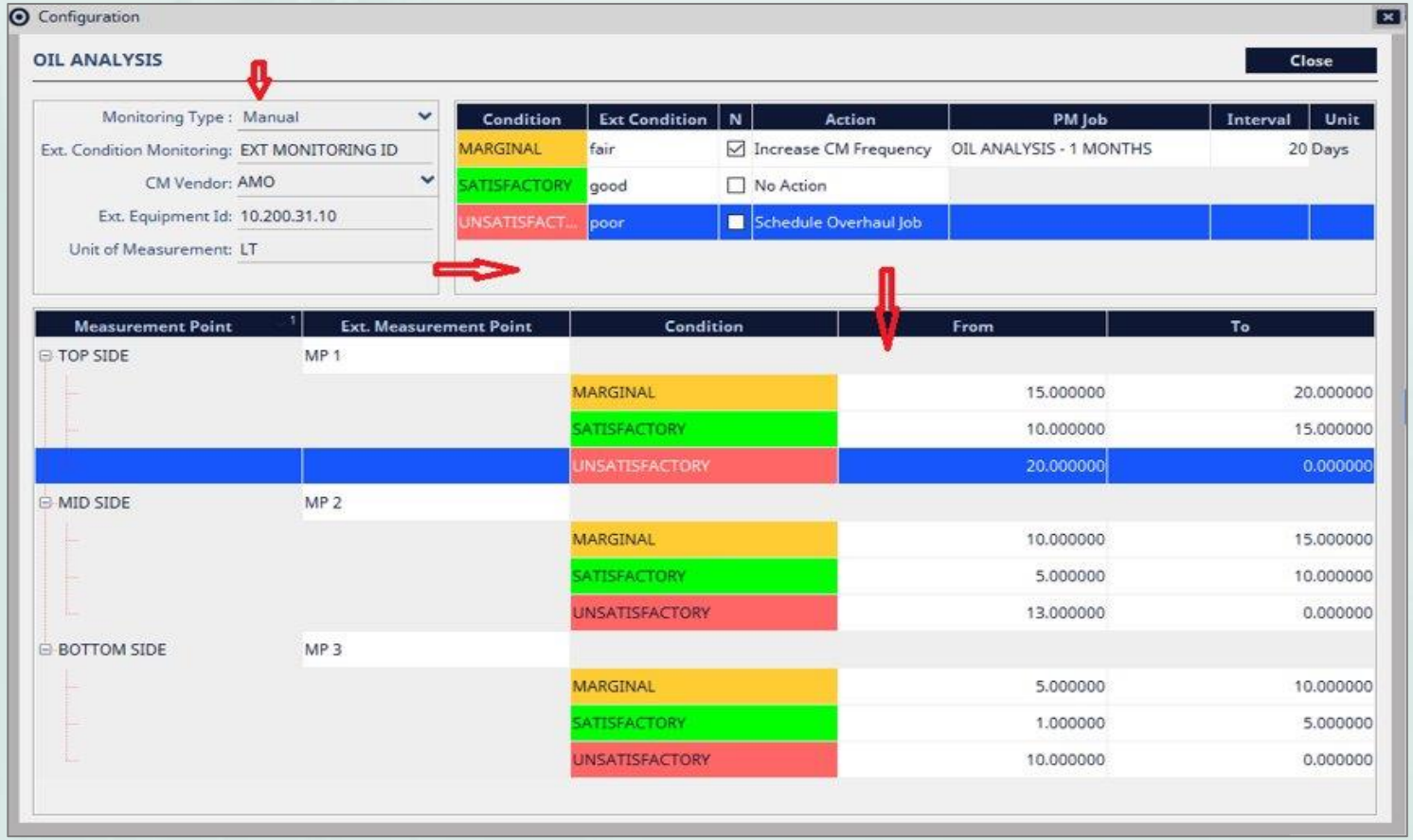
Implementation/Configuration

- Maintenance Manager Authorizations > System Administration
- Standard Job creation with work instructions
- CM Vendors (Companies)
- Company Type
- CM Equipment Creation
- Reserved Document Numbers
- Notifications (email & internal)
- Master Data to include:
  - Measurement point
  - Condition monitoring status
  - Condition monitoring type
- Optional CM Interface



