VHP® SERIES FIVE

THE RIGHT ENGINE.

THE RIGHT TIME.

Offers superior power in even the toughest, most remote environments. Ideal for gas compression and power generation

KRAFTPOWER
The power of performance

Waukesha

RUN STRONGER, RUN CLEANER – WITH THE WAUKESHA VHP® SERIES FIVE ENGINE

As energy demands grow, emission regulations tighten. But one engine with over 50 years of proven experience behind it, will meet both challenges.

Timing is everything. With government regulations looming, power requirements changing, and maintenance schedules shifting, there has never been a better time to switch or upgrade to a VHP Series Five Engine.

INNIO's Waukesha VHP Series Five engines combine the most advanced technology available with the history and experience of the VHP platform, resulting in a family of engines with more power, better fuel flexibility, lower fuel consumption and lifecycle costs, and longer service intervals.

Performance Reliability in the Harshest Environments

Fuel Flexibility, a Wide Fuel Tolerance, and High Elevation Performance Before Derate.

Factory-direct technical support readily available and parts commonality across the VHP product series

Designed to run on nearly any fuel from field gas and propane to commercial quality natural gas without pre-treatment

Performs in extreme heat or altitude with 120°F ambient capability before derate

Powerful engine up to 2500 BHP /1,864 kWb

Delivering 90% lower CH4 and VOC emissions and 10-20% lower CO2e than any other engine in its category

Extending Maintenance Lifecycles while Lowering Operating Costs

Despite its increased power, the VHP Series Five has a reduced cost per operating hour than previous versions. In addition, enhanced components extend maintenance intervals, meaning fewer service visits to the engine.

10% lower fuel consumption*

Up to 22% lower operating costs*

30% longer service intervals and reduced lifecycle costs*

*When comparing VHP Series Five to VHP Series Four

WORKING BETTER TOGETHER

The family of VHP Series Five engines work better together. There is commonality of parts, training, and service intervals across all 6- to 16-cylinder engines, helping simplify operations and control costs

COMMONALITY OF PARTS

Includes piston, ring liner, cylinder heads, rods, bearings and more.

TRAINING COMPATIBILITY

Service techs trained on 12- and 16-cylinder Series Fives Waukesha engines can transfer this knowledge without any additional training to the 6-cylinder model.

INCREASED SERVICEABILITY

With multiple configurations of Series Five engines on site, service intervals align for ease of scheduling and increased efficiency.

COMPRESSOR MATCH

Matched to industry standard compressors.

emPact Catalyst

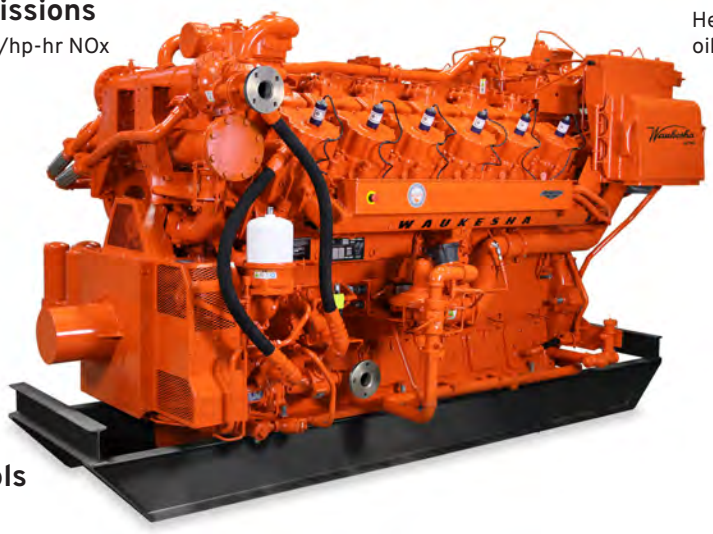
Factory Supplied. Durable and easy maintenance design. Replaceable catalyst elements

Emissions

0.15 g/hp-hr NOx

Air Filters

Heavy duty design suitable for oil field outdoor environments



Spark Plugs

4,000 hours service intervals with non-precious metal plugs

Cylinder Heads

- Enhanced design/improved cooling
- Extended life and improved reliability

Lube Oil Filters

4,000 hours service intervals (with oil analysis)

Piston/Rings

- 4,000 hours oil change intervals
- Improved low-load oil consumption
- Improved fuel flexibility

ESM® 2/ AFR2 Controls

Integrated control system, superior performance and improved diagnostics

Oilfield Pony Skid*

4-point lifting, 3-point mounting

* For gensets only

Breather

Advanced closed crankcase breather system removes fugitive methane emissions

ENHANCING PERFORMANCE

LOWER EMISSIONS AND IMPROVED FLEXIBILITY

When designing the VHP Series Five, INNIO's Waukesha used feedback from customers along with the success of previous models to drive innovation forward. Although Series Five engines are capable of higher power levels than previous versions, the stresses on components have not increased. This is made possible by enhanced designs and advanced technology.

