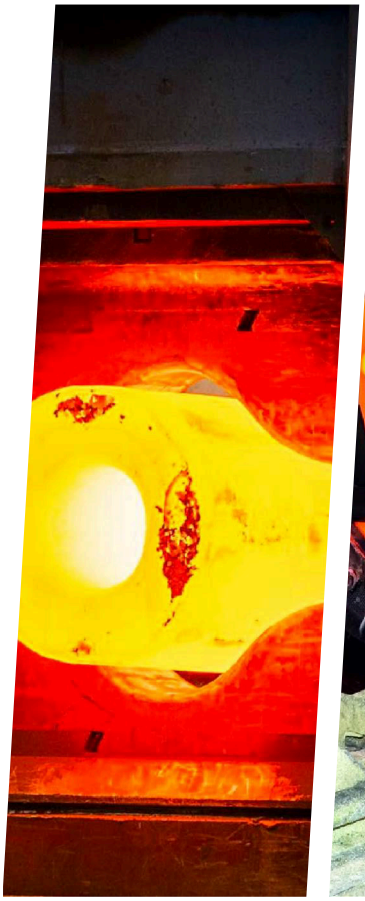
Technological excellence, industrial synergy, GLOBAL VISION

One partner, one integrated offer: we take your component from forging through heat treatment and machining all the way to a finished product, ready for service.

www.ttnspa.it

One contact. One answer. One partner.



Forging

Open-die forging of components up to 35 t and 14 m in length.



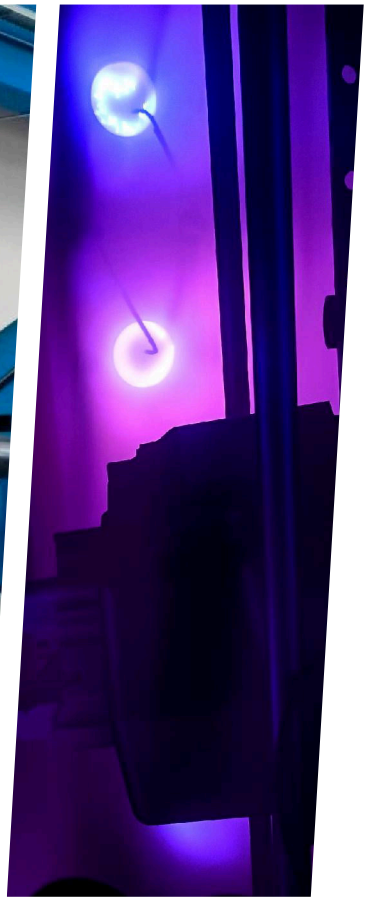
Heat treatment

Hardening, carburizing, nitriding and induction, with cycles tailored to steel, geometry and loads.



Precision machining

From precision parts to massive components, finished to drawing.



PVD coatings

1–10 µm films against wear, friction and sticking.

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The TTN Group · Trattamenti Termici Nervianesi

Since 1978, metallurgy applied to the COMPONENT

TTN Group – Trattamenti Termici Nervianesi – was founded in 1978 in Nerviano (Milan) by Ernesto Pirovano as a specialist in the heat treatment of steels. Over the years the range has grown to include gas, salt, oil and water quenching, thermochemical treatments – gas and plasma nitriding, carburizing including low-pressure carburizing – and induction and laser hardening.

Through successive acquisitions the group now brings together ten companies with complementary skills, coordinated within a single organisation: production sites in Lombardy, Piedmont, Veneto, Friuli Venezia Giulia and Spain, plus a sales office in the United States. With CRT it applies PVD coatings, with Friulforgia it forges components of up to 35 tonnes, and with Vittuone and Omnia Press it machines them to drawing.

We act as your technical partner: we choose the treatment cycle with you based on design requirements, control every critical process parameter and document the result.



NERVIANO (MI) · PIT FURNACES

Our pit furnace area extends deep underground across several levels, giving us the room to treat shafts, columns and long components vertically, up to 14 metres.

