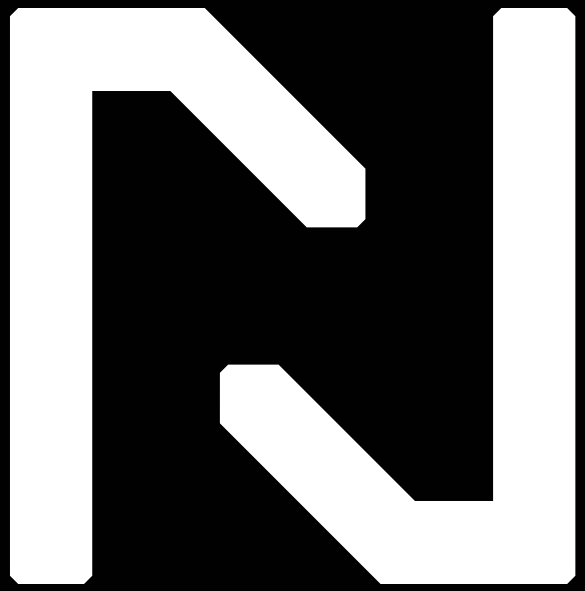
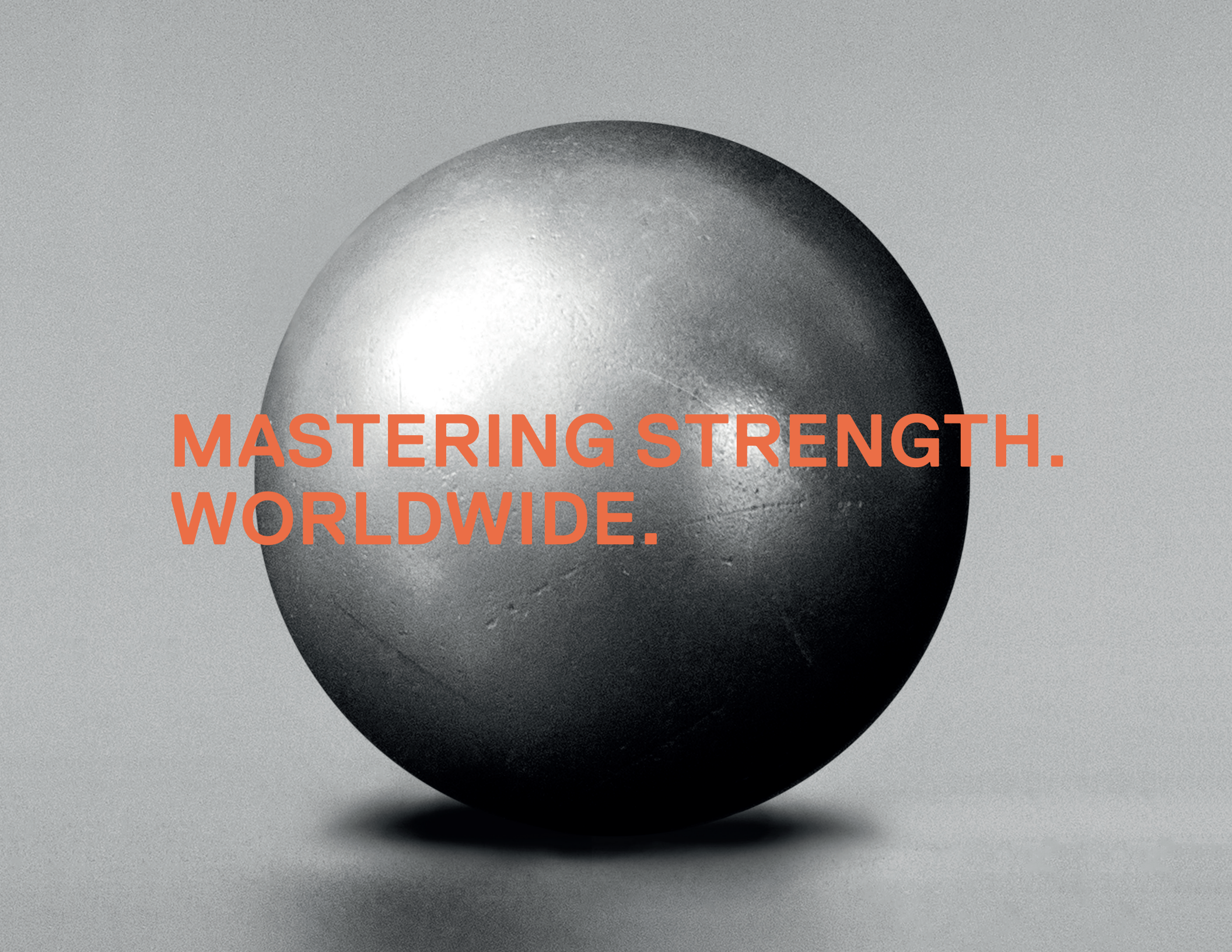


