



North American Capabilities

power to perform

HPS Capabilities



COMPANY

With our headquarters in Guelph, Ontario, Canada, HPS operates out of multiple plants located throughout Canada, US, Mexico, and India. HPS has expanded its manufacturing and product base to offer the broadest range of both standard and special transformers.

Founded: 1917

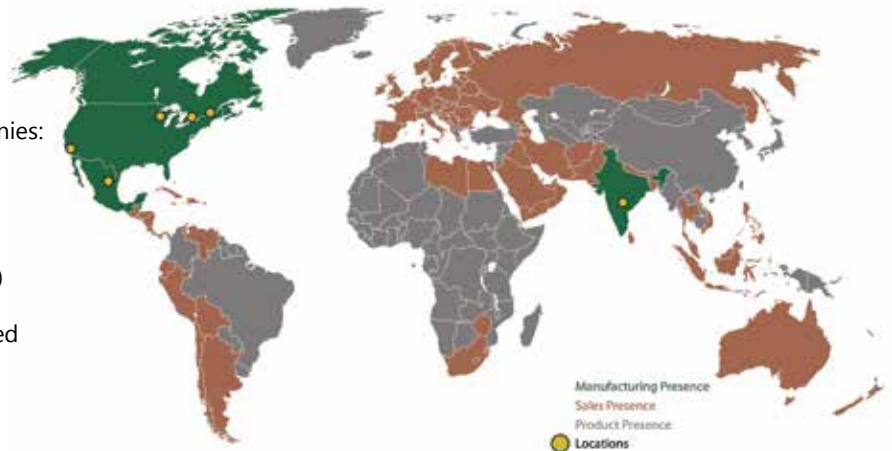
Number of employees: 1,330

Ownership: Hammond Power Solutions (HPS) is a public company traded on the Toronto Stock Exchange ("HPS.A")

GLOBAL PRESENCE

HPS offers a broad range of dry-type and liquid-filled transformer capabilities through our International Companies:

- **Hammond Power Solutions, Canada**
 - Specializing in Dry-type transformers (VPI & Cast Coil)
- **Hammond Power Solutions, U.S.A.**
 - Specializing in Dry-type transformers (VPI & Cast Coil)
- **Hammond Power Solutions Private Limited, India**
 - Specializing in Dry-type (Cast Coil & VPI) & Liquid-Filled transformers



COMPETITIVE EDGE

HPS is a global leader for the design and manufacture of standard & custom transformers and associated magnetics.

- Global manufacturing presence
- Multiple channels to market
- Extensive engineering expertise
- Customer Service
- High-value products which can be offered to meet any global design/regulatory requirements

MARKETS



SALES

Our sales team are ready for your enquiries. No matter where you are located, someone knowledgeable is close by to provide assistance. We have technically capable quotation staff located in various locations who are trained in helping to find a solution to your specification and deliver the required quotation quickly.



CUSTOMER SERVICE

HPS customer service personnel are dedicated to providing the information you need as quickly as possible. Our teams are technically trained to provide solutions to meet your specifications and are able to answer most questions over the phone. Stock checks, expediting, quotations or technical information are always readily available. Our modern business systems allow most quotation requests to be completed in less than 24 hours. Our commitment to customer service means you will be an informed and satisfied customer.

DELIVERY

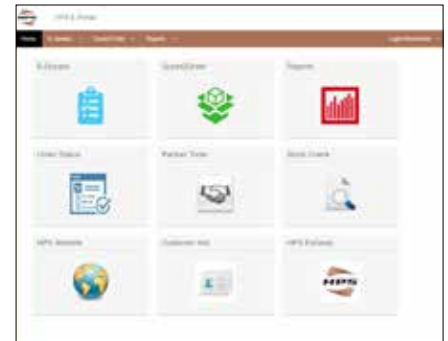
We meet or exceed the lead times expected within our markets. Our business systems, engineering capabilities and multiple manufacturing locations have enabled HPS to have some of the best lead times in the industry. We can deliver special transformers in as little as one week. In addition to our quick deliveries, HPS stocks a broad selection of standard control, potted, reactor and low voltage distribution products.

