

GRACE TECHNOLOGIES

MAKING MAINTENANCE SAFER, SMARTER,
AND MORE PRODUCTIVE

**Product Applications,
End Users, and Brand Messaging**





Grace Technologies is making maintenance safer, smarter, and more productive as a designer and manufacturer of the most innovative electrical safety products and predictive maintenance solutions. Our products are sold through a global distribution network with sales presence in 60+ countries around the world. We believe a reliable plant is a safe plant, and a safe plant is a profitable plant. We want to see a world where every maintenance professional works at their maximum productivity and return home safely to their families. Our engineers develop intuitive solutions for a wide variety of application challenges that industries are facing today. From GracePort® panel interface connectors and GracePESDs® voltage indicators/portals to GraceSense™ asset health monitoring IIoT devices, Grace is contributing each day to a safer, more productive, and brighter future.



The Typical Sales Process

- Finding the user's current status in their safety and maintenance journey and bridging the gap to realize better future outcomes.
- Root cause analysis of pain points, maintenance struggles, electrical safety objectives/goals.
- Educating potential users on how our products can help to accomplish their desired goals.
- Understanding customers' budget allocation and help them to prioritize and align.
- Educating staff on current customer pitfalls, added benefits and ROI payback after implementation of Grace products.



Selling Points & Brand Message

GracePorts® relocate a panel's communication ports from PLCs, Industrial computers and VFDs, from inside the panel to the outside so you can easily access them without exposure to any electrical hazards, while maintaining a cabinet's UL ratings. They can be easily mounted on the door or the side panel and are 100% customizable. We can incorporate special text, cables, unique logos or any custom configuration in our standard 2-3 day lead-time.



GracePort® Products



Standard GracePort® UL 4/4X



GracePort®+



H-Series UL 4/4X



NEMA 1



SAFER

GracePorts® were designed to minimize the risk of hazardous electrical exposure on Industrial Control Panels. They use thru-door technology to improve overall safety in these often-performed, routine procedures while complying with the performance requirements of OSHA & NFPA 70E.



SMARTER

Right here at our facility in Davenport, IA, GracePorts® are built and shipped within 2-3 days of ordering. This is the key ingredient of what sets a GracePort® apart from the competition, as well as the option of complete customization of each individual unit.



MORE PRODUCTIVE

By providing access to PLCs and other devices safely behind closed doors, GracePorts® improve productivity by eliminating certain steps involved in routine programming. Walk up, plug in, program. It's that simple.

GracePort® Common Configuration Options

- All varieties of Ethernet
- Stainless Steel/Hazardous Area
- Network Taps
- SD Card Interface
- Custom text
- Multiple USB including 4 into 1 hub
- Serial / Parallel
- E5 Ethernet Switch hub
- Custom Company Logo Printing

Sales Pitch Questions

- Q:** How are you currently troubleshooting and programming your PLCs?
- Q:** Do you need to wait for facility electricians to lockout before opening enclosure door?
- Q:** Do you panels have sequestered disconnects?
- Q:** What safety regulations do you have to follow when opening a panel? Do you follow it/them?
- Q:** Do you require energized work permit to perform the task?
- Q:** What are the safety guidelines for third party contract employees at your work site?
- Q:** Are electricians required to be present during programming? What is the cost?
- Q:** What is your typical Hazard Rating Category (HRC) for control cabinets?
- Q:** Can you explain your electrical safety culture?

Target Market, Customer Profiles, & Competition

End Users

Large End Users with rigorous safety programs that prohibit opening the panel without PPE. Most End Users will specify GracePorts® on projects, or all procured electrical/automation equipment. There are some users who still have applications for retrofits.

System Integrators & OEMs

System Integrators & OEMs that are selling to safety conscious End Users or high value system integrators wanting to make their solutions stand out from the crowd through adding value while making them safer and more convenient. OEMs needing an environmental rated communication point on the outside of machinery for trouble shooting and programming. OEMs looking to improve their field service personnel task efficiencies and reduce incident rates.