TURNKEY VACUUM
SYSTEMS


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 solution. Developed by G-M Enterprises, a Nitrex company, this solution ensures unparalleled quality and expertise throughout the process.

THE NITREX "TURNKEY" APPROACH OFFERS SUPERIOR FURNACE SOLUTIONS, TECHNICAL EXPERTISE, INSTALLATION ASSISTANCE, AND FULL SYSTEM INTEGRATION, GUARANTEEING AN OPTIMAL RETURN ON INVESTMENT.

NITREX

MAKING AN IMPACT IN EVERY INDUSTRY

SOLUTIONS FOR ALL TYPES OF BUSINESSES

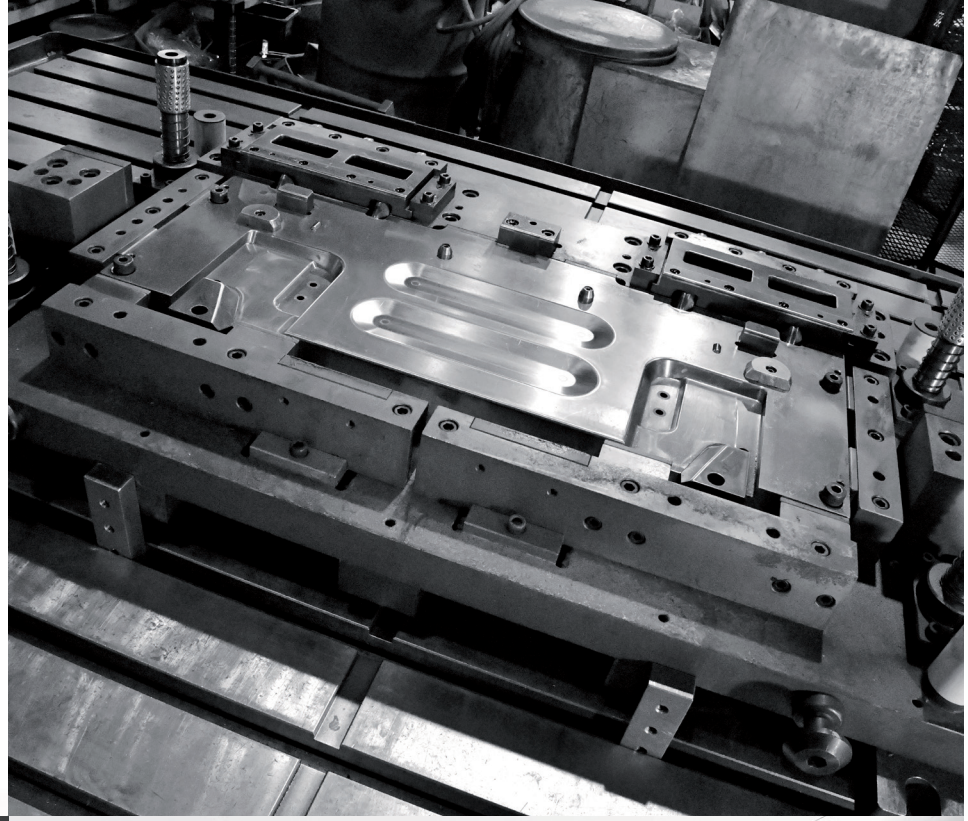
NITREX serves customers in a wide range of industries, all with unique needs and requirements. And in this fast-changing world that demands durability, sustainability, quality, and cost efficiency, more and more industries and companies are viewing vacuum heat processing as business critical.

