

NOVELIS is the world's largest producer of rolled aluminium and the global leader in beverage can recycling. We are a growth-oriented company, drawing upon our industry-leading technology and expertise to develop and deliver an expanding portfolio of premium rolled aluminium products. Novelis is an important part of the worldwide Aditya Birla Group of companies. By partnering with our customers to bring innovative products to market, by being a leader in recycling, and by operating with a mindset of sustainability, **Novelis makes the world lighter, brighter and better.**

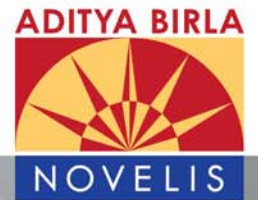
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Brighter ideas with aluminium



NOVELIS NOVELIS PAE Expert in casthouse equipment

Continuous strip casting
DC casting
Metal treatment



NOVELIS PAE

Technical expertise and innovation for aluminium casthouses

Equipment and process specialist for the aluminium industry, Novelis PAE provides technologies and services in the fields of casting and in-line molten metal treatment.

“ Novelis PAE is a global player, able to supply your entire casting line. ”

With more than 50 years' experience in these fields of expertise, NOVELIS PAE supplies several state-of-the-art technologies:

- Continuous strip casters **JUMBO 3C® - 3CM®**
- Complete DC slab and billet casting station and its automation system **AUTOPAK®**
- In-furnace metal treatment system **IRMA®**
- In-line molten metal degassers **ALPUR® - JETCLEANER®**
- In-line molten metal filters **PDBF® - CFF**



A project partner

ENGINEERING CAPABILITY

With a production background, and in some cases experience as former users of Novelis PAE equipment, our engineers are able to recommend the most suitable solutions.

CUSTOMIZED DESIGN

Working closely with our process engineers, our Design Office defines the ideal configuration for an existing casting line or a green-field project, including casthouse capacity, layout, utilities, metal flow, ancillary equipment and the best liquid metal treatment solutions.

PROJECT MANAGEMENT

The successful completion of our customers' projects requires careful planning from the preliminary engineering study through to final commissioning. A dedicated Project Manager ensures coordination between the different actors throughout construction and guarantees that production start-up will be on schedule.

AFTER-SALES SUPPORT

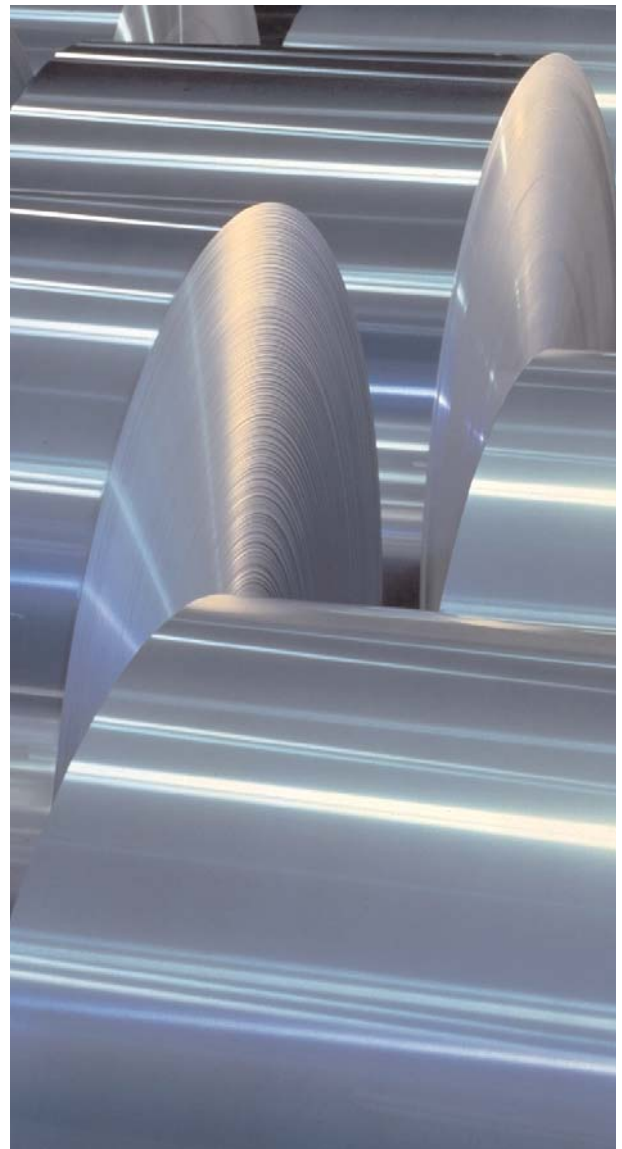
Delivering equipment is not all we do. Our collaboration with our customers extends beyond the period of guarantee. Our After-sales department will rapidly meet demands for spares and consumables, and our experienced engineers provide customers with any operating assistance required.