Contacts at End Users, System Integrators, & OEMs

- Automation Engineers
- Electrical and Instrumentation Engineer
- Maintenance Supervisors
- Controls Engineers
- EH&S Members
- Anyone frequently accessing or design PLC/drive cabinets

GracePort® Target Markets

- Aerospace
- Food & Beverage
- Metals & Mining
- Power Generation
- Solar & Wind
- Water & Wastewater Treatment
- Automotive
- Manufacturing & Assembly
- Oil & Gas
- Rubber & Tire
- Utilities

Notable Customers

- P&G
- Ford
- Kimberly Clark
- 3M
- Bridgestone/Firestone
- Clorox
- DuPont
- Crown Bottling
- Disney
- Rockwell Automation
- Siemens
- Eli Lilly
- Trane
- Nestle
- Bayer Pharmaceutical
- Goodyear
- Coca-Cola
- Corning
- Boeing
- Universal Studios
- ABB

Competition

- Mencom
- ILME
- Panduit
- Automation Direct
- Murr Elektronik

GracePort® Panel Interface Connectors

GracePort® panel interface connectors are convenient access ports that allow you to safely bridge the hazard gap between a programmer and their PLC. In the past 20+ years since its inception, we've created over 16,000 unique GracePorts® for our customers.

GracePorts® are intended to be mounted on the outside of an enclosure product. Installation should be performed by a qualified technician and adhere to applicable regulatory codes and manufacturer's installation instructions. These devices are meant for mounting on the flat surface of enclosures having the same type of environmental ratings.



Common Customer Objectives

- Minimize/eliminating risk of exposure to electrical hazards
- Improve task productivity
- Enhanced safety for their personnel
- Data logging, interfacing, and programming
- Reduce the amount of PPE required

Common Customer Objections & Obstacles

- We just open the door and plug-in
- We use a standard ethernet port outside the door
- I would have to put these everywhere
- Nobody gets hurt doing this task
- Added cost to the BOM for OEMs & System Integrators
- My guys know what they are doing

Common Applications

- Harsh contaminant environments
- PLC, Industrial Computers, VFDs
- Difficult to Access Panels
- Data logging with USBs
- Food/Pharma Security – lockable ports in a stainless-steel housing
- Stainless steel (304/316) housings offer extra protection
- High Traffic Areas where open doors create hazards
- E5 Space Saving in Panels with Limited Space
- Program updates with SD Card
- UL listed GFCI outlets for charging laptops

GracePort®+ HMI Covers

GracePort®+ is a Human Machine Interface (HMI) cover kit that features a strong and rigid design, mounting securely to the outside of an enclosure and provides accessibility to high-end components easy. The following sizes are available to meet most industry standards HMIs:

- 10" x 8" • 12" x 10" • 14" x 12"
- 16" x 14" • 20" x 16"

The GracePort®+ is designed to provide protection for HMIs from dust, dirt, oil, water, and other environmental contaminants found in the industrial setting. The standard GracePort®+ HMI cover is UL Recognized (Types 1, 2, 3, 3R, 4, 4X, 12, & 13) and UV Rated for outdoor applications.



Common Customer Objectives

- HMI protection from harsh industrial contaminants
- Restrict access to HMIs and other items with a padlock
- Protecting HMIs and other high-end components from UV rays.

Common Customer Objections & Obstacles

- Frequent opening and closing of the units.
- We use screen protectors for HMIs
- HMI carries the ratings for washdown
- No available space on the panel to accommodate an HMI cover

Common Applications

- HMI and push button protection
- More connections than a typical GP can handle
- GracePort components and power options
- Drive interface units
- Panel interface connectivity to PLC
- Configurable with PESDs®

Sales Pitch Questions

Q: What is the lead-time and cost of downtime when you experience a damaged HMI?

Q: Do you experience unauthorized access to your HMIs?

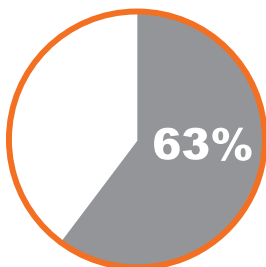
Q: How frequently are your HMIs getting damaged?

Q: Is it worth the expense and effort to repair or replace your HMI?

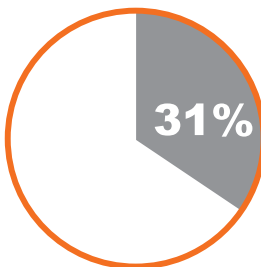
Q: Do you have any outdoor HMIs that are frequently getting affected by the sun?

