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Industrial Furnaces





## WE PRODUCE::

- Industrial chamber electric furnaces
- Vacuum pressure impregnating machines
- Autoclaves with/without heating for various industries
- Test benches for electric machines
- Automated/robotised shaft surfacing machines
- Quench tanks
- Spray booths
- Equipment for electric machine repair/manufacturing shops
- Other equipment on demand

## WE PRODUCE

### Resistance furnaces:

- Drying furnaces
- Polymerisation ovens for composite materials
- Pyrolysis/annealing furnaces
- Heat treatment furnaces for metals (tempering, aging, etc.)
- Wood drying chambers
- IR ovens for drying various coatings

### Induction drying furnaces:

- Vacuum drying ovens for transformer winding
- Induction drying furnaces (IDF)

### Induction melting furnaces

## WE APPLY



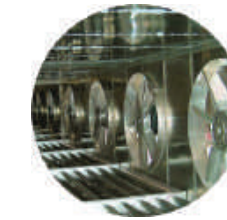
Post-coating/  
post-impregnation  
part drying



Annealing of electric  
machine winding  
insulation



Polymerisation  
of composite  
materials



Product drying



Low-and  
medium-temper-  
ature tempering  
of steel parts



Shrink fitting



Wood drying

## WE DESIGN

Our engineers can design for you any furnace, whether standard or custom-built, including:

- Steam heated furnaces
- Oil heated furnaces
- Continuous furnaces
- Other



# DRYING AND HEAT TREATMENT FURNACES



## APPLICATIONS

- Heating and drying of electric machine winding after impregnation
- Convective/IR drying of paint coating
- Dehydration of various materials
- Metal heating to relieve locked-up welding stress, aging stress, etc.
- Heat treatment of various materials



## OPTIONS & EXTRAS

- Chamber vapour concentration monitoring system up to the lower flammability limit
- Additional accessories on demand
- Continuous furnace conveyor design
- Loading system with sliding trays
- Temperature sensors to be placed at the product in the chamber
- Door domes intended to prevent gas release from the furnace into the environment
- Other options and extras on demand



## SPECIFICATIONS

Dimensions	On demand, 1000×1000×1000 mm and above
Heating system	Electric/ water/ vapour/ oil/IR heater
Chamber design	Dead-end / tunnel
Effective temperature	Max +550 °C
Adjustable rate of heating	0 - 10 °C/min
Heating temperature increment	1 °C/min
Temperature pattern deviation within the treatment zone	±5 °C
Door design	Hinged / sliding / lifting / bed-integrated
Door actuator	Manual / electromechanical
Trolley drive	Manual / electromechanical
Protection degree	IP54



# POLYMERISATION OVENS FOR COMPOSITE MATERIALS

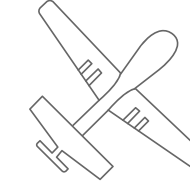
Polymerisation ovens are used to cure binders while producing articles from composite materials by vacuum or injected moulding. Besides, these are commonly used for thermal post-treatment of finished goods, to dry materials, to warm up moulds, for other purposes.



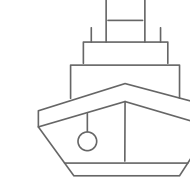
## APPLICATIONS



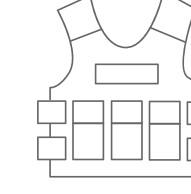
Aerospace industry



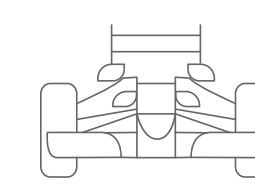
Unmanned aerial vehicles



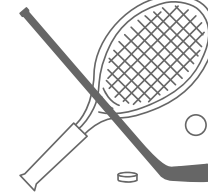
Shipbuilding



Defence industry



Automotive industry & racing



Sports gear

his equipment provides such a major advantage as uniform temperature distribution within the chamber ensured by the effective air recirculation system of our own design, which significantly reduces the time required to reach the desired temperature in the furnace. Therefore, the chamber gets warmed up sooner and heat is evenly distributed throughout the internal chamber space, thus precluding formation of hot and cold areas.