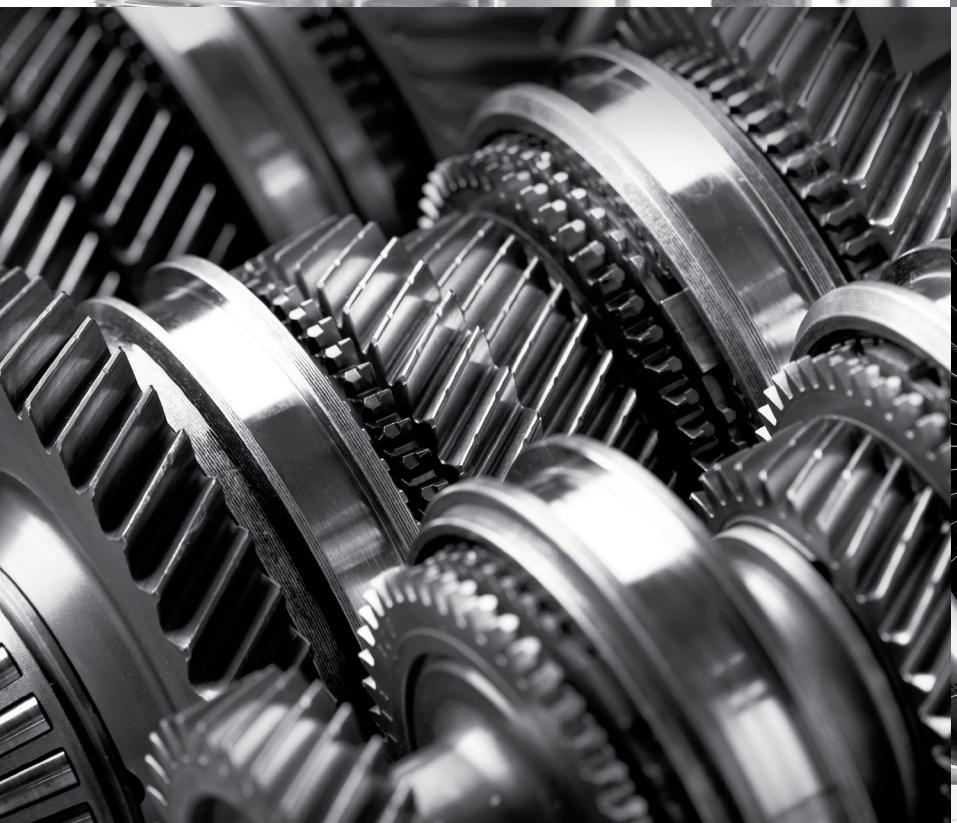
MARKETS WE SERVE

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

TYPICAL APPLICATIONS

- MIM & 3D printed parts
- Aircraft components
- Surgical tools
- Dies
- Engine components
- Fasteners
- Fuel injectors
- Gears
- Implants
- Industrial tools
- Landing gears
- Pumps
- Shafts
- 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 front-loading vacuum furnace for high quality, demanding applications. It's perfect for hardening, annealing, tempering, brazing and sintering processes, as well as for MIM and 3D printing applications.

FUSION SERIES / QUICK QUENCH

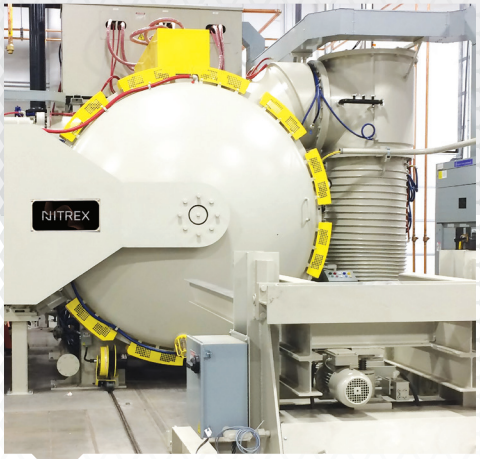
The Fusion series is a horizontal single-chamber vacuum furnace designed to offer Nitrex quality and durability at a budget-friendly price.

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.

VACUUM TEMPER SERIES

This retort-based system with vacuum purge and precise control over inert and reactive atmospheres delivers impeccably clean parts. Cost-effective and highly productive, our temper furnace is ideal for aging, certain annealing processes, and uniform heating up to 700°C (1300°F).



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.

HIGH-TEMPERATURE RETORT SYSTEMS FOR VPA COATING

Designed as a coating or brazing furnace, the SAR/VPA series is the preferred choice for aerospace manufacturers seeking to improve the performance and durability of turbine blades and vanes through vapor phase aluminide coatings.

