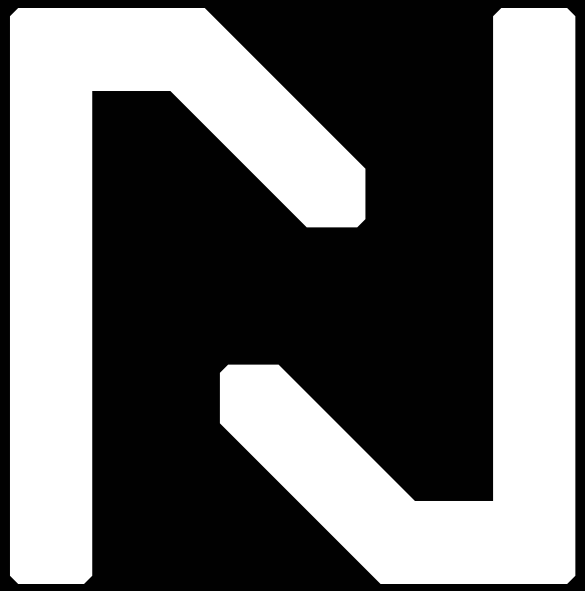
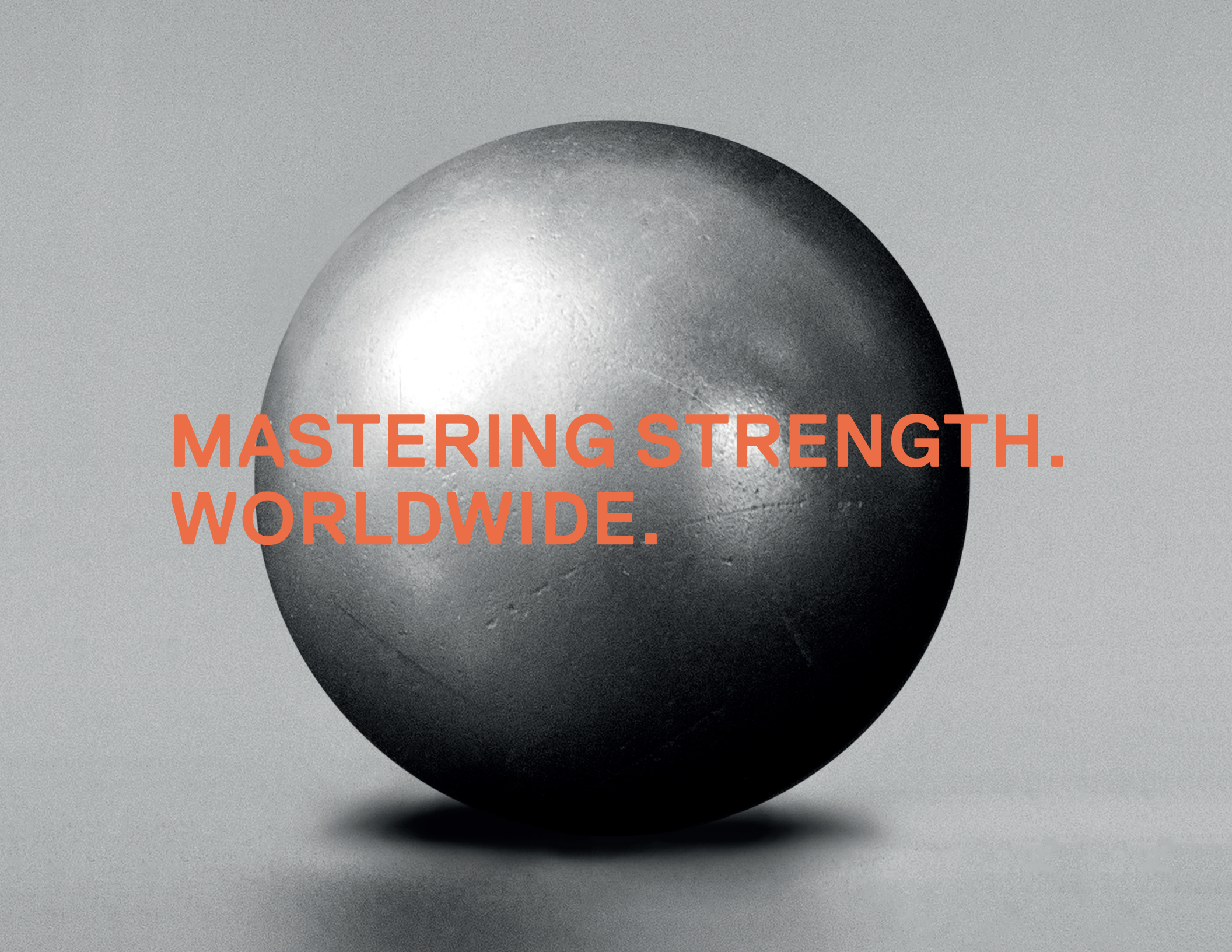


TURNKEY VACUUM
SYSTEMS


MASTERING STRENGTH.
WORLDWIDE.

A WORD FROM

THE PRESIDENT OF GLOBAL NITREX TURNKEY SYSTEMS

NITREX embodies the company I've long aspired to lead. From my early work in nitriding science to my career in vacuum and hydrogen retort furnaces, my journey closely aligns with NITREX's vision as a global leader in technology and processing expertise. Today, it is my honor to head the furnaces and equipment division.

