



THERMAL PROCESS-TECHNOLOGY

NON-FERROUS-METAL:

MELTING
DOSING
HOLDING
HEAT TREATING



Furnaces and Equipment for

MELTING | DOSING | HOLDING | POURING
PREHEATING | DRYING | CURING
DE-CORING | SOLUTION ANNEALING | AGEING



Lightweight construction is considered one of the key technologies for many industrial sectors, in particular for the automotive or aircraft construction. Lightweight materials made of non-ferrous metals are therefore becoming increasingly important. The demands on the components and structures used in lightweight construction are continuously increasing.

A prerequisite for the manufacture of innovative cast products is the use of modern furnace concepts in all relevant stages of the process chain, starting with the melting of the materials, the mould construction, the de-coring and the subsequent heat treatment of the components. The goal: cast products with optimum material quality.

The demands on the required furnace systems are high: precise and controlled temperature management, high energy efficiency, long service life, flexible use, sophisticated safety technology, digital monitoring units and documentation systems.

THERMCONCEPT has decades of experience in the development, design and manufacture of high-performance industrial furnaces and plants for foundries. Our innovative engineering results in strong products and practical solutions, individual concepts that meet even the highest demands for efficiency, temperature control and documentation.

Engineering

Our highly qualified engineers and technicians, hard- and software engineers and mechanics work out cost-effective and reliable solutions. A close contact to the user enables us to design furnaces that are practical to operate. Our aim is to provide crucial technical and economic benefits.

Flexibility and speed

Many applications can be solved with our standard furnace range. Your advantages: Sophisticated equipment, prfurnace in practice with excellent price/performance ratio and short delivery times. Of course we also deliver furnace systems especially tailored to your application. In close coordination with you a furnace system is created, which will meet your demanding tasks reliably and economically.

Automation and Industry 4.0

The need for automation in all areas of production is increasing constantly. THERMCONCEPT supplies adapted automated systems for batch handling. We are just as familiar with linear handling as we are with robot supported systems. For monitoring, control and regulation of heat treatment processes we use sophisticated software and hardware components. Machine communication and technical assistance worldwide is part of our service profile.

Global Sales and Service Network

THERMCONCEPT furnaces prove their worth in daily use at satisfied customers in many countries around the world. Our international distribution network guarantees our customers individual support, fast reaction times and qualified service on site.

THERMCONCEPT *powered by innovation*

THERMCONCEPT furnaces and industrial heat treatment plants stand for:

- TOP-Qualität and sophisticated technology
- Practical and service-friendly constructions
- Customer-specific and application-oriented solutions
- Highest possible thermal efficiency and economy
- Environmentally compatible materials
- Professional service, plant support and assurance of a reliable operation

THERMCONCEPT is your partner for high performance furnaces and plants for versatile and demanding applications in production and research in the world of foundries.





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High-performance furnaces in industrial use



Furnace systems for foundry industry

THERMCONCEPT manufactures a comprehensive range of furnaces and equipment for foundries of non-ferrous metals. The furnace systems are characterised by a very high quality and optimum energy efficiency. Depending on the requirements, electrically or gas heated furnaces are used. The THERMCONCEPT range of furnaces covers the process steps melting/heat holding/dosing as well as the heat treatment tasks before and after casting.

Furnaces and plants for melting – holding – dosing

- Electrically and gas-heated tilting crucible furnaces
- Electrically and gas-fired bale-out crucible furnaces



Furnaces and plants for heat treatment of cast products

- Chamber, bogie hearth, drop shaft and continuous furnaces
- Solution annealing, ageing, tempering of aluminium



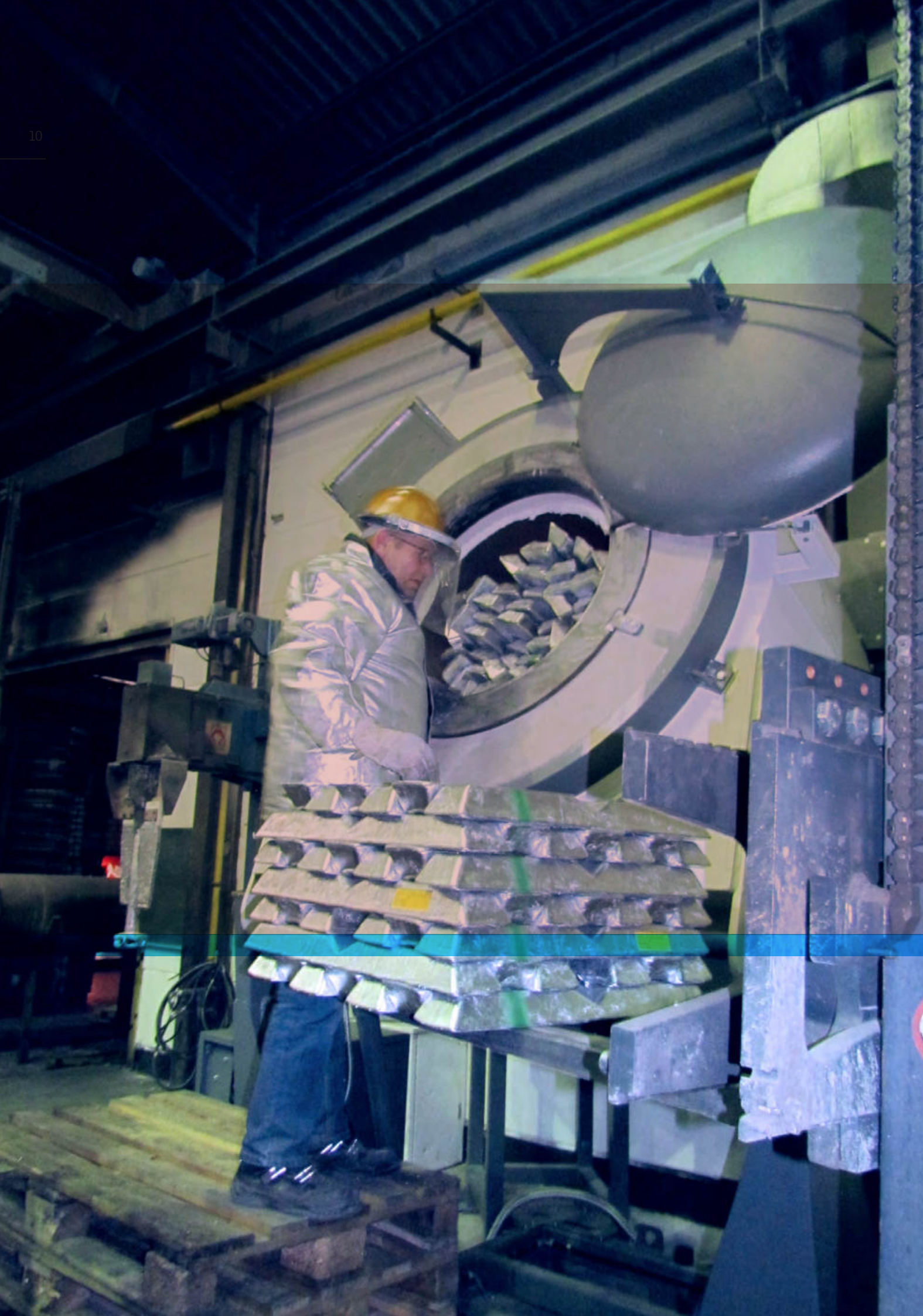
Furnaces for peripheral processes around the casting process

- Drying and preheating of cores, moulds and tools
- Waxing and firing ceramic moulds
- Flash Fire Process
- Core removal from castings

Process control and plant peripherals

- Control engineering and process documentation
- Plant automation
- Exhaust air purification systems





Furnaces for melting,
holding and dosing

Tilting crucible furnaces

Electrically heated | Fuel heated

Tilting crucible furnaces

Electrically heated



When a high quality melt and a high melting performance are required, electrically heated tilting furnaces are the first choice.

At the same time, these models offer a high level of energy efficiency and are suitable for both for pre-melting as well as for direct pouring into the mould.

With precise regulation of the tilting speed and accurate temperature control, electrically heated tilting furnaces are versatile applicable. They can be moved to other locations without much effort.

The installation of an exhaust system is not necessary. Operation is noiseless. THERM-CONCEPT tilting furnaces with electric heating are equipped with high-quality insulating materials and are characterised by extremely low heat losses.

TA 600/12/K tilted

Technical features

- Robust furnace constructions
- Comfortable working on the furnace due to very low outer wall temperature
- Low energy consumption, low electricity costs due to excellent thermal insulation
- Low heat loss, excellent efficiency
- High-quality heating elements mounted on ceramic support tubes, with free heat radiation into the furnace chamber and high energy efficiency
- Low surface load of the heating elements for reduced wear and longer service life
- Uniform heating of the melt and the crucible through 3-sided heating of the crucible ensures excellent metal quality
- Crucible optimally protected by refractory concrete cover plate, removable for inspection and repair work
- Ladle hole rim covered with heat-resistant cast iron ring, thus protected from damage
- Cast iron ring embedded in cover plate
- Standard crucibles of well-known brand manufacturers included in the scope of delivery
- Heating elements can be replaced individually and very easily
- Practical emergency outlet for safe discharge of the melt in the event of crucible leakage
- Connecting cable between switchgear and furnace in protective metal conduit, optimum protection against damage
- Low maintenance costs

Also available as holding furnaces with lower connected loads

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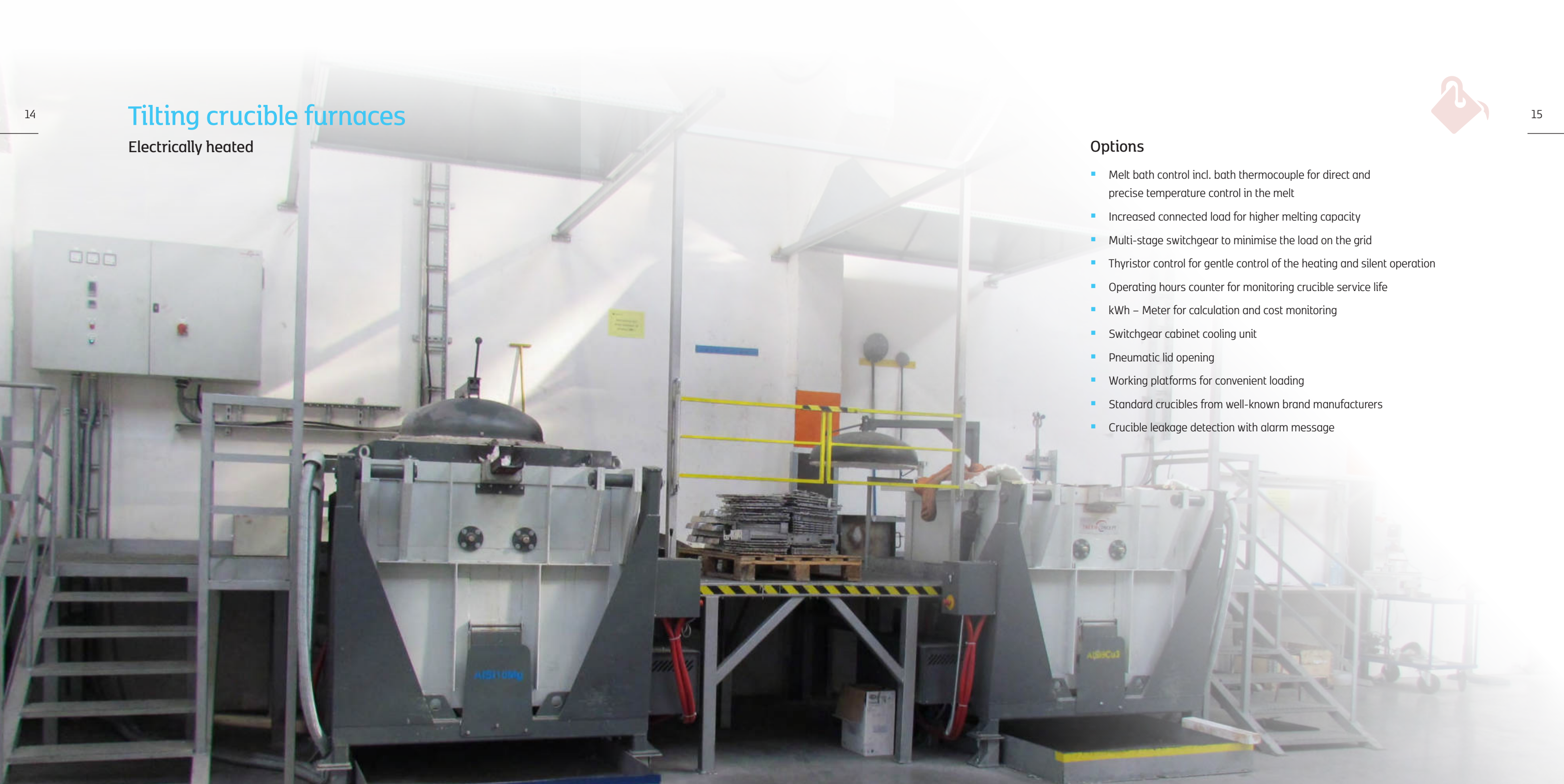