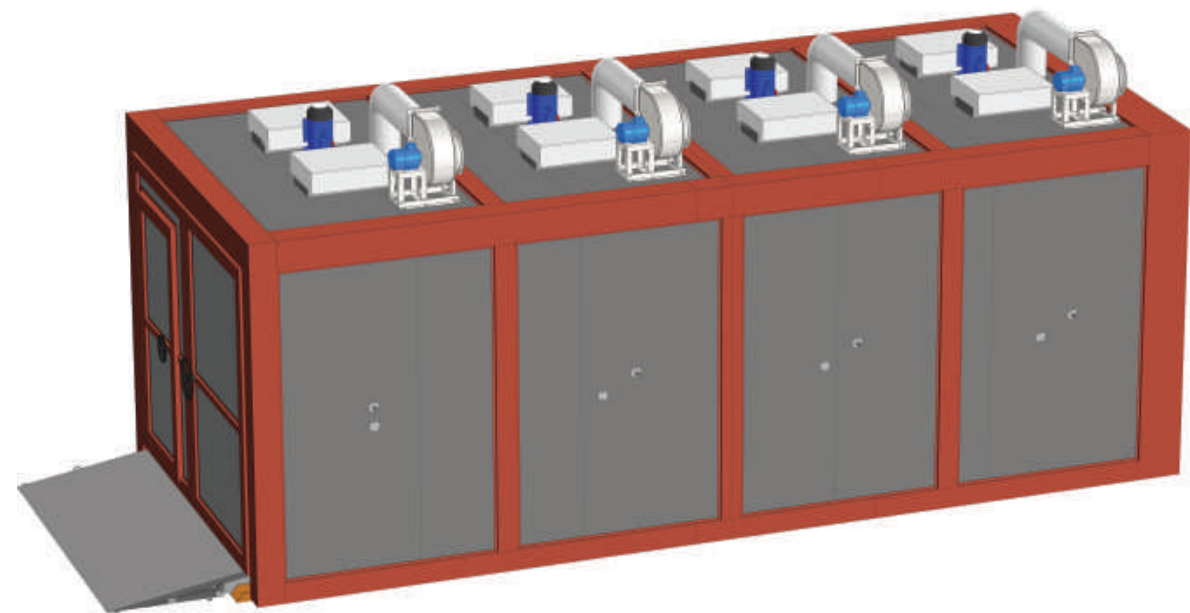
## Specifications

Dimensions	On demand
Heating system	Electric heater
Chamber design	Dead-end / tunnel
Effective temperature	0 - 10 °C/min
Adjustable rate of heating	0 - 10 °C/min
Adjustable rate of cooling	0,1 °C/min
Heating temperature increment	Max. ±2 °C
Temperature pattern deviation within the treatment zone	Hinged / sliding / lifting
Door design	Manual / electromechanical
Door actuator	Manual / electromechanical
Trolley drive	



## FEATURES

- High-performance forced recirculation system for uniform temperature distribution within the chamber
- Adjustable heating and cooling rates
- Vacuum bags with inlets for binder and vacuum – for vacuum forming/vacuum injected moulding (VARTM) processes
- Possibility to place any number of temperature sensors at the product with easy connection in the chamber and readings displayed at the operator's touch screen
- Easy-to-use loading system based on a rail track mounted inside and outside the chamber, or a flat-bed chamber with a material handling trolley
- Adaptive control system tailored to the customer's needs respecting its functions and interface. The control system supports integration with the infusion module under common control
- SCADA-based control system for remote condition monitoring with the possibility to generate process charts and protocols as required



## OPTIONS

- Vacuum system to create vacuum in the process bag as required
- Infusion system to depressurise the process space so as to impregnate reinforcement materials and facilitate resin intake



# PYROLYSIS/ANNEALING FURNACES

The pyrolysis/annealing furnaces are designed for controlled thermal decomposition of organic insulation of electric machine winding in low-oxygen atmosphere (pyrolysis process).

These are used to remove winding during overhauling at electric machine repair and service facilities.



## Features

Pyrolysis process (controlled thermal destruction of insulation materials under anaerobic conditions)

- Monitoring of oxygen (O<sub>2</sub>) concentration in the furnace
- Internal furnace pressure monitoring and keeping below the ambient
- Safety valve to protect the furnace against internal overpressure



## ADVANTAGES

- Less efforts to remove electric machine winding
- Advanced production technology, better repair quality
- Personnel safety – no harmful exposure during destruction of windings
- Eco-friendly – three-stage afterburner to burn organic matter pyrolysis products at high temperatures
- Safety – multilevel accident prevention and monitoring system
- Control system that allows assigning annealing conditions to certain types of insulation materials and loaded weights; pre-set annealing programmes created by Volna company based on its expertise in using such type of furnaces