At NITREX, our commitment to innovation and heat treating sciences allows us to meet the evolving needs of manufacturers. Our many processing experts assist customers in selecting the appropriate cutting-edge heat treating technologies and solutions that optimize performance while meeting the latest needs in quality, productivity, safety, and environmental responsibility.

My team of experts and I stand by you from the initial contact to the post-installation stages and process confirmation, fostering a deeper partnership built on trust and innovation. We ensure your satisfaction, sustained growth, and business development. Our dedication to your journey is absolute—your success is our personal investment.

Please contact us today and let us assist you in your journey to better heat processing.

MARK HEMSATH

President of Global NITREX Turnkey Systems / mark.hemsath@nitrex.com

NITREX

TURNKEY VACUUM SYSTEMS

FOR AN OPTIMAL RETURN ON INVESTMENT

WHAT IS A VACUUM TURNKEY SYSTEM?

A NITREX turnkey system is much more than a standard vacuum furnace with controls. It's a comprehensive solution that starts with a client and an application requirement analysis, and continues with equipment proposal and design, manufacturing, testing, installation, startup, training, plant integration, and life cycle services for a complete turnkey system.

THIS PLATFORM SOLUTION DELIVERS SUPERIOR QUALITY AND RELIABILITY YEAR AFTER YEAR, WHILE OPTIMIZING PERFORMANCE AND COST EFFICIENCY, AND GUARANTEEING AN OPTIMAL RETURN ON INVESTMENT.

NITREX

MAKING AN IMPACT IN EVERY INDUSTRY

SOLUTIONS FOR ALL TYPES OF BUSINESSES

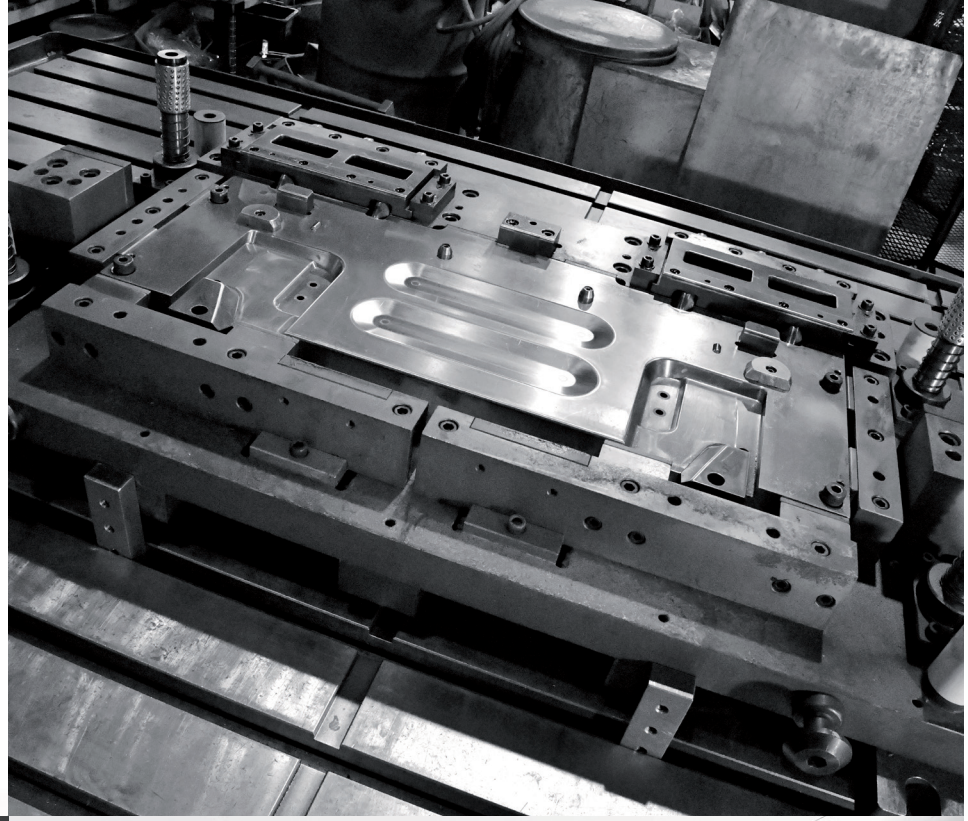
NITREX serves customers in a wide range of industries, all with unique needs and requirements. And in this fast-changing world that demands durability, sustainability, quality, and cost efficiency, more and more industries and companies are viewing vacuum heat treating as business critical.