Photo right: Spout in the tilting axis for precise pouring stream
Photo below: Cast iron ring to protect the crucible rim



Tilting crucible furnaces

Electrically heated



Options

- Melt bath control incl. bath thermocouple for direct and precise temperature control in the melt
- Increased connected load for higher melting capacity
- Multi-stage switchgear to minimise the load on the grid
- Thyristor control for gentle control of the heating and silent operation
- Operating hours counter for monitoring crucible service life
- kWh – Meter for calculation and cost monitoring
- Switchgear cabinet cooling unit
- Pneumatic lid opening
- Working platforms for convenient loading
- Standard crucibles from well-known brand manufacturers
- Crucible leakage detection with alarm message

TECHNICAL DATA

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Model	Crucible	Capacity		Melting power*		Power	Tmax	External dimensions [mm] Width x depth x height
		kg Al	kg Cu	kg/h Al	kg/h Cu		Furnace chamber	
TA 30/12/K	A 70	20		32		18	1200	1660 x 1240 x 2020
TA 50/12/K	A 150	45		43		21	1200	1600 x 1400 x 1250
TA 100/12/K	A 300	90		58		26	1200	1840 x 1530 x 2500
TA 200/12/K	TP 287	180		130		54	1200	2100 x 1400 x 2700
TA 350/12/K	TP 412	330		160		67	1200	2000 x 1650 x 3150
TA 600/12/K	TP 587	570		210		82	1200	2150 x 1900 x 3570
TA 800/12/K	TBN 800	750		260		103	1200	2420 x 1960 x 3600
TK 70/13/K	A 70	20	70	32	47	18	1300	1660 x 1240 x 2020
TK 150/13/K	A 150	45	150	43	63	20	1300	1600 x 1400 x 1250
TK 300/13/K	A 300	90	300	58	84	26	1300	1840 x 1530 x 2500
TK 500/13/K	TP 287	180	550	130	190	54	1300	2100 x 1400 x 2700

Other sizes on request
Height without lid to top edge of collar plate.
*The melting capacity refers to normal industry use in continuous operation with at least 30 % molten metal (swamp) in the crucible. The furnace chamber temperature is at least 50°C above the set melting temperature.



Tilting crucible furnaces

Fuel heated

When it comes to high melting performance, gas-fired melting furnaces with exhaust gas routing via the crucible rim are the first choice, whether as pre-melting furnaces or also for direct casting into the mould. The excellent insulation as well as the favourable burner arrangement result in the best possible performance values with high Energy efficiency.

For use as a holding furnace with liquid material input, the burner output is reduced.

In the version with lateral flue gas routing, the quality of the melt is increased.

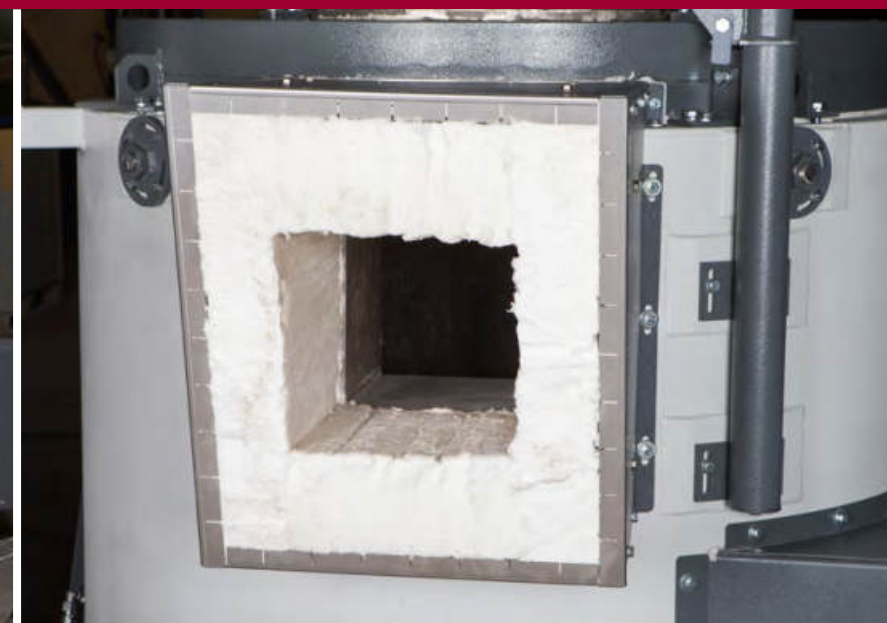
The gas-fired tilting furnaces are also characterised by low-noise operation.

Technical features

- Robust furnace constructions
- Oil or gas-fired with high melting capacity
- Safe pouring through the use of 2 hydraulic cylinders with end bearing dampers on the tipping frame
- Precise dosing and thus uniform pouring
- Low energy consumption, low fuel costs due to excellent thermal insulation
- Low heat loss due to high-quality furnace insulation
- Powerful, modern Weishaupt burners with safe, optimised flame monitoring and quiet operation
- Delivery with gas line incl. pressure regulator, gas filter, pressure gauge and solenoid valves



- Uniform heating of the melt and the crucible due to circulating flame guidance
- Crucible optimally protected by refractory concrete cover plate
- Ladle hole rim covered with heat-resistant cast iron ring, thus protected from damage
- Practical emergency spout
- Side flue on models TAG 180/12/K – TAG 1000/12/K
- Exhaust gas routing over crucible rim models TKG 400/14/K - TKG 600/14/K, lateral exhaust gas routing available as an option



Tilting crucible furnaces

Fuel heated



Options

- Melt bath control incl. bath thermocouple for direct and precise temperature control in the melt
- Gas – Meter for calculation and cost monitoring
- Working platforms for convenient loading
- Pneumatic lid opening
- Switchgear cabinet cooling unit
- Standard crucibles from well-known brand manufacturers
- Crucible leakage detection with alarm message



Furnace system consisting of 2 identical tilting crucible furnaces equipped with special hydraulics and control for very fine dosing of the pouring quantity

TECHNICAL DATA

Model	Crucible	Capacity		Melting power ^a		Power	Tmax	External dimensions [mm]			
		kg Al	kg Cu	kg/h Al	kg/h Cu			Furnace chamber	Width 1	Width	Depth
TAG 180/12/K	TP 287	180		220		300	1200	2900	2100	1600	3450
TAG 330/12/K	TP 412	330		240		300	1200	3000	2200	1700	3730
TAG 370/12/K	TP 412 H	370		260		300	1200	3000	2200	1700	3830
TAG 570/12/K	TP 587	570		400		390	1200	3200	2400	2100	4070
TAG 750/12/K	TBN 800	750		420		450	1200	3300	2500	2250	4270
TAG 1000/12/K	TBN 1100	1000		450		450	1200	3300	2500	2250	4450
TKG 400/14/K	TP 723		400		330	400	1400	2800	2000	1600	3400
TKG 500/14/K	TP 843		500		360	400	1400	2800	2000	1600	3400
TKG 600/14/K	TP 287		550		380	400	1400	2900	2100	1600	3500

Other sizes on request
Width l incl. side-mounted burner – height without lid to top edge of collar plate.
^aThe melting capacity refers to normal industry use in continuous operation with at least 30 % molten metal (swamp) in the crucible. The furnace chamber temperature is at least 50°C above the set melting temperature.





Furnaces for melting,
holding and dosing

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Bale-out crucible furnaces

Electrically heated – Fuel heated

Bale-out crucible furnaces

Electrically heated



Technical features

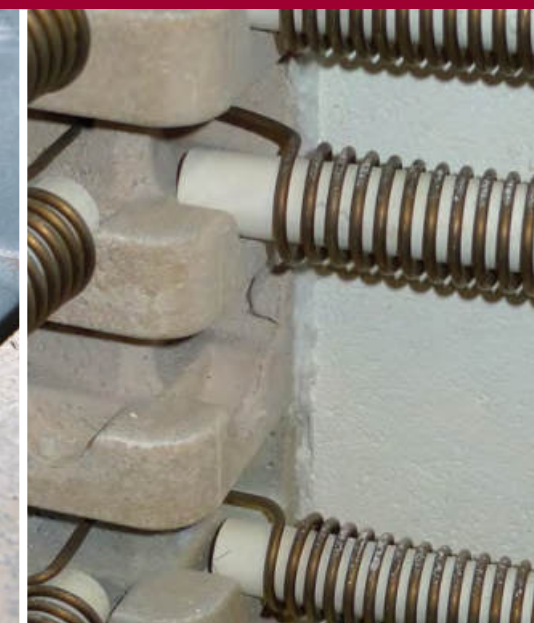
- Robust furnace constructions
- Good accessibility to the melting bath due to small external dimensions
- Comfortable working on the furnace due to very low outer wall temperature
- Low energy consumption, low electricity costs due to excellent thermal insulation
- Low heat loss, excellent efficiency
- High-quality heating elements mounted on ceramic support tubes, with free heat radiation into the furnace chamber and high energy efficiency.
- Low surface load of the heating elements for reduced wear and longer service life
- Very uniform heating of the melt and the crucible due to all-round heating from 4 sides of the crucible ensures an excellent metal quality.
- Crucible optimally protected by refractory concrete cover plate, removable for inspection and repair work
- Ladle hole rim covered with heat-resistant cast iron ring and protected from damage
- Cast iron ring embedded in cover plate
- Heating elements can be replaced individually and very easily
- Practical emergency outlet for safe discharge of the melt in the event of crucible leakage
- Connecting cable between switchgear and furnace in protective metal conduit, optimum protection against damage
- Low maintenance costs

Also available as holding furnaces with lower connected loads



Photos left:
Lid mechanism

Photo right:
Emergency outlet



Bale-out crucible furnaces

Electrically heated

Options

- Melt bath control incl. bath thermocouple for direct and precise temperature control in the melt
- Increased connected load for higher melting capacity
- Multi-stage switchgear to minimise the load on the grid
- Thyristor control for gentle control of the heating and silent operation
- Operating hours counter for monitoring crucible service life
- kWh – Meter for calculation and cost monitoring
- Switchgear cabinet cooling unit
- Pneumatic lid opening
- Standard crucibles from well-known brand manufacturers
- Crucible leakage detection with alarm message
- Special collar plate and lid for pulling the crucible with subsequent pouring



TECHNICAL DATA

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Model	Crucible	Capacity		Melting power*		Power	Tmax	External dimensions [mm] Width x depth x height	Model	Crucible	Capacity		Melting power*		Power	Tmax	External dimensions [mm] Width x depth x height
		kg Al	kg Cu	kg/h Al	kg/h Cu						kg Al	kg Cu	kg/h Al	kg/h Cu			
TA 30/11	A 70	20		34		18	1100	860 x 860 x 840	TK 70/12	A 70	30	105	34	47	18	1200	860 x 860 x 810
TA 50/11	A 150	45		42		20	1100	980 x 980 x 850	TK 150/12	A 150	60	210	42	63	20	1200	860 x 860 x 870
TA 100/11	A 200	90		58		27	1100	980 x 980 x 920	TK 300/12	A 300	105	335	58	84	26	1200	1010 x 1010 x 910
TA 200/11	BU 200	200		130		53	1100	1160 x 1160 x 890	TK 500/12	BU 200	185	625	130	190	54	1200	1160 x 1160 x 950
TA 300/11	BU 300	300		140		63	1100	1250 x 1250 x 1050									
TA 350/11	BU 350	350		150		68	1100	1250 x 1250 x 1150	TK 70/13	A 70	30	105	34	47	18	1300	860 x 860 x 840
TA 500/11	BU 500	500		170		72	1100	1320 x 1320 x 1180	TK 150/13	A 150	60	210	42	63	20	1300	980 x 980 x 850
TA 600/11	BU 600	600		210		83	1100	1320 x 1320 x 1310	TK 300/13	A 300	105	335	58	84	26	1300	980 x 980 x 920
TA 800/11	BU 800	800		260		102	1100	1430 x 1430 x 1420	TK 500/13	BU 200	185	625	130	190	54	1300	1160 1160 x 890

Other sizes on request
Height without lid to top edge of collar plate

* The melting capacity refers to normal industry use in continuous operation with at least 30 % molten metal (swamp) in the crucible. The furnace chamber temperature is at least 50°C above the set melting temperature.