Miller Cycle Combustion

Miller Cycle combustion modifies valve timing to shift work from the piston to the turbocharger. It also reduces temperatures at the end of the compression stroke. Miller Cycle combines the benefits of higher compression ratio pistons—improved power and reduced fuel consumption—with the improved fuel flexibility typically seen with lower compression ratio pistons. The Miller Cycle requires more boost than a traditional rich-burn engine. A new turbocharger match was used on the Series Five to provide that boost. Series Five turbochargers have a 30,000-hour lifetime and are built with higher material specifications than previous models for better reliability.

Modified Cylinder Heads

VHP Series Five cylinder heads may look similar to previous versions, but modified internal passages improve heat transfer and reduce temperatures within the head, resulting in up to a 5% decrease in exhaust valve temperature when comparing Series Five to Series Four.

Enhanced Piston Design

Series Five uses a piston design that decreases crevice volume. The result is:

- 100° F temperature reduction in the critical area
- Reduced carbon deposits for increased robustness, durability, and oil life
- Reduced fuel slip for improved efficiency and lower hydrocarbon emissions
- Improved fuel flexibility

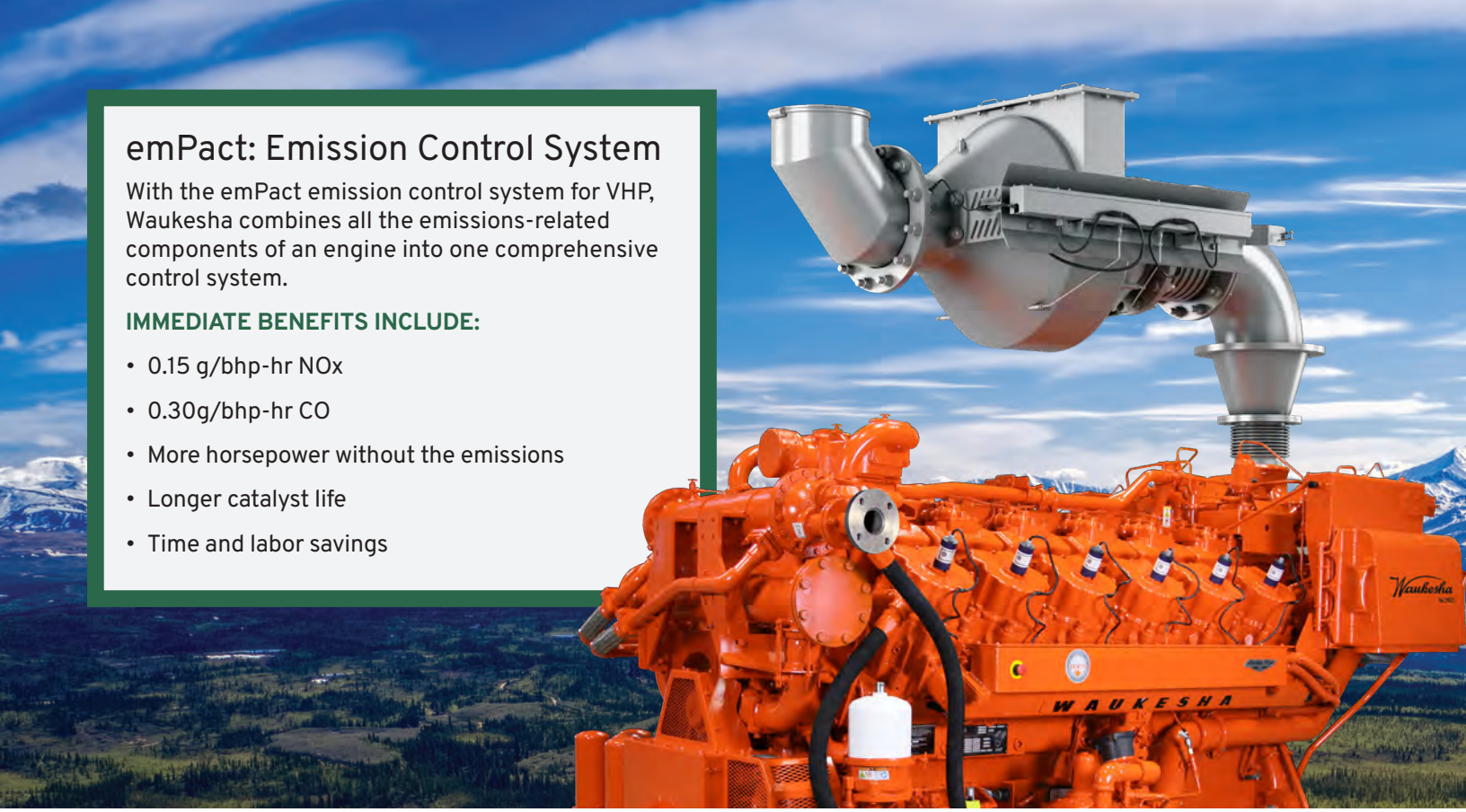
A VHP Series Five piston after field validation illustrates reduced carbon deposits