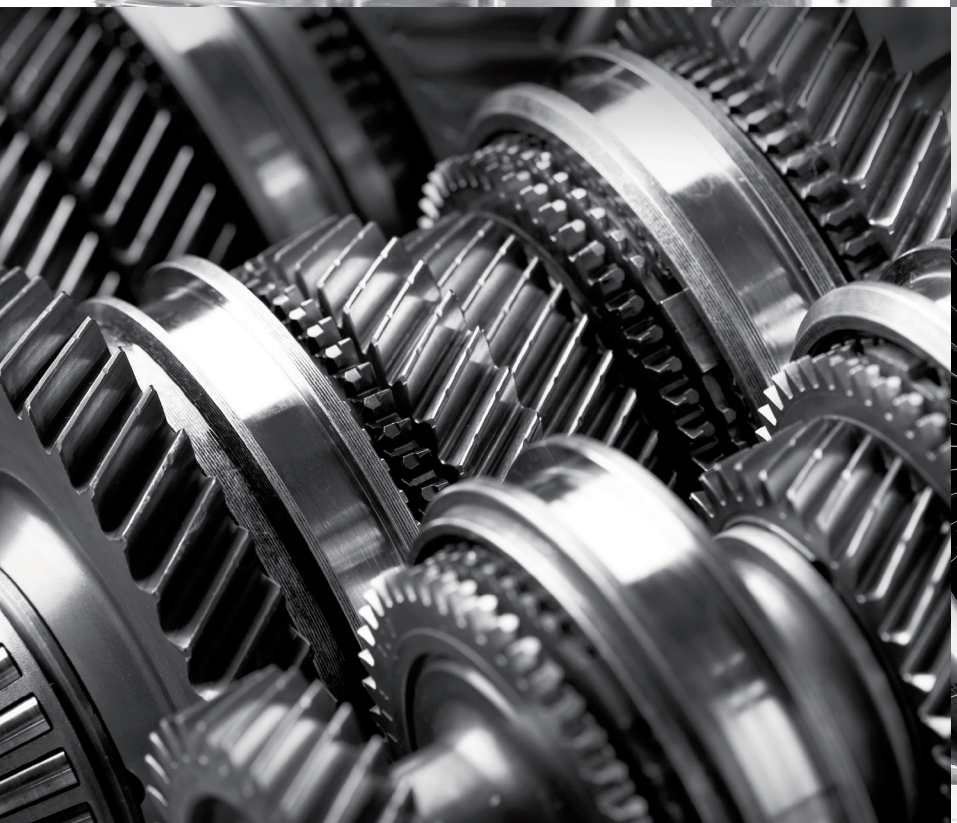
MARKETS WE SERVE

- Additive manufacturing
- Aerospace
- Automotive
- Defense & armament
- Medical
- Mining
- Oil & gas
- Tooling

TYPICAL APPLICATIONS

- 3D printed parts
- Aircraft components
- Axles
- Dies
- Engine components
- Fasteners
- Fuel injectors
- Gears
- Implants
- Industrial tools
- Landing gears
- MIM parts
- Piping
- Pumps
- Shafts
- Surgical tools
- Valve train components





NITREX

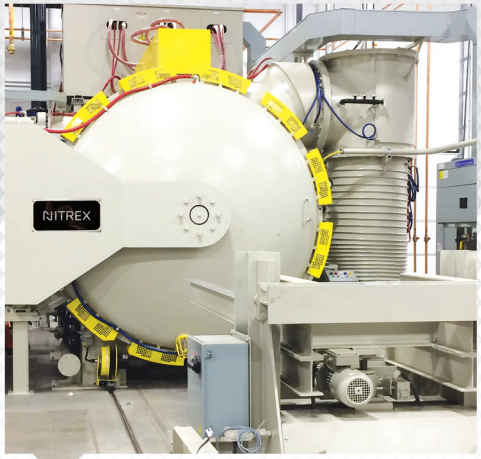
VACUUM
BROCHURE

Making an
Impact in
Every Industry

MEET OUR LINEUP

HVF SERIES / HORIZONTAL

The HVF series is the most reliable and widely used vacuum furnace for horizontal front-loading applications. It's perfect for hardening, annealing, tempering, brazing and sintering processes, as well as for MIM and 3D printing applications.



QUANTUMQUENCH®

Based on the HVF design platform, the QuantumQuench® offers directional cooling with controlled flow rates to deliver targeted cooling where it is needed most, achieving superior distortion control and unparalleled metallurgical results.

3Q™ SERIES / QUICK QUENCH

The 3Q™ series is a horizontal single-chamber vacuum furnace with a moving hot zone that encompasses a load during heating and automatically retracts during cooling for a faster quench rate – 2.5 times faster than a stationary hot zone.

VVF SERIES / VERTICAL

The VVF series is a bottom-loading vacuum furnace ideal for heat treating larger and taller workpieces as well as high-stacked loads. The modified hot zone design assures even gas distribution for optimal cooling.

SAR/VPA SERIES

Technically a coating furnace, the SAR/VPA series with vapor phase aluminide technology is super important to aerospace manufacturers looking to enhance the performance and service life of turbine blades and vanes.

HVF SERIES / HORIZONTAL VACUUM FURNACE

PERFECT FOR HARDENING, ANNEALING, TEMPERING, BRAZING AND SINTERING PROCESSES

The HVF series is the most reliable and widely used vacuum furnace for horizontal front-loading applications. Available as an internal or external quench, this furnace is exceptionally robust and energy-efficient, ensuring longevity and maximum performance. The hot zones of the HVF series deliver class-leading durability and value.

For metal injection molding (MIM) and 3D printing applications, the HVF is fitted with a special hardware package, consisting of heated /cooled maintenance-friendly binder/wax traps and a custom hot zone. This allows debinding and sintering to be executed in one uninterrupted cycle, shortening the process time and delivering superior and consistent part quality.

FEATURES

- Available in an all metal or graphite construction
- Patented free-floating heating element support system that reduces stress on heating elements and the potential for grounding and arcing
- Heating elements available in curved graphite or ribbed molybdenum for rapid heating and cooling
- "Screw-in" Venturi gas distribution nozzles for uniform cooling and ease of maintenance
- Large water jacket construction for exceptional cooling capabilities
- Power feed-through assemblies with high efficiency water cooling
- External/internal cooling system available

See pages 22-23 for furnace models and specifications.