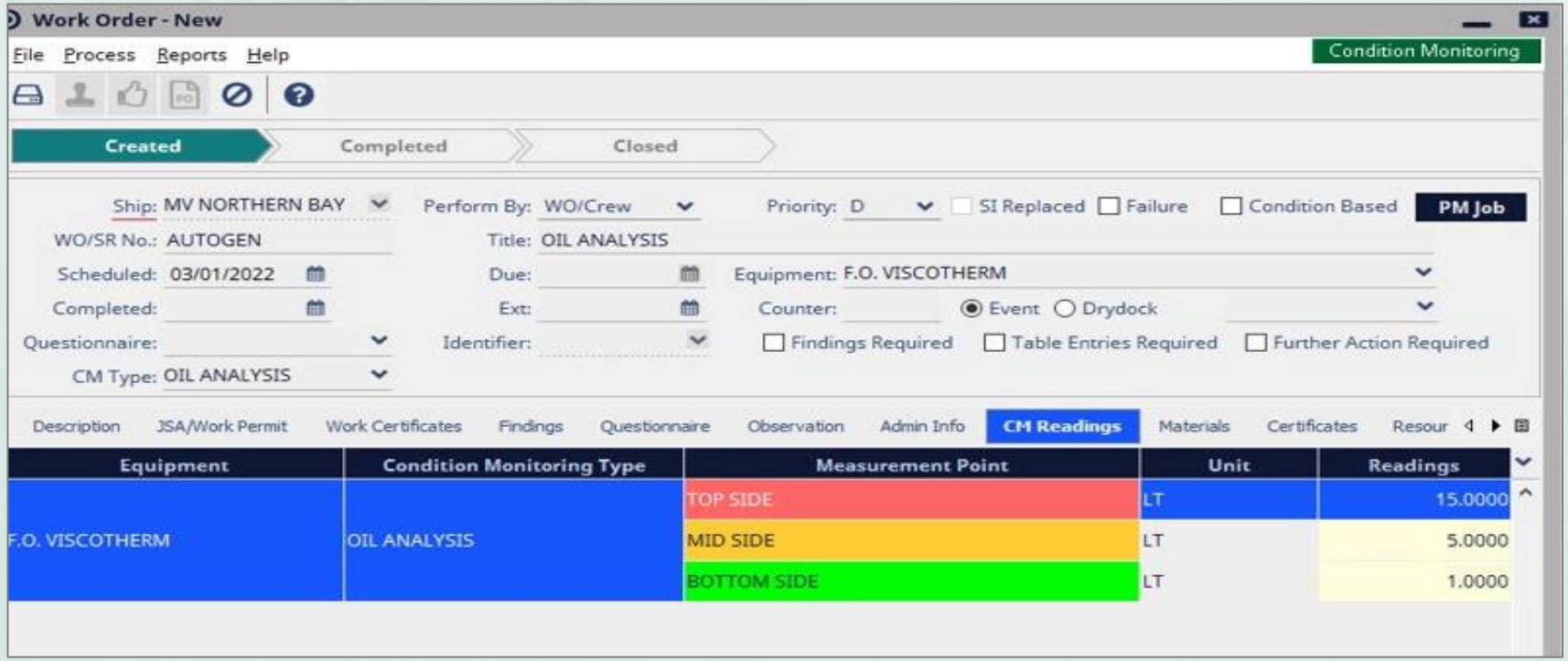


Configuration – Measurement Points



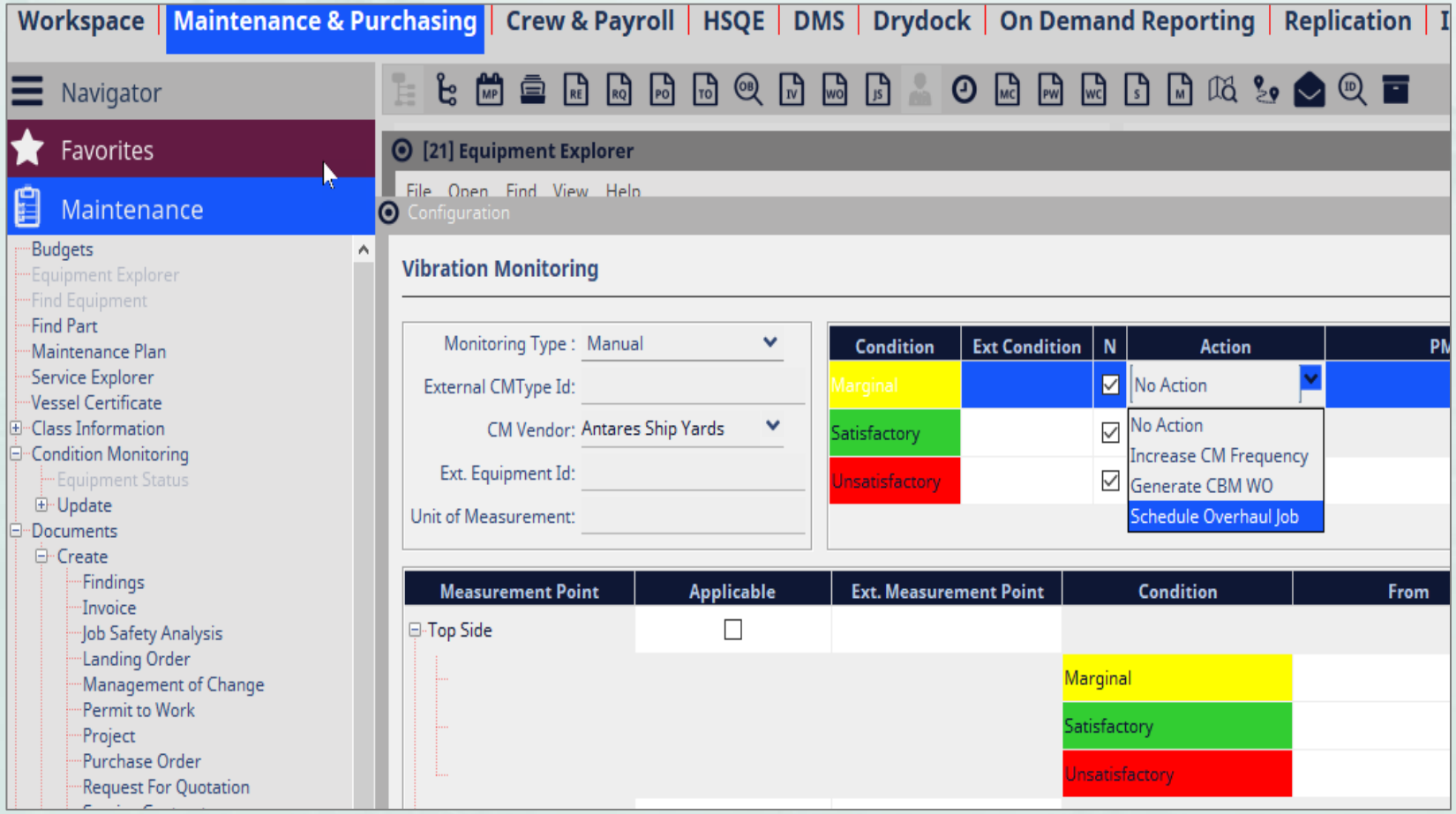
- Released in vs 6.5.27
- General Data > The measurement points are available under Machinery Measurement Point
- Measurement point can be associated with one or many CM Type
- Manual or automated collection of data based on measurement points