HVF SERIES / HORIZONTAL VACUUM FURNACE

PERFECT FOR CLEAN HARDENING, ANNEALING, AGING, TEMPERING, BRAZING, DEBIND & SINTERING PROCESSES

The HVF series is the most reliable and widely used vacuum furnace for horizontal front-loading applications. Built to meet the rigorous standards of the aerospace industry, this furnace offers both internal and external quench options. It is exceptionally robust and energy-efficient, ensuring longevity and maximum performance. The hot zones of the Nitrex HVF series deliver best-in-class 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
- Our patented free-floating heating element support system reduces stress on heating elements and the potential for grounding and arcing
- Heating elements available in curved graphite or curved, ribbed molybdenum for uniform and rapid heating
- "Screw-in" Venturi gas distribution nozzles for uniform cooling and ease of maintenance
- Circular design hot zone delivers improved temperature uniformity and volume utilization
- Large water jacket construction for exceptional cooling capabilities
- Power feed-through assemblies with high efficiency water cooling
- External cooling allows for different size heat exchangers
- Internal cooling systems provide more compact installations

See pages 22-23 for furnace models and specifications.

NITREX

VACUUM
BROCHURE

HVF Series /
Horizontal
Vacuum
Furnace

FUSION SERIES / QUICK QUENCH VACUUM FURNACE

A SINGLE-CHAMBER, INTERNALLY COOLED FURNACE DESIGNED FOR OPTIMAL COMPACTNESS AND VALUE

The Fusion series is a horizontal single-chamber furnace complete with an internal heat exchanger. Its compact design and streamlined options aim to maximize value and expedite shipment, all while upholding the renowned Nitrex quality.

FEATURES

- Available in 2 bar, 6 bar, and 15 bar options
- Efficient internal quench blower
- Streamlined controls based on Nitrex platforms
- QMULUS cloud-based connectivity and cloud data retention
- Nitrex world-class hot zone designs

See pages 22-23 for furnace models and specifications.

NITREX

VACUUM
BROCHURE

Fusion Series /
Quick Quench
Vacuum
Furnace

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
- "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

See pages 22-23 for furnace models and specifications.


NITREX

VACUUM TEMPER SERIES

RETORT-BASED SYSTEM WITH VACUUM PURGE OFFERING PRECISE CONTROL OVER INERT AND REACTIVE ATMOSPHERES FOR IMPECCABLY CLEAN PARTS

This retort-based system with vacuum purge and precise control over inert and reactive atmospheres delivers impeccably clean parts. Cost-effective and highly productive, our temper furnace is ideal for aging, certain annealing processes, and uniform heating up to 700°C (1300°F).

FEATURES

- Capable of reaching a range of temperatures to accommodate various metals and alloys for optimal results.
- Minimizes contamination and oxidation of metals, ensuring a clean tempering process without impurities.
- Features rapid cooling capabilities essential for achieving specific metallurgical properties and significantly decreasing cycle times.
- Tight uniformity at all tempering ranges.
- Large, compact loads are easily heated

See pages 22-23 for furnace models and specifications.