emPact: Emission Control System

With the emPact emission control system for VHP, Waukesha combines all the emissions-related components of an engine into one comprehensive control system.

IMMEDIATE BENEFITS INCLUDE:

- 0.15 g/bhp-hr NOx
- 0.30g/bhp-hr CO
- More horsepower without the emissions
- Longer catalyst life
- Time and labor savings



reUp®

Upgrade and Experience the VHP Series Five Difference

Now is the time to upgrade to a Series Five. Waukesha Engine's reUp® Remanufacturing program offers complete engines, short and long blocks, and parts. The core exchange program allows customers to return core Series Two and Series Four engines for like new Five engines. The engines are disassembled, cleaned, and inspected using state-of-the-art technology and are backed by Waukesha's rigorous testing and best-in-class warranty.

reUp Engine Performance Expectations

- Zero hour overhaul
- Production-spec upgrades
- Same warranty as new engine
- Reduced downtime
- Lower environmental impact

THE NEXT-GENERATION CONTROLLER FOR WAUKESHA ENGINES

The VHP Series Five is equipped with ESM® 2/AFR2 Controls

A large, full-color touch screen display panel allows users to see all engine parameters, trend data, view manuals, and walk through troubleshooting steps, eliminating the need for a laptop computer. By directly reading exhaust and main bearing temperatures, as well as an oil pressure permissive for starting, your investment is protected more than ever. For those with VHP Series Two or Series Four engines, upgrade to integrate ESM 2/AFR2 to existing engines.

Digital Product Portfolio: Upgrades for Advanced Monitoring

SkidIQ and myPlant are both cloud-based digital solutions designed to help operators improve reliability and uptime. Connecting with your fleet just became easier with real-time asset health monitoring along with the ability to automate fleet wide reporting to drive deeper business intelligence insights.

SKID IQ

Real-time engine and compressor monitoring

Overview: Combines INNIO's Waukesha engine analytics with partner Detechtion Technologies' real-time compressor monitoring and optimization technology.