NITREX
NITREX

QUANTUMQUENCH® / VACUUM FURNACE

FLEXIBLE COOLING OPTIONS FOR THE BEST METALLURGICAL RESULTS

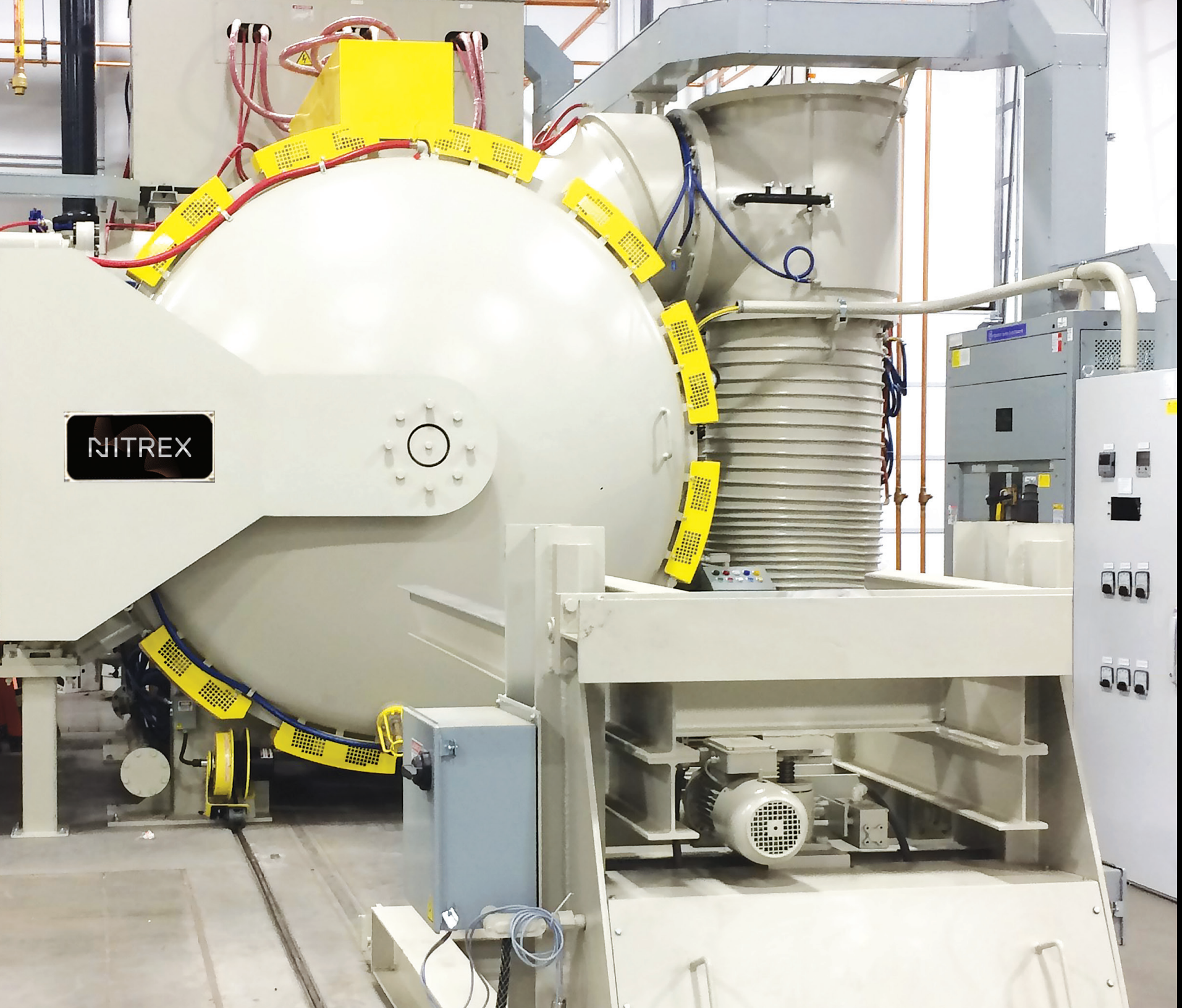
Based on the HVF design platform, the QuantumQuench® vacuum furnace offers directional cooling with controlled flow rates to deliver targeted cooling where it is needed most.

The four-quadrant design of the furnace allows total flexibility over cooling options, adjusting the flow direction and rate to optimize the cooling performance for a given load configuration and part geometry. The more reliable and precise control of cooling gas allows for superior distortion control and unparalleled metallurgical results.

FEATURES

- Available in an all metal or graphite construction
- Four-quadrant design that enables full cooling control
- Patented free-floating heating element support system that reduces stress on heating elements and the potential for grounding and arcing
- Heating elements available in curved graphite or ribbed molybdenum for rapid heating and cooling
- "Screw-in" Venturi gas distribution nozzles for uniform cooling and ease of maintenance
- Large water jacket construction for exceptional cooling capabilities
- Power feed-through assemblies with high efficiency water cooling
- External/internal cooling system available

See pages 22-23 for furnace models and specifications.