Bale-out crucible furnaces

Fuel heated



Technical features

- Robust furnace constructions
- Oil or gas-fired with high melting capacity
- Low energy consumption, low fuel costs due to excellent thermal insulation
- Low heat loss due to high-quality furnace insulation
- Powerful, modern Weishaupt burners with safe, optimised flame monitoring and quiet operation
- Delivery with gas line incl. pressure regulator, gas filter, pressure gauge and solenoid valves
- Uniform heating of the melt and the crucible due to circulating flame guidance
- Crucible optimally protected by refractory concrete cover plate
- Ladle hole rim covered with heat-resistant cast iron ring, thus protected from damage
- Practical emergency spout
- Side exhaust outlet on models TAG 200/12 – TAG 600/12
- Exhaust gas routing over crucible rim for models TAG 100/14 – TAG 600/14 (Side exhaust outlet available as an option)



Bale-out crucible furnaces

Fuel heated



Options

- Melt bath control incl. bath thermocouple for direct and precise temperature control in the melt
- Gas - Meter for calculation and cost monitoring
- Working platforms for convenient loading
- Pneumatic lid opening
- Switchgear cabinet cooling unit
- Standard crucibles from well-known brand manufacturers
- Crucible leakage detection with alarm message
- Special collar plate and lid for manual crucible extraction and subsequent pouring



TECHNICAL DATA

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Model	Crucible	Capacity		Melting power*		Power	Tmax Furnace chamber	External dimensions [mm] Width x depth x height	Model	Crucible	Capacity		Melting power*		Power	Tmax Furnace chamber	External dimensions [mm] Width x depth x height
		kg Al	kg Cu	kg/h Al	kg/h Cu						kg Al	kg Cu	kg/h Al	kg/h Cu			
TAG 200/12	BU 200	200		140		180	1200	2100 x 1300 x 1100	TKG 100/14	A 100	30	100	90		210	1400	1900 x 1100 x 700
TAG 250/12	BU 200	250		140		180	1200	2100 x 1300 x 1100	TKG 150/14	A 150	45	150	100		210	1400	1950 x 1100 x 800
TAG 300/12	BU 300	300		150		210	1200	2100 x 1300 x 1300	TKG 400/14	A 400	120	400	300		300	1400	2100 x 1300 x 1100
TAG 350/12	BU 350	350		220		300	1200	2100 x 1300 x 1300	TKG 500/14	A 500	150	500	320		320	1400	2100 x 1300 x 1100
TAG 500/12	BU 500	500		270		300	1200	2250 x 1450 x 1300	TKG 600/14	A 600	180	600	320		320	1400	2100 x 1300 x 1300
TAG 600/12	BU 600	600		330		390	1200	2300 x 1600 x 1450									

Other sizes on request
Height without lid to top edge of collar plate

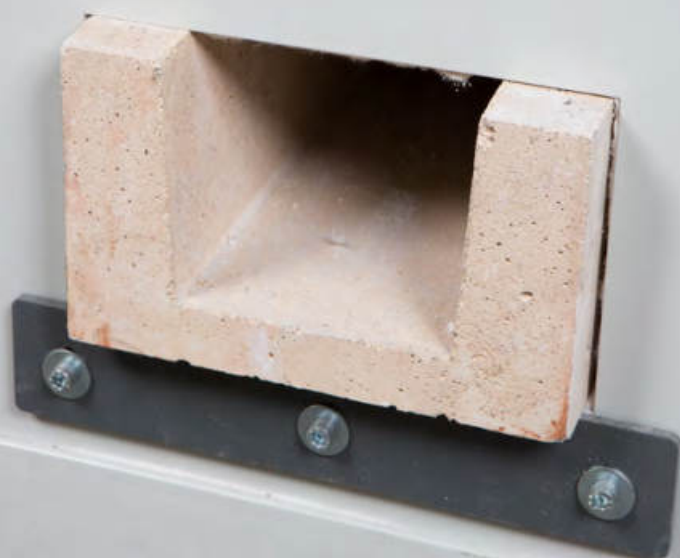
*The melting capacity refers to normal industry use in continuous operation with at least 30 % molten metal (swamp) in the crucible. The furnace chamber temperature is at least 50°C above the set melting temperature.

Additional equipment

THERMCONCEPT offers a wide range of options for the individual adaptation of furnaces to the respective process.

Options

- Individual design adapted to the process
- Heating and insulation matched to the application
- Increased connection or burner power
- Working platforms and pedestals for convenient loading
- Furnace lid with electro-mechanical, pneumatic or hydraulic swivelling device via 2-hand operation
- Hand lid to lay on or with swivel joint
- Swivelling special collar plate with adapted cut-outs for crucible extraction with a crucible tong for subsequent casting
- Collecting pans
- Exhaust air bonnets and bonnets for discharging waste heat from the furnace and combustion air
- Temperature control by means of melting bath control possible
- Thyristor control for gentle control of the heating and silent operation of electric furnaces
- Gas, kW/h and operating hours meters for calculation and cost monitoring
- Control cabinet cooling units
- Crucible leakage detection with visual, acoustic or telephone alarm message



Production line consists of 2 x TA 600/12/K, adjusted working- and charging-platform as well as sliding exhaust bonnets





Furnaces for melting,
holding and dosing

Process control

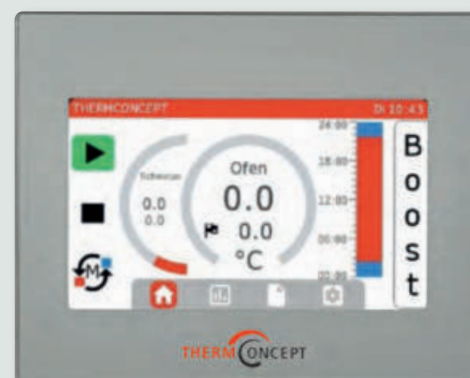
Program Controller

THERMCONCEPT PID controller TCP 400-T with 4.3" Touch Panel

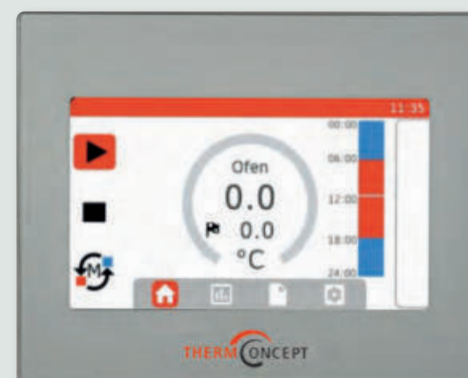


Thermconcept has developed the TCP 400 touch panel controller in close cooperation with customers. In order to meet the requirements of foundry operations, this controller has various features, including an integrated, programmable weekly timer, which makes it easy for the user to program the furnace. The basic version controls the furnace via the furnace chamber temperature, alternatively a melting bath control with a thermocouple in the furnace chamber is available. Also a control with a thermocouple in the liquid melt or control via a thermocouple in a crucible pocket is possible.

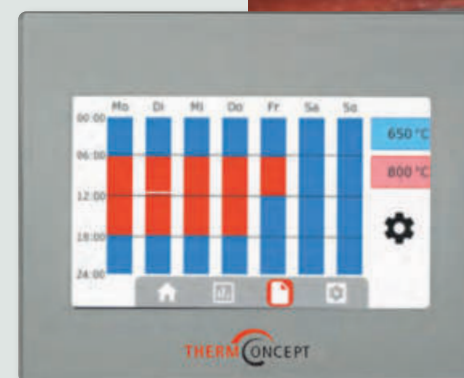
- PID program controller with input via touch panel
- Precise temperature control, self-optimisation
- Clear and intuitive operation largely language-neutral via pictograms
- Up to 5 program-controlled event functions / control contacts possible
- Resistive touchscreen, can also be operated with gloves on
- Display of up to 3 operating states (depending on the furnace version)
- Graphical view of program progress
- Language selection (DE, GB, FR, CZ, NL, ES, IT, PT, CHN)
- Alarm messages in plain text
- Real-time display with date and timer for up to 20 days lead time
- History display of the last 48 h on the display
- USB interface for reading out data history on USB stick integrated (plug-in socket optional)
- Ethernet interface for connection to a PC with corresponding software integrated (plug-in socket optional)
- Excel script for simple graphical evaluation of the measurement data



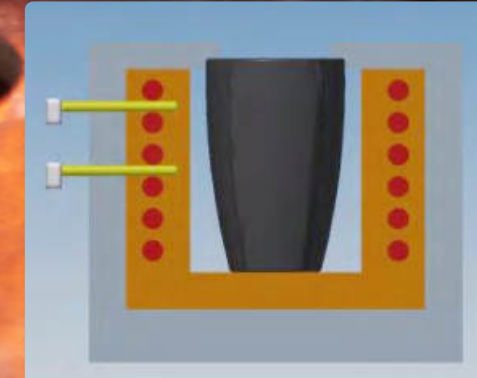
Main view



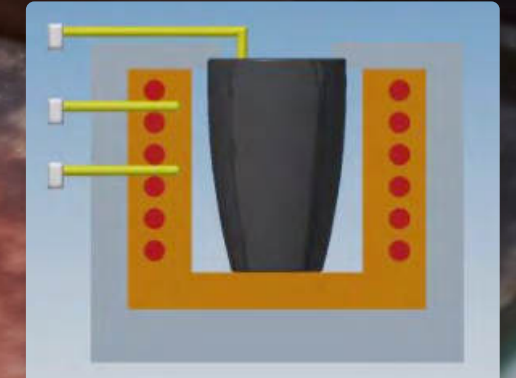
Programming window



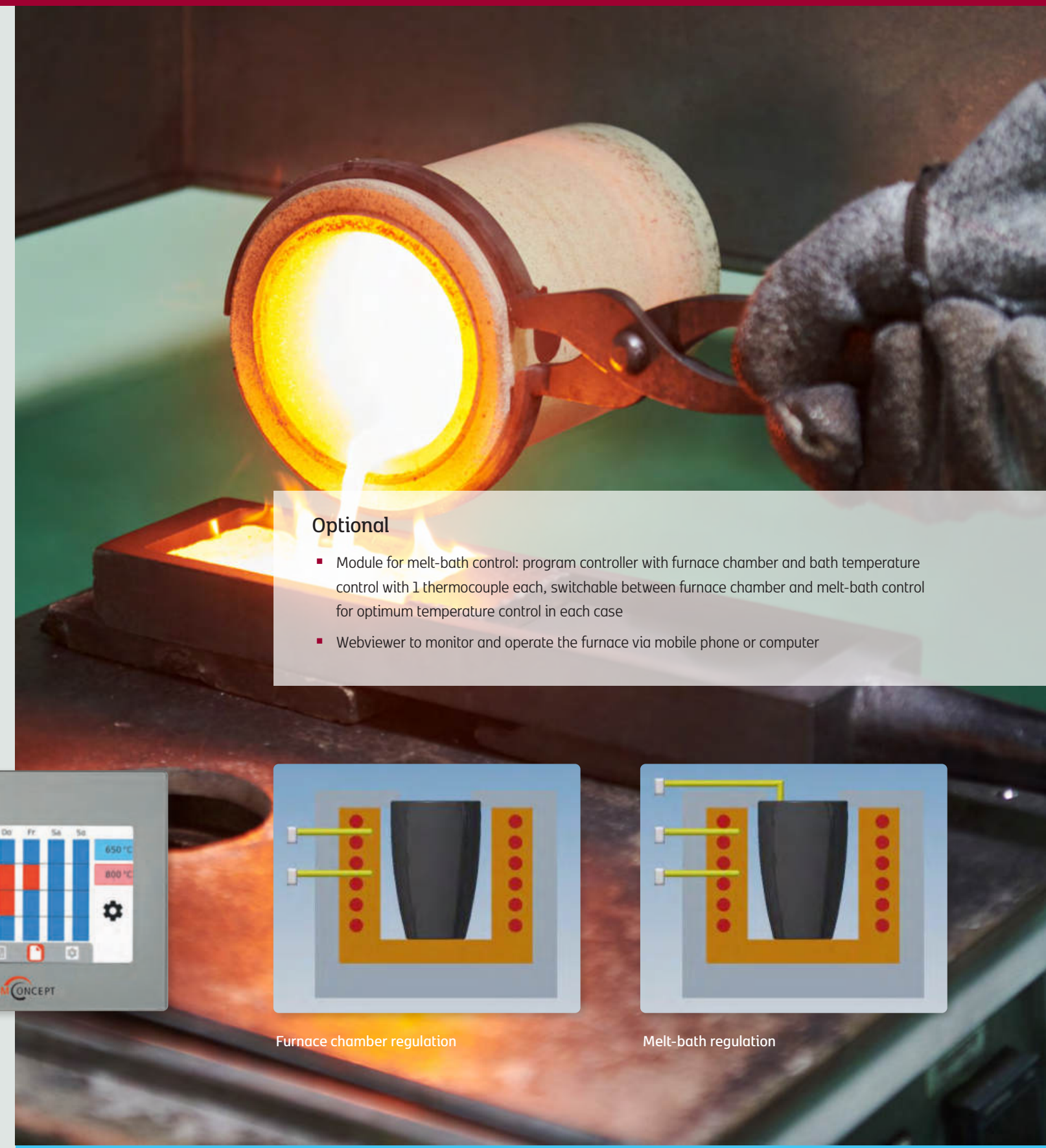
Weekly time switch



Furnace chamber regulation



Melt-bath regulation



Optional

- Module for melt-bath control: program controller with furnace chamber and bath temperature control with 1 thermocouple each, switchable between furnace chamber and melt-bath control for optimum temperature control in each case
- Webviewer to monitor and operate the furnace via mobile phone or computer