Application: Gas Compression

myPlant

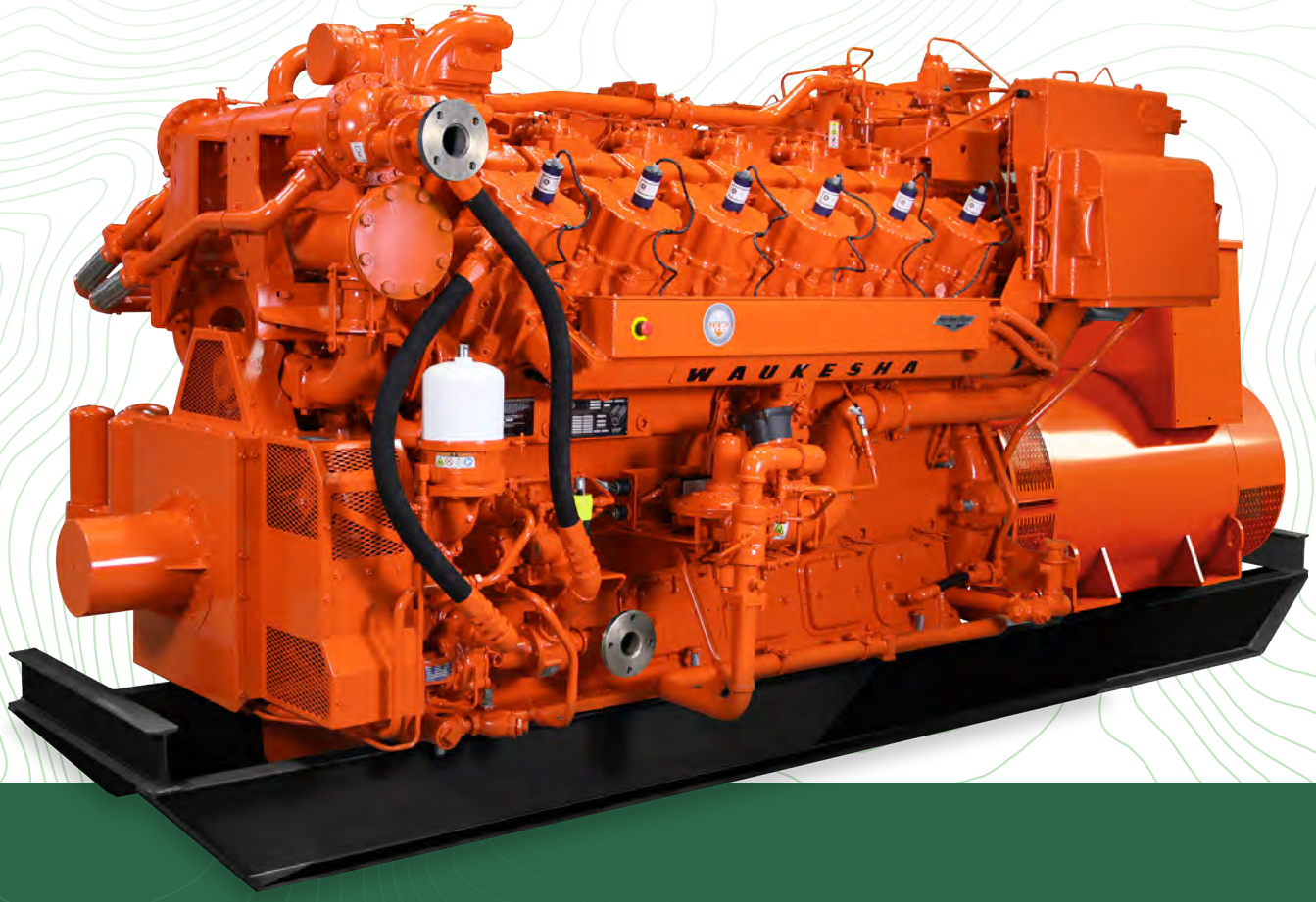
Engine analytics and insights at your fingertips

Overview: INNIO's Waukesha myPlant Asset Performance Management (APM) solution provides real-time monitoring and preventative analytics for engines.

Application: Power Generation

VHP Series Five Performance Data

	F3524GSI S5	L7042GSI S5	L7044GSI S5	P9394GSI S5
Power @ RPM	740-950 hp @ 1,200 rpm	1,500 hp @ 1,200 rpm	1,900 hp @ 1,200 rpm	2,500 hp @ 1,200 rpm
BSFC (Btu/bhp-hr; -0/+5% LHV)	7,156	7,209	7,063	6,972
Altitude Capability Before Derate	4,800 ft @ 100° F 4,000 ft @ 120° F	4,800 ft @ 100° F 4,000 ft @ 120° F	5,000 ft @ 100° F 4,200 ft @ 120° F	4,000 ft @ 120° F
Ambient Capability Before Derate	120° F	120° F	120° F	120° F
Fuel Derate Begins	No Fuel Derate at 740 hp	No Fuel Derate	55 WKI (~1,250 Btu/ft³ LHV)	58 WKI (~1,225 Btu/ft³ LHV)
Power @ 35 WKI (2,350 Btu/ft³ LHV)	740 hp	1,500 hp	1,600 hp	2,135 hp
Oil change/spark plugs	4,000 hours			
Top end overhaul	24,000 hours			
Major overhaul	48,000 hours			



WAUKESHA ENGINE

LEADING THE ENERGY TRANSITION WITH RELIABLE SOLUTIONS

INNIO's Waukesha engines are at the forefront of the energy transition, providing reliable and compliant energy solutions for distributed gas compression and power generation applications. The brand's rich and lean-burn engines, ranging from 400 hp to 5,000 hp, set an industry standard for low emissions, high reliability, and fuel flexibility.

Waukesha products are continuously upgraded to help operators stay emission-compliant without sacrificing operational excellence. These upgrades include new and remanufactured engines and parts, as well as conversion and modification kits, all of which are backed by OEM warranty and more than 115 years of engine expertise. Additionally, Waukesha's digital solutions include a collaborative solution with Detechtion Technologies for gas compression applications and INNIO's myPlant platform for power generation applications. Both solutions provide customers with enhanced monitoring and optimization capabilities, resulting in improved performance and reduced downtime.

We connect locally with our customers to enable a rapid response to their service needs, providing enhanced support through our broad network of distributors and solution providers with parts, services, and digital offerings.

Waukesha engines are engineered in Waukesha, Wisconsin, U.S., and manufactured in Welland, Ontario, Canada. To learn more about the company's products and services, please visit INNIO's Waukesha website at www.innio.com.

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Waukesha