



Hanon  
SYSTEMS

Corporate Brochure

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**Formed as a standalone company in 2015 and with origins that date back more than three decades, Hanon Systems is an established global automotive supplier of eco-friendly and high-efficiency thermal and energy management solutions.**

As a trusted partner to most of the world's top vehicle manufacturers, automakers look to Hanon Systems for solutions that address the shift toward electrification and the efficiency needs to support conventional vehicles.

The company – with a mindset focused on creating a better tomorrow for future generations – takes pride in its innovation for automakers supporting the next-generation electrified (electric, hybrid, fuel cell and autonomous vehicles) and conventional vehicles.

# CORPORATE DIRECTION

Hanon Systems creates value for automakers in its endless commitment to delivering innovation and striving for excellence. Through its differentiated product portfolio, abundant experience and business acumen, the company remains focused on strengthening its position as a leader in automotive thermal management solutions for a clean energy future.

**Vision**      **Leader in Automotive Thermal Management Solutions for a Clean Energy Future**


## Strategy


  
**Expedite Innovative Technology**


  
**Drive Enterprise Excellence**

  
**Accelerate Growth**

## Values

  
**Customers**  
Success is driven by customer satisfaction

  
**Employees**  
People are the strength of our company

  
**Shareholders**  
Superior execution delivers profitable growth

# HISTORY AND AWARDS

- 1986 • Established as Halla Climate Control Corp., a joint venture between Ford Motor Co. and Mando Machinery Corp.
- 1989 • Established first R&D center in Daejeon, Korea
- 1989 • Launched Canada operations; first manufacturing site outside of Korea
- 1999 • Visteon Corp. becomes major shareholder
- 2002 • Named “Supplier of the Year” by Hyundai Motor Group
- 2004 • Selected by Forbes as “Best under a Billion” three years in a row
- 2011 • Awarded “Grand Prize of Green Company” by Korean Ministry of Environment
- 2013 • Integrated its business with Visteon’s climate operations
- 2014 • Acquired thermal and emissions business from Cooper Standard
- 2015 • Changed major shareholder to Hahn & Co. Auto Holdings
- 2016 • Opened China engineering center in Shanghai
- 2017 • Received Ford World Excellence Gold award for compressors (Pyeongtaek)
- 2017 • Named “Best Product Development Partner” by Hyundai Motor Group
- 2018 • Named to Ford Aligned Business Framework (ABF) network of strategic suppliers
- 2019 • Acquired the Fluid Pressure & Controls business from Magna
- 2023 • Named a “Supplier of the Year” by General Motors (sixyears in a row 2017-2022; and 1997 and 2000)

# INNOVATION AND TECHNOLOGY

As global legislation becomes more stringent in terms of fuel economy and emissions, automakers are looking for ways to address these demands by downsizing engines; adding turbochargers for power and exhaust gas recovery systems to reduce tailpipe emissions; and introducing alternative powertrains such as electric, hybrid electric and fuel cell architectures.

Hanon Systems is well-positioned to serve its customers. The company is committed to delivering automotive solutions that address government, consumer and industry trends through connected, integrated, controlled and optimized designs that meet the individual needs of automakers in the development of next generation vehicles.

## Recognition

### IR52 Jang Young-Shil Award\*

- 2019 Integrated thermal energy management system (iTEMS)
- 2022 800V EV High-efficiency thermal management system
- 2023 Visible Ray (VR) LED Photocatalyst Module

### Automotive News PACE Award

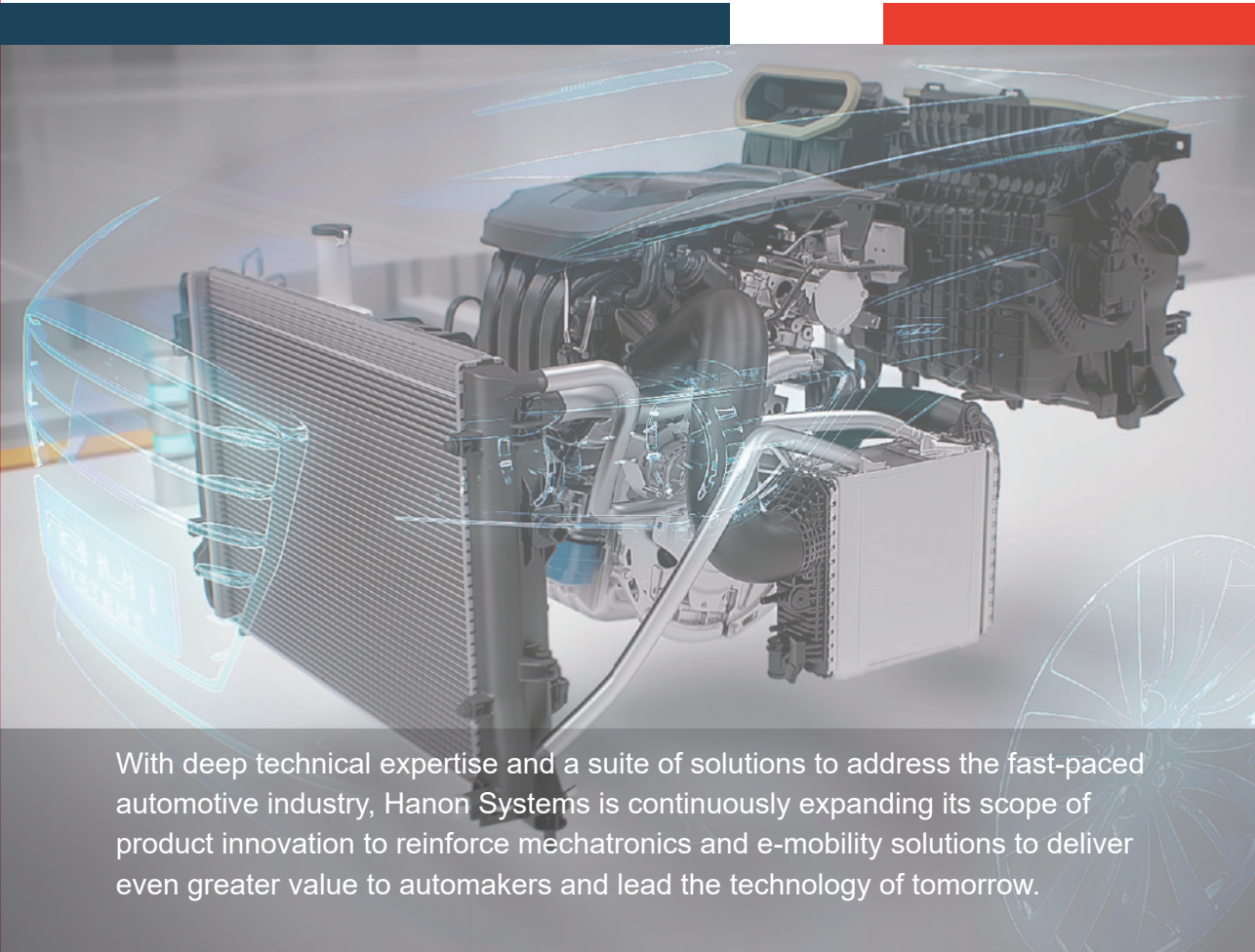
- 2007 Wavy blade fan
- 2013 Metal seal fitting

### New Excellent Technology (NET) Award\*

- 2019 Integrated HVAC active noise reduction technology
- 2020 Water-cooled condenser integrated receiver drier for electric vehicles
- 2021 Air disinfection HVAC technology
- 2022 Generation 2 Integrated Heat Pump System

\*Recent years

# INNOVATIVE THERMAL AND ENERGY MANAGEMENT SOLUTIONS



With deep technical expertise and a suite of solutions to address the fast-paced automotive industry, Hanon Systems is continuously expanding its scope of product innovation to reinforce mechatronics and e-mobility solutions to deliver even greater value to automakers and lead the technology of tomorrow.