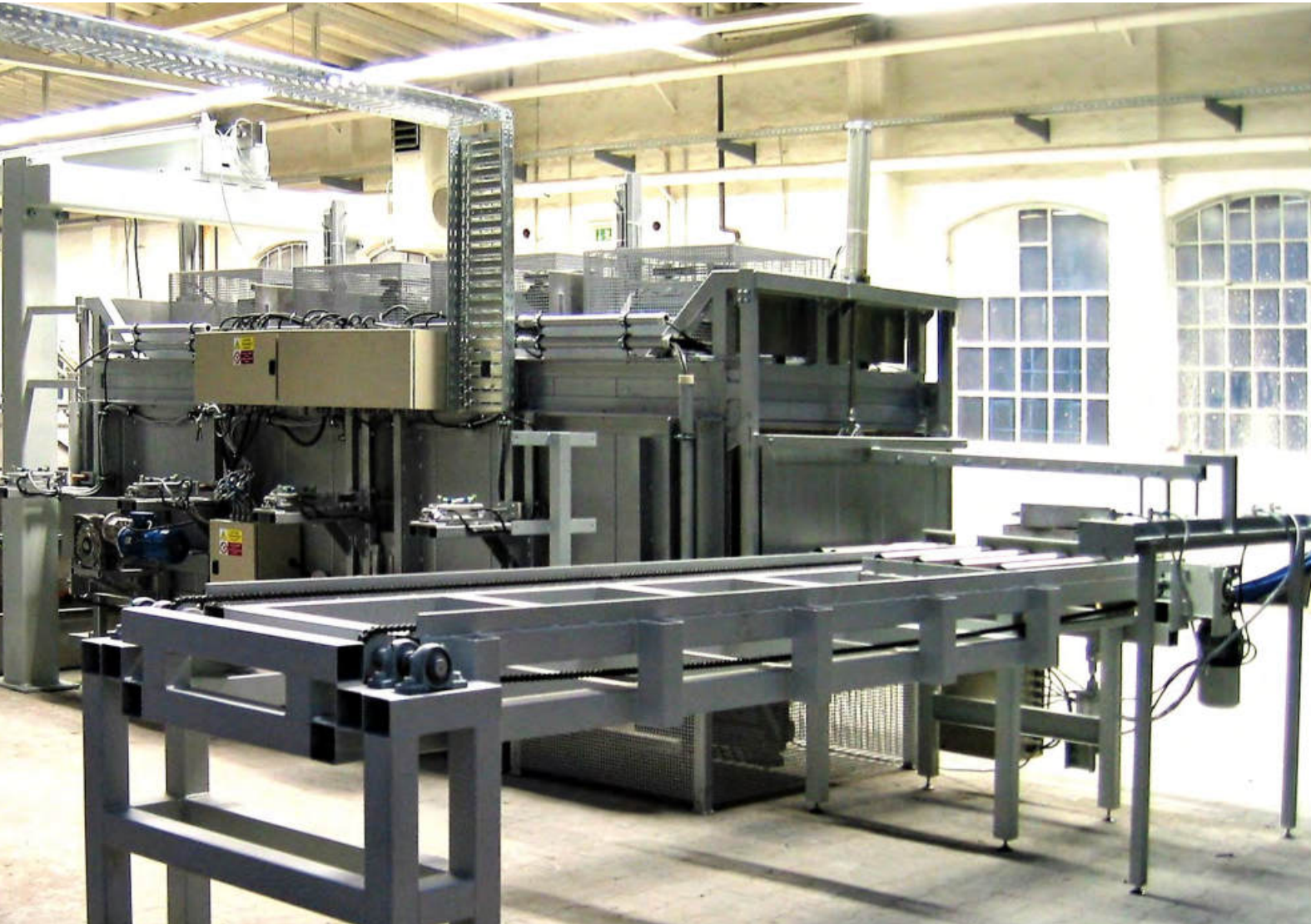


Heat treatment plants

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Tempering systems

Solution Annealing | Quenching | Artificial Ageing



THERMCONCEPT quenching and tempering systems are used for solution annealing, quenching and artificial ageing of aluminium components for T 1 – T 9 processes.

Design of the systems

The design of the systems is adapted to the special component and process requirements:

- Furnace systems with vertical or horizontal batch transport
- Furnace systems with fixed or movable furnaces
- Mobile or stationary quenching tank, also with installation in a pit
- Plant concepts with multi-furnace systems, various baths and various batch storage areas
- Systems for manual operation up to fully automated heat treatment lines
- Furnace systems usually with electric heating, alternatively also available with direct or indirect gas heating

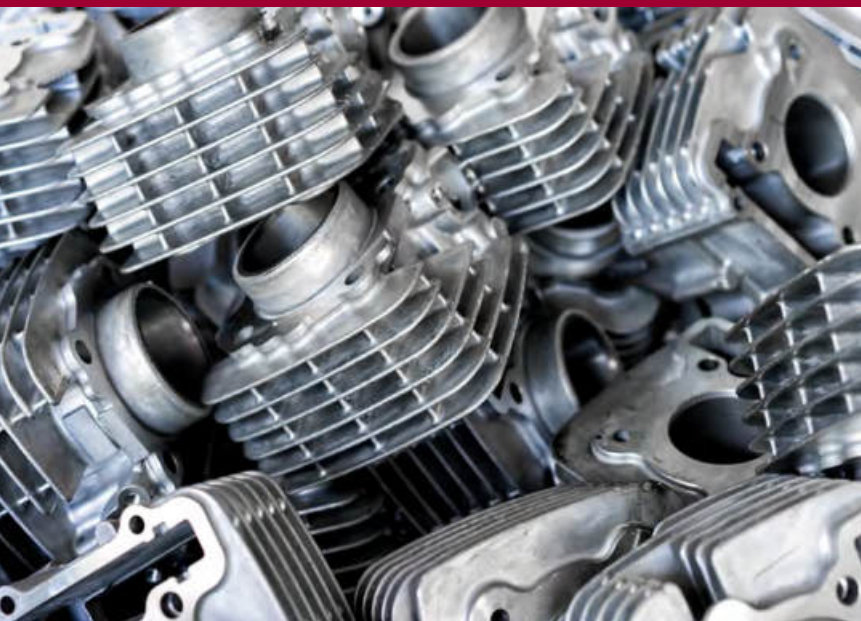
The furnace systems are characterised by very high temperature accuracy and fast batch transport. The working temperature ranges are between

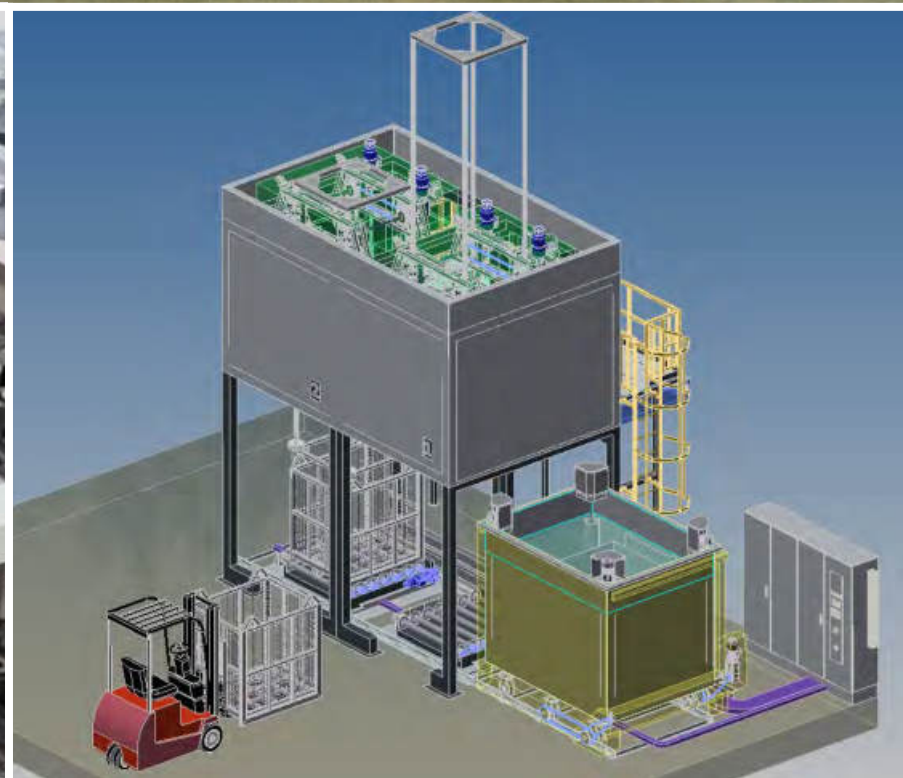
80 °C and 600 °C and can optionally be extended to 850 °C.

The systems are usually controlled via a PLC. All motion sequences can be controlled fully automatically.

The process documentation is in accordance with NADCAP, AMS, CQI-9 and optionally also with batch recognition systems.

THERMCONCEPT tempering systems are used in the aircraft and automotive industries as well as in the forging and foundry industries.





Tempering plants are designed on the basis of different furnace systems:

Tempering plants based on chamber furnaces

- Horizontal batch transport
- Manual batch movement by forklift truck
- Automated batch movement via traversing unit or robot system
- Water quenching bath placed in front of the furnace

Tempering plants based on bottom furnaces

- Vertical batch transport
- Manual batch movement by overhead crane
- Automated batch movement via lift conveyor unit
- Water quenching bath placed next to the furnace

Tempering plants based on bogie hearth furnaces

- Horizontal and, if the furnace is elevated, also vertical batch transport
- Manual batch movement by overhead crane
- Automated batch movement via lift conveyor unit
- Water quenching bath placed in front of the furnace

Tempering plants based on continuous furnaces

- Horizontal batch transport
- Automated batch movement via conveyor systems
- Water quenching bath placed at the exit of the solution annealing furnace
- Design with integrated or also separately arranged ageing furnaces

Tempering plants based on drop bottom furnaces

- Vertical batch transport for very short quenching times
- Automated batch movement via lift conveyor unit
- Falling bottom furnace fixed or movable
- Versions with fixed or mobile quenching baths under the furnace
- Optionally equipped with parking spaces for loading and unloading.



Tempering systems

based on drop bottom furnaces

Heat treatment plant for aluminium parts with a quenching delay time of ≤ 7 seconds.

This heat treatment plant is designed for solution annealing and ageing of aluminium parts and consists of an electrically heated circulating air drop bottom furnace for solution annealing between 500°C – 600 °C with integrated water bath and a circulating air chamber furnace for ageing between 100°C – 200 °C.

Plant control and process documentation is carried out according to CQI-9.

After the basket with components has been placed in the charging frame of the furnace, the operator closes the safety door and starts the heat treatment process by pressing a button. After that, all subsequent process steps up to process step 5 run fully automatically. The furnace system is equipped with all relevant safety features for fully automatic operation.



PROCESS STEP 1:

- Basic position of the furnace: Furnace floor is open, charging frame is in loading position
- Operator manually opens the safety gate

PROCESS STEP 2:

- A forklift truck places the basket on the charging frame
- Operator manually closes the safety door and starts the process

PROCESS STEP 3:

- The charging frame with basket is pulled up into the solution annealing furnace.
- Furnace bottom moves forward and closes the furnace
- After closing the bottom, the furnace starts the programmed heating cycle.

PROCESS STEP 4:

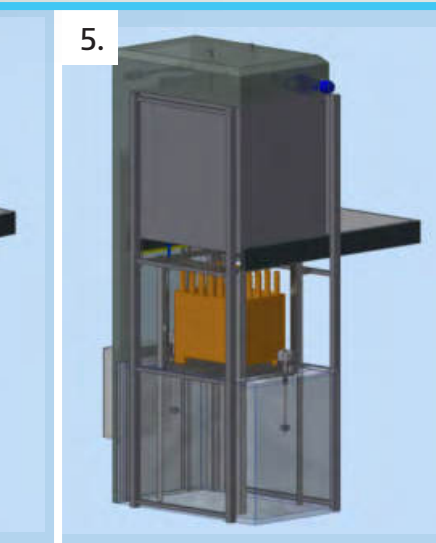
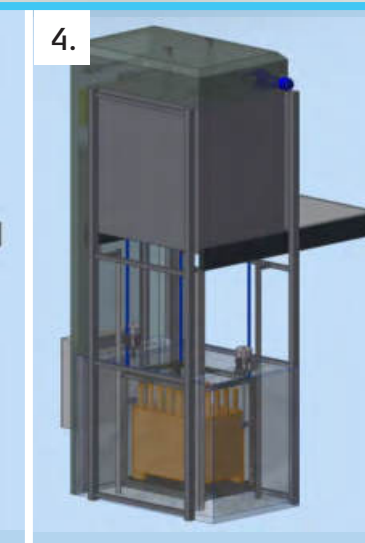
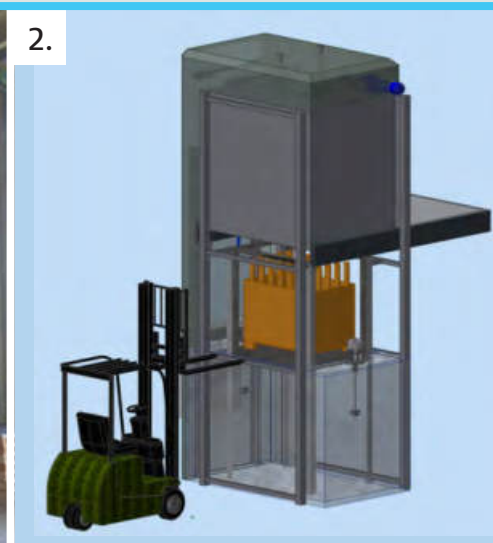
- At the end of the heating cycle, the furnace bottom moves back and opens the furnace
- Charging frame with basket sinks into the water bath below

PROCESS STEP 5:

- After quenching, the charging frame with basket is raised to the loading/unloading position
- In this position, the water is dripping from the batch

PROCESS STEP 6:

- Operator manually opens the safety gate
- A forklift truck removes the basket from the charging frame of the solution annealing furnace.
- The basket is then placed in the ageing furnace.
- The solution annealing furnace is ready to receive the next batch.



