

GE Power



Products & Solutions for the Metals Industry

GE's Power Conversion Business

gepowerconversion.com

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GE's Power Conversion business applies the science and systems of power conversion to help drive the electric transformation of the world's energy infrastructure. Designing and delivering advanced motor, drive and control technologies that evolve today's industrial processes for a cleaner, more productive future.

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Challenge & GE Value

High productivity, quality and efficiency are key for energy-intensive manufacturing industries. All three factors help you to stay competitive in sectors where raw materials and energy expenses constitute a huge share of production costs. For example, a single hot strip mill can lose up to \$30 million in annual revenue due to unplanned downtime.

GE is a full-scope partner for electrification, digital and services solutions across multiple industries, helping to improve the productivity, product quality and energy efficiency of your process. We deliver leading product and systems technology based on variable-speed drives, motors and generators. This is combined with productivity solutions and system architecture enabled by control, automation and predictive analytics. Our life cycle services and digital capability help you maximize operational efficiency and productivity with connected, responsive and predictive solutions

Challenge



Failures in Steel Making or Rolling Mills May Hinder You From Optimizing Throughput, Recovery and Asset Availability

GE Value

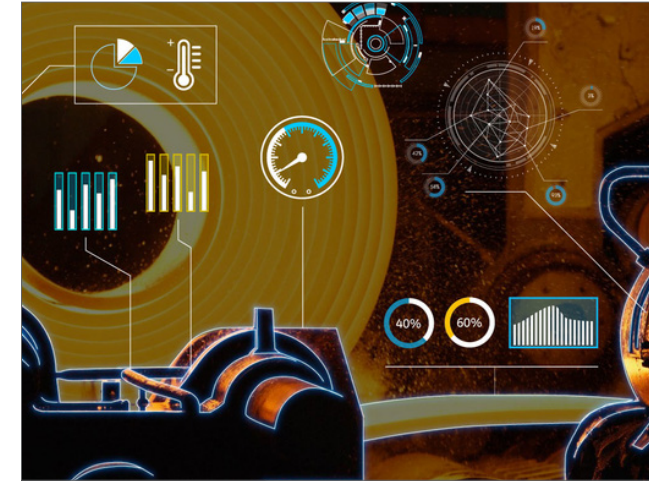
➤ *To stay competitive, steelmakers always need to reduce costs and lead time, increase operational efficiencies and use greener methods to produce metals with quality and reliability*

Metals Solutions



Steel Making

Energy-intensive processes, such as electric arc furnace operations, need to balance the requirements of steel plant operations with power grid interaction. GE offers cost-effective STATCOM and SVC solutions to improve power quality and ensure a stable and steady voltage supply. Our systems provide more active power to the process installation, helping to optimize production times and reduce operational costs, such as those from reduced electrode wear-off.



Digital Solutions – Brilliant Metals

GE helps to modernize the aluminum smelting process by enabling a new era of productivity for the industry. Digital Smelter Twin is an organized collection of physics-based methods and advanced analytics that's used to model the present state of every asset in a smelter. It provides predictive analytics and alerts on pot stability and current efficiency. GE's Digital Twin also helps to optimize processes, for example, with pot line operations for reduced energy consumption and the avoidance of unplanned stoppages.



Rolling Mills

GE provides solutions tailored to almost every type of rolling mill – including hot strip, plate, reversing cold rolling, tandem, PLTCM or temper variants – to facilitate the production of modern, high-quality steel grades. Our advanced product and service solutions for power distribution, drives, control and automation help boost the overall performance of your mill in terms of plant productivity, availability, reliability, process and energy efficiency.



Digital Motor and Drive Fleet APM

GE provides solutions tailored to almost every type of rolling mill – including hot strip, plate, reversing cold rolling, tandem, PLTCM or temper variants – to facilitate the production of modern, high-quality steel grades. Our advanced product and service solutions for power distribution, drives, control and automation help boost the overall performance of your mill in terms of plant productivity, availability, reliability, process and energy efficiency.



Processing Lines

Our offering comprises a complete set of electrical and automation products, as well as services for processing lines – including continuous pickling lines, annealing plants or continuous galvanizing lines. This enables operators to expand capacity, speed up processing and enhance overall plant productivity. GE helps to produce high-performance steel while keeping a constant focus on improving plant throughput and yield, reducing energy usage and lowering the environmental footprint.