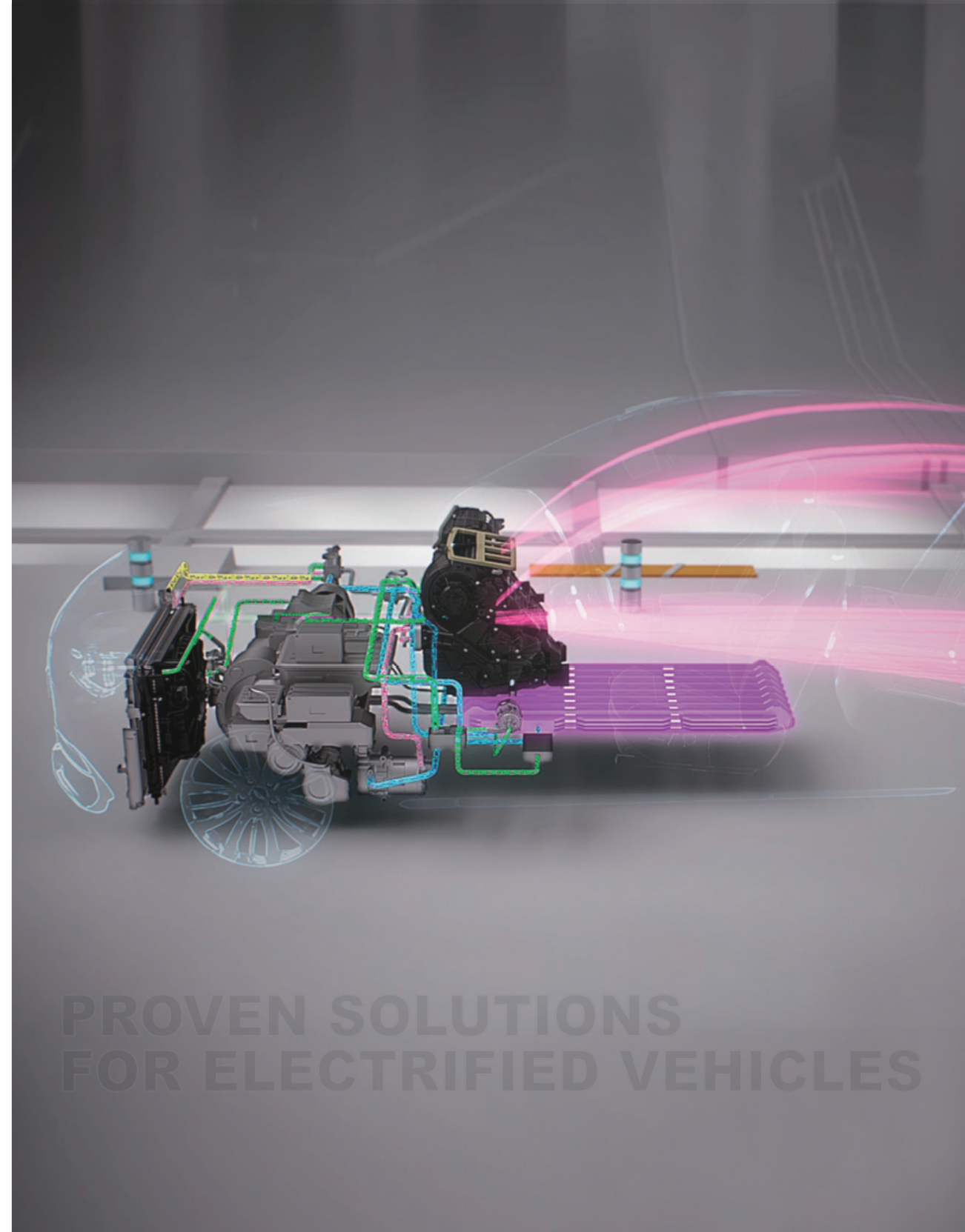
# TRUSTED PARTNER SERVING THE GLOBAL AUTO INDUSTRY

The automobile is a highly-sophisticated machine and the rate of change in today's vehicles is accelerating as more electrical and electronic componentry is introduced.

As experts in the field of automotive thermal and energy management, Hanon Systems plays an important role in the supply of solutions that not only deliver cabin comfort and enhance powertrain efficiency, but also can maintain the optimal operating temperatures of these devices.

## SYSTEMS

- Full Vehicle Systems for A/C and Powertrain Cooling
- R134a, R1234yf, R445A and R744 Refrigerants
- Heat Pump System
- Battery Thermal Management
- Fuel Cell Thermal System



## PROVEN SOLUTIONS FOR ELECTRIFIED VEHICLES

To address the demands of today's marketplace, Hanon Systems applies its long history of HVAC design and manufacturing to offer a suite of solutions that satisfy an increasing range of requirements by global automakers to optimize performance, improve fuel efficiency, and deliver the occupant's sense of comfort and cleanliness.

**HVAC Technologies**

Whether it is an HVAC with a space-saving sliding door; hyper circumferential kinematics; defrost/demist distribution or temperature control; or one that incorporates the innovative high-efficiency blower scroll and wheel technology, Hanon Systems offers a suite of HVAC solutions to support the needs of today's automakers across a range of vehicle architectures. Key to enabling Hanon Systems to quickly develop conventional and omnifarious HVAC designs is the application of a standard methodology, which results in solutions that reduce power consumption and interior noise, reduce overall size and weight, and improve airflow and temperature performance.