Tempering systems based on drop bottom furnaces

This fully automatic plant is used for quenching and tempering aluminium components for vehicle construction. The plant is based on drop bottom furnaces, which are used whenever short quenching times have to be achieved. The plant consists of two identical drop bottom furnaces for solution annealing, a stationary water bath and several ageing furnaces.

A charge basket is provided on the feed position. The drop bottom furnace moves over the charge basket and pulls it into the furnace chamber. After closing the furnace bottom, solution annealing is started. After completion of the selected holding time at working temperature, the drop bottom furnace moves over the water bath. The quenching process is initiated by opening the furnace bottom.

The basket is lowered into the quenching bath below via a lifting unit integrated in the furnace. After the quenching process, the basket is pulled back into the furnace via the lifting mechanism. The furnace moves to a deposit position and places the batch basket down. From this position, the batch basket is transferred to one of the waiting ageing furnaces.

Tempering plants based on drop bottom furnaces are designed according to customer-specific requirements and can be supplied in different variants:

- Tempering systems with a fixed drop bottom furnace and the quenching bath positioned underneath.
- Tempering systems with a fixed drop bottom furnace and a movable water bath
- Quenching and tempering systems with several mobile drop bottom furnaces and one or more stationary or mobile quenching baths
- The facilities can be supplemented with supply areas and parking spaces.
- The movement technique can be semi- or fully automatic
- The documentation is carried out in accordance with the relevant aviation and automotive standards, such as AMS 2750 or CQI-9.



The system consists of the following components:

Drop bottom furnaces with air circulation for solution annealing

The drop bottom furnaces with a volume of 1100 litres can be operated flexibly up to 650 °C. Each furnace has a horizontally movable furnace floor as well as an integrated drive for vertical lifting and lowering of the charge basket.

For quenching, the entire furnace is moved over the quenching bath by motor.

After opening the bottom, the basket is lowered into the water bath.

Stationary water quenching bath

The water bath is mounted between the two drop bottom furnaces. In order to keep the height of the drop bottom furnaces as low as possible, the quenching bath is embedded in the hall floor. The water bath is equipped with a cooling unit and water circulation. The water temperature in the quenching bath and the temperature rise during quenching are continuously recorded and documented.

Air-circulating chamber furnaces for ageing

After the quenching process, the batch basket is placed at a deposit position and from here manually moved into one of the waiting ageing furnaces.

The ageing furnaces have similar dimensions to the drop bottom furnace, but are adapted to manual charging from the front. The maximum application temperature is 450 °C.

Due to the independent set-up and mode of operation, the furnaces can also be used for tempering steel components after hardening from the steel tempering plant nearby.





This fully automatic furnace system is used for the quenching and tempering of high-performance engine pistons. The plant consists of a batch feeder, the 4-chamber continuous furnace, a traversing unit with horizontal and vertical working area, a double quenching bath, the cleaning bath and a storage area. Ageing takes place in air-circulation chamber furnaces. The entire process is fully automatic, from the provision of the batch baskets in front of the furnace to the depositing on the storage area.

Batch feed

- The batch feeder consists of a charging table, an infeed table and a cross conveyor.
- The charging baskets are placed manually on the charging table.
- The batch table stores 4 charging baskets. The baskets are automatically transported to the infeed table.
- The prepared charging basket is moved from the infeed table into the furnace while at the same time the next basket is pulled from the charging table.

A detailed description can be found on the two following pages.

Solution annealing furnace

- The continuous furnace is designed for T max. 650 °C.
- The furnace system is equipped with 4 chambers separated from each other by bulkheads. Each chamber is separately controllable
- In the first chamber, heating to 580 °C takes place.
- Once the set temperature has been reached, the batch basket is moved into chamber 2, one of the two holding chambers.
- After a dwell time, the basket is transported to chamber 3, the second holding chamber.
- Once the preset holding time at working temperature has been reached, the batch basket is moved into chamber 4, the removal chamber.
- In chamber 4 the basket is waiting to be removed
- After opening the furnace door, the basket automatically moves to the transfer position at the furnace exit. Here, the manipulator takes over the basket for further transport to the quenching area.

Tempering systems

based on continuous furnaces



1. Double quenching bath

- The solution heat treatment system includes a double quench tank for two different emulsions
- Both quenching baths are equipped with a heater, a circulation pump and a swivelling shower device
- The quenching device can be moved on rails and stands in a drip tray that can absorb the entire contents of the bath in the event of a leakage
- A drainer is fitted to both baths.
- The quenching unit is made entirely of stainless steel

2. Cleaning bath

- The cleaning bath is arranged in a stationary position and also stands in a drip tray
- The bath is equipped with an air bubble device
- The entire system is also made of stainless steel

3. Manipulator

- The further transport of the baskets after solution annealing in the continuous furnace takes place fully automatically via a manipulator
- The manipulator, suspended from a running rail, picks up the basket at the pick-up position and carries out the quenching process in one of the two water baths
- After quenching, the basket and parts are washed in a cleaning bath
- The manipulator then places the charging basket on a storage table. The storage table is equipped with rollers for transporting the deposited baskets.
- For occupancy detection the storage table is equipped with limit switches.
- From here, the baskets are picked up manually and transported on to the multi-chamber ageing furnace.

4. Furnace system for ageing

- The tempering plant is equipped with 2 identical 4-chamber convection furnaces for a T max. of 260°C for ageing.
- Each chamber can be regulated separately and is designed to accommodate 2 charging baskets on top of each other.



Tempering systems

based on chamber furnaces



The semi-automatic quenching and tempering system is designed for solution annealing with subsequent quenching and ageing of aluminium components for aircraft construction with a quenching time of 7 seconds

Process flow

The process sequence is semi-automatic. First, the charging basket with the components is pushed into the solution annealing furnace via a roller conveyor. A swivelling part of the roller conveyor enables connection to the open furnace.

After the pre-set dwell time in the furnace, the user presses a foot switch on the water bath to open the furnace door. The furnace door opens and the user pulls the charging basket over the roller conveyor onto the quenching grid against a stop.

The system is equipped with light barriers. As soon as both light barriers indicate that the basket is in the correct position on the quenching grid, the quenching grid automatically lowers into the water bath. The release of the draw hook is also automatic. The quenching time is 7 seconds.

The dwell time of the basket in the quenching bath can be defined via the furnace control. After the programmed dwell time, the quenching grate moves back to the starting position above the water bath.

The user can now manually move the basket by the roller conveyor into the drying station. The fan of the drying station switches on automatically. The drying time is also programmable.

After the drying process is completed, the operator pulls the basket again onto the charging grid and moves the basket to the ageing furnace placed opposite. The ageing process then takes place at approx. 180 °C. If no ageing process is required, the basket with the dried parts can also be taken directly to a storage place.

The next basket with still untreated aluminium components is then picked up from a staging area.



Tempering systems based on chamber furnaces

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The tempering system consists of the following components:

Solution annealing furnace model KU 270/06/A

The basis of this tempering system is formed by two identical air-circulation chamber furnaces for T max. 650 °C with pneumatic lift door. The two furnaces are arranged stationary opposite each other. The parts are charged in adapted charging baskets.

Water quenching bath with pneumatic lifting device

Quenching takes place in a water quenching bath equipped with a pneumatically driven lifting grate. In order to be able to move the charging basket above the water bath, the lifting grate is equipped with stainless steel ball rollers. The water quenching bath is mounted on rails and movable between the two furnaces.

The water quenching bath has a chiller, heat exchanger and circulation pump. The water temperature is continuously recorded. The cooling water is pumped through the heat exchanger and thus constantly cooled. The system components are matched to each other and ensure precise process cooling with energy-efficient operation.

Drying station

A drying station with a powerful blower is located between the two furnaces. The parts removed from the water bath are blown dry here. The drying station has a stainless steel roller conveyor and is equipped with a water collection tray. It is switched on/off automatically via the system control.

Ageing furnace model KU 270/06/A

The second air-circulation chamber furnace is mounted in a space-saving manner on the opposite side of the tempering system and integrated into the tempering process. Depending on the task, this furnace can be used as an ageing furnace or also as a solution annealing furnace.

Charging places

The system can be supplied with various stand-by locations for the for holding batches or baskets. Likewise, any number of storage locations for finished batches can be integrated.

System control

The system is controlled via a Siemens PLC S7 with touch panel and various options for data tracking and data logging with complete documentation according.