E-PORTAL

Our partners have access to an online Partner Portal we call E-Portal. The E-Portal system provides 24 hours, 7 days a week access to an array of tools that allow our partners to work efficiently in meeting the needs of end customers. Our on-line systems differentiate us from other transformer manufacturers by providing our partners with a competitive advantage. Distributors are able to respond to their customer's needs quicker, more accurately, and in greater detail than ever before.

This on-line system offers 24/7 access to the following features:

- Specify and quote standard or custom products
- Check stock and order status
- Nameplate and product specification data
- Additional HPS and product information



HPS ACADEMY - www.hpsacademy.com

An interactive online training site that allows you to participate in HPS training modules on your own time (24 hours a day, 7 days a week), right from the comfort of your desk. Widely recognized as an invaluable tool to enhance knowledge related to our products, with industry awards that demonstrate the benefits of this training system.

HPS TOOLBOX - www.hammondpowersolutions.com/hps-toolbox/

HPS offers many different tools to assist you in selecting an HPS Transformer. Simply go to www.hammondpowersolutions.com and select the HPS Toolbox from the Online Tools. You can choose from the following three tools: Efficiency Calculator, Current Calculator, and Buck-Boost Selector. Choosing an HPS Transformer has never been easier with the HPS Tool Box.

HPS Capabilities

HPS IMPERATOR® ENCAPSULATED MACHINE TOOL INDUSTRIAL CONTROL TRANSFORMERS



HPS Imperator® transformers are used where high performance, reliability and quality are required to meet your needs. Standard features include:

- VA range from 50 VA to 1500 VA
- Available with standard secondary or optional primary fuse kits
- 8 terminations per side
- Patented unique terminal block design
- Innovative fusing method
- cULus Listed, CE Marked and RoHS Compliant

HPS SPARTAN® INDUSTRIAL OPEN CORE & COIL CONTROL TRANSFORMERS



HPS Spartan® industrial open-style control transformers are ideally suited for general purpose, industrial, light duty loads. Standard features include:

- VA range from 50 VA to 5000 VA
- Molded terminal blocks for connections up to 3000 VA and coil face termination over 3000 VA
- Vacuum impregnated
- Bolted core construction
- Meets NEMA and ANSI standards
- CSA Certified, UL Listed, CE Marked and RoHS Compliant

HPS FUSION™ GENERAL PURPOSE ENCLOSED TRANSFORMERS



HPS Fusion™ line of enclosed transformers are an indoor, cost effective approach specifically designed for applications such as: industrial lighting and circuit isolation, supplying motor control circuits and HVAC applications. Standard features include:

- VA range from 50 VA to 5000 VA
- Molded terminal blocks for connections up to 3000 VA and coil face termination over 3000 VA
- Easy mounting and installation via four mounting slots and two keyhole slots
- Enclosed in a type 1 enclosure
- CSA Certified, UL Listed, CE Marked and RoHS Compliant

REACTORS AND DV/DT FILTERS



HPS Centurion® R provides a unique blend of improved performance and reliability while reducing the product footprint. The 'RC' series DV/DT filter combines the current limiting ability of an AC line reactor plus a resistive capacitance circuit that forms a damped, low pass filter. Standard features include:

- Sizes available for 0.5 to 1200 HP motors (600 HP for DV/DT)
- Maximum system voltage is 600/690V (600V for DV/DT)
- Standard core & coil (optional Type 2 or 3R enclosure)
- 50/60 Hz
- UL Listed, CSA Certified and CE Marked

DRIVE ISOLATION TRANSFORMERS



HPS drive isolation transformers are suitable for both AC and DC variable speed drives. They are sized to match standard motor horsepower and voltage ratings.

HPS offers three standard lines of energy efficient drive isolation transformers that meet TP1 and/or NRCAN 2019 energy efficiency standards. Standard features for the two lines include:

- Three phase ratings from 7 kVA to 660 kVA
- Copper and aluminum available
- Optional shield available
- UL Listed and CSA Certified
- Type 3R enclosure (optional type 4, 12 or stainless)

AUTOTRANSFORMERS

HPS offers two types of Autotransformers:

Motor Starting Autotransformers

Motor starting autotransformers are a significant component of a motor controller. In its simplest form, motor starters start and stop a motor and protect against over voltage and under voltage. These products are suitable for use with magnetic or manually operated motor controllers. Standard features include:

