Cat® Asset Intelligence (VE)

VE

Cat Asset Intelligence VE is the onboard module of the Asset Intelligence technology platform that enables automated analytics to be used by the onboard crew to make better maintenance and operations decisions resulting in decreased fuel and maintenance costs. VE automatically and continuously analyzes all relevant sensor data and uses automated analytics to determine the current status of the equipment, both in terms of equipment health and efficiency. Asset Intelligence is monitoring equipment for potential failures and degradation in performance. These predictive diagnostics are then used to implement a Condition Based Maintenance program onboard the vessel. Asset Intelligence VE integrates online and offline equipment data sources, and analyzes that data against user configured rules and algorithms to evaluate the state of machines or systems. The software uses Open Standards to integrate data from control systems, stand-alone sensors, tank management systems, navigation/GPS/ECDIS systems, torque meters, fuel flow sensors, vibration monitors, and other applications to create a 360˚ view of all equipment data sources.

Cat Asset Intelligence VE consists of the following user components:

· Equipment Dashboard: Provides high level alert summary of plant equipment
· Performance Analysis: Logical rollup of diagnostic data such that end user gets a "quick" look at active and non-active faults. Very similar to dashboard but focused on a specific piece of equipment
· Real-Time Data viewers: Provides graphical view of data over time
· Historical trend and event views: Provides graphical view of data by equipment operational profile
· Application health monitoring: Alert summary review of internal software faults

Cat Asset Intelligence VE performs the following functions:

· Data integration: Brings together data from multiple data sources, including control system, navigation/GPS, tank management systems, torque meters, fuel flow meters, propulsion systems, generators and power management systems, auxiliary systems, etc.
· Data qualification and validation: Vessel Edition continuously analyzes each sensor and uses algorithms to identify which data is needed for specific analysis and captures that data. The configuration of these algorithms is based on the vessel type and equipment type.
· Data compression and transmission: Vessel Edition identifies the necessary data for analysis and then compresses that data for transmission to the shore data center using the existing onboard communications network. VE does not require an 'always-on' internet connection and transmits data on a configurable time basis
· Data and Analytics Viewer: Provides equipment health and performance analytics for the onboard Chief Engineer and Master. These are discussed in more detail above.

Asset Intelligence VE is installed on a small-form computer that is connected via various data protocols to all relevant data sources. It typically has a very small footprint and can be installed within existing electronics cabinets or in a stand-alone enclosure within the engine room. It is installed with an industrial firewall, uninterrupted power supply (UPS) and relevant commservers. The application is accessible by any computer on the ship's LAN, enabling users to interact with the platform more easily.
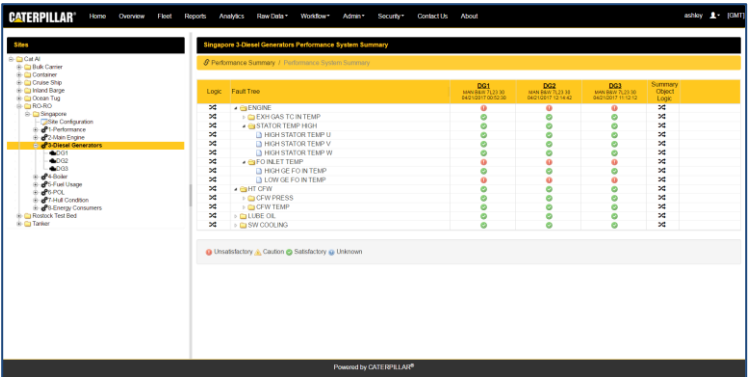
Performance summary view shows graphical health status of onboard equipment with sub-system breakdown. Asset tree on the left enables navigation between different systems. All of the analysis is based on qualified data.
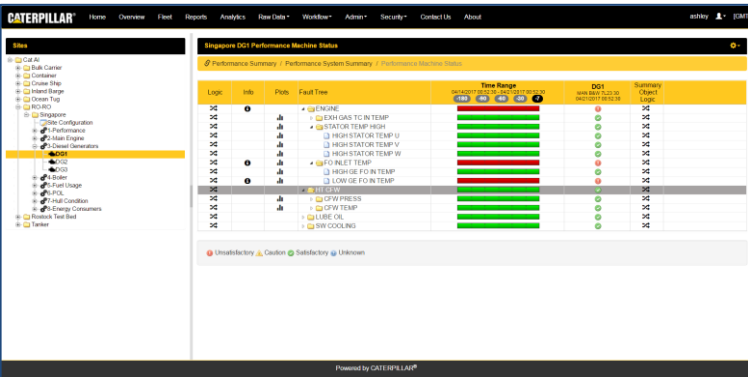
Performance Machine Status provides graphical health and performance by sub-system for a particular asset over a user defined time horizon. These are based on qualified data.
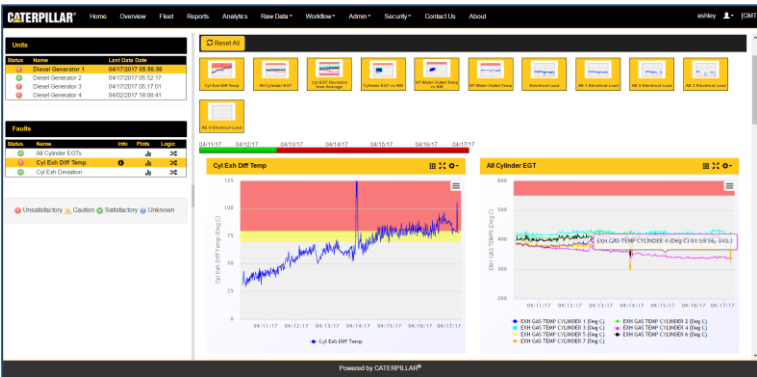
Performance Plots enable onboard user to see qualified data in a variety of pre-configured plots, with click-and-zoom charts and variable time horizons. Data is also able to be downloaded into a CSV or spreadsheet file for additional manual analysis. Real-time raw data is also available to be viewed as the equipment is operated.
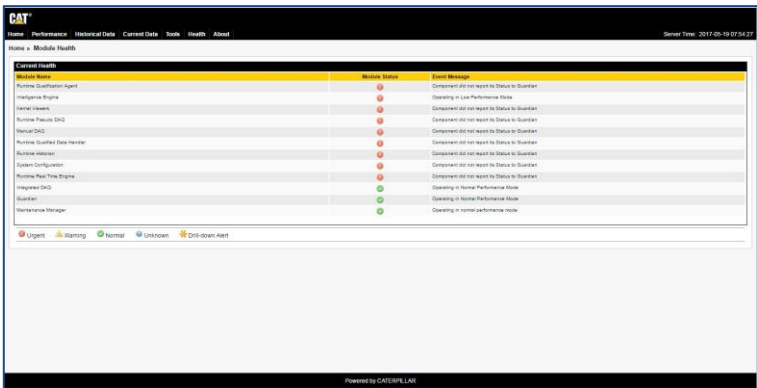
Asset Intelligence Health Monitor enables local users to see the health of the AI system and identify any potential problems and troubleshooting actions. Asset Intelligence system health information is also sent to the shore data center for analysis by Caterpillar to ensure proper performance of the Asset Intelligence Vessel Edition onboard.