Tempering systems

based on chamber furnaces



Semi-automatic tempering unit KM 1700/06/AS

with lifting door, roller conveyor, manual charging device and water bath

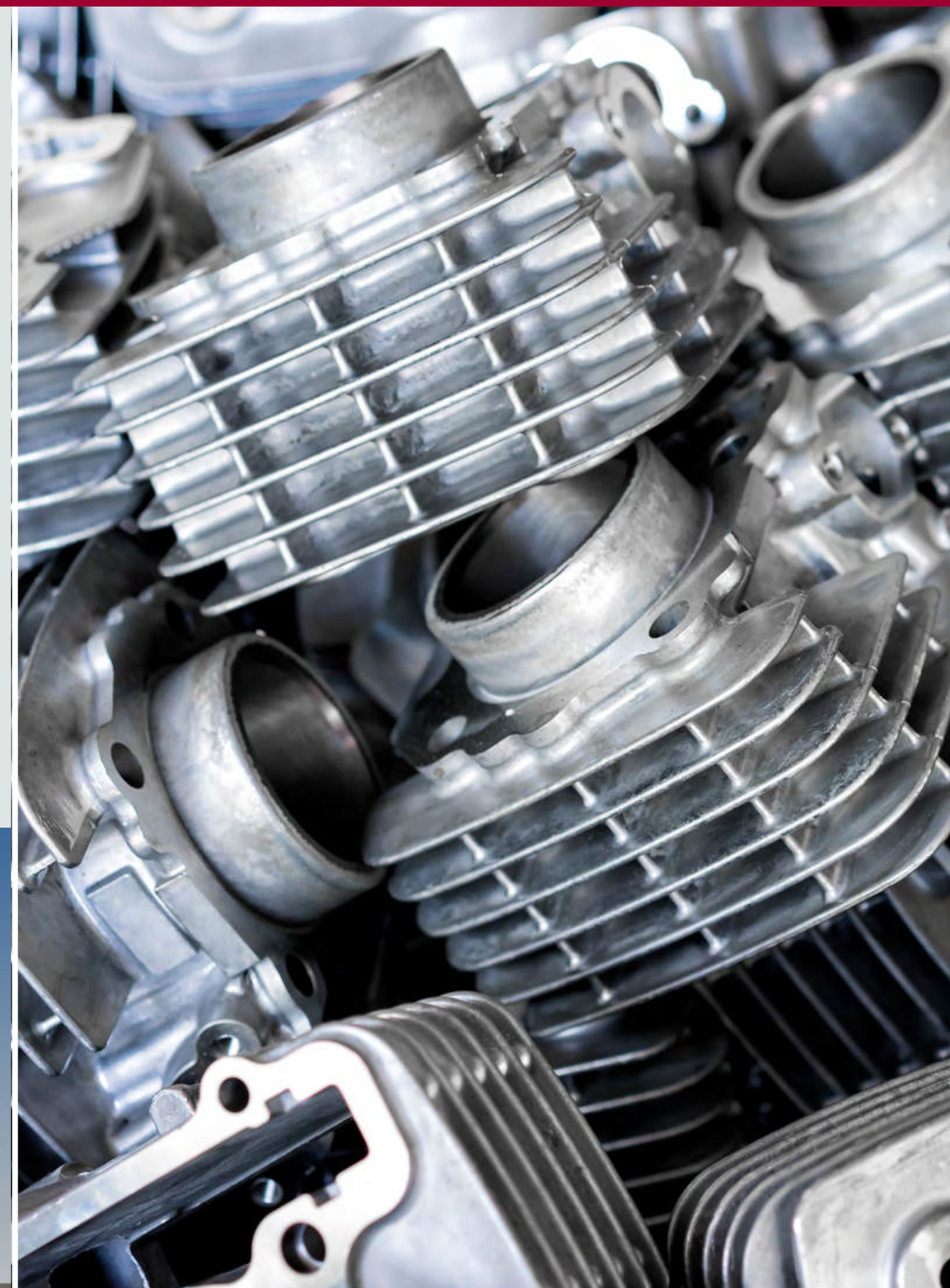
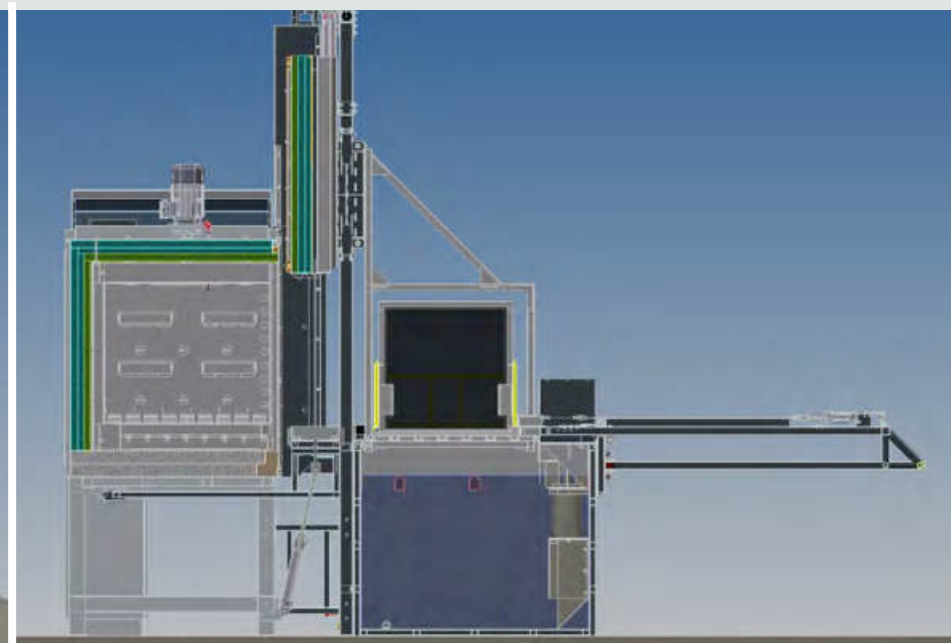
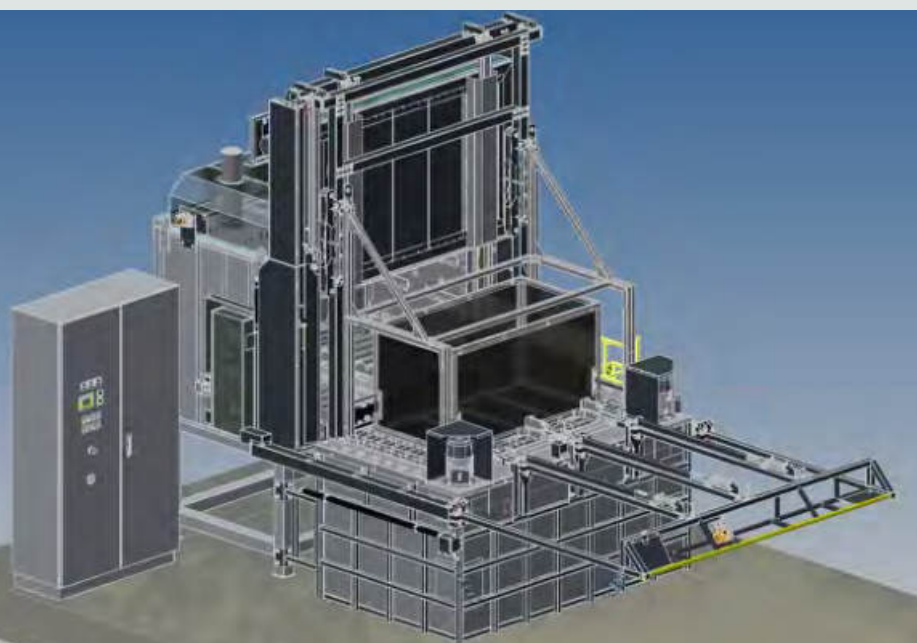
- Furnace designed for batch dimensions of 1500 x 800 x 800 (mm) with a max. batch weight of 20 kg per basket. The working temperatures are 430 – 502 °C.
- Roller belt without drive for manual feeding of the batch, mounted on the side of the furnace
- Charging device consists of a frame with manual handle and lateral guidance via telescopic pull-outs for safe and smooth movement

Pick-up bracket for automatic latching into the pick-up profile of the basket, when lowering the basket into the water bath, the charging bracket is automatically released again

Manual release of the charging bar after inserting the basket into the furnace via manual lifting mechanism

Fencing of the protected area with door for loading and unloading, door with safety switch

- Water bath with table incl. ball rollers for horizontal movement and pneumatic lifting system, stop contact for automatic lowering of the lifting table, raising of the lifting table to the starting position via pushbutton





Heat treatment plants

Furnaces for drying, preheating,
solution annealing and ageing

Electrically heated – Gas heated

Air-circulation drying furnaces KT

T max. 250 °C to 450 °C



Technical features

- Furnaces for maximum temperatures of 250 °C and 450 °C, e.g. for drying and preheating large batches
- All furnaces with horizontal or vertical airflow are electrically heated.
- Robust, double-walled housing constructions, inner housing to cover the insulation and air guide box made of heat-resistant stainless steel.
- Furnace door designed as a single-leaf or double-leaf swing door
- High-quality insulation with low heat loss and power consumption
- Powerful recirculation fans for high air exchange and optimum temperature distribution of up to +/- 5 K in the usable space according to DIN 17052



Low-temperature furnaces and cabinets for drying and heating cores and moulds in production, in which flammable and combustible substances, e.g. alcohols and solvents, are released during the temperature process, must comply with EN 1539 and be equipped with suitable safety devices, as a flammable gas mixture may form during the process..

THERMCONCEPT optionally offers EN 1539-compliant versions for many models. In this case, the furnace is designed as a „dryer type A“ with

- monitored air exchange
- monitored recirculation system
- secured pre-purge time,
- and an additionally sealed working chamber.

The design of the flushing volume is individually adapted to the requirements.



TECHNICAL DATA

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Models		T max. [°C]		Internal dimensions [mm] Width x depth x height	Volume [l]	Power [kW]		Voltage [V]
KT 1000/02/A	KT 1000/04/A	250	450	1000 x 850 x 1200	1020	17	20	400 3/N
KT 1500/02/A	KT 1500/04/A	250	450	1000 x 850 x 1850	1570	20	36	400 3/N
KT 2000/02/A	KT 2000/04/A	250	450	1100 x 1500 x 1200	1980	27	41	400 3/N
KT 3000/02/A	KT 3000/04/A	250	450	1000 x 1500 x 2000	3000	30	48	400 3/N
KT 4000/02/A	KT 4000/04/A	250	450	2200 x 1500 x 1200	3960	41	53	400 3/N
KT 4000/02/A1	KT 4000/04/A1	250	450	1100 x 1500 x 2300	3795	41	53	400 3/N
KT 5000/02/A	KT 5000/04/A	250	450	2000 x 2000 x 1250	5000	48	66	400 3/N
KT 6000/02/A	KT 6000/04/A	250	450	2000 x 2000 x 1500	6000	66	90	400 3/N
KT 8000/02/A	KT 8000/04/A	250	450	2200 x 1500 x 2300	7590	78	96	400 3/N



Photo left:
3 indirect gas-heated fur-
naces for drying ceramic
filters before sintering in a
gas-heated sintering furnace.

Photo right:
125m³ low-temperature
furnace for working
temperatures up to 200°C,
accessible at ground level



Air-circulation drying furnaces KT

T max. 250 °C to 450 °C



Options

- Electric lift door
- Entry ramp/tracks for entry at ground level with charging trolleys
- Individually adapted charging trolleys with and without shelf system
- Rail-mounted charging trolleys with electric drive
- Automatic supply and exhaust air flap control for furnace ventilation
- Supply air fan for forced furnace ventilation
- Automatic cooling system for forced cooling
- Viewing window and furnace chamber illumination
- All models also available with indirect gas heating
- Optical/acoustic signals
- Connections for thermocouples



Drying furnace up to 250 °C
in the automotive industry



84 m³ drying furnace up to 250 °C, integrated into the production as an airlock for passing through. Ground-level charging with small trolleys or with plug-in guide rails for 2 large charging trolleys | temperature distribution of up to +-3K



Air-circulation bogie hearth furnaces WM

T max. 250 °C, 450 °C, 650 °C and 850 °C



Technical features

These bogie hearth furnaces are particularly suitable for the heat treatment of large batches with high charge weights.

- All furnaces with horizontal or vertical airflow, electrically heated
- Robust, double-walled housing constructions, inner housing to cover the insulation and air guide box made of heat-resistant stainless steel.
- Furnace door in standard version as parallel-guided swing door
- Sturdy bogie hearth equipped with flanged wheels on rails incl. rails in front of the furnace, bogie hearth completely covered with stainless steel plates
- Powerful recirculation fans for high air exchange and optimum temperature distribution of up to +/- 5 K in the usable space according to DIN 17052
- High-quality insulation with low heat loss and power consumption
- Manual exhaust air dampers
- Applications such as chamber furnaces, e.g. according to EN 1539



TECHNICAL DATA

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Photos:
Electrically heated convection bogie hearth ovens with vertical air circulation for T max. 450°C (left) resp. 850°C (top).

Both models with vertical air circulation, bogie on rails and pneumatic lift door.

Models		T max. [°C]		Internal dimensions [mm] Width x depth x height	Volume [l]	Power [kW]		Voltage [V]
WM 1000/02/A	WM 1000/04/A	250	450	1000 x 1000 x 1000	1000	32	41	400 3/N
WM 1500/02/A	WM 1500/02/A	250	450	1000 x 1500 x 1000	1500	47	53	400 3/N
WM 2000/02/A	WM 2000/04/A	250	450	1000 x 2000 x 1000	2000	59	68	400 3/N
WM 3500/02/A	WM 3500/04/A	250	450	1300 x 2500 x 1100	3580	72	81	400 3/N
WM 5000/02/A	WM 5000/04/A	250	450	1300 x 3100 x 1250	5040	78	87	400 3/N
WM 7000/02/A	WM 7000/04/A	250	450	1500 x 3100 x 1500	6980	93	102	400 3/N

Air-circulation bogie hearth furnace WM

T max. 250 °C, 450 °C, 650 °C and 850 °C



Options

- Lift door with electric or hydraulic drive
- Automatic supply and exhaust air flap control for furnace ventilation and faster cooling
- Automatic cooling system for forced cooling
- Exhaust fan
- Electric bogie hearth drive
- Second door on the rear wall of the furnace, e.g. for operation with two bogies
- Furnace system with transverse shifting device for an operation with several bogies and parking or charging bays
- Indirect gas heating
- Support grid for bogie hearth made of heat-resistant cast steel for optimum distribution of heavy loads
- Bogie hearth furnaces also available gas-heated
- Customised special designs



TECHNICAL DATA

Models		T max. [°C]		Internal dimensions [mm] Width x depth x height		Volume [l]		Power [kW]		Voltage [V]
WM 1000/06/A	WM 1000/08/A	650	850	1000 x 1000 x 1000	1000	47	50	400 3/N		
WM 1500/06/A	WM 1500/08/A	650	850	1000 x 1500 x 1000	1500	59	66	400 3/N		
WM 2000/06/A	WM 2000/08/A	650	850	1000 x 2000 x 1000	2000	75	86	400 3/N		
WM 3500/06/A	WM 3500/08/A	650	850	1300 x 2500 x 1100	3580	93	101	400 3/N		
WM 5000/06/A	WM 5000/08/A	650	850	1300 x 3100 x 1250	5040	10	156	400 3/N		
WM 7000/06/A	WM 7000/08/A	650	850	1300 x 3100 x 1250	6980	117	168	400 3/N		