Nerviano: built for big parts

14 m
length in plasma nitriding

12 m
length in gas nitriding

4.3 m
usable height in pit carburizing, Ø3.8 m

Maximum capacities of the TTN S.p.A. plants in Nerviano; details on p. 10.

A supply chain built STEP BY STEP

Acquisition by acquisition, the group has added the stages that come before and after heat treatment, creating a fully vertically integrated supply chain.

1978 — ***TTN Nerviano***
Ernesto Pirovano founds the group: heat treatment of steels.

1980 — ***TTN Cinisello***
Quenching & tempering, annealing and induction hardening.

1985 — ***CRT***
PVD coatings, vacuum treatments, plasma nitriding.

1988 — ***TTN Vittuone***
Machining and complex components.

2000 — ***TTN Veneta***
Heat treatment and surface coatings.

2000 — ***Omnia Press***
Precision machining.

2005 — ***TTN Piemonte***
Treatment of forgings, series production.

2010 — ***Friulforgia***
Open-die forging and large-scale machining.

2015 — ***TTN Navarra***
Induction hardening and laser hardening.

Today — ***Forge TTN USA***
Sales office in Houston, Texas, serving the North American market.


TTN Piemonte, Castellamonte.

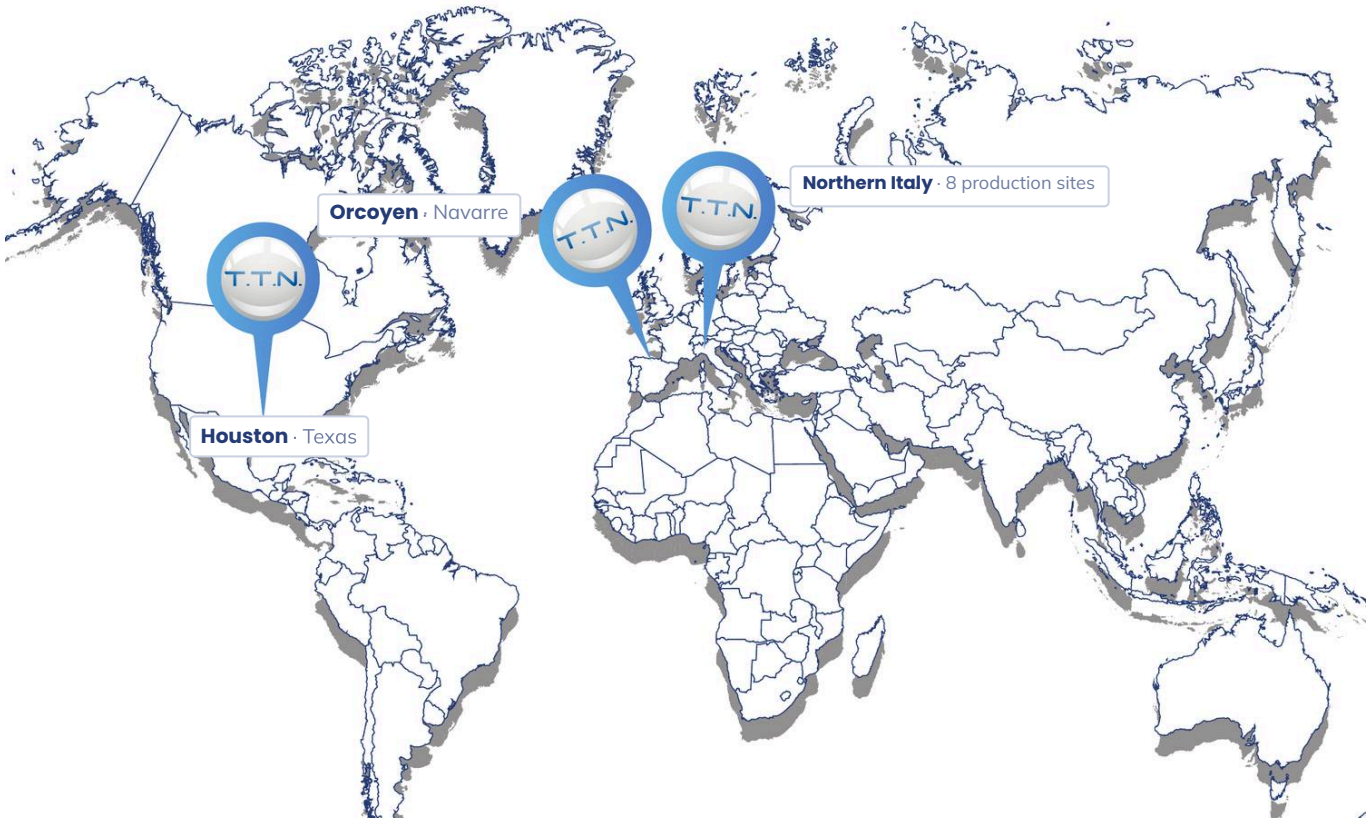

TTN Veneta, Nervesa della Battaglia.


Friulforgia, Sedegliano.

Where we are · 10 firms, 3 countries

A network across Italy, Spain and the UNITED STATES

TTN Group is located right where demand for heat treatment and steel components is strongest: in the industrial districts of Northern Italy, in the manufacturing hub of Navarre and, through a sales office in Houston, in the North American energy market. Being close to our customers means faster pick-up and delivery, quick answers and a direct technical dialogue with the people who design the component.



Italy

8 production companies

In Lombardy, Piedmont, Veneto and Friuli Venezia Giulia, at the heart of the mechanical engineering, tooling and automotive districts. Heat treatment, forging, machining, coatings.

Spain

1 plant

TTN Navarra in Orcoyen: induction and laser hardening and furnace treatments for the wind, automotive, rail and steel industries.

United States

1 sales office