Work Order



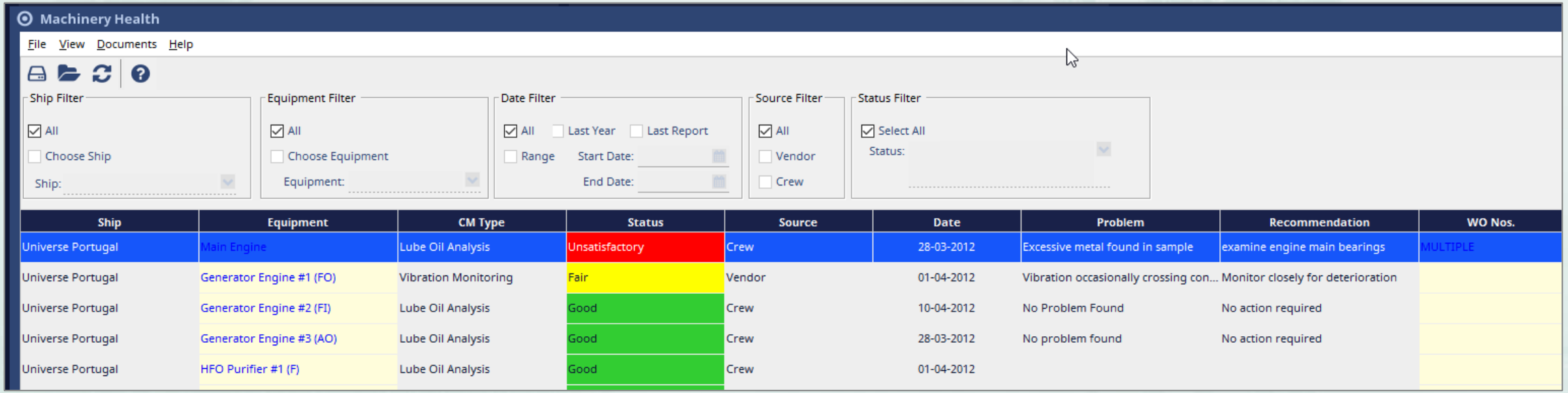
- Condition Monitoring WOs from the Standard Jobs or Adhoc Condition Monitoring Work Orders can record the measurements and generate the actions required from the measuring points.
- This could be to Increase PM Frequency, Create CBM Work Orders, or No Action.

Actions Based on Status



- Condition & Action based on Status
  - No Action
  - Increase CM Frequency
  - Generate CBM WO
  - Schedule Overhaul Job
- From the condition information, the maintenance schedules could be increased or decreased, and repair work can be initiated