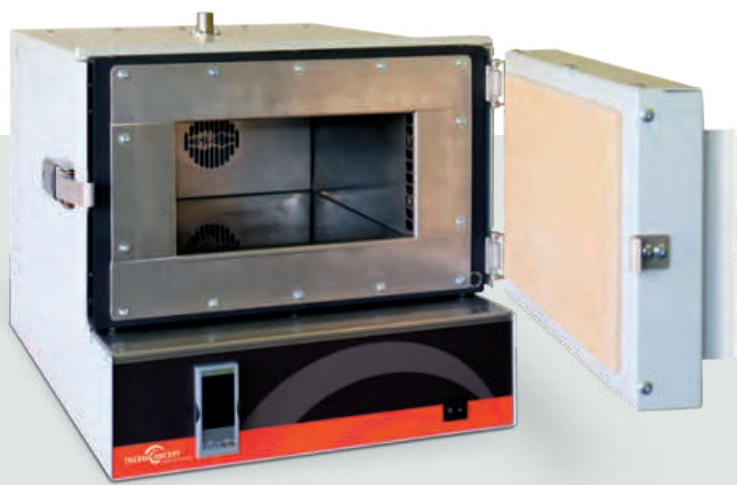


Air-circulation chamber furnaces KU

T max. 450 °C and 650 °C

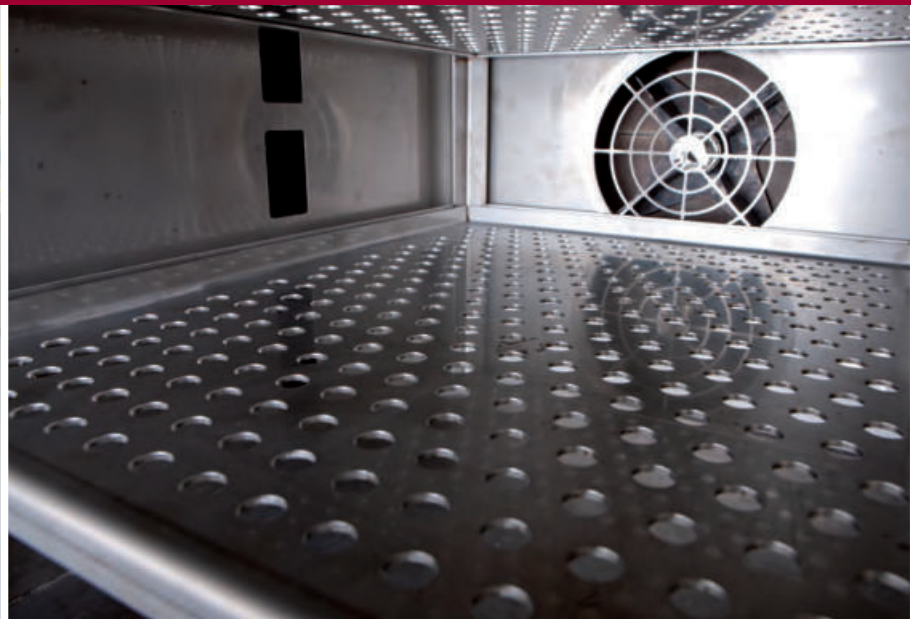
Technical features

- Air-circulation chamber furnaces up to 450 °C and 650 °C, especially suitable for tempering, ageing, preheating, drying, shrinking, baking, testing, ...
- Robust housing constructions made of high-quality steel sheets
- Swing door hinged on the right
- Inner casing as air guide box made of heat-resistant stainless steel, with long service life, extremely resistant and corrosion-resistant
- In the standard version with 2 pairs of slide-in rails for optional slide-in trays
- High-quality heating elements with long service life, mounted in the air flow for even and fast heat transfer
- Powerful horizontal air circulation ensures uniform temperature distribution up to +/- 5 K according to DIN 17052
- High-quality insulation for low energy consumption and low electricity costs
- Base included in standard scope of delivery
- KU 15/06/A as a compact workbench furnace with air baffle, designed for installation in the HS 1 hardening system, without slide-in rails



Options

- Pneumatic lift door with hand switch or foot switch
- Automatic fresh air and vapour vent flaps for controlled furnace ventilation
- Automatic cooling system for forced cooling
- Boreholes and bushings as access for pipes to the furnace chamber
- Gas boxes for heat treatment under protective gas, with matching charging trolley
- Viewing window
- Eurotherm controller with recorder function, interfaces and software for documentation
- Calibration of thermocouple and controller at different temperatures
- Control of the heating elements via solid-state relays
- Customised special designs



TECHNICAL DATA

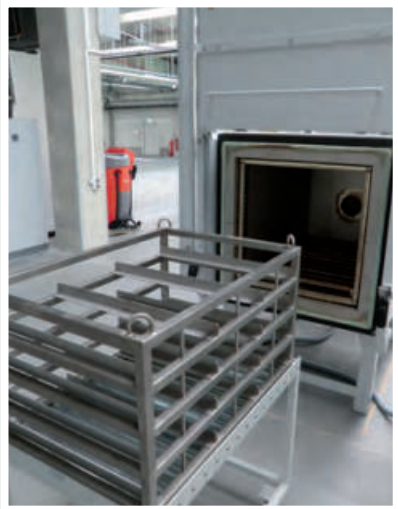
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Models		T max. [°C]		Internal dimensions [mm] Width x depth x height	Volume [l]	Power [kW]		Voltage [V]
KU 15/06/A		650		300 x 350 x 150	15	2,4		230 1/N
KU 40/04/A	KU 40/06/A	450	650	300 x 400 x 300	35	3,2	4	400 3/N
KU 70/04/A	KU 70/06/A	450	650	350 x 500 x 400	70	6,4	8	400 3/N
KU 140/04/A	KU 140/06/A	450	650	450 x 600 x 500	135	9,6	12	400 3/N
KU 270/04/A	KU 270/06/A	450	650	600 x 750 x 600	270	12,8	16	400 3/N
KU 540/04/A	KU 540/06/A	450	650	750 x 900 x 800	540	19,2	27	400 3/N
KU 800/04/A	KU 800/06/A	450	650	800 x 1250 x 800	800	24	35	400 3/N



Air-circulation chamber furnaces KU

T max. 750 °C and 850 °C



Technical features

- Air-circulation chamber furnaces up to 850 °C, suitable for almost all processes up to 850 °C where high temperature accuracy is required, such as tempering, ageing, preheating, shrinking, testing
- Robust housing constructions made of high-quality sheet steel with right-hinged swing door
- Inner housing made of heat-resistant stainless steel, extremely durable and corrosion-resistant, with long service life
- Equipped with 2 pairs of slide-in shelves, slide-in shelves for loading on several levels optionally available
- Models up to 750 °C in semi-gas-tight design suitable for operation with non-flammable protective gases such as argon, nitrogen etc.
- Multilateral heating via powerful horizontal air circulation with uniform temperature distribution up to +/- 3 K according to DIN 17052 (750 °C models)
- High-quality heating elements with a long service life, mounted in the air flow of the air circulation system
- High-quality insulation for low energy consumption and low electricity costs
- Base included in standard scope of delivery

Air-circulation chamber furnaces for T max. 750 °C also available in low-dust version with completely covered insulation.

TECHNICAL DATA

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Models		T max. [°C]		Internal dimensions [mm] Width x depth x height	Volume [l]	Power [kW]		Voltage [V]
KU 40/07/A	KU 40/08/A	750	850	300 x 400 x 300	35	5,2	6	400 3/N
KU 70/07/A	KU 70/08/A	750	850	350 x 500 x 400	70	10,4	9	400 3/N
KU 140/07/A	KU 140/08/A	750	850	450 x 600 x 500	135	21	15	400 3/N
KU 270/07/A	KU 270/08/A	750	850	600 x 750 x 600	270	21	20	400 3/N
KU 540/07/A	KU 540/08/A	750	850	750 x 900 x 800	540	28	30	400 3/N
KU 800/07/A	KU 800/08/A	750	850	800 x 1250 x 800	800	40	30	400 3/N



Air-circulation chamber furnaces KM

T max. 650 °C and 850 °C

Technical features

- Air-circulation chamber furnaces for heavy industrial use, suitable for charge weights of several tonnes depending on the design
- Robust housing constructions made of high-quality steel sheets
- Inner housing made of heat-resistant stainless steel with long service life, extremely durable and corrosion-resistant
- Furnace door designed as a parallel-guided swing door
- High-quality heating elements with long service life
- Heated from several sides and powerful horizontal air circulation for uniform temperature distribution up to +/- 5 K according to DIN 17052 in the usable space
- Optimum airflow through air guidance system with adapted arrangement of the air outlets
- High-quality insulation for low energy consumption and low electricity costs



Options

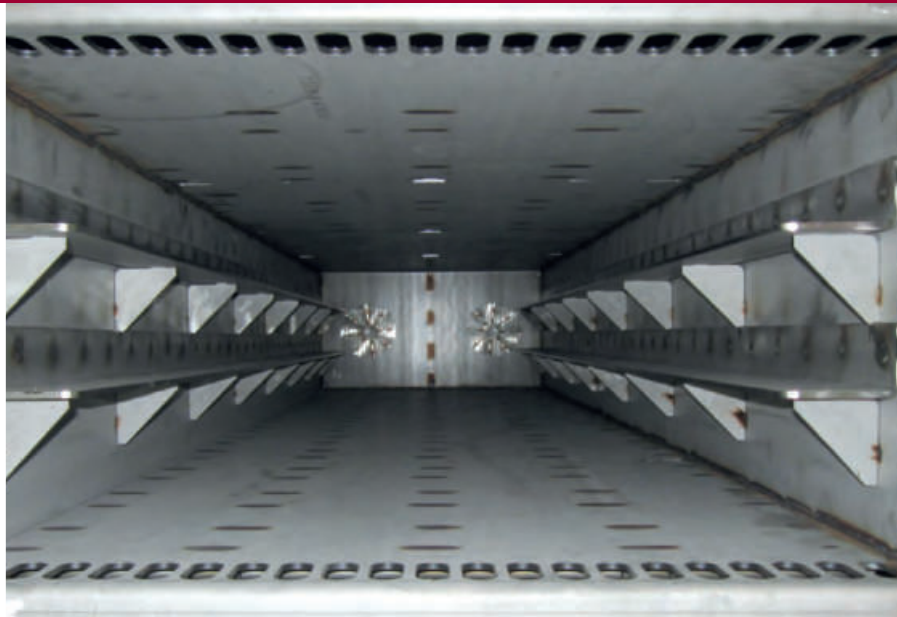
- Pneumatic, electric or hydraulic lift door
- Automatic exhaust air flap control
- Powerful fan cooling
- Furnace in semi-gas-tight design with protective gas connection for operation under protective gas
- Gas-feed systems
- Charging racks and aids
- Optical/acoustic signals
- Customised special designs



KU 840/07/AS

Air-circulation chamber furnace up to 750 °C with internal dimensions of 750 x 3000 x 400 mm (W x D x H) for heat treatment of bar, profile and plate materials.

With shelves in the furnace, lift door and drive-in aid in the base frame for easy loading with long components.



TECHNICAL DATA

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Models		T max. [°C]		Internal dimensions [mm] Width x depth x height	Volume [l]	Power [kW]		Voltage [V]
KM 1000/06/A	KM 1000/08/A	650	850	1000 x 1000 x 1000	1000	39	45	400 3/N
KM 1500/06/A	KM 1500/08/A	650	850	1500 x 1000 x 1000	1500	51	65	400 3/N
KM 1500/06/A1	KM 1500/08/A1	650	850	1000 x 1500 x 1000	1500	51	65	400 3/N
KM 2000/06/A	KM 2000/08/A	650	850	2000 x 1000 x 1000	2000	75	83	400 3/N
KM 2000/06/A1	KM 2000/08/A1	650	850	1000 x 2000 x 1000	2000	75	83	400 3/N
KM 4000/06/A	KM 4000/08/A	650	850	2200 x 1500 x 1200	3960	85	97	400 3/N
KM 4000/06/A1	KM 4000/08/A1	650	850	1500 x 2200 x 1200	3960	85	97	400 3/N



Continuous furnaces



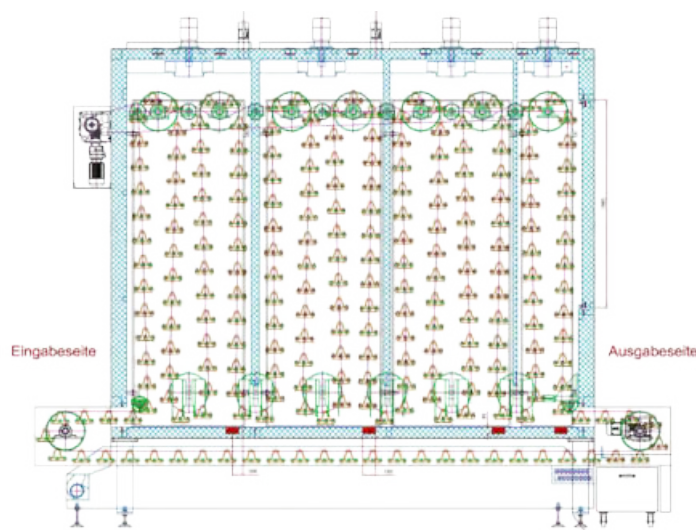
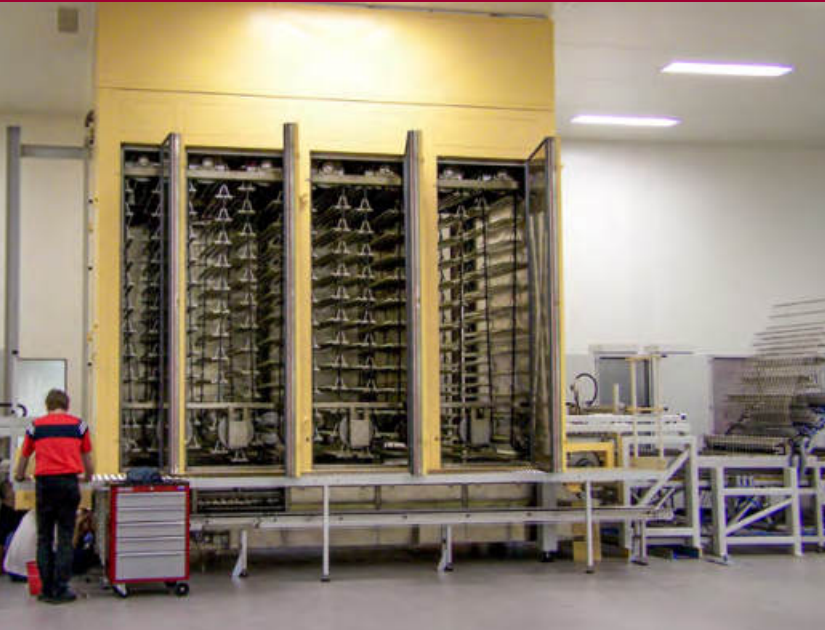
Continuous furnace for charging with standardised transport trolleys. Manual feeding of the trolleys into the oven, the trolleys are fed into the furnace automatically. The number of trolleys in the annealing zone depends on the throughput. Different numbers of cycles and cycle times can be realised.