GRACE PESDs® **Selling Points & Brand Message**

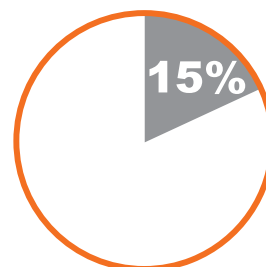
GracePESDs® are Permanent Electrical Safety Devices that include Voltage Indicators, Voltage Portals, Safe-Test Points and combination units. With the installation of the Safe-Test™ Point and Voltage Test Station, customers have witnessed their LOTO task duration reduced from a 1/2 hour, 2-crew operation down to a mere 10 minute, 1 person operation. This is a direct reflection of OSHA's Office of Regulatory Analysis which states that, "For every \$1 invested in safety and health programs, companies can expect a return of \$4-\$6 dollars." In a survey of customers conducted by Grace, we found that:



Users have identified failed or faulty isolators with PESDS



Users have fewer accidents with PESDS



Users have seen a reduction in near misses using PESDS



SAFER

One of the highest-ranking citations issued by OSHA each year is the Control of Hazardous Energy or LOTO. PESDs eliminate exposure to energy during mechanical and electrical LOTO by providing external voltage presence indication and absence of voltage testing capabilities.



SMARTER

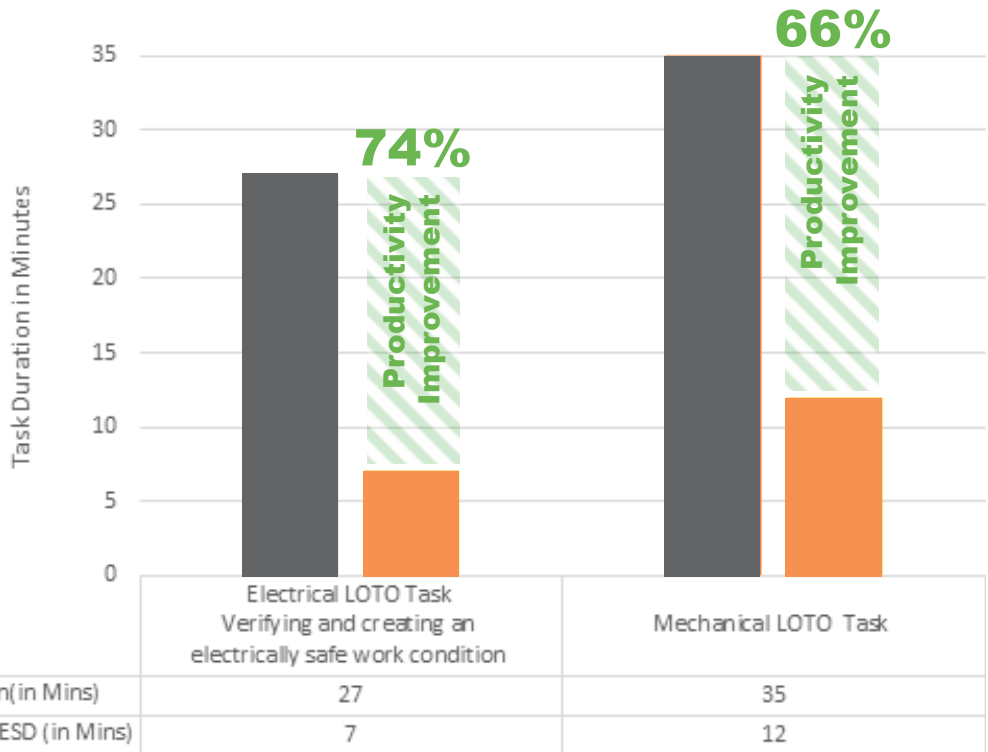
We looked at the problem of energy exposure and came up with a smart solution. The problem is opening panels and coming into direct exposure of energy to verify presence or absence. GracePESDs® eliminate this exposure step with intelligent design leading to smarter maintenance procedures.



MORE PRODUCTIVE

Ask any PESD user and they'll tell you the same story. PESDs make their job easier to perform, and much faster. Customers have reported that PESDs have decreased their LOTO procedures from 45-minute, 2-man job operations down to as low as 5-minute, 1-man job tasks.