- Three phase, 3 coil, standard designs, using economical open core and coil construction (two coil units also available)
- 220°C insulation with 150°C temperature rise
- Heavy solid copper tabs with holes provide reliable termination
- Copper construction
- UL Listed and CSA Certified

General Purpose Autotransformers

Autotransformers are available for applications where small voltage corrections are necessary in a distribution system. They are frequently used to adjust the supply voltage to match specific load requirements when load isolation from the supply line is not required. This product can be used as either a step-up or step-down transformer. Standard features include:

- Three phase from 3 kVA to 500 kVA
- Copper and aluminum available
- UL Listed and CSA Certified
- Type 3R Enclosure
- Neutral terminals standard



HPS Capabilities

HPS UNIVERSAL™ BUCK-BOOST TRANSFORMERS



HPS Universal™ offers an economical solution to the adjustment of line voltages that are slightly above or below normal. Standard features include:

- VA range from 50 VA to 5000 VA
- Single phase, welded core construction
- Made with high quality, high permeability silicon steel laminations
- Encapsulated core & coils in a combination silica sand and resin compound
- UL Listed and CSA Certified
- Type 3R enclosure (optional Type 4, 4X and 12 enclosures)

HPS FORTRESS™ COMMERCIAL ENCAPSULATED TRANSFORMERS



The HPS Fortress™ is an innovative design that provides the ideal solution for commercial applications where quality, ease of installation, and low cost are key. Standard features include:

- Single phase ratings from 0.50 kVA to 37.5 kVA, three phase from 2 kVA to 150 kVA
- Standard shield on all three phase units and single phase units 7.50 kVA and up
- UL Listed and CSA Certified
- Type 3R Enclosure

HPS TITAN® SERIES ENCAPSULATED TRANSFORMERS FOR HAZARDOUS & HARSH LOCATIONS



The HPS Titan® series are specifically designed for installation in harsh environments. Typical applications are oil & gas plants, marine and shipboard installations, steel mills, mining, etc. Standard features include:

- Single phase ratings from 0.50 kVA to 37.5 kVA, three phase from 6 kVA to 150 kVA
- Single Phase: Type 3R enclosure (optional Type 4, 12 or stainless)
- Three Phase: Type 4/12 enclosure (optional stainless)
- UL Listed for "Class 1, Division 2, Group A, B, C, D and Class I, Zone 2, Group IIC, T3 Hazardous Locations, ABS Type Approval for "Marine Duty Service and Offshore Applications - Electrical Distribution and Propulsion" and a North American Temperature Classification of T3C/T3A.
- Standard shield on all units

HPS POWERPLUS™ MINI POWER CENTERS



The HPS PowerPlus™ is a convenient pre-wired power center that saves you time, money, and space. Standard features include:

- 480V Primary, 120/240V Secondary
- Single phase ratings from 5 kVA to 25 kVA
- Shielded transformer
- Type 3R enclosure
- cULus Listed



ENERGY EFFICIENT DISTRIBUTION TRANSFORMERS

HPS offers three standard lines of energy efficient low voltage distribution transformers that meet or exceed U.S. Department of Energy (DOE) 10 CFR Part 431 efficiency standards and the latest Canadian Energy Efficiency Regulations SOR/2018-201 efficiencies - NRCan 2019. Standard features for the three lines include:

- Single phase ratings from 15 kVA to 333 kVA (only available in HPS Sentinel® and HPS Sentinel® G) and three phase from 15 kVA to 1500 kVA (custom ratings available on request)
- Copper and aluminum available
- UL Listed and CSA Certified
- Type 3R enclosure
- Pre-installed lugs (up to 270 Amps)



ENERGY EFFICIENT GENERAL PURPOSE DISTRIBUTION TRANSFORMERS

Generally used for supplying appliance, lighting, heating, motorized machine and power loads from electrical distribution systems.