Forge TTN USA in Houston (Texas) brings the group's integrated offer to North America, starting with oil & gas.

The TTN system Every site has its own clear specialisation; together they cover the component's entire journey, from steel to finished surface, with a single technical contact.

An ENGINEERED approach

TTN Group works with an engineered approach: tightly controlled processes, a quality end result and reliable mechanical performance of every treated component.

Process control

Plants with continuous regulation and monitoring of every critical parameter: temperature, soaking times, controlled atmospheres, cooling cycles. The result is repeatable and uniform, coatings included.

Controlled quality

Structured operating procedures and dimensional and metallurgical checks at every stage, with full batch traceability. Hardness, strength, toughness and durability are verified, cutting scrap and rework.

On-time delivery

Production planning and streamlined workflows cut lead times and keep agreed dates, even with combined cycles and highly variable coatings.

Customer partnership

Technical expertise, collaboration and transparency: the group works alongside you to define treatment cycles and coating solutions.

> ***"The Group positions itself as a technical partner to its customers, helping them choose the most suitable treatment cycles for their application requirements and design specifications."***
>
> **Claudio Bonafede**, Sales Director TTN Group · from "Approccio ingegnerizzato nei trattamenti termici", RMO, March 2026



01 Heat treatment

Six sites in Italy and Spain deliver heat and thermochemical treatments: from vacuum hardening for dies to nitriding of 14-metre parts and induction hardening of 16-metre shafts.

Our treatment range	**08**
TTN S.p.A. · Nerviano	**09**
TTN Vittuone	**11**

Fourteen processes, one TECHNICAL DIRECTION

Vacuum hardening

No atmosphere: clean, oxide-free surfaces, unaltered chemistry, outstanding dimensional stability.

→ TTN S.p.A. · TTN Veneta · CRT

Oil & water quenching, Q&T

Controlled atmosphere, oil or water quenching and tempering for superior mechanical properties.