Productivity Improvement with PESDs



GracePESDs® Products



R-3W/R-3W-SR Voltage Indicator



R-3W2 Voltage Indicator



R-3F2 Fiber Optic Voltage Indicator



R-3W DC



R-1VL003/R-1VH003 Medium Voltage Indicator



R-3K (no additional wiring when paired with Voltage Indicator)



Combination Units



Flex-Mount Voltage Indicator



Safe-Test Point™



Voltage Test Station (VTS)

Lockout/Tagout (LOTO) Applications

Mechanical LOTO (Voltage Presence Indication)	Voltage Indicators (#R-3W/2, #R-3F2, #R-3D2)
Cost-Effective Mechanical LOTO	Voltage Portals (#R-T3, #R-3K)
Enhanced Mechanical LOTO	Combination Units (#R-T3W2-LCH, #R-T3W-LCF)
Electrical LOTO (Absence of Voltage Testing)	Safe-Test Point (#R-3MT),
Enhanced Electrical LOTO (Absence of Voltage Testing)	Voltage Test Station (#P-S11S21-M3RX)

Common Applications

Mechanical & Electrical Lockout/Tagout (LOTO)

- MCCs
- Circuit Breaker Panels
- Often accessed panels
- Control Cabinets
- Remote disconnects

Electrical LOTO

- Low Voltage Switchgear & transformers
- MCCs

Sales Pitch Questions

Q: Can you tell me about your current LOTO program?

Q: Do you have Arc Flash labels on your equipment with PPE requirements?

Q: Are your personnel trained on LOTO procedures?

Q: How do you assess the training level of your personnel?

Q: How often do you do Electrical LOTO at your facility? What is the frequency (Day/Week/Month)? Does your process make it difficult to open the panel?

Q: What level PPE is worn to open the panel?

Q: How long does it typically take to verify a de-energized state?

Q: Tell me about the difference between electrical and mechanical LOTO in your facility?

Q: When was your last Arc Flash Study? Do you have a schedule to update?

Target Market, Customer Profiles, & Competition

End Users

End Users with active LOTO programs that prohibit workers from entering panels without verification of deenergized state. Frequently performed LOTOs increase payback on Voltage Indicators. These companies tend to be over the \$100 million in revenue range.

System Integrators

System Integrators selling to safety conscious End Users or high value-add System Integrators wanting to make their solutions stand out from the crowd while making them safer and more convenient.

OEMs

Manufacturers of MCCs, drives, switchgear, etc. that provide high quality equipment to demanding, safety conscious End Users. The goal with large OEMs is to make PESDs a standard option that doesn't add lead time.

Prospective Contacts

- Electrical Engineers
- Safety Directors
- Maintenance Supervisors
- Automation Engineers
- Electricians/Foreman
- Power Distribution Engineer
- Health & Safety Engineers
- Maintenance Managers
- Machine Operators/technicians

GracePESDs® Target Markets

- Chemical Production
- Electrical OEMs
- Health Care
- Manufacturing
- Packaging
- Pharmaceuticals
- Telecom
- Water & Wastewater Treatment
- Data Centers
- Food & Beverage
- Laundry Care
- Material Handling/Warehouses
- Petrochemical
- Pulp & Paper
- Utilities Power Generation

Notable Customers

- P&G
- Savannah River Paper
- Shell
- Quebec Hydro
- Michelin
- Nucor Steel
- Alcoa
- LaFarge
- USPS
- International Paper
- Kimberly Clark
- Abbott Lab
- Domtar
- Rockwell Automation
- GE
- North Slope Mine
- Diageo
- Caterpillar
- Cintas
- Hunter Douglas

Competition

- Panduit VeriSafe

GracePESDs® Voltage Indicators (*Voltage Presence*)

Grace's Voltage Indicators are self-powered, UL listed, and permanently installed devices that visually alerts the presence of voltage with flashing or non-flashing, redundant LED indication lights. Typically hardwired to the load side of an electrical feeder or a disconnect switch, voltage indicators illuminate whenever hazardous voltage is present in any individual phase and can assist in verifying voltage presence in addition to OSHA's requirements in 29 CFR 1910.147

Voltage indicators greatly assist task qualified personnel with enhanced productivity and reduced risk while performing mechanical and electrical LOTO tasks by verifying the release of stored electrical energy per Article 120.5(4) of NFPA 70E, 2018.



Common Customer Objectives

- Verify voltage presence in Mechanical LOTO
- I don't want to wait for my qualified electrician when I am not working inside the electrical panel, motor termination or a disconnect switch
- Make it easy for operators to work on the mechanical LOTO task

Common Customer Objections & Obstacles

- Do they meet OSHA standards for LOTO?
- What if the device leads are disconnected inside the panel from the source?
- I don't want to bring 480 V/600 V to the door.
- Are they NFPA 70E approved?
- I use pilot lamps instead which are very cheap.