Ever-increasing effectiveness

The target of Novelis PAE project teams, engineers and design office technicians is **technological excellence**.

By continuously improving its technologies, Novelis PAE is able to develop **innovative solutions** suited to customer production needs.

A rigorous management system complying with environmental, health, safety and quality standards, has enabled Novelis PAE to obtain the **triple certification ISO 9001, ISO 14001 and OHSAS 18001** from Bureau Veritas Certification.



Continuous Strip Casters

Jumbo 3C[®] - 3CM[®]

Novelis PAE has unique expertise in strip roll casting, built on more than 50 years of developing the 3C[®] process.

Novelis PAE's team has gained significant expertise from internal R&D programs and from commissioning over 110 continuous casters worldwide.

Based on our extensive knowhow in equipment and process technology, we are able to offer a tailor-made project, whether it be a new caster, a revamp of an existing machine, or a casthouse turnkey project.

ON-SITE SCRAP PROCESSING

All scrap can be recycled into value-added products.

MODULAR INVESTMENT AND FLEXIBLE OPERATION

Production capacity can be progressively increased to keep pace with market demand.

LOW CAPITAL AND OPERATING COSTS

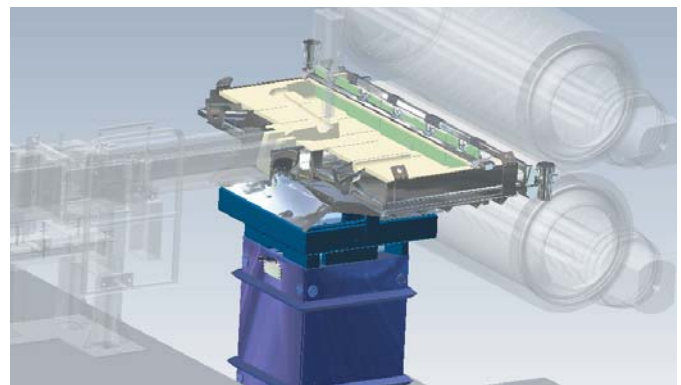
A continuous caster is an all-in-one process replacing DC casting, scalping, sawing, preheating and hot rolling. This short process reduces capital and conversion costs, including manning and energy.

SHORT LEAD TIME

As a single-step process, the continuous caster produces strip from molten metal in a much shorter time than conventional processing routes. This enables a quick response to customer demand and reduces inventory.

WIDE RANGE OF CAPABILITIES

	Jumbo 3C [®] - 3CM [®] casters
Roll diameters (mm)	500 - 620 - 840 - 960 - 1150
Maximum strip width	up to 2500 mm
Strip thickness	3 to 12 mm
Maximum coil weight	Up to 25 tons
Maximum capacity	Up to 30 000 t/year





The Jumbo 3C® - 3CM® strip casters can produce a broad variety of alloys for multiple end-uses.



This technology is available for **aluminium, magnesium, copper, zinc, lead, tin...**



Advanced proven technology for high quality strip and improved productivity

METAL FEEDING SYSTEM (PATENTED)

Taking advantage of the stability and positioning accuracy of our new tip table, our metal feeding system is designed to ensure a uniform flow and temperature field for the liquid metal across the tip width in the roll gap. The pre-shaped refractory tundish with its adjustable dam combined with an accurate metal level control system of proprietary design are key factors in controlling the strip cross profile and surface quality.