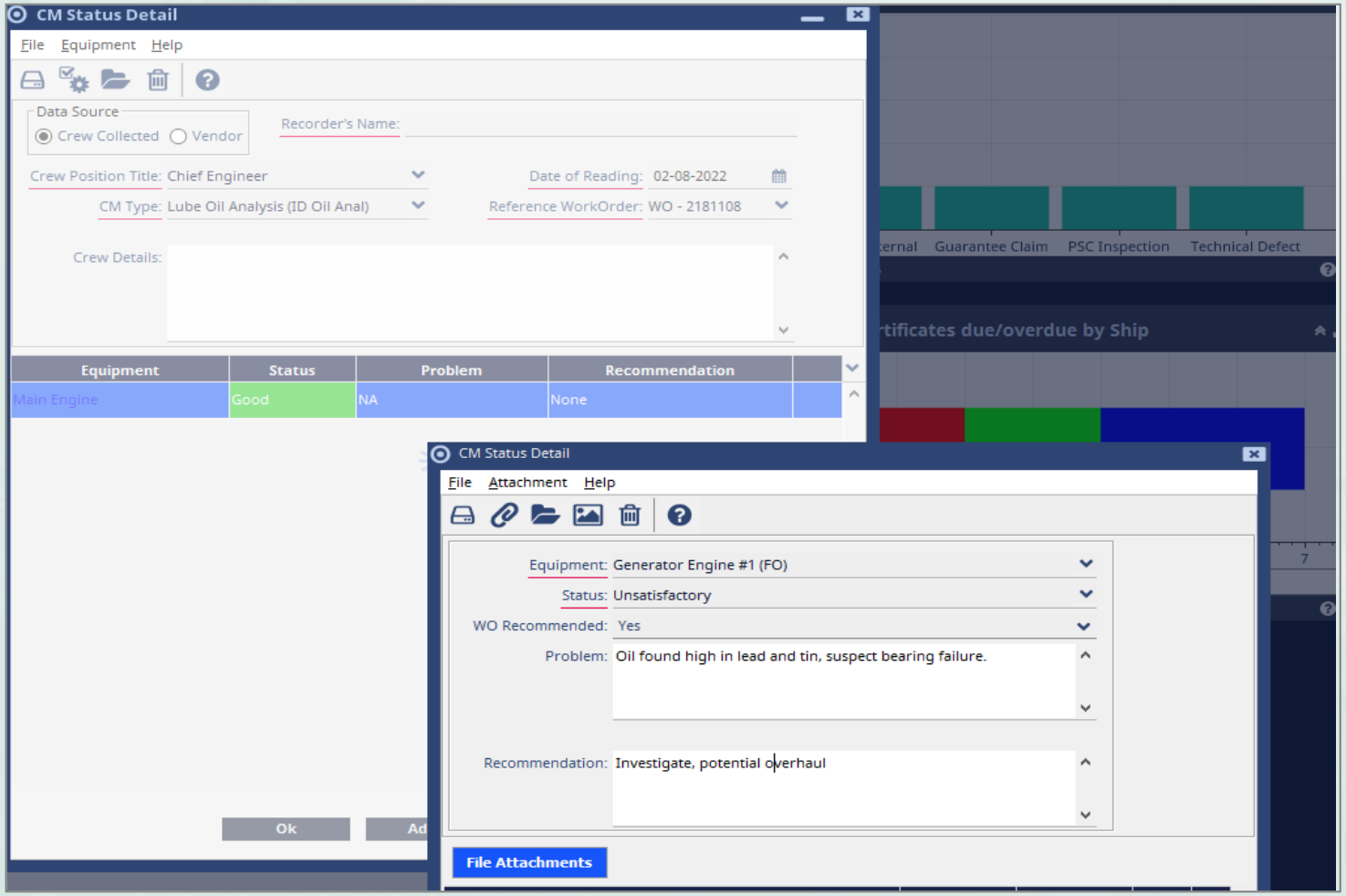
Equipment Health Status



Ship	Equipment	CM Type	Status	Source	Date	Problem	Recommendation	WO Nos.
Universe Portugal	Main Engine	Lube Oil Analysis	Unsatisfactory	Crew	28-03-2012	Excessive metal found in sample	examine engine main bearings	MULTIPLE
Universe Portugal	Generator Engine #1 (FO)	Vibration Monitoring	Fair	Vendor	01-04-2012	Vibration occasionally crossing con...	Monitor closely for deterioration	
Universe Portugal	Generator Engine #2 (FI)	Lube Oil Analysis	Good	Crew	10-04-2012	No Problem Found	No action required	
Universe Portugal	Generator Engine #3 (AO)	Lube Oil Analysis	Good	Crew	28-03-2012	No problem found	No action required	
Universe Portugal	HFO Purifier #1 (F)	Lube Oil Analysis	Good	Crew	01-04-2012			

- Machinery Health can be viewed from the Equipment Status screen or the Equipment Hierarchy
- At either Ship or Fleet Level the CM Equipment Status will show the Machinery Health which reflects the:
  - Ship (If at Fleet Level)
  - Equipment
  - CM Type
  - Status
  - Source – of the report,
  - Date
  - Problem – if found
  - Recommendation
  - Work Orders