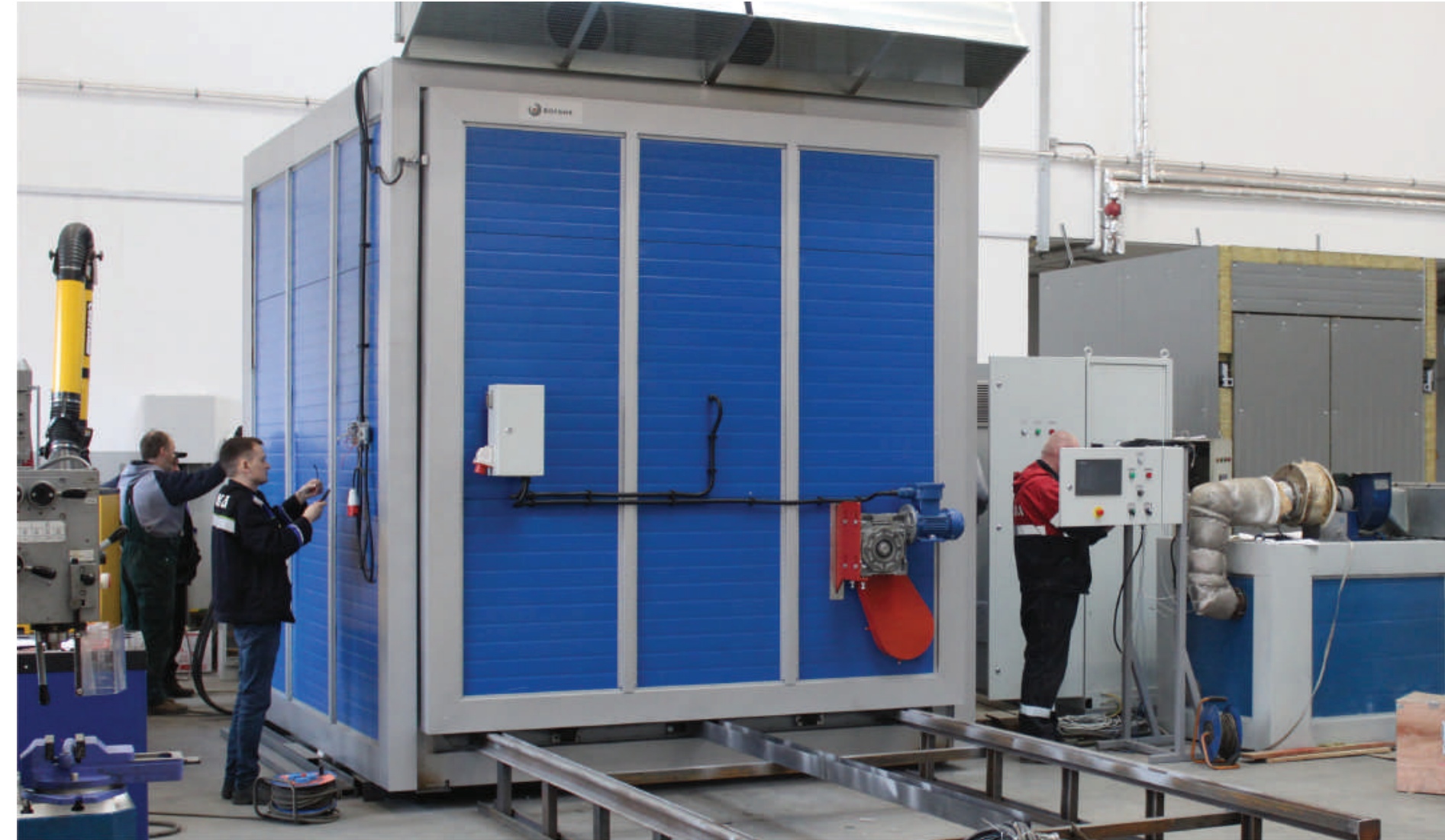
## Specifications

Dimensions	On demand
Heating system	Electric heater
Chamber design	Dead-end / tunnel
Effective temperature	Max +400 °C or higher, when required
Heating temperature increment	1 °C/min
Temperature pattern deviation within the treatment zone	Max ±10 °C
Afterburner temperature	Max +900 °C
Door design	Hinged / sliding / lifting / bed-integrated
Door actuator	Manual / electromechanical
Trolley drive	Manual / electromechanical



# INDUCTION DRYING FURNACES

Induction drying furnaces are intended to dry and pre-heat various items, including electric machine winding, in the air at up to +280 °C in stationary conditions, through energy loss on internal wall magnetization. These are most efficient for post-impregnation drying of electric machine winding, having no red-hot electric heating elements or NiCr (FeCrAl) coils that can ignite solvent vapours extracted from the impregnating compound by drying.