EDGE MILLER

Milling the edges of the as-cast strip on the caster greatly reduces the risk of strip breakage during the subsequent cold rolling passes. It also increases the maximum rolling reduction that can be achieved before a new edge trimming operation is needed, resulting in a higher recovery rate during downstream processing.

SUPERVISION & DATA MANAGEMENT SYSTEM

Our supervision system has three main functions guaranteeing that all key process parameters are kept within defined tolerances, thus significantly improving quality consistency:

- Setting and modification of all parameters of the casting line through user-friendly video display. The operator controls the entire casting line from the main pulpit.
- Monitoring of main casting parameters using historical and trend curves. This allows the operator to anticipate a problem before it becomes critical, by early detection of any deviation or drift of parameter values;
- Logging and archiving of casting data for each coil for quality tracking. This also ensures repeatability of the window of operation and stable product quality.

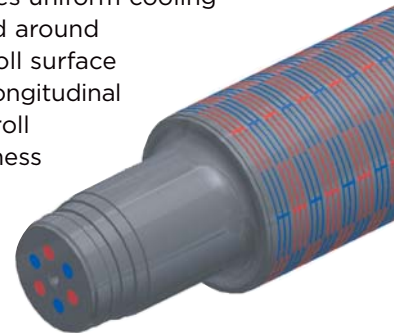
CASTER STAND EQUIPPED WITH POSITION/PRESSURE CONTROL

Our position/pressure hydraulic screwdown system represents a breakthrough compared to the old technology of casting on shims, and has the following advantages:

- Better cross-profile stability linked to the control of the separating force,
- Less thickness variation along the strip length (mechanical eccentricity compensation),
- Possibility of adjusting strip gauge during casting.

ROLL COOLING SYSTEM (PATENTED)

The 4-hole and 6-hole core with a new design for the roll cooling channels guarantees uniform cooling efficiency across the roll width and around the circumference. Homogenous roll surface temperature significantly reduces longitudinal strip thickness variation over one roll revolution. This avoids rapid thickness changes, which are difficult to correct during the downstream rolling process.



LOW PRESSURE SPRAYING SYSTEM

Roll coating is of paramount importance, as it controls heat exchange during solidification of the liquid metal. Our new low-pressure spraying system features improved spraying accuracy and automatic adjustment of gun travelling speed. This ensures a homogeneous deposit of lubricant on the casting rolls.

For more information:
pae.jumbo3C@novelis.com

Complete DC casting station and automation system

Backed by over 25 years of experience in vertical DC casting, Novelis PAE is able to propose customized solutions.

As a recognized supplier of DC casting technology, Novelis PAE can recommend solutions best adapted to customer needs and within a given budget. Novelis PAE is able to supply DC casting machines, molds, automation and supervision systems, and global engineering services for the entire casting line.

Thanks to the AUTOPAK® automation system, Novelis PAE proposes a user-friendly interface ranging from simple metal-level control in the molds to global automatic management of the entire casting line, thus ensuring safety, quality assurance and productivity.

Casting machines

Novelis PAE proposes fully automated casters consisting of:

- Sliding casting table including mold support plate and stripping grid
- Self-guided hydraulic cylinder
- Water cooling supply, with pulsing system for better start of cast
- Casting launder with utility beam supporting level control systems
- Transfer trolley and safety barriers.

All assemblies can be customized to meet all customer configurations and work conditions.



OPERATOR SAFETY

No operator action in the machine area and automatic shutdown of cast in the event of any abnormal situation.

QUALITY

Strict compliance with casting parameters and excellent repeatability.

PRODUCTIVITY

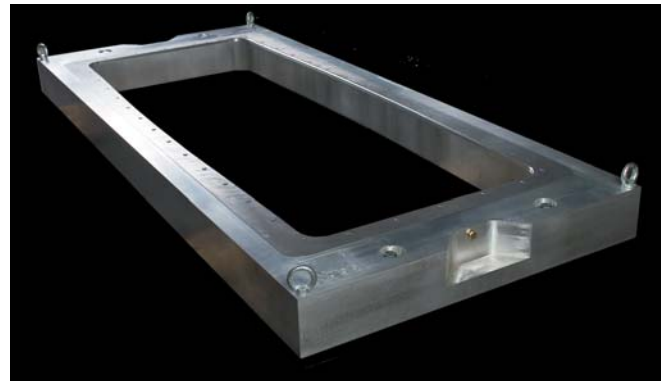
Higher recovery, shorter cycles, quick-change devices.