Specific Applications

- AC/DC Applications
- Conveyor feed disconnects/sections
- Line-side/Load-side indication on MCC buckets
- Disconnect switches
- Control Cabinets

GracePESDs® Voltage Portals (*Voltage Presence*)

Grace PESD Voltage Portals allows the task qualified maintenance worker to safely and productively perform voltage presence verification from outside a grounded electrical enclosure. Voltage portals are typically connected to the load side of electrical disconnects.



Installed on the door or flange of an electrical cabinet using a 1/2" or 30mm standard punch hole with site-specific procedure labels, workers can perform a voltage presence test using an adequately rated CAT III/CAT IV Non-Contact Voltage Detector (NCVD) Pen during mechanical Lockout/Tagout.

Common Customer Objectives

- Display voltage isolation for Mechanical LOTO
- Make it easy for operators to work on the mechanical LOTO task
- Limits incident energy exposure
- I don't want to wait for my qualified electrician when I am not working inside the electrical panel, motor termination or a disconnect switch.

Common Customer Objections & Obstacles

- We don't trust those pens.....We recommend only quality tools for your procedures like FLUKE, FLIR and others that are adequately rated for the application
- Our staff is not trained on the use of NCVD pens
- Our techs don't carry NCVD pens

Specific Applications

- Corrosive environments
- Cost-sensitive applications
- Enhanced Mechanical LOTO

GracePESDs Combination Units (*Voltage Presence*)

We have numerous other combination units available. These include any variation of our voltage portals and indicators. We can combine them with labeling suitable to any application or place them in one of our trusted GracePort housings.

Grace's voltage indicators can be either flashing or non-flashing (solid-on) devices that monitor both AC and DC voltage. They are externally mounted and give a visual indication of voltage presence outside the panel. Voltage indicators are also available in Class.1 Div.2 and Class.1 solid-on LED versions.

Our voltage portals are non-conductive, encapsulated test points that allow for safe detection of the presence of voltage through a panel door with a non-contact voltage detector (NCVD).



Common Customer Objectives

- Mechanical LOTO procedures to verify presence of voltage
- Limits incident energy exposure
- Safer method of performing tri-test/bump test

Common Customer Objections & Obstacles

- This won't work on my DC system
- Why should I use Voltage Portals ONLY on grounded metallic enclosures?

Specific Applications

- Grounded electrical systems

Flex-Mount Voltage Indicator

Flex-Mount voltage indicator conveniently mounts onto any isolator or disconnect that features an M20 or 3/4" conduit knockout. This 3-phase voltage indicator uses redundant, long-life LEDs (flashing or non-flashing options available) to provide a visual representation of energy presence with the flexibility of being mounted virtually anywhere conduit knockout (alternate mounting position labels provided). In addition to the four-wire option, the Flex-Mount is the first voltage indicator PESD to utilize an optional five-wire configuration for use on wye power systems. The Flex-Mount comes fully potted with CAT III & CAT IV ratings that can be hardwired directly to the voltage source and is ideal for use in both AC & DC applications.



Common Customer Objectives

- Indicate if there is a stuck blade on disconnect
- Local indication
- 4/5-wire Mechanical LOTO applications

Common Customer Objections & Obstacles

- I trust my switch, why do I need to add a light to it?

Specific Applications

- Motor Disconnects
- Safety Switches
- Breaker Panels
- Generators
- Rotary disconnects

Safe-Test Point™ (Voltage Absence)

The Safe-Test Point PESD provides qualified electrical workers a safer and more productive way to perform the live-dead-live test (three-point test) from outside the electrical cabinet using an adequately rated test instrument. These devices can be mounted directly on any enclosure with the option to test either the line side, load side, or both.

This high impedance protected device allows for a closed-door absence of voltage testing. It contains four or five test point jacks that are hardwired directly to the point-of-work and allows measurement of AC/DC voltages by inserting the insulated meter probes into any two test point jacks to take a voltage measurement either phase to phase or phase to ground and neutral.



Common Customer Objectives

- Electrical LOTO
- Testing each phase conductor Phase to Phase and Phase to Ground
- Verifying the Absence of Voltage
- Ability to use a voltmeter/multimeter

Common Customers Objections & Obstacles

- Are these UL Listed?
- Does it meet Exception No.1 in NFPA Article 120.5 (7)?
- How does it impact my current electrical safety program? Do I need to retrain my employees?
- Are these approved by OSHA and NFPA 70E?
- I don't want to bring 480 V/600 V to the door.
- Can I add them to my cabinet?