## FEATURES

- Minimum heating circuits with process chamber surface itself being the heating surface which ensures → uniform and gradual heating
- Fire safety with the wall (being the heating element) temperature not much above the process temperature in the chamber
- Modern heat insulation and intelligent heating control system → energy saving, energy consumption lower by 20 % to 40 %
- Safety: as flammable gas concentration reaches the explosive limit, heating stops and the furnace turns into the ventilation mode to remove the flammable gas → flammable gas concentration monitor

## Specifications

Dimensions	On demand
Heating system	Induction
Chamber design	Dead-end / tunnel
Effective temperature	Max +280 °C
Heating temperature increment	1 °C/min
Temperature pattern deviation within the treatment zone	Max. ±5 °C
Door design	Hinged / sliding / lifting / bed-integrated
Door actuator	Manual / electromechanical
Trolley drive	Manual / electromechanical



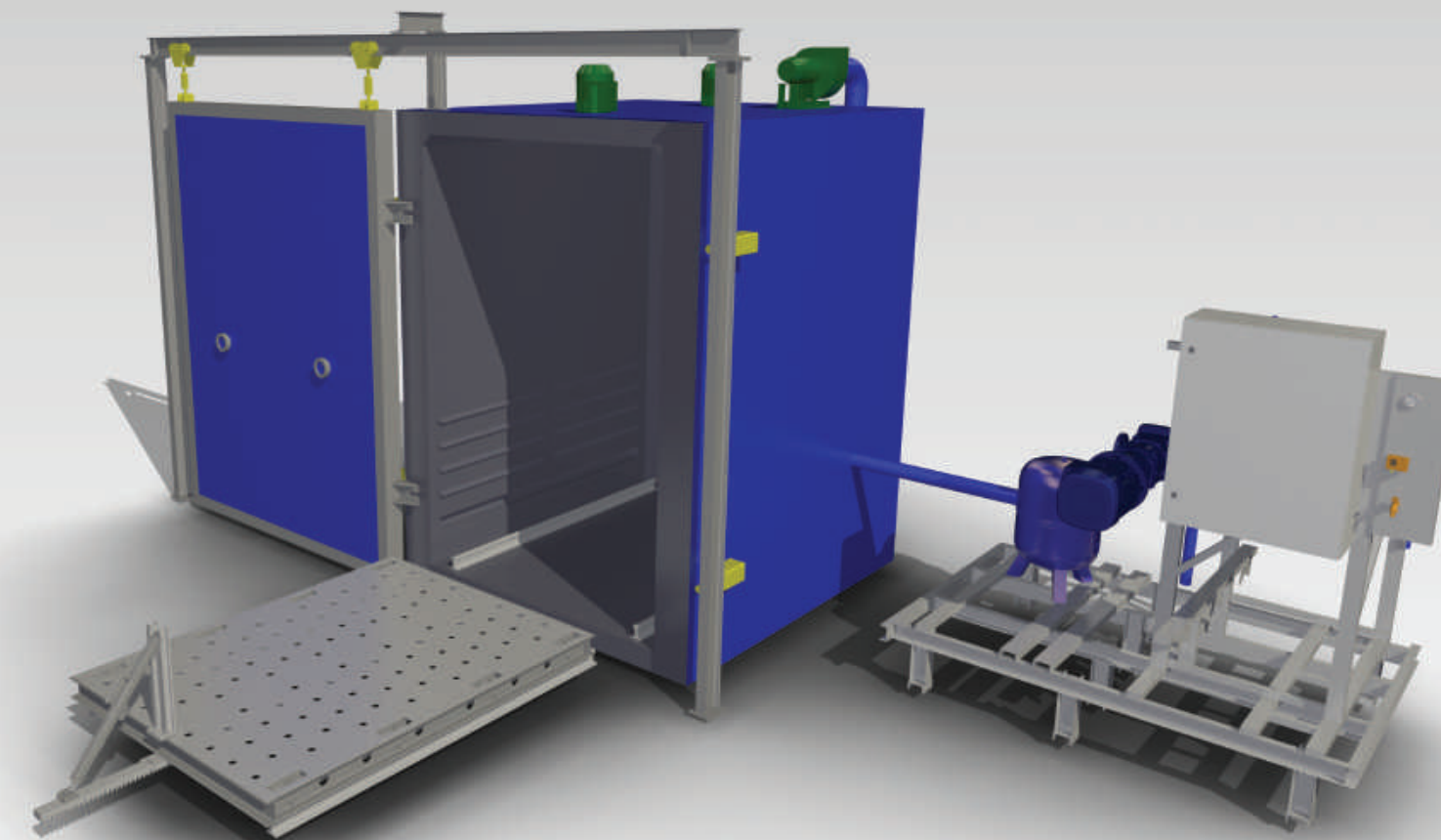
# VACUUM DRYING OVENS FOR TRANSFORMER WINDING