TRACEABILITY

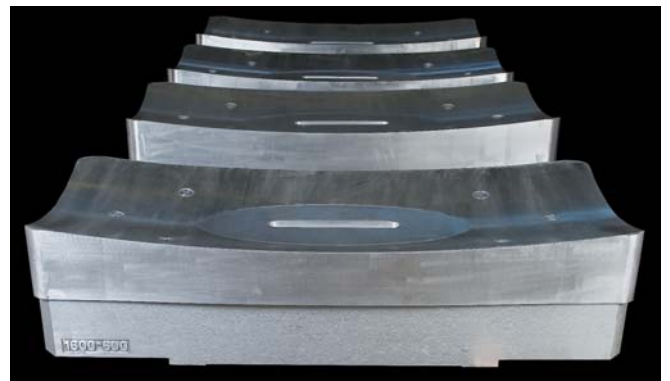
Recording of casting data provides data bases for analyses and improvement.

Mold technology

Owing to the advanced technology of our slab casting molds (fixed or variable), it is possible to cast all families of alloys, whatever their dimensions, cross-sections and lengths.



By choosing this technology the customer will benefit from the best possible compromise in terms of investment and cast product quality.





Process automation system

The process automation system can be divided into three groups of functions.

AUTOPAK®

The entirely automatic cast control function, known as AUTOPAK®. This is basically the core of the system and controls key casting parameters to eliminate operator errors and minimize process fluctuations from cast to cast.

SUPERVISION SYSTEM

The supervision system for the on-line follow-up of the cast, with a wide range of screen views and applications, depending on customer standards. This system can be connected to other PCs on site, and to the Novelis PAE office for remote diagnosis and help.

DATA MANAGER

The DATA MANAGER software for off-line follow-up and analysis. Specifically perfected over the years for aluminium casthouses, the powerful Data Manager uses a real SQL data base to manage and analyze the data and parameters from all equipment, whether it be used on a single casting line or to manage all the existing casting lines at casthouse level. It is very simple to modify set-up, recipe or alloy parameters with the rigor requested by metallurgists, to check consistency, and to keep track of changes over time via the casting reports and trends.

Data Manager - Casting controls (selection)		
Base	Set up file	Key parameters of the casting line
Production control	Alloys Manager	Type, composition of each alloy
	Recipes	Parameters of product type (alloys, size...) to ensure quality
	Reports	Parameters used and events for each cast to improve quality
Machine control	Tools Manager	Mold, starting block, sensor, actuator...
	Alarms History	Statistics, fault research
	Graphical control	Equipment: Tracking and tuning

Molten metal level control equipment

METAL LEVEL SENSOR

The level of the molten aluminium is controlled by a laser or capacitance (customer's choice) sensor using an advanced digital technology to achieve a very high degree of accuracy.

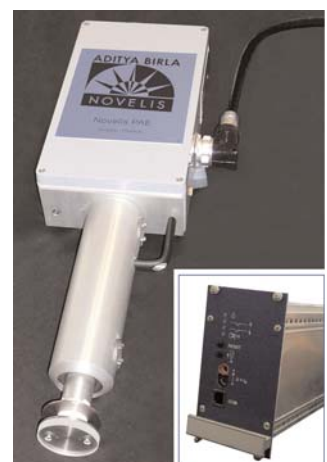
ACTUATOR

The actuator enables the flow of molten aluminium to be controlled by moving a plug in the downspout. This actuator is able to precisely position the plug by means of a position loop in the electronic control module.

NEW DIGITAL SENSOR AND ACTUATOR

Novelis PAE is now proposing an upgraded family of digital capacitance level control equipment featuring:

- Digital control cards for a better signal,
- Interface with PC for reports, diagnosis, etc.
- Improved mechanical systems,
- New signal processing allowing fewer sensor movements for an increased service life,
- Plug and play for easier module replacement.



For more information:
pae.autopak@novelis.com

In-line degassing systems

ALPUR®

Since its initial development in 1981, the ALPUR® system has been continually improved over the years.