NITREX

3Q™ SERIES / QUICK QUENCH VACUUM FURNACE

A SINGLE CHAMBER WITH MOVING HOT ZONE THAT ENSURES SUPERIOR METALLURGICAL RESULTS

The 3Q™ series is a horizontal single-chamber furnace with a moving hot zone. During heating, the hot zone encompasses a stationary load and automatically retracts to a base position away from the load, allowing the workpieces to quench at a faster rate. This unique design approach makes it possible to achieve a cooling rate that is 2.5 times higher than a standard single-chamber vacuum furnace with similar quench pressure and a stationary hot zone. 3Q™ is available with 2 to 10-bar pressure capabilities.

FEATURES

- Two-position movable hot zone for faster quench rates that ensure superior metallurgical results
- Elimination of deformation typically associated with workloads moving in a conventional two-chamber vacuum furnace
- Less wear and tear on the hot zone caused by high-velocity cooling gas, translating to lower maintenance costs and longer hot zone service life

See pages 22-23 for furnace models and specifications.


NITREX

VVF SERIES / VERTICAL VACUUM FURNACE

DESIGNED WITH LARGE-SIZE WORKPIECES AND LOADS IN MIND

The VVF series with bottom-loading capability is ideal for processing larger and taller workpieces as well as high-stacked loads. A circular hot zone with 360° gas cooling nozzles assures even gas distribution throughout the work area for optimal cooling.

For heavy and large cross-section parts at the bottom of the load, an optional bottom cooling system helps to direct cooling gas over the area for rapid and more uniform cooling.

FEATURES

- Available in an all metal or graphite construction
- Patented free-floating heating element support system that reduces stress on heating elements and the potential for grounding and arcing
- Heating elements available in curved graphite or ribbed molybdenum for rapid heating and cooling
- "Screw-in" Venturi gas distribution nozzles for uniform cooling and ease of maintenance
- Large water jacket construction for exceptional cooling capabilities
- Power feed-through assemblies with high efficiency water cooling
- External cooling system available

See pages 22-23 for furnace models and specifications.


NITREX

SAR/VPA SERIES / COATING FURNACE

MEETING THE PERFORMANCE DEMANDS OF COMMERCIAL AND MILITARY AEROSPACE JET ENGINE APPLICATIONS

The high-temperature Sealed Atmosphere Retort (SAR) designed for vapor phase aluminide (VPA) coating technology is the go-to furnace for aerospace manufacturers looking to enhance the performance and extend the life of turbine blades and vanes. The VPA process substantially increases the durability, including the oxidation and corrosion resistance of superalloys against high-burn temperatures and erosion.

AVAILABLE MODELS

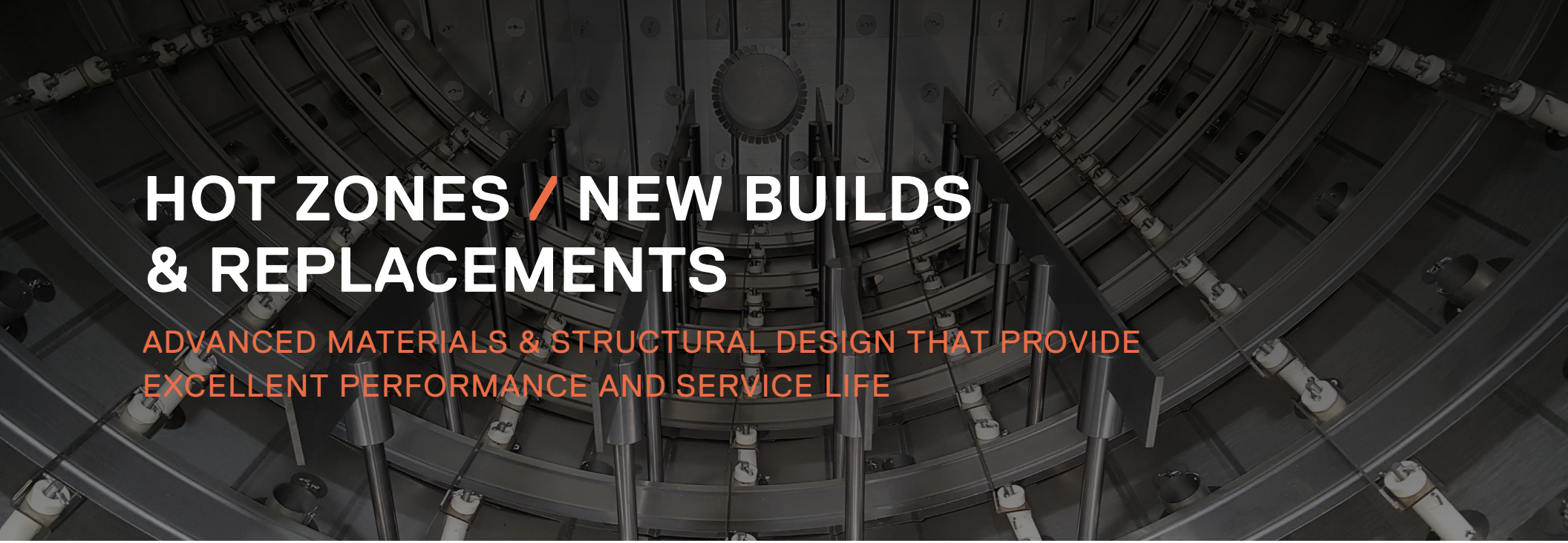
- Furnace hearth on a fixed base perfect for low to medium production
- Fully or semi-automated production cell with the furnace hearth on a moving base and optional single or dual forced-air cooling stations for high production and 24/7 operation

FEATURES

- Low maintenance requirements
- Furnace uptimes above 95%, a critical KPI in lean manufacturing
- Improvement of component durability and reliability to withstand increasingly extreme environments

See pages 22-23 for furnace models and specifications.