HPS Sentinel® G

- Meets new DOE 2016 and NRCan 2019 energy efficiency standards
- 10kV BIL on all three phase transformers



ENERGY EFFICIENT K-FACTOR TRANSFORMERS

The use of K-Factor distribution transformers has become a popular means of supplying power for non-linear loads such as electronic ballasts, drives, personal computers, telecommunications equipment, broadcasting equipment and other similar power electronics. These non-linear loads generate harmonic currents which can substantially increase transformer losses. Our K-rated transformers have been specifically designed to allow some overheating. Standard features include:

HPS Sentinel® K

- K-Factor ratings of K4, K9, K13 and K20
- Meets new DOE 2016 and NRCan 2019 energy efficiency standards
- 10kV BIL on all transformers



ENERGY EFFICIENT HARMONIC MITIGATING TRANSFORMERS

HPS Harmonic Mitigating Transformers reduce voltage distortion (flat-topping) and power losses due to current harmonics created by single-phase, non-linear loads such as computer equipment. They treat sequence harmonics (3rd, 9th and 15th) within the secondary windings and 5th and 7th harmonics upstream with appropriate phase shifting. Typical applications of severe non-linear loading conditions include data centers, internet-service providers, telecom sites, call centers, broadcast centers, etc. Standard features include:

HPS Sentinel® H

- K-Factor rating of K13 offered as standard (others available on request)
- Meets new DOE 2016 and NRCan 2019 energy efficiency standards
- 10kV BIL on all transformers

HPS Capabilities

ENERGY EFFICIENT MEDIUM VOLTAGE DISTRIBUTION TRANSFORMERS



2.5 & 5 kV class transformers are designed to step down incoming high voltage power to utilize voltages for commercial, institutional or industrial applications. Standard features include:

- Large variety of standard and custom single phase and three phase voltages and kVA ratings
- Standard primary voltages of 2400 and 4160 volts
- UL Listed and CSA Certified
- Type 3R and ANSI 61 enclosure (optional Type 4, 12; other paint colors or stainless steel)

HPS Millennium™ G

- Meets new DOE 2016 and NRCAN 2019 energy efficiency standards

DRY-TYPE MEDIUM VOLTAGE (POWER) DISTRIBUTION TRANSFORMERS



Our medium voltage (power) distribution transformers provide a high level of quality and service reliability that has become synonymous with HPS. These transformers are suitable for any commercial, industrial or renewable energy application within the most demanding of environments. Standard features include:

- Ratings up to 34 MVA and 46 kV class
- Enclosure options (Type 1, 2, 3R, 3RE, 4, 12; other paint colors or stainless steel)
- Multiple standard options
- UL Listed and CSA Certified

HPS Millennium™ E/C

- Meets new DOE 2016 and NRCAN 2019 energy efficiency standards

CAST RESIN TRANSFORMERS



HPS EnduraCoil™ is a high-performance cast resin product designed for many demanding and diverse applications. Coils are precision wound with copper or aluminum conductors that are electrically balanced to minimize axial forces during short-circuit conditions. Standard features include:

- kVA Ratings from 300 to 3000 ANN, 4000 AFN, up to 34.5 kV Class
- Enclosure options (Type 1, 2, 3R, 3RE, 4, 12; other paint colors or stainless steel)
- Multiple standard options
- UL Listed and CSA Certified

HPS EnduraCoil™ E

- Meets new DOE 2016 and NRCAN 2019 energy efficiency standards

SPECIALTY & CUSTOM TRANSFORMERS



The HPS Design Team of passionate engineers and support staff are dedicated to solving real-world transformer challenges for a broad range of customers.

This investment in people and facilities has resulted in a rich legacy of leading technologies and manufacturing methodologies to address the most demanding specialty/custom dry-type transformer requirements.

From environmental, energy efficiency and durability improvements to installation and maintenance simplification, we're never satisfied with the status quo.

We design to your specifications – in days instead of weeks or months. Our custom designs range from 10 VA – 34 MVA and up to 46,000 volts in order to address the most demanding applications and extreme working environments.