NITREX

QUANTUMQUENCH® / VACUUM FURNACE

FLEXIBLE COOLING OPTIONS FOR THE BEST METALLURGICAL RESULTS

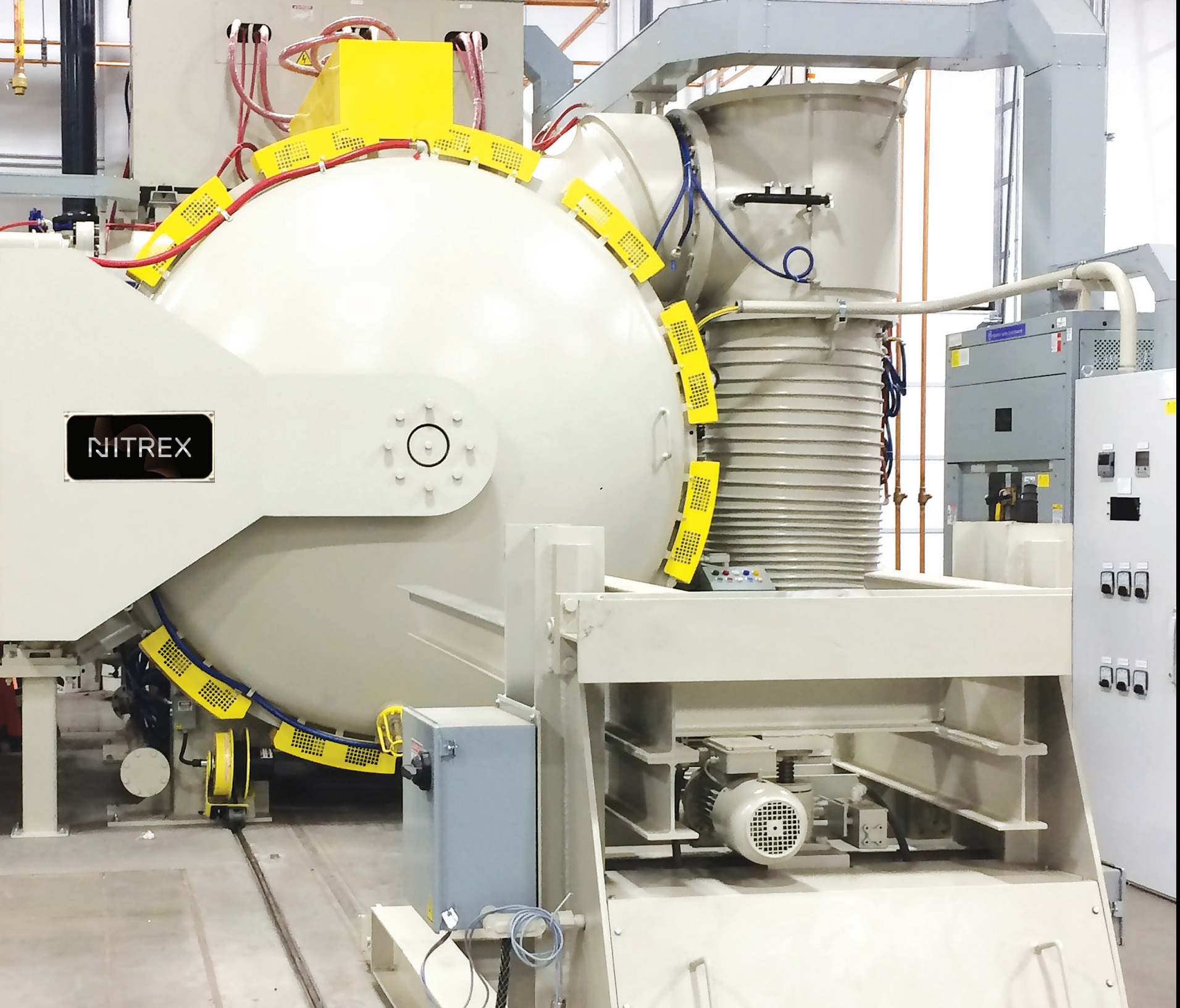
Based on the HVF design platform, the QuantumQuench® vacuum furnace offers directional cooling with controlled flow rates to deliver targeted cooling where it is needed most.

The furnace's four-quadrant design offers complete flexibility in cooling options via an external heat exchanger and a hot zone devoid of moving parts. This configuration allows for precise adjustments to flow direction and rate, optimizing cooling for specific load configurations and part geometries. The enhanced reliability and precise control of cooling gas lead to superior distortion control and unparalleled metallurgical results.

FEATURES

- Available in an all metal or graphite construction
- Four-quadrant design offers full cooling control across various pressure ranges
- 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
- "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

See pages 22-23 for furnace models and specifications.


NITREX

HIGH-TEMPERATURE RETORT SYSTEMS TAILORED FOR VPA COATINGS

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

Vertical retort systems work with vacuum purge, hydrogen or argon atmospheres, capable of reaching high temperatures up to 2100°F (1150°C). Favored by aerospace clients, the movable base/ fixed heating system is trusted for its safety and reliability in vapor phase aluminide (VPA) coating technology.

Manufacturers of turbine engines depend on VPA coatings to optimize performance and prolong the lifespan of turbine blades and vanes.
The VPA process significantly improves the durability, including oxidation and corrosion resistance, of superalloys against high-temperature combustion and erosion.

AVAILABLE MODELS

- → Fully or semi-automated production cell equipped with moving bases that automatically lift up to the furnace and then proceed to a cooling chamber, all while protecting the surrounding environment
- → Simple fixed base with lift-off furnace, including retort and fixed, high-temperature hearth, tailored for overhead handling and medium production needs.