NITREX
WARNING
DANGER
CRANE OVERHEAD



HOT ZONES / NEW BUILDS & REPLACEMENTS

ADVANCED MATERIALS & STRUCTURAL DESIGN THAT PROVIDE EXCELLENT PERFORMANCE AND SERVICE LIFE

The NITREX Aftermarket team has the experience and capabilities to tackle the repair, rebuild, and upgrade of hot zones for most vacuum furnace brands. These industry workhorses are designed to outperform competitive offers with a lower cost of ownership.

Whether it's a standard or custom-engineered hot zone or an upgrade of a third-party furnace with a graphite or all metal hot zone, we can build it better than the original. Our design experts thoroughly review your application and process requirements, as well as your maintenance history and challenges to help determine the best performing hot zone for your process goals.

BENEFITS

- Heavy-duty, double-wall plenum design that provides a highly efficient, uniform cooling-gas flow
- Improved structural integrity that reduces distortion over the life of the hot zone
- Uniform gas distribution using patented screw-in Venturi graphite and molybdenum nozzles
- Patented free-floating heating element support system that reduces stress on heating elements and the potential for grounding and arcing
- High efficiency insulation and all metal shielding that minimize heat loss and energy costs
- Easily replaceable parts, easy maintenance, and longer component life

CONTROL SYSTEM AND FURNACE UPGRADES & RETROFITS

FUTURE-PROOFING YOUR FURNACE SYSTEM MADE EASIER

When your objective is to add more capabilities and functionalities to your existing vacuum furnace and controls, our engineering experts can optimize the value and life of your asset with upgrade and retrofit solutions.

Our upgrade services align equipment and software to the latest specifications and industry standards to boost furnace lifetime, performance, safety, and reliability while maximizing overall efficiency and energy usage.

BENEFITS

- Compliance with the latest quality and safety standards
- Security protection, maintenance and logging, as well as analysis capabilities included
- Backed by industry-leading technical support

FURNACE MODELS & SPECIFICATIONS

HVF SERIES

MODEL	Maximum Load Dimensions (Width x Height x Depth)	Standard Capacity	Maximum Capacity	Temperature Range	Working Pressure
HVF-101	18" x 18" x 24" (457 mm x 457 mm x 610 mm)	750 lb. (340 kg)	1,500 lb. (680 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	2-20 bar
HVF-201	24" x 24" x 36" (610 mm x 610 mm x 914 mm)	1,200 lb. (544 kg)	2,400 lb. (1,088 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	2-20 bar
HVF-301	36" x 30" x 48" (914 mm x 762 mm x 1,219 mm)	2,000 lb. (907 kg)	5,000 lb. (2,268 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	2-20 bar
HVF-401	36" x 36" x 48" (914 mm x 914 mm x 1,219 mm)	2,500 lb. (1,134 kg)	5,500 lb. (2,495 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	2-20 bar
HVF-701	48" x 48" x 48" (1,219 mm x 1,219 mm x 1,219 mm)	3,500 lb. (1,588 kg)	2,400 lb. (1,088 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	2-20 bar
HVF-701XXB	48" x 48" x 72" (1,219 mm x 1,219 mm x 1,829 mm)	4,000 lb. (1,814 kg)	8,000 lb. (3,629 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	2-20 bar

QUANTUMQUENCH®

MODEL	Maximum Load Dimensions (Width x Height x Depth)	Standard Capacity	Maximum Capacity	Temperature Range	Working Pressure
HVF-101	18" x 18" x 24" (457 mm x 457 mm x 610 mm)	750 lb. (340 kg)	1,500 lb. (680 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	10-20 bar
HVF-201	24" x 24" x 36" (610 mm x 610 mm x 914 mm)	1,200 lb. (544 kg)	2,400 lb. (1,088 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	10-20 bar
HVF-301	36" x 30" x 48" (914 mm x 762 mm x 1,219 mm)	2,000 lb. (907 kg)	5,000 lb. (2,268 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	10-20 bar
HVF-401	36" x 36" x 48" (914 mm x 914 mm x 1,219 mm)	2,500 lb. (1,134 kg)	5,500 lb. (2,495 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	10-20 bar
HVF-701	48" x 48" x 48" (1,219 mm x 1,219 mm x 1,219 mm)	3,500 lb. (1,588 kg)	2,400 lb. (1,088 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	10-20 bar
HVF-701XXB	48" x 48" x 72" (1,219 mm x 1,219 mm x 1,829 mm)	4,000 lb. (1,814 kg)	8,000 lb. (3,629 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	10-20 bar

Standard sizes are shown, custom sizes are available.