Condition Report



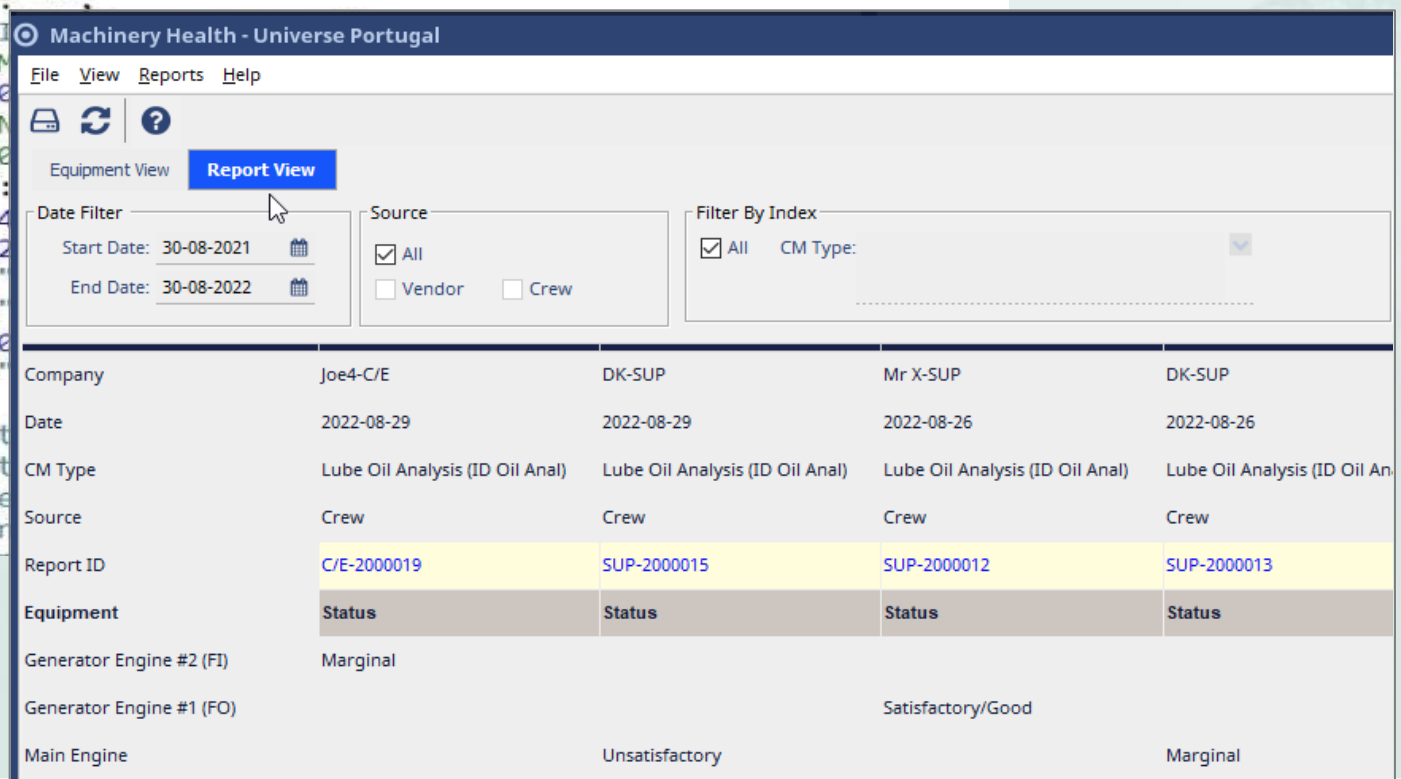
Condition Reports can be created/updated manually by the crew or via interface

CM Report Detail:

- Data Source
- Recorder's Name
- Crew position Title
- Date of Reading
- CM Type (One per CM Report)
- Reference Work Order (WO), this is a requirement, multiple WOs can be selected
- Crew Details if needed
- Add Equipment, multiple Equipment can be linked