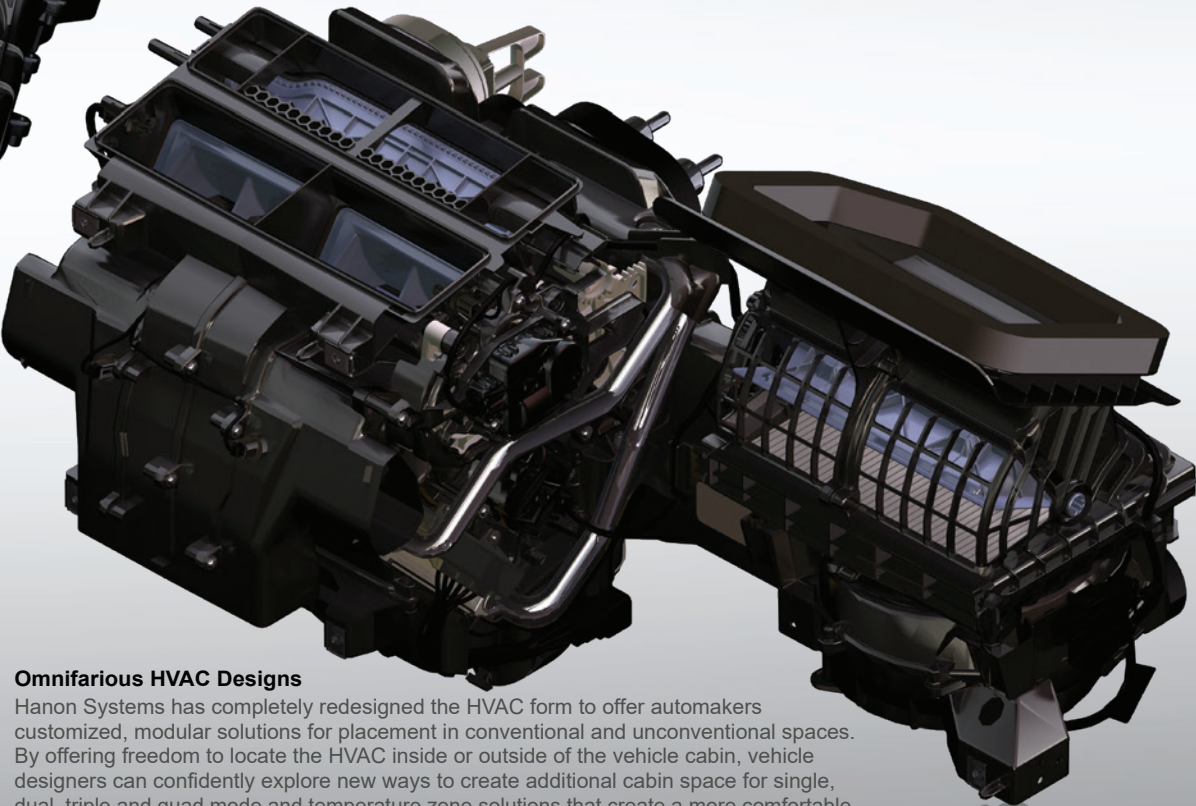
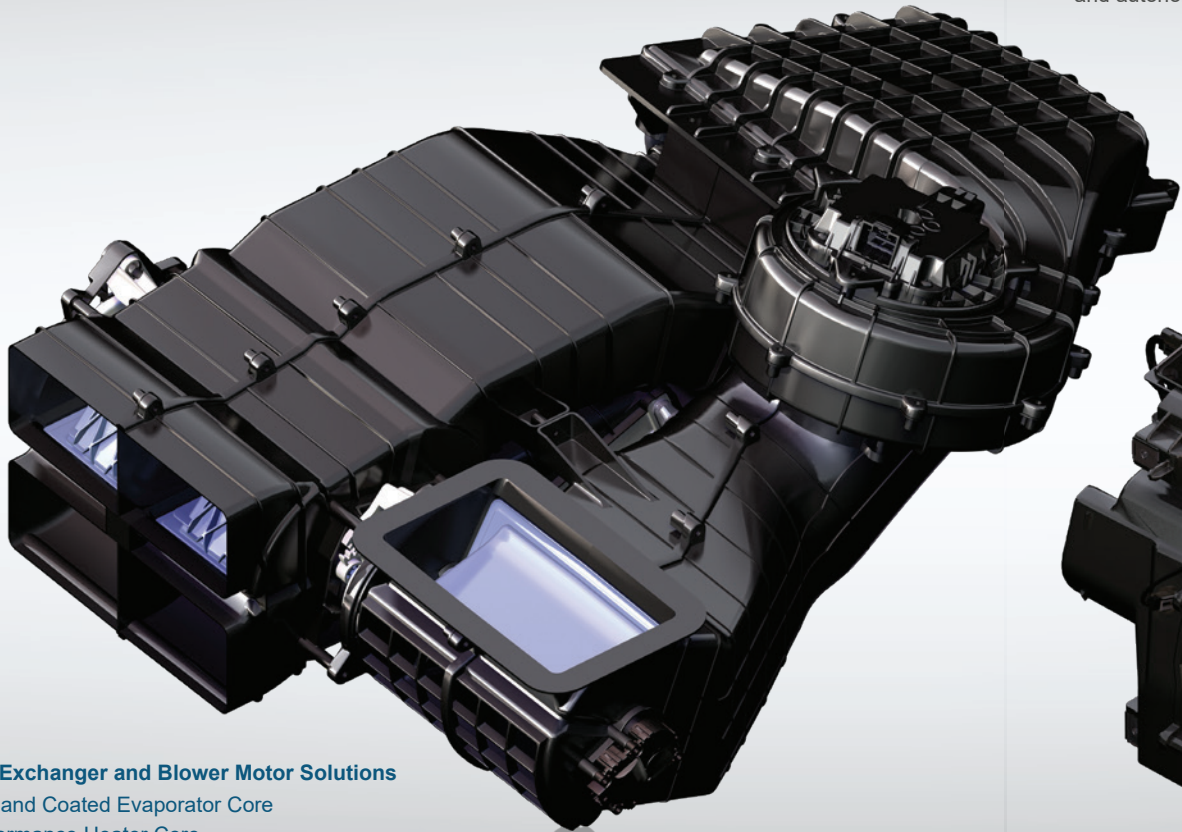
**High-Efficiency Blower Scroll**

Hanon Systems is continuously developing new solutions that bring value to automakers and one example is advancing the science surrounding blower technology. The innovative high-efficiency blower scroll by Hanon Systems is an HVAC technology that improves scroll efficiency and delivers the same airflow with a 13 to 30 percent reduction in power consumption, and a 1 to 3 dB(A) reduction in noise, vibration and harshness (NVH) levels. This patented solution is proven in serial production to deliver equivalent or better performance in a smaller package compared to a larger HVAC, and can be applied to conventional, hybrid, electric and autonomous vehicles.

**Intelligent Air Quality**

With a focus on the well-being of people and creating home-like comfort for vehicle occupants, Hanon Systems extends its reach beyond cabin thermal comfort to include a portfolio of innovations centered on in-vehicle air quality. Combined or integrated separately into the HVAC module, the company's suite of intelligent air quality solutions include:

- The **visible ray (VR) LED photocatalyst** is a patented and award-winning innovation that improves cabin air quality by eliminating 99 percent of odor-causing bacteria from the evaporator and absorbed gases from outside of the vehicle. Easily mounted on the HVAC, the module creates a hydroxyl radical when activated to deodorize and purify the interior air of the vehicle.
- The **CO<sub>2</sub> sensor** monitors the level of carbon dioxide (CO<sub>2</sub>) in the cabin and signals the HVAC to introduce fresh air when levels exceed the threshold.
- The **fragrance system** is installed on the HVAC and allows occupants to select a scent and toggle the system on and off to diffuse aroma into the cabin. The integrated control algorithms enable the system to intermittently open and close to maintain the selected aroma intensity.