Metals Product Portfolio

Power Electronics

High power density, reliability, availability and scalability.

Models

- MV6 Series
- MV7 Series
- LV7 Series
- LV8 Series
- Large DC drives (new or upgrades)

Technical Capabilities

- Output power: 0.25–120 MW
- Output voltage: Up to 13.8 kV
- Output frequency: Up to 300 Hz
- Input frequency: 50 or 60 Hz +/-5%
- Variable-Speed Systems for Main, Major and Auxiliary Drives
- HV/LV Power Supply



Rotating Machines

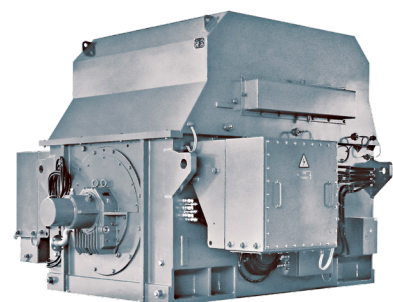
We offer reliable, efficient rotating machine technology for steel making, lamination and processing lines.

Models

- Induction Motors
- Synchronous Motors

Technical Capabilities

- Speed: 40–1,200 rpm
- Power: 1–30 MW
- Voltage: Up to 13.8 kV



Power Quality

Our Static Var Compensator (SVC) and Static Synchronous Compensator (STATCOM) belong to GE's range of power electronics-based FACTS devices. These improve the power quality of melting shops – for example those using an electric arc furnace.

Models

- STATCOM – IGBT Press-Pac
- SVC – Thyristor-Base Valve

Technical Capabilities

- STATCOM
- System Power Range Up to 300 MVar
 - Step-Less Adjustable Cos Phi
- SVC
- System Capability 20 to 600 MVar
 - SVC Thyristor Valves Up to 300 MVar, Voltages Up to 63 kV



Automation and Controls

Our advanced control and automation solutions designed for metal processing enable customers to optimize application capability and cost.

Functionalities

- HPCi
- Simplicity
- Safety
- RIO
- Application SW L1, Process Framework L2
- Process Models HSM, TCM and SSCM

Technical Capabilities

- Basic Automation (Level 1)
- Process Automation (Level 2)
- HMI, Diagnostics and Safety
- Instrumentation

Motor and Drive Fleet APM

Asset Performance Management (APM) architecture for assets across the steel plant, such as blast furnaces, ladle furnaces, rolling mills, coiling machines, furnace coilers for Steckel mills, pumps and back-up rolls.

Functionalities

- Connectivity and Edge Diagnostics
- Analytics and Data Management
- Operations and Maintenance Services

Technical Capabilities

- *See What's Wrong:* Level 1 – Equipment Insights
- *Optimize Opex:* Level 2 – Maintenance Optimization
- *De-Risk Your Operation:* Level 3 – Performance Optimization
- Outcome-Based Service Agreement

Digital Smelter

Asset Performance Management (APM) architecture for assets across the smelter plant, such as potline PTA, carbon, rodding and cast house.