FEATURES

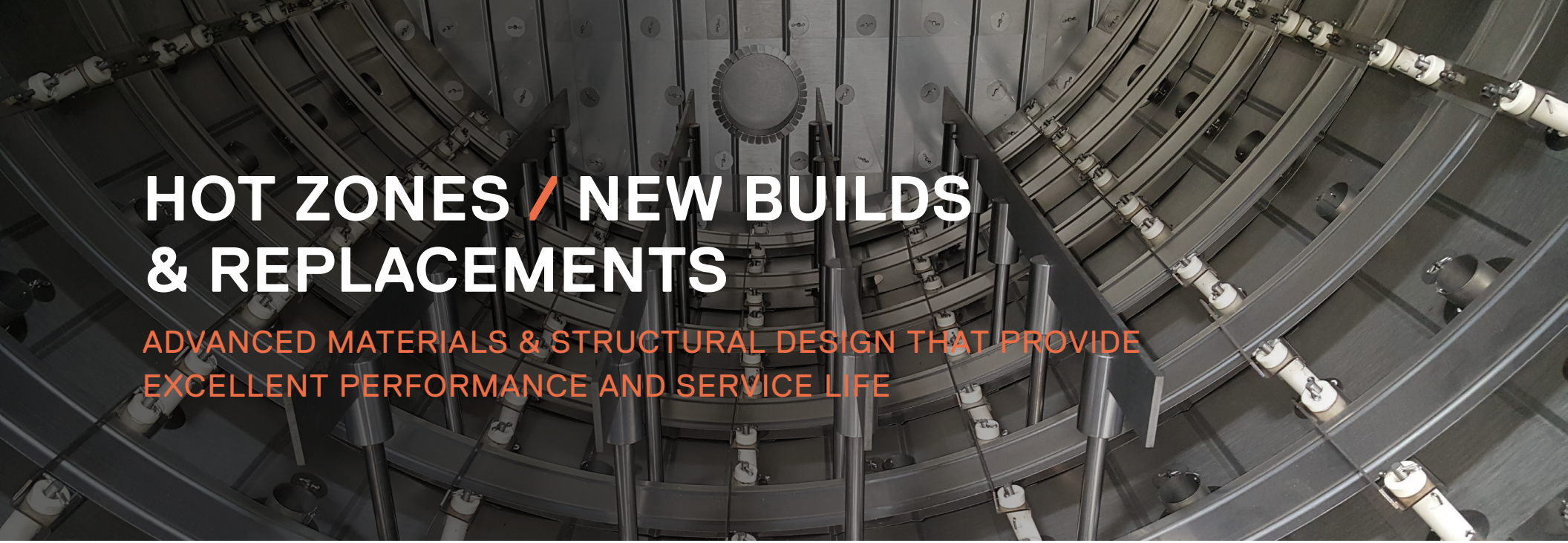
- → Low maintenance requirements
- → Furnace uptimes above 95%, a critical KPI in lean manufacturing
- → Reliable and engineered to protect workers in a typically extreme environments

See pages 22-23 for furnace models and specifications.

NITREX

VACUUM
BROCHURE

High-
temperature
Retort
Systems



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)	7,000 lb. (3,175 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

FUSION SERIES

MODEL	Maximum Load Dimensions (Width x Height x Depth)	Standard Capacity	Maximum Capacity	Temperature Range	Working Pressure
F-050	12" x 12" x 12" (305 mm x 305 mm x 305 mm)	350 lb. (158 kg)	750 lb. (340 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C)	2, 6, 15 bar
F-101	18" x 18" x 24" (457 mm x 457 mm x 610 mm)	750 lb. (340 kg)	1,500. (680 kg)	1,000 °F – 2,500 °F (538 °C – 1,371 °C	2, 6, 15 bar
F-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, 6, 15 bar
F-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, 6, 15 bar

VVF SERIES

MODEL	Maximum Load Dimensions (Width x Height x Depth)	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

Standard sizes are shown, custom sizes are available.