Specific Applications

- Disconnect Switches
- VFDs
- Low voltage switchgear
- Energized equipment that is frequently accessed
- Motor Control Center Buckets
- Equipment with high incident energy
- Main power distribution panels

Voltage Test Station (Voltage Presence & Voltage Absence)

Our flagship combination unit, the Voltage Test Station, combines our voltage indicator and Safe-Test Point™ PESDs conveniently within an environmentally rated housing. The UL recognized VTS allows workers a safer way to verify presence of voltage and perform an Absence of Voltage Test from outside the electrical cabinet using an adequately rated test instrument.

The VTS can be hardwired directly to the point-of-work and it allows for visual verification of de-energized voltage; and measurement of AC/DC voltage either phase-to-phase or phase-to-ground through a meter test. The two devices are independently connected to the same source providing a redundancy check for additional safety. The device must be installed by a qualified electrical worker and adhere to all regulatory requirements and manufacturer's instructions.



Common Customer Objectives

- Combination of Indicator and STP for enhanced Mechanical/Electrical LOTO
- Additional ratings of UL Type 4/4X

- Line and/or Load Side applications
- Restricted access to qualified personnel only

Common Customer Objections & Obstacles

- I would have to cut into my panel to install this.
- Are these approved by OSHA and NFPA 70E?
- I don't want to bring 480 V/600 V to the door.
- How does it comply with OSHA and NFPA 70E?
- Does it meet Exception No.1 in NFPA Article 120.5 (7)?
- How does it impact my current electrical safety program? Do I need to re-train my employees?

Specific Applications

- Automation Panels
- Motor Control Centers (mains and selected buckets)
- High Incident Energy Areas
- VFDs
- Standalone Disconnect Switches
- High Power Control Panels
- Low voltage switchgear
- Power Disconnects

Medium Voltage Indicator (*Voltage Presence*)

Our full line of thru-door voltage/live line indication products make your LOTO procedures quicker, easier, simpler, and safer by pre-verifying isolation on disconnects and switchgear without exposure to hazardous voltage. These products help companies with electrical workplace safety regulations by keeping the door closed and workers safe.

The Medium Voltage Indicator (R-1V) mounts to a medium voltage bus and alerts personnel to voltage presence with flashing LEDs. This PESD is designed to provide enough illumination to be easily seen through a regular or IR viewing window mounted on a medium voltage starter, transformer, switchgear, or other power distribution equipment. The R-1V is built for long life and reliability with solid-state LEDs and is coated with flame-rated material. The Medium Voltage Indicator also uses capacitive-coupled resistivity to provide high surge immunity. This device is not safety rated.



Common Customer Objectives

- Used for Medium voltage indication for applications ranging from 2-43kV
- Visually verify the isolation to ensure there is no voltage present

Common Customer Objections & Obstacles

- Need a viewing window to see the indicator
- We can't shut down the system to install these

Specific Applications

- MV Switchgear
- Open Bus Work
- Substation Switches
- MV Motor Starters
- MV Isolation Switches
- High Resistance Ground Switches

The cost of wasteful resources spent on route-based inspections and unplanned downtime is costing process industries \$20 billion USD per year. Data from the Society of Maintenance and Reliability Professionals indicates that 70% workplace injuries occur during Reactive Maintenance. The Predictive Maintenance solutions provided by GraceSense™ ensure a safer method of scheduling out your downtime as opposed to reacting to unexpected problems.



The field-proven Predictive Maintenance System is a suite of smart devices that utilize low-power wireless sensor technology. Advanced data analytics provide asset managers with deep insights to machine health to effectively prioritize resources and maximize the value of their maintenance spend. GraceSense™ technology improves overall plant reliability and maintenance metrics by remotely monitoring the asset health and sending timely notifications through SMS or email alerts when anomalous behavior is detected.



SAFER

Most workplace injuries occur during Reactive Maintenance. Predictive Maintenance solutions provide a safer method of scheduling out downtime. The entire system is designed to empower maintenance personnel to be prepared for what would normally be a surprising and risky situation.



SMARTER

Through seamless integration and the application of IIoT, we're making maintenance smarter by delivering actionable data in real-time. Because of this, our customers have experienced a swift return on their investment in the Predictive Maintenance System.



MORE PRODUCTIVE

Reactive Maintenance costs billions. By equipping users with actionable information in real-time, we're providing value to our customers using continuous data to drive actionable decisions. This allows for faster and more efficient response times than ever.

