Modernization & Digital Services

Extending equipment lifetime

At GE, we support our marine customers with modernization and upgrade programs which help to keep your system up-to-date without the need to undertake a complete system replacement.

MODERNIZATION TO THE PECe PLATFORM

PECe provides improved core product security, establishes the foundation to meet IEC 62443-3-2 Cyber Security requirements and helps ensure robust systems, networks and application protection. The PECe platform is the standard performance drive controller of choice for all our AC and DC drives across LV and MV power range. PECe is a powerful, rugged and cost-effective configuration which works in stand-alone mode or with existing drive systems to help meet stringent operational demands.

This low risk PECe upgrade solution not only simplifies your drive system, but adds flexibility for any future enhancements through integration of controller, power stack electronics and I/O in one compact unit with added fieldbus interface options and remote I/O capability.

ADVANTAGES OF PECe CONTROL

- Simplified commissioning and maintenance by using HPCi/PECe architecture with standard software function blocks, a suite of system software tools and an application environment common to GE PC drives.
- Scalable performance, easy upgrade and future proof modular configuration based on a range of power stacks, I/O interfaces, and modern COMeCPU module.
- Suitable for LV and MV drives in Marine.
- Modern control system with fast network access and enhanced security features.
- Extensive diagnostics through HPCi access and message log, power stack and drive I/O diagnostics, and Pertu (event and trend) records.
- Remote Monitoring and Diagnostics capability via GE Power Conversion's Visor solution enabling remote service support and providing automatic drive trip notification and trip history upload to the Visor Service Portal.
- Reduced spares through modular control hardware configuration enabling application for a large range of drives.
- Total life cycle care through GE global expert network.

ADVANCED ONSITE DIAGNOSTICS

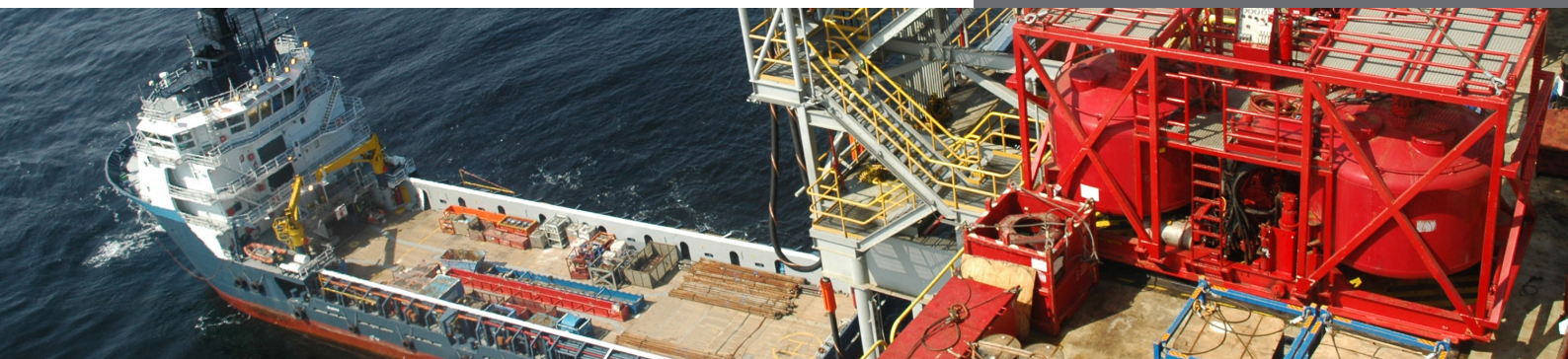
GE's advanced diagnostic capabilities offer insights into your equipment providing follow up drive behavior by measuring and analyzing the condition of your drives on-site. Our HPCi Data Manager (HDM) incorporates the latest graphics display and multi-touch operator interface to help you manage drive operation and take relevant actions to avoid shutdowns.

DIGITALLY ENABLED PECe PLATFORM

GE Power Conversion's digital services comprises of two core elements – **Visor** Remote Monitoring and **Asset Performancee Management (APM).**

GE's Visor Remote Monitoring and diagnostic solution provides a safe and secure means of remotely supporting GE Power Conversion's drives and automation control systems through GE's Visor Service Portal (VSP).

GE's recently developed **Asset Perfomance Management (APM)** suite of services helps to improve maintenance schedules and reduce unplanned downtime.