HPS Custom Transformers include:

- Air core and iron reactors up to 2500 amps
- Cyclonconverters
- Excitation Transformers
- Rectifier Duty Transformers
- Traction Duty Transformers
- Mining Duty Excavator Transformers
- Large Indoor/Outdoor Current Limiting Air-Core Reactors
- 18, 24 and 48 Multi-Pulse Drive/Inverter Duty Transformers

Custom Design Capabilities

Some examples of HPS' custom design capabilities include:

- Power Conditioning
- High Efficiency
- Low Noise
- Low Temperature Rise
- Matching Impedance
- K-Factor Rated
- Harmonic Mitigation
- Size/weight constraints
- Custom enclosures
- Unique input and output voltages
- Low Inrush
- Multi-pulse drive transformers
- Custom Drive Isolation transformers for AC and DC Drives
- Inverter and Rectifier Duty

OEM Applications:

HPS works with some of the most demanding OEMs in the world where "it has to perform". Here are some examples of the OEM applications that we have built:

- Mining
- Transit
- Drilling Rigs
- Elevator
- Robotics
- Motor Control
- Solar Power
- Wind Power
- HVAC
- Medical Equipment
- Power Distribution
- Power Quality
- Plant Automation
- Marine Duty
- Shovel Duty

HPS Capabilities

ENGINEERING CAPABILITIES

HPS' engineering services are located throughout our manufacturing facilities. Our designs are cost-effective and our transformers are built with modern manufacturing techniques. Whether it is prototypes, thermal modeling, harmonic assessment, retrofitting, tight physical dimensional requirements or any other unique magnetic problem, our engineers will work with our customers to develop and deliver the most cost-effective design available.

We particularly emphasize our 'Value Added Engineering' whereby our design staff will interface with your team to produce the optimum transformer. Our 3D modelling design and CAD facilities permit quick and effective communication when time is vital.

Within North America, HPS has multiple design facilities:

1. Maintaining standard product lineup
2. Tailoring designs for OEM partners
3. Overseeing the design and manufacturing of custom transformers

As a result, HPS offers a full-fledged global transformer platform combining design, engineering, manufacturing and services.



Casting Oven

DESIGN CAPACITY & TOOLS

- Over 3000 custom designs are engineered and built every year.
- HPS has designed over 250,000 products in over 90 years of business.
- We have over 50 engineers and technicians designing exactly what you need.
- HPS' engineering staff all have the latest software enabling them to assist with the development of designs. These include:
 - Solid Works® (3D Modeling)
 - AutoCAD®
 - P Spice® electrical simulation

MATERIALS & PROCESSES

A wide range selection of standard materials and processes are available, which provide the most cost-effective and rugged designs.

- High grade electrical steel laminations
- Windings are available in copper or aluminum
- High performance insulation system processes - VPI or Cast Resin
- Basic Impulse Level ranges from 10 kV to 250 kV
- Enclosures for indoor, outdoor and harsh environments such as mining and marine duty
- Step lap mitred cores
- Disk or barrel wound coils

QUALITY

HPS has been highly regarded for quality products and service since inception. Customers have come to rely on our products and services. Extensive testing programs and an exemplary field service record ensures that HPS products not only meet all the standards necessary, but more importantly, fulfill customers expectations and requirements.

QUALITY ASSURANCE

- All facilities have implemented a quality management system based on ISO 9001:2008, with Guelph, Ontario; Granby, QC; and Monterrey, Mexico facilities having certification to this quality standard.
- Our units are designed to meet ANSI, CSA, UL, IEC, ABS and NEMA standards required by our customers.
- With our commitment to 'Excellence' and 'Continuous Improvement', we build value and reliability into every product.
- HPS stands behind its quality with warranties on both standard and special products.

TESTING

HPS has testing facilities in all manufacturing locations to ensure product quality. All transformers are tested at the manufacturing facility prior to shipment. Transformers must meet very specific criteria to be certified acceptable for release. Tests are categorized as Production Tests and Type Tests.

Production Tests are applied to every transformer where Type Tests are required either to qualify a new product or to further certify a production product.

Production Tests

- D.C. Resistance Measurement
- Polarity and Phase-Relation Test
- No-Load and Excitation Current Test
- Voltage Ratio (turns ratio)
- Impedance Voltage and Load Loss Test
- Dielectric Test
- Applied Voltage Test
- Induced Voltage Test
- Partial Discharge (Cast Resin)

Type Tests

- Temperature Rise Test
- Sound Level Test
- Partial Discharge
- Basic Impulse Insulation Level
- Short-Circuit Test



BASIC IMPULSE
INSULATION LEVEL



TEMPERATURE RISE
TEST



THERMO GRAPHICAL
ANALYSIS

HPS Capabilities



Hammond
Power Solutions



CANADA



UNITED STATES



INDIA

CANADA

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