**HVAC Module: Heat Exchanger and Blower Motor Solutions**

- Improved Drainage and Coated Evaporator Core
- Optimized Idle Performance Heater Core
- High Voltage Positive Temperature Coefficient (PTC) Heater (low profile single/dual zone)
- Brushless DC or Brushed Blower Motors and Controllers

**Heating, Ventilation and Air Conditioning**

HVAC

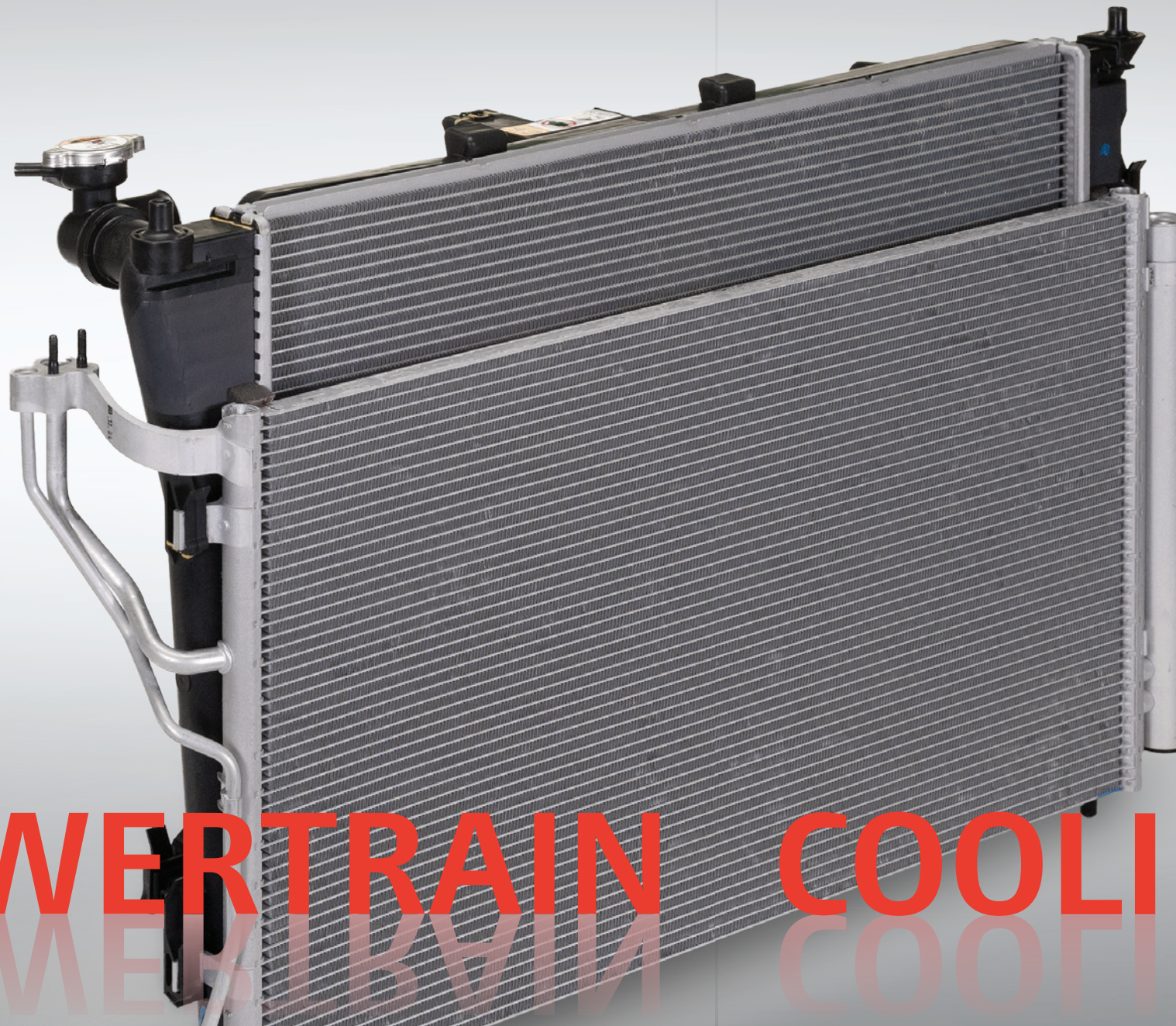
**Omnifarious HVAC Designs**

Hanon Systems has completely redesigned the HVAC form to offer automakers customized, modular solutions for placement in conventional and unconventional spaces. By offering freedom to locate the HVAC inside or outside of the vehicle cabin, vehicle designers can confidently explore new ways to create additional cabin space for single, dual, triple and quad mode and temperature zone solutions that create a more comfortable passenger experience. With omnifarious HVACs that can incorporate its range of innovative technologies, Hanon Systems is well-equipped to provide vehicle manufacturers a variety of solutions for conventional and electrified powertrains.



Vehicle powertrain technology is rapidly increasing in complexity. Hanon Systems is well-equipped to support OEM requirements with exact precision across its broad range of powertrain cooling solutions.

From conventional and turbo-charged internal combustion engines (ICEs) to electrified propulsion, Hanon Systems has the powertrain cooling solutions automakers need to address size, efficiency, weight and fuel economy requirements.



#### Cooling Module

Mounted to the front of the vehicle, the cooling module serves as a single unit that can contain several components including a fan and shroud, radiator, condenser, charge air cooler and transmission oil cooler. The radiator maintains engine operating temperature by using external air to provide cooled coolant to the engine. The condenser uses air cooling to reject heat from the A/C system and reduce the high temperature and pressurized refrigerant it receives from the A/C compressor. The transmission oil cooler uses external air to cool oil to the transmission. When coupled with Hanon Systems' *Automotive News* PACE Award winning wavy blade fan design, the cooling module can maximize airflow and reduce operational noise.

#### Charge Air Coolers

In the case of boosted engines, the air charge air cooler (ACAC) uses external air to cool high temperature charge air, thereby increasing the mass flow to the engine intake generating more horsepower for engine downsizing and efficiency. Water charge air coolers (WCAC) can be applied to enhance the range of charge air temperature control by exchanging heat more efficiently with the coolant supplied from a low temperature radiator in the cooling module. Hanon Systems has extensive experience offering engine-mounted or manifold-inserted WCACs.

#### Transmission Oil Coolers

Hanon Systems offers heat exchangers for transmission oil temperature and viscosity management. To prevent overheating on high duty and/or trailer load applications an air transmission oil cooler (ATOC) uses external air cooling. For a broadened range of temperature and viscosity control, Hanon Systems also offers water transmission oil coolers (WTOC), which provide high efficiency oil-to-coolant heat transfer and operation across a wider range of ambient temperatures to heat or cool to deliver long life to oil and transmissions alike.

# POWERTRAIN COOLING



The compressor is the heart of a vehicle's air conditioning system, which circulates refrigerant at a high temperature and pressure to the condenser. Hanon Systems has decades of experience developing and manufacturing compressors for the automotive industry.

With a portfolio of three distinct types of eco-friendly and highly-efficient compressors – fixed rotary suction, variable displacement and electric scroll – Hanon Systems is uniquely positioned to support nearly any vehicle application.

**Variable Displacement Compressor (HV)**  
Hanon Systems offers a modular family of variable displacement compressors in a wide range of displacements in clutched and clutchless designs. The architecture utilizes a common piston and shaft, as well as a variety of enhanced design features to improve efficiency, durability and noise, vibration and harshness (NVH).