GraceSense™ Products

Predictive Maintenance System



Vibration & Temperature Node



Panel-Mount Node



Gateway (CloudGate, ControlGate, ComboGate)



Hot Spot Monitor



Maintenance Hub



Service Offerings

Common Applications

- Low and Medium voltage switchgear
- Industrial Control Systems
- Motors and Pumps
- MCCs
- Rotating Equipment

Sales Pitch Questions

- Q: How do you know when your asset will fail?
- Q: Do you have spares on inventory to perform maintenance?
- Q: Which assets keep you up at night?
- Q: What is your maintenance strategy?
- Q: Where are your most problematic areas?
- Q: When is your next planned maintenance on your equipment?
- Q: Do you have a vibration program?
- Q: Do you know how much it costs for each inspection location?
- Q: Do you have vibration testing equipment in house?
- Q: How often you do these mechanical inspections?
- Q: Does your facility use SCADA/DCS systems for plant-wide integration?
- Q: Do you have any measurement for downtime at your facility?

Target Market, Customer Profiles, & Competition

End Users

- Reliability Engineers
- Facility operations personnel
- Maintenance Managers
- Facility Directors

System Integrators & OEMs

These product lines are typically sold to End Users. SIs are only brought in for integration work unless they are trying to identify an option for their customers. All hardware and cloud services can be branded to OEMs. These OEMs can make a wide variety of equipment that requires different types of sensing (i.e. Fans, Compressors, Air Handling Units, Hydraulic Systems, etc.).

GraceSense™ Target Markets

- Heavy Manufacturing Industries
- Automotive Plants
- Power Generation Plants
- Oil & Gas
- Data Centers
- Hospitals
- Food & Beverage
- Paper Mills
- Steel Mills
- Paper & Pulp
- Mobile equipment (generators, compressors, substations)
- Water & Wastewater Treatment
- Telecom
- Pharmaceuticals

Notable Customers

- Chrysler
- Fairlife
- Hutchinson
- City of Monroe
- Flexco
- Maid-Rite Steak
- Tower International
- Green Bay Nonwovens
- Metal Technologies
- American Eagle
- Ellis Corporation
- GoJo Industries
- Verantis

Competition

- Fluke
- iAlert
- Banner
- KCF Technologies
- Intellisaw

GraceSense™ Predictive Maintenance System

The complete Predictive Maintenance System consists of four key components. Starting with the Vibration & Temperature Node; this rugged wireless sensor with advanced edge processing and proprietary ZigBee compatible communication monitors vibration and temperature to insightfully predict health on any rotating equipment. Multiple mounting options ensure quick deployment across applications in any industry. Easy to replace batteries deliver 3-5 years of life (dependent on use).

The CloudGate/Panel-Mount Node consists of configurable hardware architecture with a wide selection of inputs, transducers, radios, and power options. Nodes can be mounted in our environmentally rated housing. Configured as a CloudGate with an LTE or WiFi module, it can provide cloud-based support to as many as a 100 of other wireless nodes within a 30m radius, making the architecture massively scalable.

Finally, the Maintenance Hub is an intuitive web application providing real-time asset status using dashboards, plot trends, and analytics. Hosted either in the cloud or on a local server, the Maintenance Hub displays system information, generates reports, and issues alerts via SMS and email containing actionable step-by-step remediation instructions. An open API lets you share data and alerts with existing systems (i.e. CMMS, SCADA, DCS).



Common Customer Objectives

- Preventing unplanned downtime due to unexpected failures
- Real-time data analytics visualization
- Productivity cost savings achieved through optimized maintenance scheduling
- Proactive maintenance as opposed to reactive maintenance

Common Customer Objections & Obstacles

- Shortage of skills
- Integrations
- Lack of need (“If it ain’t broke, why fix it?”)
- Budgetary constraints
- Security
- Justifying ROI with management
- Inability to access sensor data
- Other priorities

Specific Applications

- Electric Motors/Pumps and Rotating Machinery
- Pumps
- Hoists
- Conveyor Systems
- Generators
- HVAC Systems
- Drives

GraceSense™ Vibration & Temperature Node

Rugged wireless sensor nodes that monitor vibration and temperature to insightfully assess the health of rotating equipment. Using advanced edge processing and IEEE 802.15.4 ZigBee compatible communication, these nodes enable plant floor personnel to continuously monitor equipment, detect defects, and predict health on any rotating equipment. Multiple mounting options ensure quick deployment across applications in any industry. Easy to replace batteries deliver 3-5 years of life, dependent on use.