Functionalities

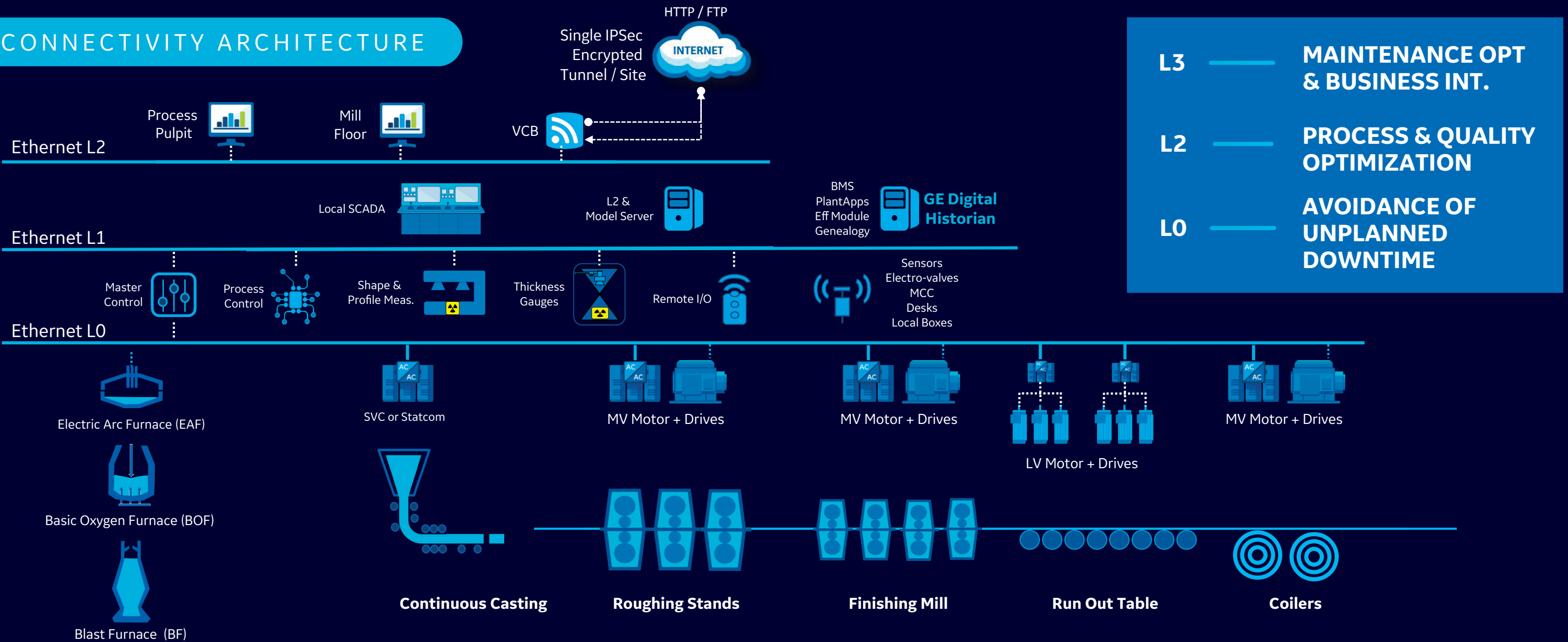
- Highly Scalable to Other PTAs and Complex Units
- Non-Intrusive Solution
- Wireless-Based Communication
- Web-Based Health Monitoring UI
- Cloud-Based Data Elasticity
- Quick and Lean Roll-out

Technical Capabilities

- Reduced Unplanned Downtime
- Asset Optimization
- Machine Learning/Pattern Recognition
- Continuous Tuning
- Condition-Based Repair
- Analytics-Based Lifting
- Per Asset Models
- As-a-Service Models
- Ecosystem Benefits

Digital Asset Performance Management

CONNECTIVITY ARCHITECTURE



L3 — MAINTENANCE OPT & BUSINESS INT.

L2 — PROCESS & QUALITY OPTIMIZATION

L0 — AVOIDANCE OF UNPLANNED DOWNTIME

From Asset Management...

- Remote support
- Guaranteed response time
- Time-based maintenance
- Parts and strategic stock

GE is a pioneer in industrial digital twins, having developed more than 300 models.

...to Performance Management

- Connectivity and visualization
- Predictive analytics
- Maintenance optimization
- Power management optimization
- Performance commitments

Driving transformation in metals with the world's first digital smelter in China.

Cyclo-Converter Retrofits

Extend the life cycle of your legacy cyclo-converters by retrofitting with GE's proven drive control.

Minimize the Risk of Unplanned Outages

Any unplanned outage comes with significant costs. Ensuring plant availability is a key priority but it can be a challenge, especially when you're running obsolete and legacy cyclo-converter drives for metal rolling mills, SAG mills, ball mills, cement plants or similar.

If you currently rely on legacy drive controls, obsolescence is a risk you can't ignore as it can lead to extended unanticipated downtime in the event of a failure. To help you tackle obsolescence and save the time and expense of a complete system replacement, GE offers reliable and cost-effective retrofits for your cyclo-converter drive controls.