→ TTN S.p.A. · TTN Veneta · TTN Piemonte · Friulforgia

Salt-bath hardening

Quenching in molten salts at controlled temperature: uniform, with minimal distortion on complex geometries.

→ TTN S.p.A. · TTN Veneta · Friulforgia

Annealing and stress relieving

Softens the material, improves machinability and ductility, removes internal stresses.

→ TTN S.p.A. · Cinisello · TTN Veneta · TTN Piemonte · Friulforgia · TTN Navarra

Cryogenic treatment

After hardening, cooling to cryogenic temperatures: dimensional stability, hardness, wear resistance.

→ TTN Veneta

Solution annealing and ageing

Mechanical and corrosion properties for PH and duplex stainless steels, maraging steels, aluminium alloys.

→ Cinisello · TTN Veneta · TTN S.p.A.

Carburizing and carbonitriding

Enriches the surface with carbon (and nitrogen): hardness, wear and fatigue resistance with a tough core. Also low-pressure.

→ TTN S.p.A. · TTN Veneta

Gas nitriding and nitrocarburizing

Enriches the surface with nitrogen (and carbon); performed on finished parts with no change in dimensions.

→ TTN S.p.A. · TTN Veneta

Plasma nitriding

Same principle, plasma technology; controlled depth, ideal for finished parts.

→ TTN S.p.A. · TTN Veneta · CRT

ET01® thermal oxidation

Corrosion-resistant magnetite layer (Fe_3O_4) with a black-oxide look.

→ TTN Veneta

NIPRE®

Gas nitriding plus post-oxidation: wear and corrosion resistance on finished parts.

→ TTN S.p.A. · TTN Veneta

Induction hardening

Localised heating by magnetic field and rapid cooling: hardens only where it is needed.

→ Cinisello · TTN Veneta · TTN Navarra

Laser hardening

Localised surface hardening with a laser beam.

→ Cinisello (on request) · TTN Navarra

Hot and cold shrink fitting

Interference fit using thermal expansion and contraction, with no fasteners.

→ TTN Veneta

Company attribution for ET01®, NIPRE® and solution annealing to be confirmed.



01 HEAT TREATMENT

TTN S.p.A. · Nerviano (MI)

The group's TECHNICAL HUB

In Nerviano, where the group was born in 1978, TTN S.p.A. performs gas nitriding, carburizing, vacuum and salt-bath hardening, and defines cycles together with you based on steel, geometry and loads. It is home to management, the R&D department and the metallographic laboratory.

Hardening with four quenching media

Gas, salt, oil and water, to strike the right balance between hardness, toughness and distortion.

- Double salt-bath hardening: first bath at 400 °C, second at 200 °C. Two-stage quenching limits distortion and raises toughness.
- Vacuum hardening with a cycle chart for every load, recorded by thermocouples on the surface and at the core of the part.

Aerospace division

Qualified normalising, quenching & tempering, solution annealing, ageing and stress relieving of steels, superalloys and non-ferrous alloys.

Thermochemical treatment of large components

- Plasma nitriding up to Ø700 × 14,000 mm and Ø3,000 × 1,700 mm.
- Gas nitriding up to Ø1,000 × 12,000 mm.
- Low-pressure carburizing in a single plant: carburizing and quenching cells linked by a vacuum tunnel, acetylene and propane, quenching in nitrogen or oil. Less distortion, no intergranular oxidation, shorter grinding times.
- NIPRE®, nitriding with post-oxidation for wear and corrosion resistance: 6,500 mm 39NiCrMo3 columns for offshore machines in the North Sea, flawless after 5 years in service.



Detail inside the plasma nitriding chamber.

Carburizing: equipment

Furnace	Ø × usable height
Pit	750 × 1,500 mm
Pit	1,900 × 2,500 mm
Pit	1,900 × 3,500 mm
Pit	2,600 × 2,700 mm
Pit	3,800 × 4,300 mm
Suspended parts	750 × 3,900 mm
Supported parts	900 × 4,500 mm

Case depth up to 6 mm. Source www.ttnspa.it



Pit furnace for carburizing.