3Q™ SERIES

MODEL	Maximum Load Dimensions (Width x Height x Depth)	Standard Capacity	Maximum Capacity	Temperature Range	Working Pressure
HVF-201-3Q	18" x 18" x 24" (457 mm x 457 mm x 610 mm) 24" x 18" x 36" (610 mm x 457 mm x 914 mm)	1,000 lb. (454 kg)	2,000 lb. (907 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	2 bar
HVFF-401-3Q	36" x 36" x 48" (914 mm x 914 mm x 1,219 mm)	4,000 lb. (1,815 kg)	5,000 lb. (2,268 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	2 bar

VVF SERIES

MODEL	Maximum Load Dimensions (Diameter x Height)	Standard Capacity	Maximum Capacity	Temperature Range	Working Pressure
VVF-202-B	48" x 54" (1,219 mm x 1,372 mm)	3,000 lb. (1,361 kg)	4,000 lb. (1,815 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	2-10 bar
VVF-302-B	60" x 48" (1,524 mm x 1,219 mm)	4,000 lb. (1,815 kg)	5,000 lb. (2,268 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	2-10 bar
VVF-402-B	72" x 72" (1,829 mm x 1,829 mm)	5,000 lb. (2,268 kg)	6,000 lb. (2,722 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	2-10 bar
VVF-502-B	84" x 84" (2,134 mm x 2,134 mm)	5,000 lb. (2,268 kg)	6,000 lb. (2,722 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	2-10 bar
VVF-602-XB	96" x 96" (2,438 mm x 2,438 mm)	6,000 lb. (2,722 kg)	7,000 lb. (3,175 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	2-10 bar

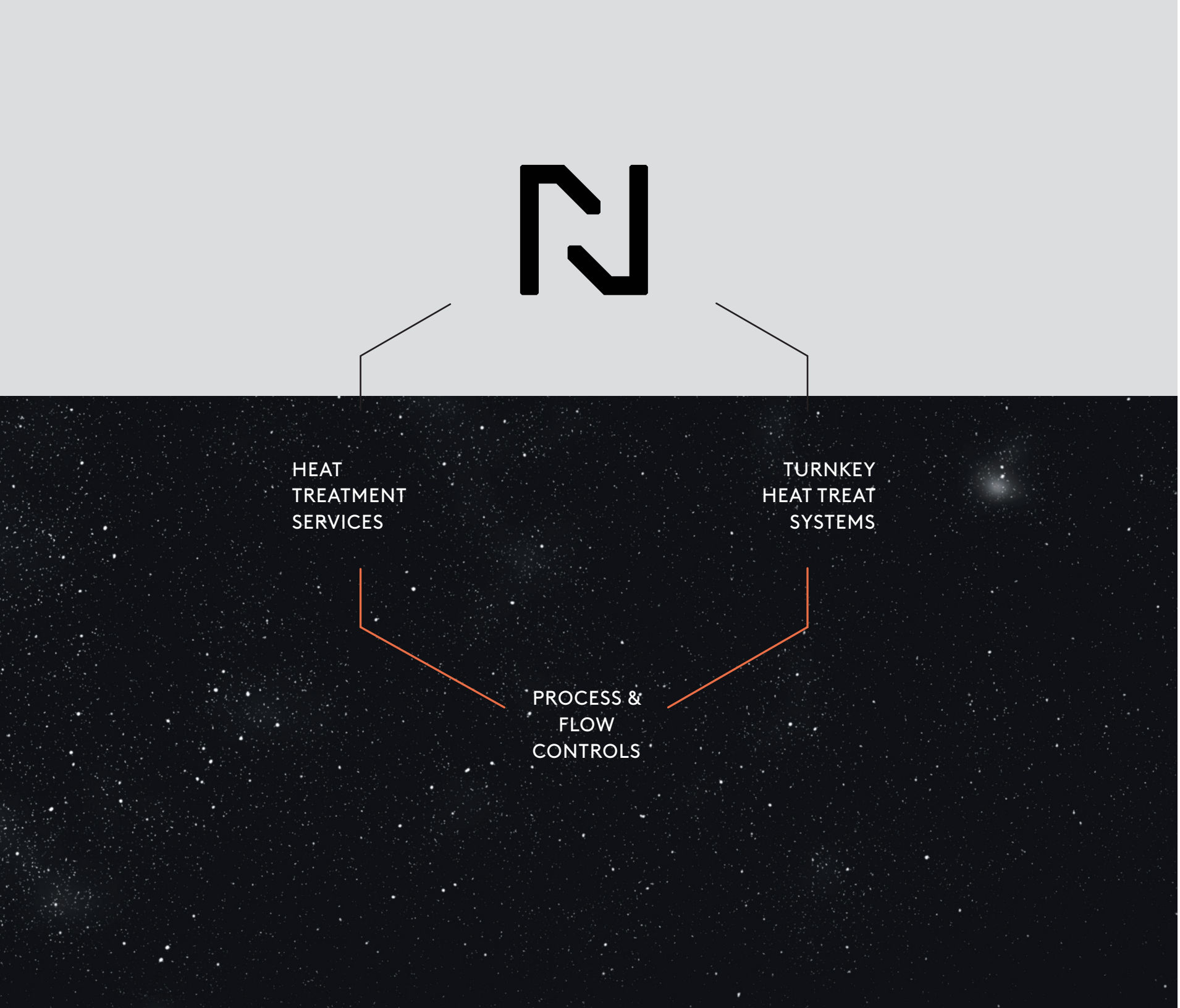
SAR/VPA SERIES

MODEL	Maximum Load Dimensions (Diameter x Height)	Gross Load Capacity (LB. @ 2,400 °F / KG @ 1,315 °C)	Temperature Range
SAR-3642	36" x 42" (914 mm x 1,067 mm)	2,250 lb. (1,021 kg)	2,200 °F (1,204 °C)
SAR-4242	42" x 42" (1,067 mm x 1,067 mm)	2,500 lb. (1,134 kg)	2,200 °F (1,204 °C)

NITREX

A GLOBAL SOLUTIONS PROVIDER

WE ARE THE ONLY FULLY INTEGRATED SOLUTIONS PROVIDER IN THE PREMIUM SURFACE TREATMENT MARKET.