VACUUM TEMPER SERIES

MODEL	Maximum Load Dimensions (Width x Height x Depth)	Load Capacity
NXHT-669	23½″ x 23½″ x 35½″ (600 mm x 600 mm x 900 mm)	750 lb. (340 kg)
NXHT-9812	35½″ x 31½″ x 47¼″ (900 mm x 800 mm x 1,200 mm)	3,300 lb. (1,500 kg)
NXHT-9912	36″ x 36″ x 48″ (914 mm x 914 mm x 1 ,219 mm)	3,300 lb. (1,500kg)
NXHT-101012	39½″ x 39½″ x 47¼″ (1,000 mm x 1,000 mm x 1 ,200 mm)	4,400 lb. (2,000 kg)
NXHT-101018	39½″ x 39½″ x 71" (1,000 mm x 1,000 mm x 1,800 mm)	6,600 lb. (3,000 kg)

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

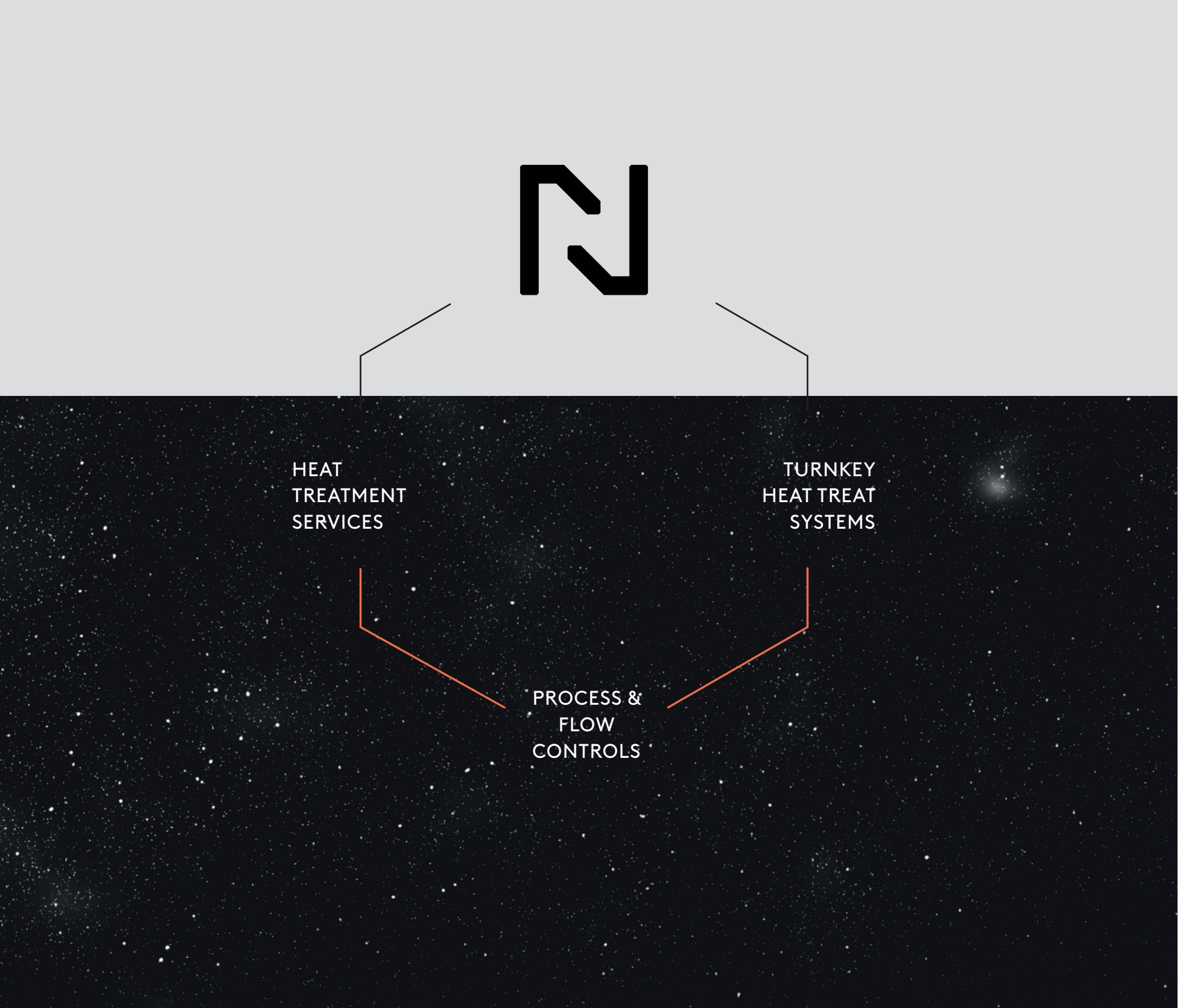
HIGH-TEMPERATURE RETORT SYSTEMS FOR VPA COATINGS