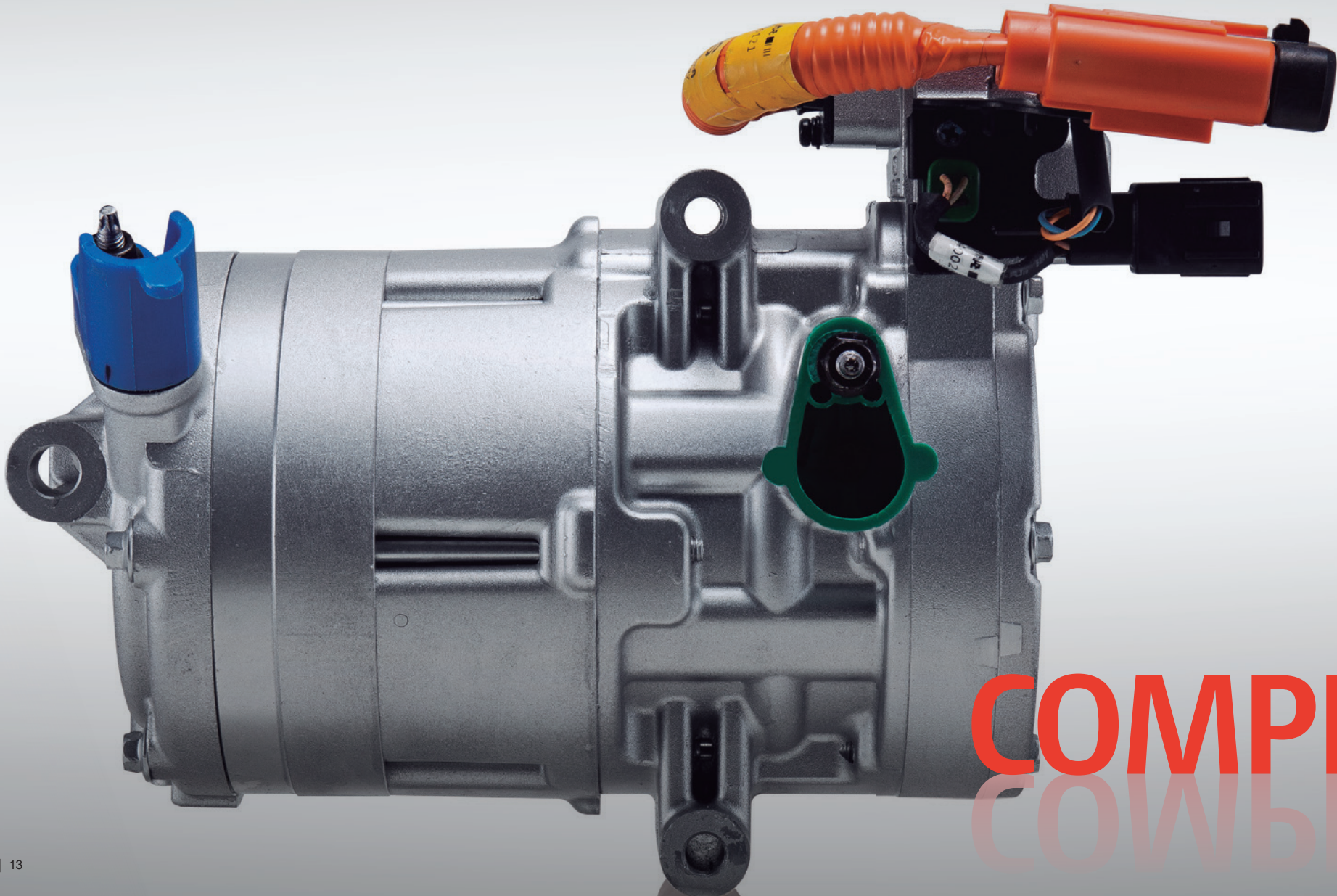
**Electric Compressor (HES)**  
The electric compressor features a durable scroll design controlled by an integrated electric motor and sophisticated electronic inverter. Designed for partial and full hybrid, and battery electric vehicle applications, this compressor provides efficient cooling for conventional, heat pump and multi-loop cooling systems. Operating independently from the powertrain, the compressor enables cabin cooling even when the engine is off.

HV  
COMPRESSOR

HES  
COMPRESSOR

**Fixed Rotary Suction Compressor (HRS)**  
A rotary suction compressor has a fixed displacement swashplate design that draws refrigerant through the center shaft and delivers better fuel economy by creating less suction loss compared to a traditional suction valve. The solution from Hanon Systems is offered in a wide range of displacements and features designed to improve coefficient of performance (COP) and reliability.

HRS  
COMPRESSOR



COMPRESSOR



Hanon Systems is an expert in handling various automotive refrigerants – including CO<sub>2</sub> (R744) – and is global leader in fluid transport solutions. The company offers a complete portfolio of refrigerant lines; coolant (water/glycol) lines; accumulators; accumulators combined with internal heat exchangers for CO<sub>2</sub>; internal heat exchangers (IHX); and associated metal seal fittings.

**Internal Heat Exchanger (IHX)**

This innovative coaxial tube design integrates in the refrigerant circuit for enhanced system performance, cooling capacity and efficiency. The IHX replaces part of the suction and liquid A/C lines to exchange energy in a counter-flow arrangement with a design and architecture that minimizes initial pressure drop and pressure drop deterioration after bending.

**Metal Seal Fitting**

This patented fluid transport fitting stops refrigerant from leaking into the environment at the source. By design, the Hanon Systems metal seal fitting incorporates a metal-to-metal primary seal and a rubber secondary seal that delivers zero (no detectable) leakage, making it more durable than an elastomer O-ring seal. This innovative technology received the prestigious *Automotive News* PACE Award in 2013 for superior innovation in the product category. Using the same concept of a metal seal fitting, Hanon Systems is now in serial production with a fitting developed specifically to withstand the increased operating conditions associated with the environmentally friendly refrigerant in R744 (CO<sub>2</sub>) A/C systems.

# FLUID TRANSPORT



Legislation continues to drive global automakers to reduce emissions and improve fuel economy with the introduction of stringent standards on vehicle manufacturers in order to sell vehicles in certain markets.

Hanon Systems offers a portfolio of thermal and emissions solutions that are specifically designed to help automakers meet these legislative challenges with conventional powertrains, while also supporting the growing need for alternative powertrain solutions.

# ELECTRONICS AND FLUID PRESSURE

### Refrigerant Valves

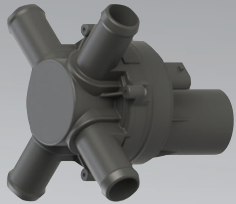
Refrigerant valves are a key component in a climate or heat pump system that enable activation/de-activation of heating and cooling functionality by switching between modes or changing the refrigerant state from a liquid to a gas. Hanon Systems offers a range of electronic shut-off and expansion valves for conventional and electrified vehicles specifically designed to control the pressure, temperature and flow rate in the refrigerant loop. Nominated as a 2017 *Automotive News* PACE Award finalist, Hanon Systems is in production with an expansion and shut-off valve family that combines expansion and switching functionality into a single component – thereby minimizing the need for multiple valves – to supply heat flow in one valve position and cooling in the other. With its patented ball-sealing design, integrated expansion groove and exceptionally tight seal, Hanon Systems valves provide bi-directional full flow functionality and immeasurable pressure drop in both directions. The ball design also consumes less power

compared to other valve types that require constant electric power to hold its position. An integrated stepper motor enables precise adjustment of the ball design for accurate valve positioning and flow control. The optional absolute position sensor offers OBD (on-board diagnostic) functionality that eliminates the need for calibration on vehicle start-up and precise valve control through a LIN 2.x interface protocol.