Maximum capacities

Ø700 × 14,000
mm · plasma nitriding

Ø3,000 × 1,700
mm · plasma nitriding

Ø1,000 × 12,000
mm · gas nitriding

Ø3,800 × 4,300
mm · carburizing

The TTN system Defines treatment cycles for the group's projects and works with CRT whenever treatment is followed by a coating.



TTN S.p.A. · Vittuone (MI) · since 1988

Complex machining and LARGE FORGINGS

In Vittuone the group performs complex machining, treatment of large forgings and management of the rolled-steel warehouse. Your part can arrive as bar or forging and leave treated and finished to drawing.

Machining

CAD/CAM systems, CNC machines and manual stations for non-standard work on small, medium and massive components.

Turning · Boring · Grinding · Milling · Deep & peripheral drilling · Lapping · Fine boring · Straightening · Finish to drawing

Treatment of large forgings

Quenching & tempering in bogie-hearth furnaces for medium and large parts, quenching in water, oil or polymer, heavy-duty overhead cranes. Can be combined with straightening and NDT: magnetic particle, dye penetrant and ultrasonic testing.

Steel stock

Nitriding and carburizing steels 41CrAlMo7 (1.8509), 34CrAlNi7 (1.8550), 31CrMoV12 (1.8519), 18NiCrMo5. Rolled bars Ø20 to Ø290 mm, forgings Ø300 to Ø1,100 mm. Laboratory testing, UT and MT, mechanical tests, cut to size.



Bars in stock. Text source www.ttnspa.it

The TTN system Shortens procurement times for the whole group and closes the loop with finish machining after treatment.



02 Forging and machining

From ingot to finished part: open-die forging up to 35 tonnes, machining of parts up to 60 tonnes and small-to-medium components machined to drawing.



Friulforgia S.r.l. · Sedegliano (UD)

Forged, treated and finished components up to 35 TONNES

Friulforgia is the forging hub of TTN Group. Part of the group since 2010 and based in Sedegliano (Udine), it produces open-die forgings and takes them all the way to the finished component: bulk heat treatment, roughing, finishing, deep-hole drilling, 3D measurement and assembly.

Open-die forging

Two open-die presses of 25 MN and 38 MN. Shafts, rolls, discs, wheels, bushings, blocks and plates in carbon, alloy, stainless, tool, duplex and super duplex steels.

Heat treatment

Normalising, quenching in water, oil, polymer and salt, tempering, annealing, vertical treatment. With the group companies: vacuum, carburizing, nitriding, induction hardening.

35 t maximum forging weight	**14 m** maximum length	**Ø2,500** mm maximum diameter	**80** employees
66,000 m² site area, 12,000 m² covered	**25 + 38** MN · open-die presses	**€30 m** turnover	**12** certifications and approvals

Machining

	Roughing	Finishing
Vertical turning	up to Ø2,700 × 1,600 mm, 18 t	up to Ø3,600 × 3,500 mm, 40 t
Horizontal turning	up to Ø1,650 mm, 15,500 mm, 30 t	up to Ø2,400 × 20,000 mm, 60 t
Milling	13,000 × 4,500 × 1,500 mm, 80 t	15,000 × 3,500 × 1,000 mm, 40 t
Deep-hole drilling	Ø27–910 mm · length 700–25,000 mm · outer Ø up to 1,700 mm	
Honing	Ø27–650 mm · length 380–12,000 mm · outer Ø up to 800 mm	
3D measurement	Coordinate measuring machine 2,000 × 1,500 × 6,000 mm	
Assembly	Shrink fitting · welding · cladding · blasting · painting	



Horizontal turning · pump barrel · machined disc · multiple flange · machined shaft · the Sedegliano plant. Photos Friulforgia.