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)	1,400 °F - 2,200 °F (760 °C - 1,204 °C)
SAR-4242	42" x 42" (1,067 mm x 1,067 mm)	2,500 lb. (1,134 kg)	1,400 °F - 2,200 °F (760 °C - 1,204 °C)
SAR-4646	46" x 46" (1,168 mm x 1,168 mm)	2,500 lb. (1,134 kg)	1,400 °F - 2,200 °F (760 °C - 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

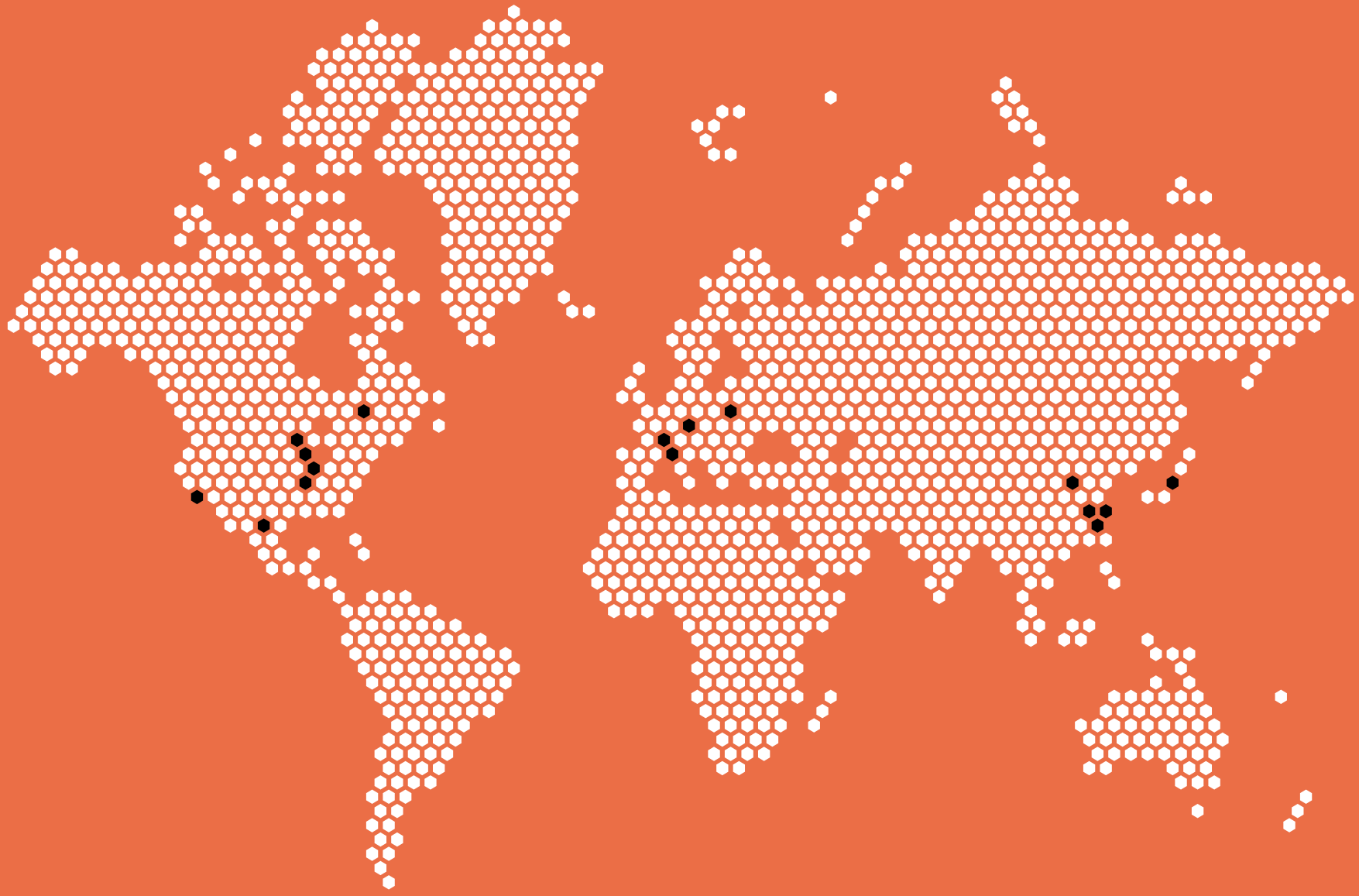
- Boeing
- Chromalloy
- GE Aviation
- Howmet Aerospace
- Parker
- PG Technologies
- Rolls-Royce

AUTOMOTIVE

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

INDUSTRIAL

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



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