### Electronic Water Pumps

Electronic water pumps are a key component to supply coolant on-demand for critical thermal management systems. By providing coolant only as required, electronic water pumps reduce fuel consumption, friction loss and emissions. Hanon Systems offers electronic water pumps designed specifically for low emission combustion engines, start/stop technology, and electric and hybrid electric (EV/HEV) and fuel cell vehicles. These pumps support a wide range of next generation thermal management systems where an engine accessory drive belt may not be available, including cooling of batteries, DC/DC converters and power electronics. Pump efficiency plays an important role in the energy management of vehicles, especially with electric and hybrid vehicles. Hanon Systems has developed a range of high efficiency pumps that operate on-demand to minimize energy consumption and, in some cases, can reduce the number of pumps required in a system.



### Electronic Coolant Valves

Multi-port electronic coolant valves route coolant in various loops of the cooling circuit, depending on need. Unlike solenoid valves that consume energy at all times and impact vehicle energy consumption, Hanon Systems offers energy efficient electronic coolant valves that use energy only when changing position. These valves use an innovative cylinder concept that delivers discrete control of coolant and can be designed to fit multiple port configurations and flow control strategies. The cylinder also can be extended to address more complex control solutions, which reduces the number of actuators for further savings in energy consumption. Hanon Systems offers electronic coolant valves designed for naturally aspirated and boosted combustion engines, stop-start technology, electric and hybrid electric (EV/HEV) and fuel cell vehicles. These support a wide range of next generation thermal management systems, including cooling of batteries, DC/DC converters and power electronics. When combined with Hanon Systems' electronic coolant pumps and extensive range of heat exchangers, the company's system capability ensures a fully optimized thermal management solution.



### Cooling Fan with Brushless Direct Current (DC) Motor

The Hanon Systems cooling fan maximizes air flow, reduces operational noise and plays a significant role in enhancing fuel efficiency. When paired with the innovative brushless DC (BLDC) motor, automakers benefit from low power consumption, less weight and lower emissions through a brushless design that eliminates noise, and improves durability and efficiency.



The era of hybrid and electric vehicles is here with automakers concentrating efforts to introduce new electrified and eco-friendly vehicles. Equipped with high performance and high efficiency parts, these new energy vehicles incorporate more electrical and electronic componentry than ever before, making the vehicle thermal management strategy an important aspect in the design process. Hanon Systems is well-positioned with a suite of thermal and energy management solutions for electrified vehicles that can maintain the optimal operating temperatures of this componentry, and also deliver comfort, improve cabin air quality and enhance powertrain efficiency.

**Heat Pump System**

The heat pump system is an efficient heating solution to electric heaters that offers the benefit of cooling and heating in a single solution, increasing driving range in battery electric vehicles. By design, it draws heat from ambient air and repurposes waste heat from the vehicle's electronics, motor and inverter to serve as an additional heat source in cold conditions. It also incorporates a positive temperature coefficient (PTC) heater that supports the heating system, which helps to boost heating performance in extreme cold conditions.

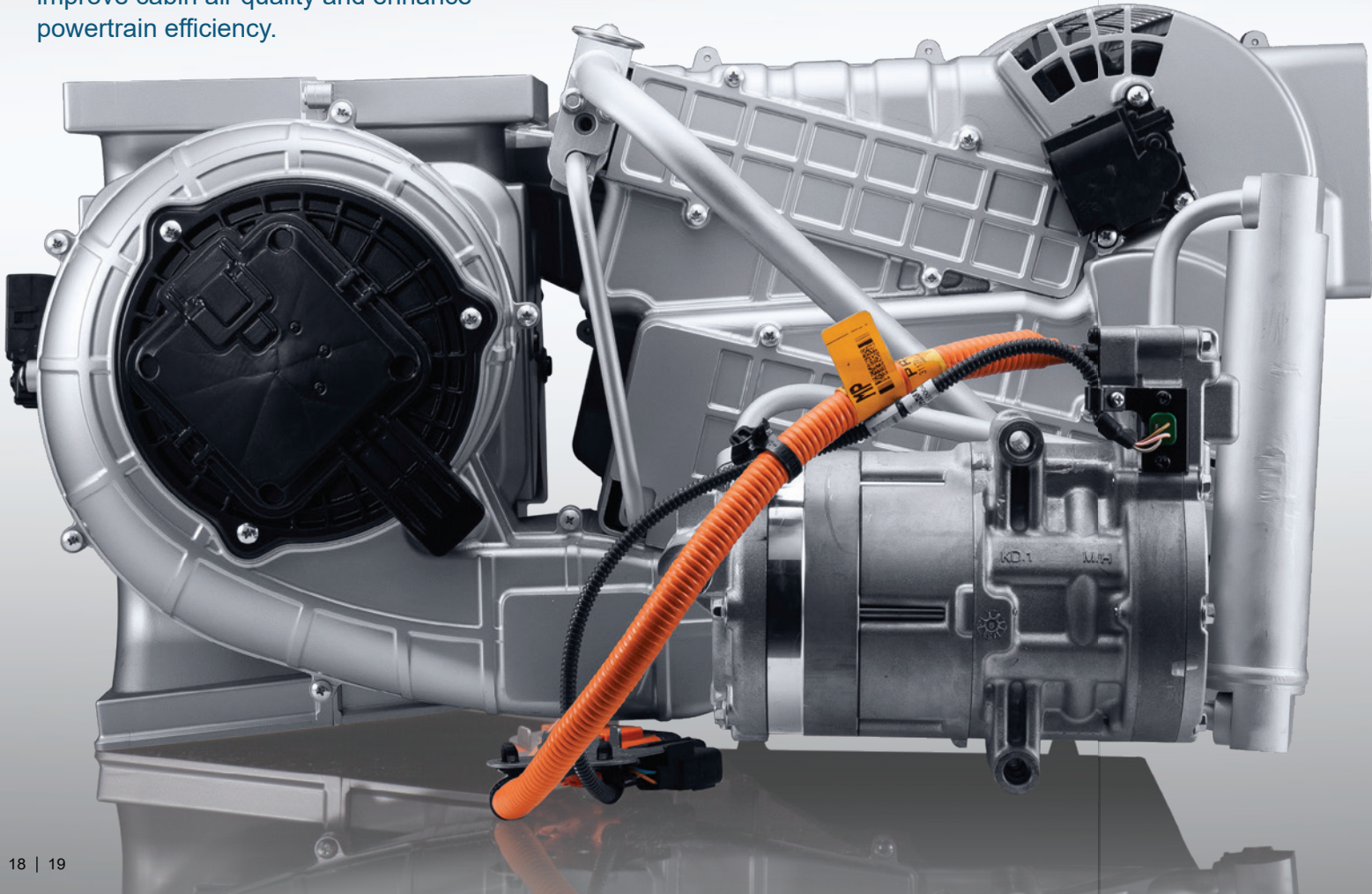
**HV iCOOL™**

HV iCOOL™ is a revolutionary concept that combines three separate air conditioning components – HVAC, compressor and condenser – into a single module. This self-contained unit can be moved anywhere in the vehicle, including under the seats or in the engine compartment. The result is an HVAC-free cockpit that enables ultimate styling freedom and an improved cabin comfort experience for vehicle occupants.