Typical products

Barrels, pump bodies, turbine shafts, propeller shafts, support rolls for rotary kilns, crane hook shanks, special products.

Markets

marine · hydropower · oil & gas · offshore & subsea · metallurgy · gearboxes · power generation · paper · mining

Certifications

ISO 9001 · ISO 14001 · ISO 45001 · DNV · TÜV · Bureau Veritas · Lloyd's Register · ABS · RINA · Korean Register · ClassNK · NORSOK

WE SHAPE YOUR WORLD

The TTN system Brings forging and large-part machining to the group; for nitriding, induction and coatings it relies on the other TTN companies.

Every industry, its IN-HOUSE SPECIALIST

Treatments, coatings and machining are chosen starting from the real operating conditions of the component.

Marine
Aggressive, humid environments: corrosion resistance and dimensional stability.
Friulforgia · Cinisello · TTN Navarra

Hydropower
Fluid wear, cavitation and continuous loads: surface quality is everything.
Friulforgia

Aerospace
Very tight tolerances and consistent performance in critical conditions.
TTN S.p.A. · TTN Navarra

Petrochemical & oil & gas
Corrosive media, high temperatures: surface resistance is key.
Friulforgia · TTN Veneta

Offshore
Corrosion, cyclic loads and harsh environmental stresses.
Friulforgia · TTN S.p.A.

Plastics & die casting
Dies that demand wear resistance, precision and surface quality.
TTN Veneta · CRT · TTN S.p.A.

Automotive and earthmoving
Dynamic loads, wear and repeated cycles: fatigue and dimensional stability.
TTN Veneta · TTN Navarra

Energy & wind
Large components under variable loads.
Friulforgia · Cinisello · TTN Navarra

Stamping & sheet metal
Wear, friction and galling of dies and punches.
Cinisello · CRT · TTN Piemonte

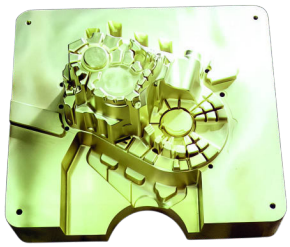
Industry needs from www.ttnspa.it; reference companies from each company's brochure.



Forged and machined shaft · Friulforgia



Induction-hardened rolls · Cinisello



PVD-coated die · CRT



Propeller shaft · Friulforgia

Induction, carburizing or NITRIDING?

All three processes harden the steel surface, each in its own way. They complement rather than replace one another: the choice starts with five questions.

1
Operating conditions
expected type of wear

2
Loads
static, dynamic, fatigue

3
Depth
required case depth

4
Tolerances
dimensions to be held

5
Steel
composition and delivery condition

	Induction hardening	Carburizing	Nitriding
Principle	Electromagnetic heating of the functional surfaces only, followed by controlled quenching	Carbon diffusion into the surface, then hardening	Nitrogen into the surface at relatively low temperature, no subsequent quenching
Hardened zone	Localised on the loaded areas	Continuous, deeper and uniform case	Surface layer, 0.05–1 mm
Distortion	Limited, highly repeatable	Managed through cycle and machining allowance	Minimal: no rapid quenching
Typical parts	Shafts, rolls, pistons, guides, power transmission parts	Gears, toothed wheels, transmission shafts	Precision shafts, hydraulics, dies, tools
When to choose it	Local hardening, high productivity	Very hard-wearing surface with a tough core	Dimensional stability comes first
In the group	Cinisello · TTN Veneta · TTN Navarra	TTN S.p.A. · TTN Veneta	TTN S.p.A. · TTN Veneta · CRT

Keeping distortion under control

Thermal gradients, microstructural transformations and residual stresses from previous machining make a part move. The group manages them before the part even enters the furnace: cycle and quenching medium, positioning and support, intermediate stress relieving, finishing allowance, dimensional checks and, if needed, straightening.

Source: technical articles on the **www.ttnspa.it** blog; nitriding depths from TTN documentation.

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One partner.

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