Vacuum drying ovens for transformer winding are mainly used to dry active parts (winding) of oil-immersed transformers with oil-paper insulation, may be used for deep drying of electric machine windings, as well as for drying wood, powders and other materials subject to quick and efficient removal of water or any other vaporizing fluid.

Vacuum drying is the most efficient method to dry active parts (winding) of electric machines. It involves active part preheating up to 100-110 °C with subsequent vacuumisation of the furnace chamber. Thereupon moist comes out of the deep insulation layers to be vaporised and removed from the furnace chamber. Thus the drying process takes 3-4 times less time.

## Specifications

Dimensions	On demand
Heating system	Electric (induction) / convection (oil heater)
Chamber design	Dead-end / tunnel
Effective temperature	Max +120 °C or higher, when required
Process chamber vacuum	0,4 kPa
Heating temperature increment	1 °C/min
Temperature pattern deviation within the treatment zone	±5 °C
Door design	Side sliding / lifting
Door actuator	Manual / electromechanical
Trolley drive	Manual / electromechanical



## ADVANTAGES

- More intensive evaporation than by hot air drying or natural drying
- Applicability of several winding drying quality assessment techniques: by the end of water extraction, by winding insulation resistance, or by the chamber vacuum drop test
- Transformers may be oil-immersed under vacuum, so that oil would fill the insulation pores before they are exposed to damp air



# INDUCTION MELTING FURNACES

Induction melting furnaces are intended to melt, superheat and refine molten steel, cast iron and non-ferrous metals. Such devices are used in metallurgy, engineering, agriculture, railways, shipbuilding, aircraft building, etc.



## ADVANTAGES

- Uniform and gradual heating thanks to the minimum number of heat transfer circuits, metal itself being heated by eddy currents
- Multilevel protection and monitoring system to maintain minimum cooling water pressure, nominal power supply voltage, desired shutdown time
- Control cabinet with an operator's panel in immediate proximity to the furnace to control the power of the furnace elements and program the heating process
- Control system (PCS) for automated control of the melting process according to the preset programme
- Automatic dumping actuator of the melting block with a control panel and manual dumping option in case of power shutoff

## Технические характеристики

Dimensions	On demand
Heating system	Electric (induction)
Chamber design	Pot-type
Pot volume (kg)	10 – 1 000
Pot type	Rammed
Effective temperature (°C)	1400 – 1 800
Melting rate (kg/h)	140 – 1 100
Inductor cooling	Water cooling
Furnace tilter type	Electromechanical / hydraulic / manual





# CHAMBER FURNACE CONTROL SYSTEMS

Volna Automation offers full-cycle development of industrial controller based control systems. The control systems can set thermal treatment conditions of any complexity level:

- Precise temperature adjustment and maintenance
- Adjustment of temperature change rate in each heating zone
- Quick change of conditions to treat different kinds of products
- Adjustment of heating performance
- Process visualisation, monitoring and remote control by operator's touch screen and SCADA
- Event logging and reporting on Customer's demand

Using of the Process Control System (PCS) during thermal treatment improves product quality.



# SERVICES

Technical consulting

Installation supervision, commissioning and start-up

Diagnostics, maintenance

Upgrading

Delivery

Selling of spare parts and components

Service

On-site training on operation and maintenance of equipment



# DOCUMENTS

In-house production certificate

Certificate of Conformity to Customs Union Technical Regulation "On the Safety of Machines and Equipment" (CU TR 010/2011); Certificate of Conformity to Customs Union Technical Regulation "On the Electromagnetic Compatibility of Technical Devices" (CU TR 020/2011)

Operating documents including a furnace manual as well as installation, operation and maintenance guidelines