GraceSense™ Panel-Mount Node

A cost-effective solution to bring in hardwired third-party sensors via 0-10V, 4-20mA, as well as serial communication over RS485 from devices like the Hot Spot Monitor (HSM). Configurable hardware architecture with a wide selection of inputs, transducers, radios, and power options. Nodes can be mounted in our IP65 environmentally rated housing.



GraceSense™ Gateway (CloudGate, ControlGate, or ComboGate)

GraceSense™ gateways transfer accumulated field node information to an actionable troubleshooting platform via our Maintenance Hub Cloud and/or your PLC, SCADA, DCS system. Choose one of the following three configurations: Appearance of product shown below may change based on final product configuration.



CloudGate™

CloudGate™ transfers field node information to the browser-based Maintenance Hub where actionable, real-time insights are provided. This WiFi or LTE configuration can provide cloud-based support to all of the GraceSense™ wireless nodes within a 30m radius, making the architecture massively scalable. In addition, third-party sensors can be hardwired into this gateway configuration.



ControlGate™

ControlGate™ is the gateway into plant floor control systems for GraceSense™ Vibration & Temperature Nodes. This gateway configuration provides users quick integration into their control network via PLC/SCADA and EtherNet/IP™ or Modbus TCP/IP communication options. In addition, third-party sensors can be hardwired into this gateway configuration (*coming soon*).



ComboGate™

ComboGate™ is a hybrid configuration of the CloudGate™ and ControlGate™ configurations. This option will securely provide data to both PLC/SCADA/DCS systems using EtherNet/IP™ or Modbus TCP/IP as well as featuring communication options for field node information transfers to the Maintenance Hub via LTE or WiFi. In addition, third-party sensors can be hardwired into this gateway configuration (*coming soon*).

GraceSense™ Hot Spot Monitor (HSM)

GraceSense™ Hot Spot Monitor (HSM) is a continuous, non-conductive temperature monitoring device that detects potential hot spots and alerts personnel of abnormalities in electrical equipment. Integrating the HSM with a panel-mount node will allow data from the HSM to be remotely monitored in the browser-based Maintenance Hub (HSM must be hardwired into a Panel-Mount Node to enable cloud connectivity)



Common Customer Objectives

- Preventing unplanned downtime due to unexpected failures
- Real-time data analytics visualization and trend over time
- Reduce hazard exposure to their personnel
- Enhance equipment longevity
- Productivity cost savings achieved through optimized maintenance scheduling
- Proactive maintenance as opposed to reactive maintenance
- Comply with regulatory codes such as OSHA and NFPA 70E

Common Customer Objections & Obstacles

- I do thermography every year and don't find many places of concern.
- I already use IR windows in my facility. Why should I use HSM?
- My loads are pretty constant, and my new equipment is running under capacity.
- I don't have people who understand this type of communication.
- I know that my equipment is in great shape and thermography is just a check box for insurance needs.
- We don't need to follow NFPA 70B.
- I can't shut down my equipment just to install these sensors.

Specific Applications

- Low and Medium Switchgear
- Emergency Backup Power Generators
- Power Transformers
- MCCs
- Large Power Plants



GraceSense™ Maintenance Hub

The Maintenance Hub is a browser-based interface that provides real-time asset statuses using dashboards, plot trends, and analytics. Hosted either in the cloud or on a local server, the Maintenance Hub displays system information, generates reports, and issues alerts via SMS and email containing actionable step-by-step remediation instructions. An open API lets you share data and alerts with existing systems (i.e. CMMS, SCADA, DCS).



Service Offerings

The entire Predictive Maintenance System is designed to provide ease-of-integration through our full-service monitoring packages and individual service offerings. For example, with the presale Initial Condition Assessment, our IIoT Application Engineers will provide an on-site audit of equipment to be monitored and work directly with your team to define your goals, review integration plans, and calculate your ROI.

Upon completing the assessment, we will dedicate oversight by an IIoT Application Engineer to address any questions or issues and provide guidance throughout the deployment of your Predictive Maintenance System. We understand that each application is different which is why we offer custom application engineering solutions for hardware and/or analytics development to meet your precise needs.





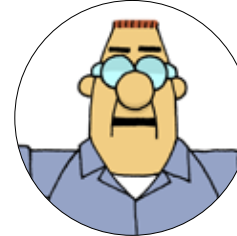
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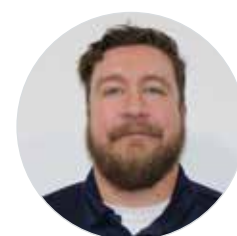


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