**Battery Thermal Management**

Hanon Systems is at the forefront delivering solutions to meet battery thermal management requirements. Contact heat exchangers conduct heat away from battery cells with coolant or refrigerant, for precise temperature control in electric and hybrid vehicles. These devices are designed specifically for lithium-ion batteries, and can improve battery output and prevent premature aging. A battery chiller is required when a

coolant-based battery thermal management system is used. This compact plate-to-plate heat exchanger transfers heat from the coolant to the refrigerant to provide adequate cooling during steady-state operation and battery fast-charging mode. Hanon Systems also provides heat exchanger solutions for sensors, electronics, power inverters and other heat management tasks using plate or tube-type contact heat exchangers.



# HYBRID AND ELECTRIC VEHICLE THERMAL SOLUTIONS

A fuel cell vehicle, which uses hydrogen as its fuel and emits no exhaust gas, is noted as an ideal car to satisfy the requirements of the global environment. Hanon Systems is in production with advanced solutions to support this next generation vehicle architecture.

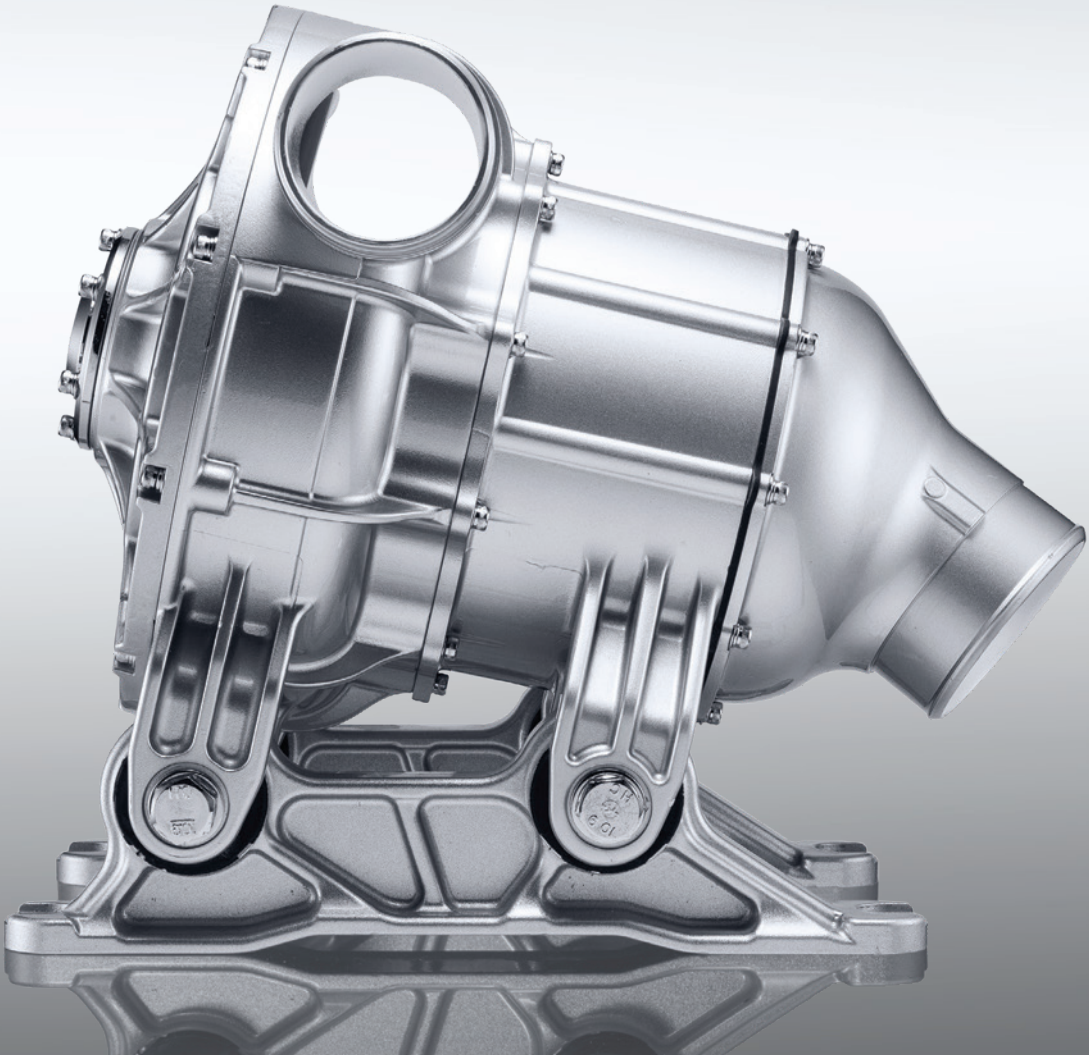
# FUEL CELL VEHICLE TECHNOLOGIES

## High Voltage Cooling Fan Motor

The high voltage cooling fan motor incorporates a brushless DC motor to offer high efficiency and reliability in fuel cell electric vehicle applications. Its high speed, high power and lightweight design received a New Excellent Technology (NET) Award from the Korean Ministry of Trade, Industry and Energy in 2012, and is the world's first in automotive to enable quietness and high efficiency by combining a motor and an inverter, resulting in low power consumption.

## Centrifugal Air Compressor

Hanon Systems has developed an innovative solution for fuel cell electric vehicles that provides clean pressurized air to the fuel cell stack to generate power to propel and operate the vehicle. The centrifugal air compressor features a high-speed brushless DC motor with a patented, oil-free ball bearing design. This technology is equipped on the first mass-produced hydrogen fuel cell electric vehicle and was named a finalist for the *Automotive News* PACE Award in the product innovation category in 2014 and 2016.





# GLOBAL NETWORK

- Innovation Centers
- Manufacturing and Engineering Sites  
Includes non-consolidated joint ventures

Hanon Systems has a strong, competitive global footprint with resources in 21 countries around the world and manufacturing operations located in close proximity to the customer



**EUROPE**

- Bulgaria Plovdiv
- Czech Republic Hluk, Kladno, Nový Jičín
- France Charleville
- Germany Bad Homburg, Kerpen
- Hungary Pécs, Retság, Székesfehérvár
- Italy Benevento, Campiglione
- Netherlands Heerlen
- Portugal Palmela
- Slovakia Ilava
- Türkiye Dilovasi
- United Kingdom Birmingham

**INDIA**

- Bhiwadi
- Chennai
- Pune
- THAILAND**
- Rayong
- SOUTH AFRICA**
- Port Elizabeth

**CHINA**

- Beijing (2)
- Changchun (2)
- Changzhou
- Chengdu
- Chongqing
- Dalian
- Foshan
- Hubei
- Nanchang
- Nanjing
- Shanghai
- Yancheng

**KOREA**

- Asan
- Daejeon
- Gyeongju
- Pyeongtaek
- Seoul
- Ulsan

**JAPAN**

- Hiroshima
- Higashi, Hiroshima
- Hofu, Yamaguchi

Hanon Systems operates in a highly-competitive industry where technological competitiveness and speed are critical. With technology centers brimming with engineering know-how, positioned in key markets that are supported by a host of engineering centers, Hanon Systems is well-positioned with the expertise, capabilities and local acumen to address the various needs of automakers where they operate.