Incorporating the numerous innovations and improvements since its introduction, the ALPUR TS® degasser is today essential for the production of high-grade aluminium.



HIGH DEGASSING EFFICIENCY

- Optimized gas dispersion within the melt
- Totally sealed vessel ensuring a permanent inert atmosphere
- Smooth melt surface without vortex effect

EASY INSTALLATION AND OPERATION

- Engineered to fit any casthouse configuration
- Tilttable vessel with lid in position

LOW MAINTENANCE COSTS

- Corrosion-free gas panel
- Extended-life vessel
- Long heater life

GOOD METALLURGICAL CONTROL

- Fast heating rate prior to cast
- High level of temperature stability during idle time

FILTRATION EFFICIENCY

- Appreciable additional benefit provided by gas dispersion

ENVIRONMENTALLY FRIENDLY

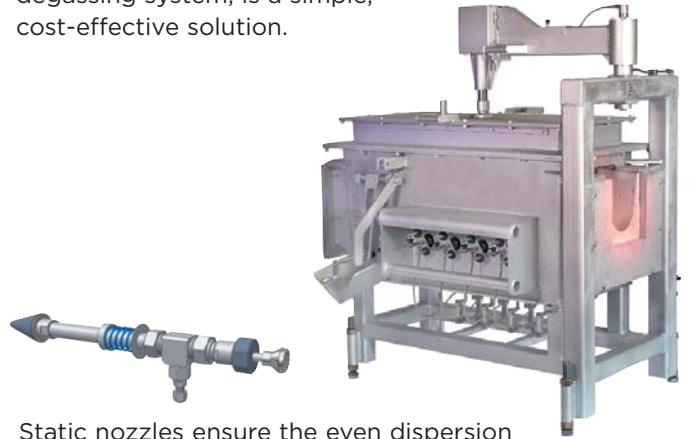
- Compliance with emission standards
- Treatment gases channeled towards treatment station

WIDE RANGE OF CAPABILITIES

ALPUR TS® models	TS 15	TS 35	TS 55	TS 60	TS 75	TS 90
Treatment capacity (t/h)	15	35	55	60	75	90
Number of rotors	1	2	2	3	3	4
Static capacity (alu)	0.8 t	1.3 t	1.8 t	2.1 t	2.9 t	3.8 t
Heating power (kW)	25	50	50	75	75	100
Dim. (mm)						
<i>Length</i>	2300	2000	2250	2670	2900	3770
<i>Width</i>	1700	2330	2500	2360	2500	2300
<i>Height</i>	2500	2600	2700	2700	2700	2900

JETCLEANER®

The JETCLEANER®, a compact in-trough degassing system, is a simple, cost-effective solution.



Static nozzles ensure the even dispersion of very fine bubbles in the melt by atomizing jets of inert gas.

MEETS MOST NEEDS

- Efficiency of degassing and inclusions removal suitable for common grades of aluminium
- **Treatment capacity 25t/h max**

EASY AND RAPID INSTALLATION

- Small size and weight, reduced floor space
- **Dimensions (L, W, H) 1550 x 950 x 1800 mm**
- No structure or foundations required
- Mounted in place of a section of the trough
- Short time required for on-site commissioning

REDUCED MAINTENANCE

- No moving parts
- Treatment trough easily and quickly replaced by drop-in refractory cartridge

EASY OPERATION

- Very limited metal retention between casts, a plus for frequent alloy changes
- No specific starting procedure
- Easy dedrossing and work conditions



Easy handling of the lid



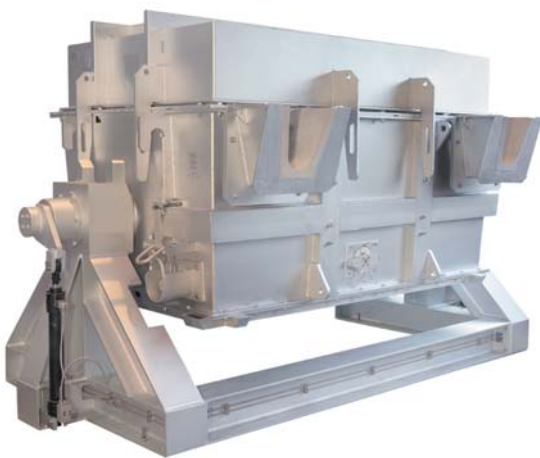
Fume exhaust system

In-line filtration units

PDBF®

The PDBF® filter meets the quality requirements of high-end products such as beverage canstock, foil-stock and lithographic sheet.