DIGITAL SERVICES

VISOR - PROVIDING SECURE & REMOTE DATA ACCESS

GE's Visor solution provides a safe and secure means of remotely supporting GE Power Conversion's drives, dynamic positioning and automation systems through GE's Visor Service Portal (VSP). A site based Visor Connect Box (VCB) connects to all GE Power Conversion's drives and automation control systems on site via the system control network(s) ensuring a complete system solution. System security is achieved through adoption of best security practices including use of a combination of hardware fire walls to both the customer WAN and control LANs to create a DMZ and remote connection through a secure tunnel (VPN).

With over 20 years of product experience Visor, certified to Achilles level 1, is one of the most proven and trusted devices of its kind, providing:-

- Remote connectivity for service engineering
- Storage of all site relevant information
- Historical data including analogue and digital time-series data
- Automated archiving
- Storage of drive trip notifications
- DP drift off notifications
- Automated service case management on system faults
- Up to three fire walls to isolate the VCB from admin and control networks
- Local analytic

AUTOMATIC DP ALERTS & BLACKOUT NOTIFICATIONS

When a vessel experiences a Dynamic Positioning (DP) drift off, drive off, Blackout or partial Blackout, Visor's in built Data Historian will trigger an internal workflow packaging the relevant alarms and time series data and will then send it to the GE Visor Service Portal. Once received in the Visor Service Portal an e-mail will be generated to the GE Contact Centre who will work to address the issue in a timely matter. As part of the incident notification system, all alarm data and pre-defined time series data will be collected from 15 minutes before the incident and 5 minutes after (default setting).

DRIVE TRIP NOTIFICATIONS

In the event of a drive trip, GE Drives generate a trip history file which gathers all the information during the 60 seconds prior to the trip and 30 seconds after it. This information is fundamental for service engineers to quickly assess the trip and potential recovery paths.

Due to the high frequency nature of frequency converter operation, the information must be gathered at a very high sampling rate. This means that even 10 seconds of data results in a very large data file. Traditional methods of forwarding this data to GE for analysis have therefore proved challenging, especially in sites where the quality of the remote connection is less stable.

The VCB was developed for sites with very low bandwidth, so it is efficient at sending data. If a drive trips, the VCB will capture the trip file history and automatically send the file, together with the drive and site information, to SmartServe* (GE's service case management tool). A service case will be logged and the service engineers who are assigned to the case will be notified.

The automatic packaging and transferring of key operational data to the GE service team delivers the correct information into the hands of the experts, avoiding delays in Customer reaction time and multiple communications during what would already be a disruptive and critical time for the Customer. GE will pro-actively work with you to determine and advise on the correct course of action and ultimately resolve. Automatic drive trip notifications logged in SmartServe are analyzed periodically by GE engineers, as part of a long term service agreement.

ASSET PERFORMANCE MANAGEMENT

PREDICTABLE AND COST EFFECTIVE EQUIPMENT MAINTENANCE

We use our expertise in variable frequency drives and more than 100 years of engineering experience with motors, generators and control equipment, to bring together advanced High Frequency Sampling, Physics Based Analytics and Advanced Pattern Recognition with our domain and equipment experts. This depth of knowledge and capability means that the Power Conversion business not only helps identify future issues, but supports our customers to avoid or resolve these issues.

With limited hardware needs and extensive expert support, Asset Performance Management (APM) simply delivers results across your business. Power Conversion's APM for electrical rotating machines and power electronics relies on the processing power of GE variable frequency drives to use them as Edge Analysis devices. We call this Drive as a Sensor. When a Power Conversion HPCi drive is present in the system it can be employed to deliver the sensing required to generate equipment health indices. Because of this APM is straightforward to install requiring minimal additional hardware. Often only one additional item of hardware is required, the Visor Connect Box (VCB), which provides a gateway for remote support and cloud connectivity.

At GE we have the ability to access high frequency data through our data acquisition devices (either drives or the Rotating Machine Diagnostic Module (RMDM) box in the absence of a drive). Utilizing these devices allows us to look at a richer set of dynamic modes versus the SCADA/cloud data only. Using the same signals we use for drive control, our expertise enables us to cut through high frequency data noise using advanced signal processing techniques, allowing the extraction of the clean signals needed for fault analysis. GE's unique experience and know how of rotating machines engineering, manufacturing and servicing provides a deeper understanding of the physics behind the data.

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