**AMERICAS**

- United States
- Carey, Ohio
- Loudon, Tennessee
- Novi, Michigan
- Shorter, Alabama
- Statesboro, Georgia
- Canada Belleville, Concord
- Brazil Atibaia
- Mexico Juarez (3)
- Monterrey (2)
- Querétaro
- Salamanca



# RELIABILITY AND EVALUATION

At Hanon Systems, reliability and evaluation (R&E) is an integral and vital part of the product development process, which consists of computer-aided design (CAD), computer-aided engineering (CAE), and component, subsystem and vehicle-level testing. Working in collaboration, R&E provides optimal designs with the highest level of robustness and quality.

Hanon Systems is equipped with highly credible design, simulation and test systems to increase the success rate of test verification, reduce development time and build customer trust. Experts with top-class product development and production knowledge conduct optimized design, data interpretation and verification from the initial design stage through production.

## Computer-Aided Design (CAD)

Hanon Systems employs a qualified staff with world-class development and manufacturing knowledge in all product segments. Customized knowledge-based CAD, combined with integrated manufacturing rules, allow the design staff to repurpose proven results with an emphasis on manufacturing capability, weight, quality, and fit and function.

## Computer-Aided Engineering (CAE)

Hanon Systems is one of only a few automotive suppliers with the global breadth and depth that can deliver comprehensive system and component level analysis across all its product lines. Through high performance computational fluid dynamics (CFD) tools and expertise, Hanon Systems offers expertise and tools to support customers and product development for early feasibility analysis, quotation and new model design, and research related to new product development.

## Test Capabilities

Global test capabilities are one of many engineering tools at Hanon Systems to support the company's development of innovative eco-friendly and efficient solutions that deliver comfort. As an integral part of the product development process, the company has component and system-level test facilities around the world in locations near its customers. In-house test operations include a full range of environmental, vibration and durability test equipment for advanced development, and design and manufacturing validation.

### RELIABILITY AND EVALUATION





# SUSTAINABLE VALUE CREATOR

Hanon Systems is committed to creating long-term sustainable value and driving positive change that has relevance to people, customers, environment and the communities where the company operates. This commitment is what fuels the culture to conduct business for the benefit of all its stakeholders. Hanon Systems takes great pride in developing thermal and energy management solutions for automakers that support electrified and conventional vehicles. At the same time, the company pledges to maintain outstanding professional, operational and environmental standards; understand and incorporate stakeholder interests into areas of corporate strategy; and build a positive and sustainable future that will lead to a better tomorrow for future generations.

## Ethical Management

Demonstrating a highest degree of ethical integrity is a top priority at Hanon Systems and the company strives to maintain a corporate culture based on firm ethical principles and compliance with all applicable laws, rules and obligations. There is commitment to build and maintain a bond of trust with customers and stakeholders through transparent sharing of relevant information, to follow fair business practices, to offer fair and equal opportunities to employees, and to undertake social responsibilities and obligations.

## Marketplace

Hanon Systems is focused on being a respected and preferred supplier of thermal and energy management automotive solutions, and to operating as a good corporate citizen. By acting in an ethical and responsible manner, the company is steadfast in its responsibility to build long-term, sustainable relationships with all its stakeholders. The company also commits to developing and delivering high-quality solutions that brings value to consumers, enhances customer brands and brings a positive impact to the world.

## Workplace

Hanon Systems sees value in nurturing a culture that embraces diversity in skill sets, experiences and thought leadership. The company strives to be an employer of choice, and to attract and retain the best talent by promoting an inclusive working environment that embodies challenging assignments, safe and fair labor practices, and is based on mutual trust and respect. From an industry leading safety record to programs around the globe that encourage healthier lifestyles, Hanon Systems aims to provide the very best conditions for its employees.

## Environment

A focus on the environment – across all aspects of the business – is the catalyst to creating a better world for future generations. This basic premise is at the heart of the company's environmental management principles, which is realized through the individual talent and personal conviction of employees. The company asserts it will continue efforts to act in an environmentally friendly manner and participate in activities to preserve nature. At the same time, the company will comply with and work to exceed the minimum level of requirements where any laws, regulations, customer requirements or other compliance obligations exist concerning environmental matters.

## Community

Hanon Systems commits to delivering thermal energy and management solutions that bring comfort and well-being to consumers. As a corporate citizen, the company also commits to activities that can positively impact the welfare of local communities. By interacting with a broad range of stakeholders, the company strives to actively listen to, learn about, and understand key issues within and beyond the company's scope to build a better tomorrow.



# PRODUCT PORTFOLIO

Heating, Ventilation and Air Conditioning (HVAC)	Modules	Single, Dual, Triple and Quad Zone HVAC Modular HVAC Omnifarious HVAC
	Interior Comfort	High-Efficiency Blower Scroll Improved Drainage and Coating Evaporator Core Optimized Idle Performance Heater Core High Voltage Single and Dual Zone Positive Temperature Coefficient (PTC) Heater Brushless DC or Brushed Blower Motor and Controller
	Intelligent Air Quality	VR (visible ray) and UV (ultraviolet) LED Photocatalyst Vehicle Carbon Dioxide (CO <sub>2</sub> ) Sensing Solution Fragrance System
Powertrain Cooling	Solutions	Cooling Module Front End Module (FEM)
	Components	Radiator Low-Temperature Radiator Air-Cooled Condenser Water-Cooled Condenser Conventional Blade Fan and Motor Assembly Wave Blade Fan and Motor Assembly Air Charge Air Cooler Water-Cooled Charge Air Cooler Air-Cooled Transmission Oil Cooler Water-Cooled Transmission Oil Cooler
Compressor	Solutions	Variable Displacement (HV) Electric (HES) Fixed Rotary Suction (HRS)
Fluid Transport	Solutions	Underhood and Underbody Lines
	Components	Refrigerant Line Hose and Pipe Metal Seal Fitting Tube-in-Tube Internal Heat Exchanger (IHX) Receiver Drier Accumulator
Electronics and Fluid Pressure	Electronic Cooling Fan	with Brushless Direct Current (DC) Motor
	Electronic Water Pump	Primary and Auxiliary
	Electronic Coolant Valve	Multi-port
	Refrigerant Valve	Electronic Shut-Off Electronic Expansion Electronic Shut-Off and Expansion for R134a, R1234yf and R744 (CO <sub>2</sub> )
	Transmission Oil Pump	Electronic and mechanical
Thermal and Energy Management	Hybrid and Electric Vehicle Thermal Solutions	Battery Chiller Battery Contact Heat Exchanger (Cold Plate) Electric Compressor (HES) Heat Pump System
	Fuel Cell Vehicle Technologies	Cooling Module with Brushless DC Fan High Voltage Positive Temperature Coefficient (PTC) Heater Centrifugal Air Compressor

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