HEAT
TREATMENT
SERVICES
TURNKEY
HEAT TREAT
SYSTEMS
PROCESS &
FLOW
CONTROLS

COMMITMENT TO QUALITY CONTROL

NITREX prides itself on providing customers with world-class quality surface treating systems, controls, and services that improve component reliability and performance, as well as the life span and productivity of their engineering parts. Maintaining quality is a core company value, and the entire team, from receiving to handling, processing, inspection, and shipping, is committed to upholding quality assurance and control procedures.

As a result of our ongoing commitment to quality, NITREX maintains several national and international accreditations. These certificates are critical to our efforts in delivering value to our customers, both now and in the future.

Repeatedly chosen by blue-chip customers:

AEROSPACE

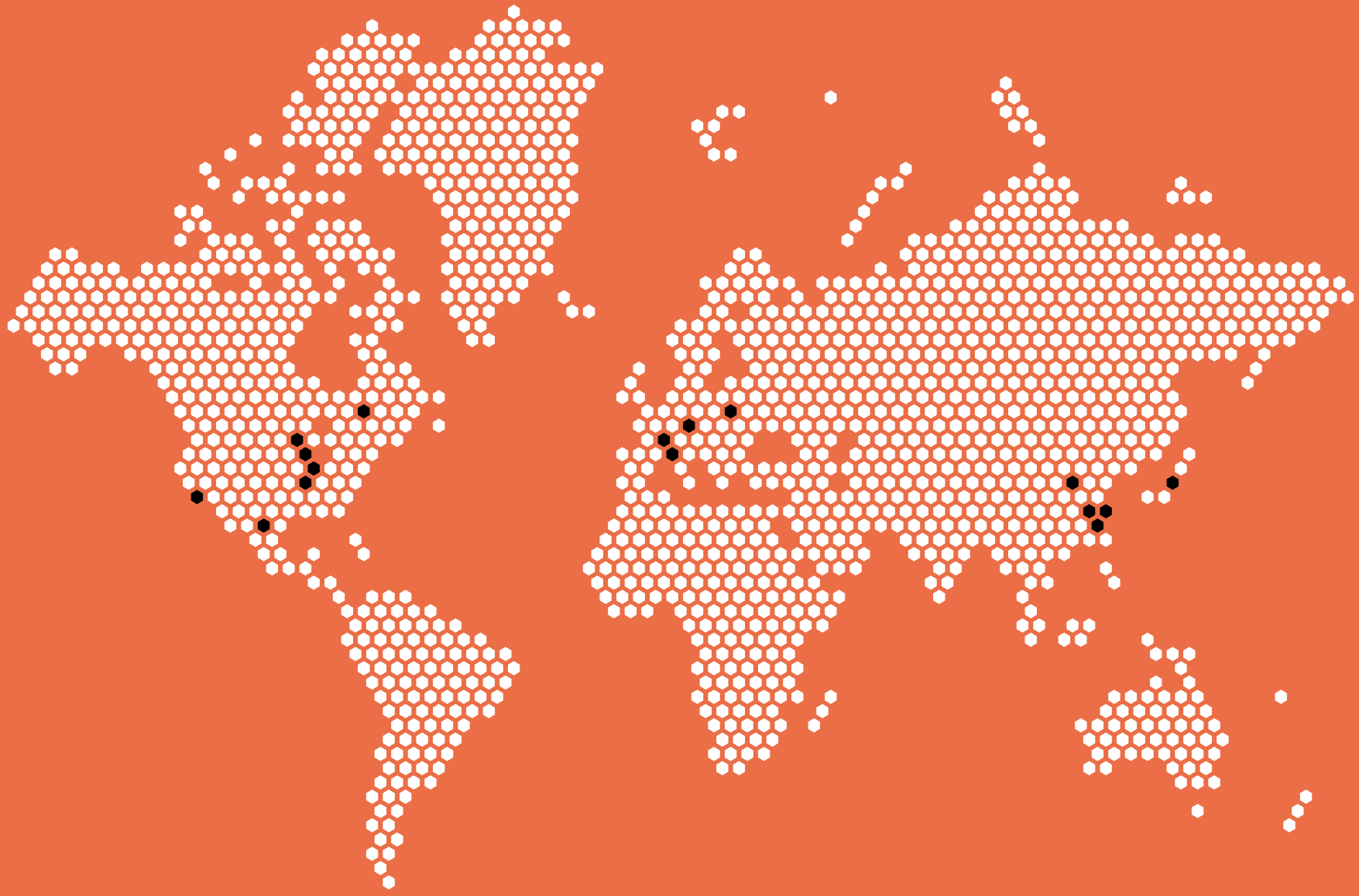
- Boeing
- Chromalloy
- GE Aviation
- Howmet Aerospace
- Parker
- PG Technologies
- Rolls-Royce

AUTOMOTIVE

- Cummins
- Bonfiglioli
- FCA (Fiat Chrysler Automobiles)
- Federal-Mogul
- MAHLE (Driven by performance)
- SKF
- Volvo
- ZF

INDUSTRIAL

- CAT
- GE
- Honeywell
- INDO-MIM (Complexity Simplified)
- John Deere
- The Linde Group



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