The liquid metal passes through calibrated alumina balls and grits, and the inclusions are captured by mechanical effect. The PDBF® design allows maximum filtration efficiency with low running costs thanks to its long service life.



LOW OPERATING AND MAINTENANCE COSTS

- Extended life of filter bed

HIGH FILTRATION EFFICIENCY

- High level of inclusion removal
- Filter bed composition adapted to meet the most demanding quality targets

GOOD METALLURGICAL CONTROL

- Powerful lid heating system: 3 to 9 radiant tubes
- Additional in-situ heating technology (patented): 1 to 3 mini-heaters

WIDE FILTERING CAPACITY

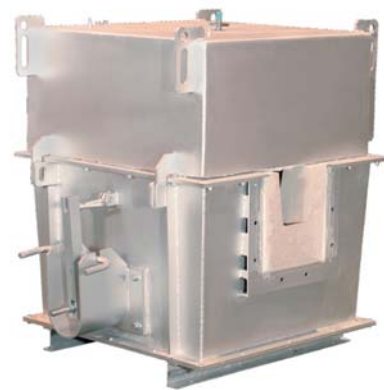
Several sizes of PDBF® are available to meet production requirements from 5 t/hour for continuous casters to 90 t/hour for large DC units.

PDBF® models	5	15	20	35	55	90
Treatment capacity (t/h)	8	15	20	35	55	90
Filter surface (dm ²)	30	60	90	141	234	351
Static capacity (alu)	0.5 t	0.8 t	1.1 t	1.7 t	3 t	4.9 t
Heating power (kW)	18	30	45	60	84	126
Dim. (mm) <i>Length</i>	1623	2130	2240	2570	2780	2800
<i>Width</i>	1570	1570	1940	2200	3000	3900
<i>Height</i>	1750	1750	1750	1800	2120	2120

CFF

The CERAMIC FOAM FILTER is a cost-effective filtration system thanks to the Novelis PAE “Tile saver” Technology.

The liquid metal flows through a porous material: ceramic foam. All grades of filter tile porosity can be used. The heating lid allows the same tile to remain immersed and to be re-used up to 10 times, thus reducing the cost of consumables.



FILTRATION EFFICIENCY

- Meeting common quality targets

LOW INVESTMENT COST

LOW OPERATING AND MAINTENANCE COSTS

SAVING ON CONSUMABLES

- “Tile saving” technology with rapid pay-back

WIDE FILTERING CAPACITY

A wide range of models has been designed to cover production requirements.

CFF models	9-12	15-17	20-23	2x20	2x23
Treatment capacity (t/h)	10	20	35	65	85
Filter surface (dm ²)	4 / 8	12 / 16	23 / 31	46	61
Static capacity (alu)	0.07 t	0.1 t	0.3 t	0.6 t	0.6 t
Heating power (kW)	10	12	15	30	30
Dim. (mm) <i>Length</i>	1150	1380	1530	1970	1970
<i>Width</i>	1000	1150	1300	1530	1530
<i>Height</i>	1350	1350	1350	1400	1400

For more information:
pae.metaltreatment@novelis.com

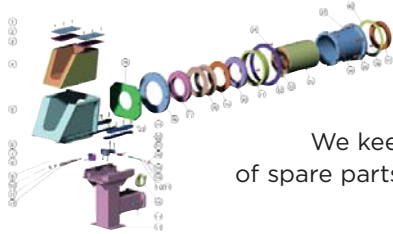
After-sales service

Spare parts & consumables

Technical support

For complete customer satisfaction, Novelis PAE offers extended after-sales services, including sales of spares and consumables, and on-site technical support.

Thanks to our team's knowledge and expertise, customers are sure of a prompt answer to their questions and rapid reception of the right part.