Condition Report via API

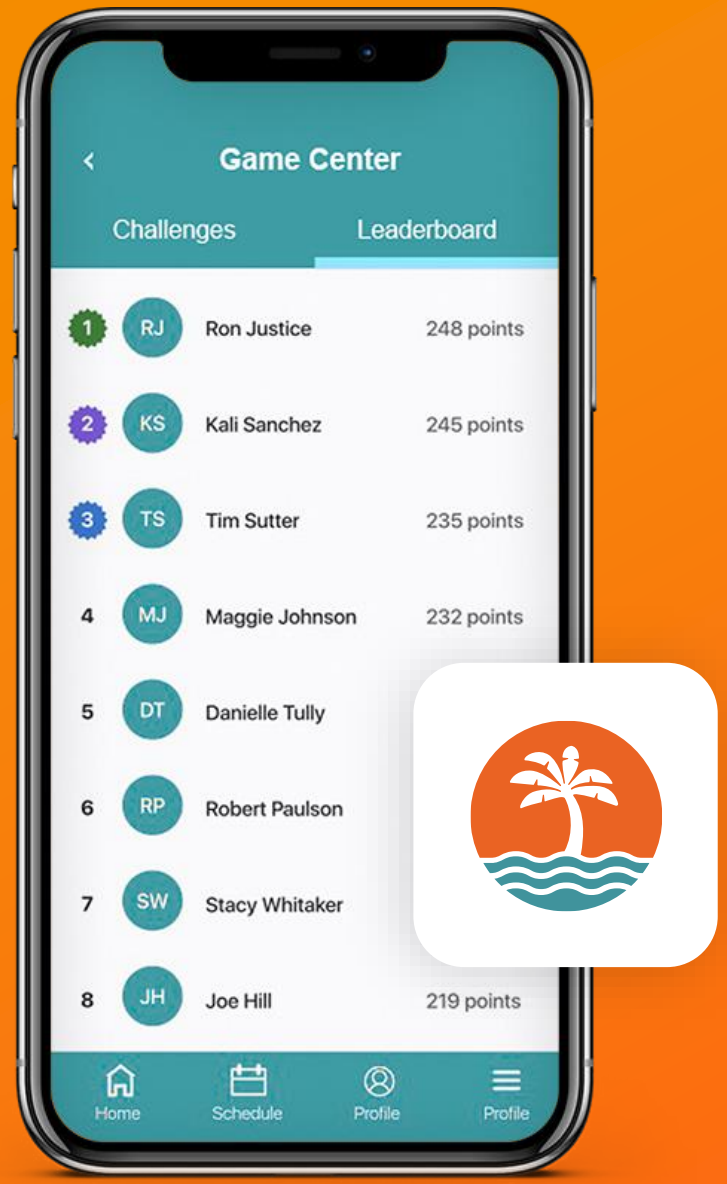

```
{
  "CmReport": {
    "VendorID": 10000012,
    "VendorCode": "CM1000",
    "CompanyCode": "",
    "AddressCode": "",
    "VendorReportI
    "Company": "CM
    "ShipId": 1000
    "ShipCode": "M
    "ShipNo": "S00
    "DateOfVisit":
    "ShipSpeed": 4
    "SeaState": 12
    "ForwardDraft"
    "MidShipDraft"
    "AftDraft": 50
    "EquipmentDtl"
      {
        "Equipment
        "Equipment
        "ImageFile
        "Performar
```

Company	Joe4-C/E	DK-SUP	Mr X-SUP	DK-SUP
Date	2022-08-29	2022-08-29	2022-08-26	2022-08-26
CM Type	Lube Oil Analysis (ID Oil Anal)	Lube Oil Analysis (ID Oil Anal)	Lube Oil Analysis (ID Oil Anal)	Lube Oil Analysis (ID Oil An
Source	Crew	Crew	Crew	Crew
Report ID	C/E-2000019	SUP-2000015	SUP-2000012	SUP-2000013
Equipment	**Status**	**Status**	**Status**	**Status**
Generator Engine #2 (FI)	Marginal			
Generator Engine #1 (FO)			Satisfactory/Good	
Main Engine		Unsatisfactory		Marginal

- Reports are fed into the system either manually or interfaced (xml)
- Images associated with the file are added if they have been placed in the same location

Demonstration



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