This engineered retrofit will modernize your controls and data interfaces, substantially improving control capabilities, enhancing performance and extending the life of your existing cyclo-converter. Remote monitoring, powerful diagnostics and self-test capability can make your system easy to maintain, in turn reducing costs.

The GE Advantage

We have designed all of our drive application equipment with reliability in mind. As a full-scale OEM with deep engineering expertise and fleet knowledge, we're your partner of choice for carrying out retrofits of legacy drive controls nearing the end of their life cycle. We're there wherever and whenever you need us providing:

- A local presence, globally
- 24/7 technical support
- Installation and commissioning services
- Field engineering services
- Preventive maintenance services
- Replacement parts and repair services
- Training services

Cyclo-Converter Drive Control Retrofits

GE's exceptional drive services can help you achieve the most value possible from your drive controls. The external control interface, GE's P80i control system toolbox, is widely considered one of the best systems for configuring, troubleshooting and maintaining legacy drives and controls.

Features and Benefits

- Experts who fully understand your industry will match our drive features to your specific requirements
- Consistent and cost-effective project execution from start to finish
- Phased upgrades and updates that fit your operating budget
- Improved process control resulting in lower operating expenses

More Reasons to Upgrade

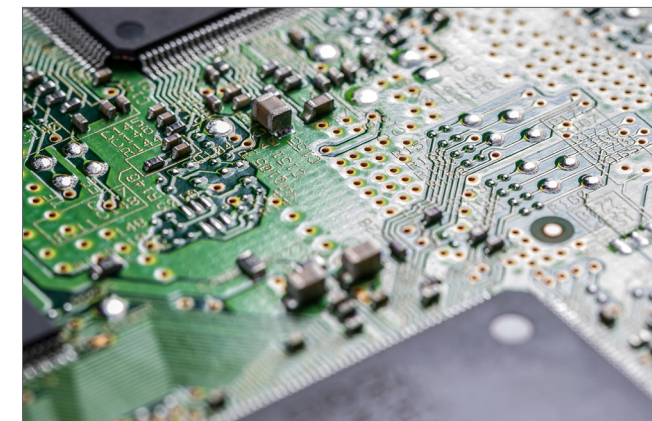
- Extend the life cycle of your existing drive systems and defer moving to the latest drive technology until the time is right
- Improve reliability through industrial PC-based control
- Enhance control flexibility and drive performance
- Modern touchscreen controls, HMIs and multiple networks to simplify operations and integration with plant level controls
- 24/7 remote technical support via Visor to resolve issues in the shortest time possible – helping to ensure minimum downtime

Power Electronics Controller (PECe)

- Standard industrial PC
- Intel-based chipset VXWorks
- Operating system IEC1131
- Compliant function block
- Deterministic Ethernet
- Five 10/100 Ethernet ports
- 1.2 to 2.5 GHz
- 60°C Ambient
- Fanless operation
- Two or four PCI slots allows Profibus, Profinet, Reflective Memory, CANbus, Modbus, EGD, etc.

Power Interface Board (PIBe)

- 24 copper or 32 fiber optic outputs to power devices
- 8 digital inputs
- 4 digital outputs
- 8 analog inputs
- 4 analog outputs
- 2 current transformer inputs
- Capable of 60 V, 10 amp outputs to power devices
- One encoder input



Field I/O

- Modular construction
- Digital inputs/outputs ... 24 VDC
- Analog inputs/outputs ... +/-10 VDC
- Fast deterministic EtherCat interface from PECe

Touchscreen for Operator Control and Maintenance

Replacing antiquated meters and push-buttons with modern touchscreen controls will improve your ability to operate and maintain your drive controls.

P80i Toolbox – Drive Commissioning and Maintenance

High Speed Trending

- Unlimited signals per trending
- Up to 3,000 samples per signal
- Limited only by PECe memory capacity

Tool Capabilities

- Configure trend (trigger, period, variables to be recorded)
- Set trend to be downloaded to a compact flash drive
- Upload records from the drive
- Display records in a trend
- Display "live" or "logged" data

MiniSemi Control Upgrade

Minimize the Risk of Unplanned Outages

With reliance on legacy drive controls, obsolescence is a risk you can't ignore. It can lead to extended and unanticipated downtime in the event of a failure. To help you tackle obsolescence and save the time and expense of a complete system replacement, GE offers a fully integrated upgrade package for your drive controls. A MiniSemi engineered upgrade will modernize your controls and data interfaces, substantially improving control capabilities, enhancing performance and extending the life of your existing drive systems.