We keep a large inventory of spare parts to reduce lead times.

Thanks to the production background of most of our experts, we fully understand customer needs.

REACTIVITY AND RELIABILITY

A permanent large inventory guarantees the delivery of spares and consumables in the shortest possible time throughout the life of the equipment delivered.

QUALITY

We strive to continually improve our services. We ensure that customers benefit from original spare parts and from the latest technological advances.

INNOVATION

We develop user-oriented solutions and we regularly propose to our customers new innovative products.

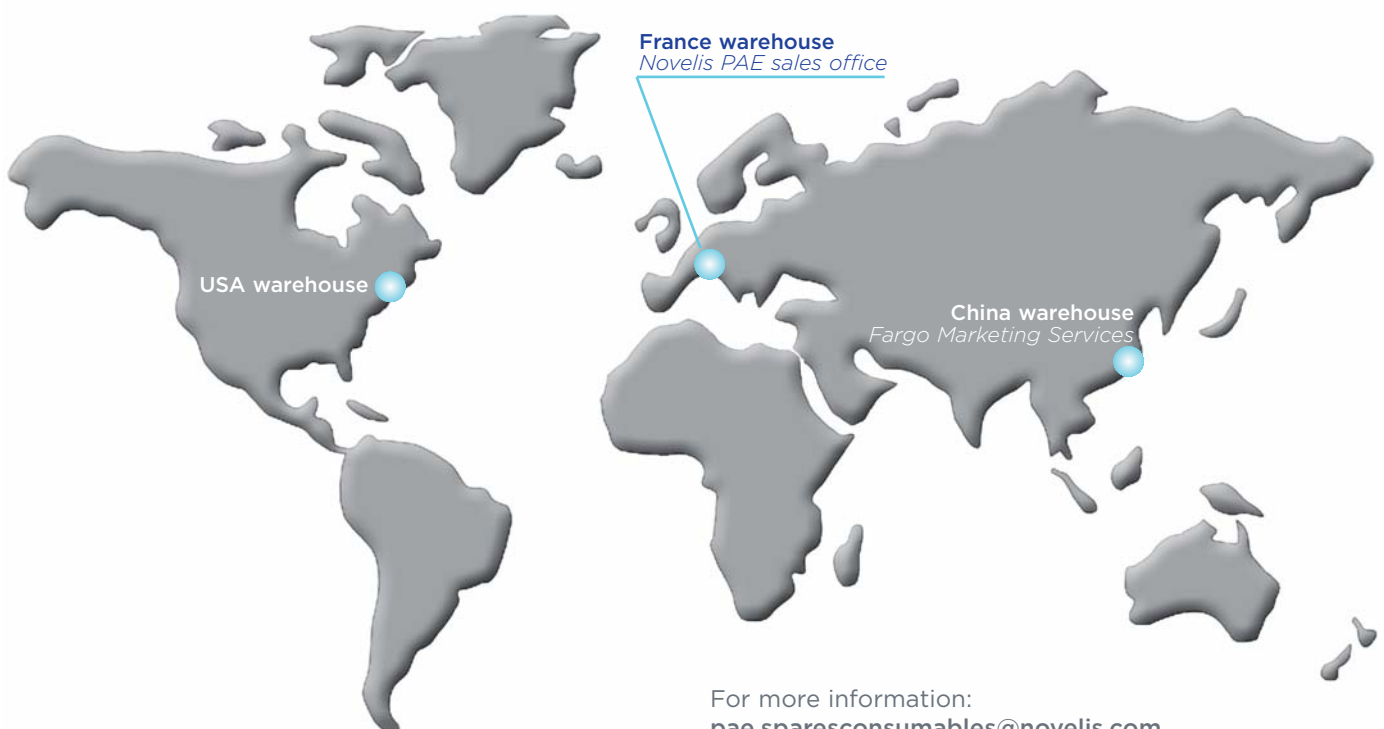
PROFESSIONAL ASSISTANCE

A multidisciplinary team is specialized in problem solving and the supply of spare parts.

SAFETY

All our deliveries take into account environmental, health and safety aspects, in compliance with the current standards in all countries.

A distribution network through various agencies is present throughout the world, close to customers' facilities...



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