The GE Advantage

GE supports you from start to finish with project management, application engineering, hardware and software engineering, system testing, technical direction of installation, commissioning and spare parts. The breadth of our experience spans pulp and paper, mining, metals, plastics, rubber and material handling. From hot strip mills, cold mills, winders and paper machines to hoists, cranes and more, our experts know your application and understand your challenges. It means they can help you get the best performance possible from your drive systems.

We're there wherever and whenever you need us providing:

- A local presence, globally
- 24/7 technical support
- Installation and commissioning services
- Field engineering services
- Preventive maintenance services
- Replacement parts and repair services
- Training services

Proven Designs Supporting Your Objectives

Used by GE Power in demanding industrial applications, our GE drives employ proven hardware. Its structured design improves engineering efficiency, reduces downtime, increases system reliability, improves process control and reduces total installed project costs.

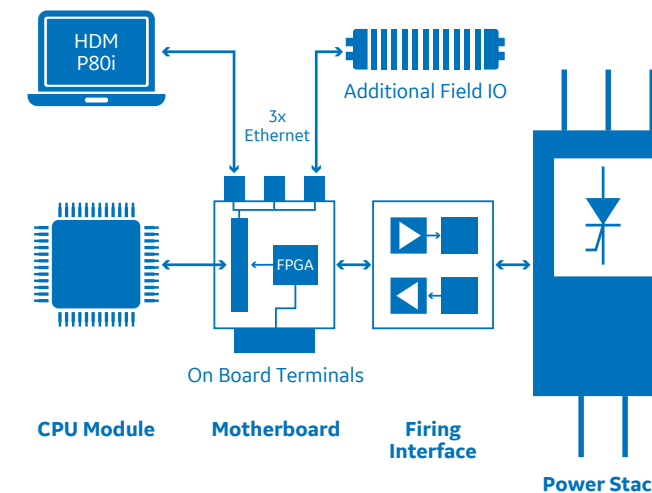
Features and Benefits

- Experts who fully understand your industry will match our drive features to your specific requirements
- Consistent and cost-effective project execution from start to finish
- Phased upgrades and updates that fit your operating budget
- Improved process control resulting in lower operating expenses

More Reasons to Upgrade

- Extend the life cycle of your existing drive systems
- Improve reliability through industrial PC-based control
- Enhance control flexibility and drive performance
- Digital capabilities that can provide insights into your equipment and help you predict failures before they occur
- Modern touchscreen controls, HMIs and multiple networks to simplify operations and integration with plant level controls
- 24/7 remote technical support via Visor to resolve issues in the shortest time possible – helping to ensure minimum downtime

PECe-Lite Drive Controller



PECe-Lite Drive Controller

GE's PECe-Lite complements the PECe as the standard performance drive controller for Power Conversion equipment. This highly modular unit combines the power, performance and flexibility of the HPCi controller with specialized high-performance interfaces to the drive's power electronics and power stack.

Power stack interfaces are made using up to two plug-in interface modules for connection to the complete range of power stack technologies, over both copper and fiber-optics. PECe-Lite supports existing power stack interface modules used in the PIBe3.

PECe-Lite provides a significant number of built-in I/O. Additional I/O is accommodated using an EtherCAT-based I/O system.

The HPCi controller is programmed using the P80i system software tool, and commissioned and maintained using the P80-HPCi Data Manager (HDM) software tool.

Key Benefits

- **Simplifies understanding, commissioning and maintenance** by using a suite of system software tools and an application environment common to PECe drives, process control and automation
- **Supports easy drive upgrades** through a wide range of power stack and I/O interfaces
- **Delivers a powerful, small-sized and cost-effective solution** for the majority of drive control applications
- **Minimizes spares through modular hardware and control design** enabling application across a large range of GE drives



For more information on GE Power Conversion's Metals Solutions, please contact your local sales representative.

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