The system is equipped with a downstream cooling zone, which is automatically loaded during the cycle. The cooling is possible with active recirculating air cooling or only by a fresh air/exhaust air change.

Cart weights up to 400 kg. Digital batch tracking with temperature data recording, network connection optional. Furnaces with a length of more than 30 m are in use here.



Paternoster furnaces

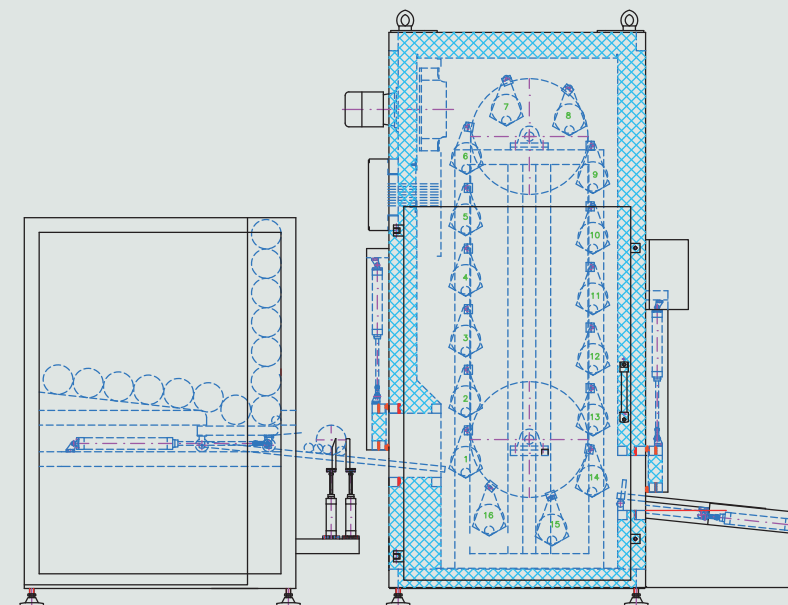


Furnace systems in paternoster design are often used when there is little space available for the erection of a furnace. Paternoster furnaces are built height and thus provide a space-saving alternative.

Paternoster furnaces are designed as gondola paternoster or tray paternosters. In the case of the gondola paternoster, the transport means remain mounted on a chain in the the furnace system. With the tray paternoster the workpiece rack can be moved out of the furnace system.

Direct integration with, for example, a downstream cooling line is possible.

This gondola paternoster system is fully integrated into automation. 18 furnaces operate 24/7 with only one-week maintenance interruption per year. The feeding of the system as well as the removal of components are done by industrial robots.



Gondola paternoster for tempering of tubes

The furnace system is designed for tempering of plastic pipes. The pipes to be tempered are automatically fed into the furnace by a separator, clocked through and passed for further manual processing.

Unloading of the gondola takes place after the cycle time has elapsed and the by the operator. The door opens and the the pipe rolls out.





For the entire temperature range up to 1400 °C, THERMCONCEPT supplies furnace concepts such as chamber furnaces, bogie hearth furnaces, top-hat furnaces and mobile furnaces with direct and indirect gas heating, which are specially tailored to the requirements and processes of the customers.

Technical features

- Universally applicable furnace types, adapted to the installation site and process requirements
- Excellent heat treatment results
- Low energy consumption due to multi-layer refractory lining with best insulating properties
- Own burner systems with a wide performance range, specially matched to the furnace system, designed for optimised consumption
- Automatic control of the furnace atmosphere to prevent oxidation of the batch
- Start-up of the furnace even at low temperature with high accuracy and without temperature jumps
- Optimum temperature distribution through multi-zone control and special flue gas routing
- State-of-the-art control and regulation technology with optimal management of the processes, for fully automatic operation of the plant, with perfect adaptation to the needs of the users.
- Minimal maintenance effort

We deliver

- Furnaces with direct or indirect heating
- Periodic and continuous furnaces (chamber, bogie hearth, shaft and hood furnaces)
- Furnaces for a reducing chamber atmosphere
- Additional equipment such as conveyors, loading and unloading systems and systems for heat recovery

Photos above: Gas-fired chamber furnace

- For dewaxing turbine blades at 800 °C
- The components are placed on an adapted charging rack
- A thermal afterburner is installed on the furnace for exhaust gas post-treatment
- The system is controlled via a Siemens PLC S7 with touch panel

Photos below: Production plant consisting of two gas-heated chamber furnaces for annealing casting moulds in baskets.

- Two chamber furnaces with hydraulic lift door
- For working temperatures up to 1100 °C
- Batch weight 4 t
- Heating via high-speed gas burner
- PLC system control with process data storage



Gas-fired 6-chamber furnace

Furnace system for a globally active manufacturer of high-quality stainless steel components produced by centrifugal casting.



- Furnace system consisting of 6 individual chambers that are heated independently of each other
- All chambers are equipped with stable steel frames for holding the moulds. Charging via 6 separately controllable lift doors
- Batch weight per chamber 5 t
- Usable internal dimensions of a chamber: 1500 x 3000 x 1500 mm (w x d x h)
- Outer dimensions of the furnace: 7700 x 4600 x 4600 mm (w x d x h)
- Heating via 12 recuperativ gas burners with a total power output of 1800 kW
- Delivery incl. a heat exchanger air/water
- Process control via Siemens PLC S7 with touch panel and various options for data tracking and archiving



Gas-fired bogie hearth furnace

Production plant consisting of 2 identical gas-heated bogie hearth furnaces for a globally active gas turbine manufacturer in Germany.

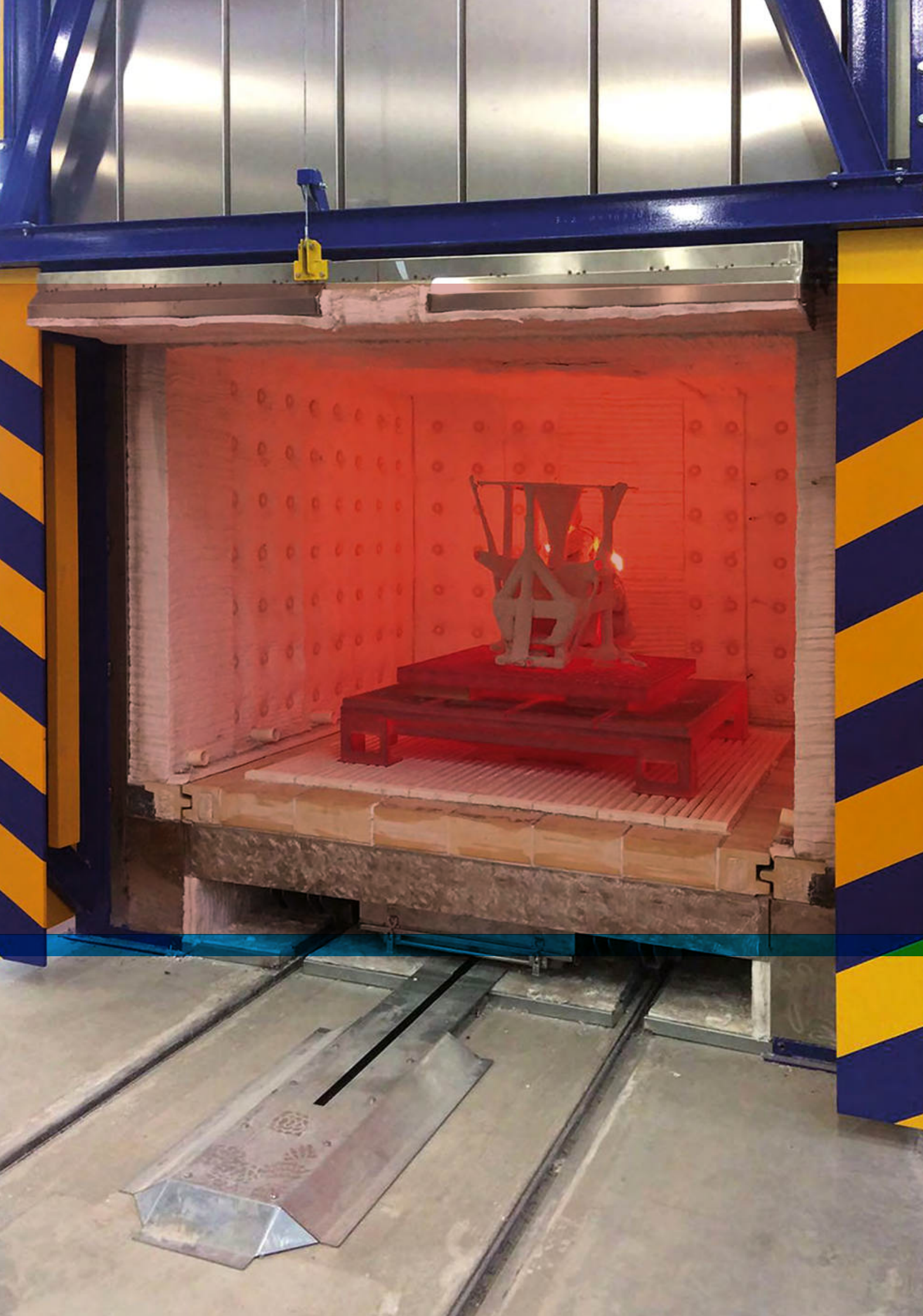
The furnaces are used for annealing of gas turbine housings with charge weights of up to 75 t at 1100 °C. To avoid oxidation, the furnaces are designed for reducing atmosphere. The delivery included exhaust chimney for outdoor installation.

- Annealing temperatures up to 1100 °C
- Bogie hearth designed for a maximum batch weight of 75 t
- Usable inside dimension: 6000 x 8000 x 4000mm (w x d x h)
- Heating via 26 high-speed gas burners with a total output of 7800 kW
- Furnace chamber divided into 8 control zones
- Temperature uniformity of up to +/- 5 °C according to DIN 17052
- Atmospheric control: Neutral or reducing atmosphere
- Controlled batch cooling
- System control via Siemens PLC S7 with touch screen and options for data tracking and data-logging



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Heat treatment plants

Furnace systems for lost wax

Flash-Fire-Verfahren

Electrically heated – Gas heated



Dewaxing furnaces



The KK-WX model series includes dewaxing furnaces with a chamber volume of 7 to 570 litres and is designed for a temperature range up to 1000 °C. KK-WX furnaces are used for burning out wax and plastic mouldings. All relevant processes for preparing a mould for the final casting process are covered in one furnace: the melting out, the residue-free burning of moulding materials and the final firing of the casting moulds.

Starting with the KK 125/10 WX model, a precisely controlled supply of preheated air ensures uniform drying and heating of the moulds, reducing the risk of cracking. A high temperature distribution during the waxing process enables a shortening of the process as well as a reduction in the risk of cracks as well as a more efficient use of energy.

Precise temperature control during dewaxing prevents uncontrolled ignition of the moulding materials.

A special deposit grid and a practical collecting tray collect the wax under the furnace and ensure easy emptying.

Larger chamber or bogie hearth furnaces can be individually designed and adapted to the process on request!



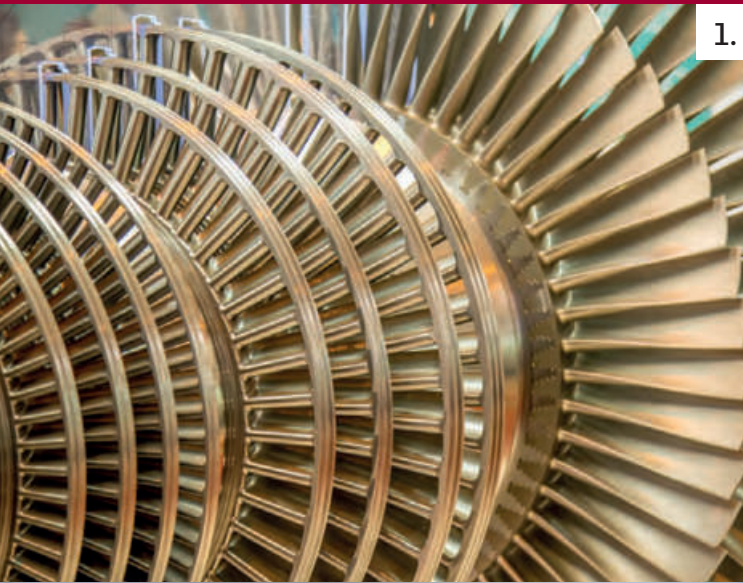
TECHNICAL DATA

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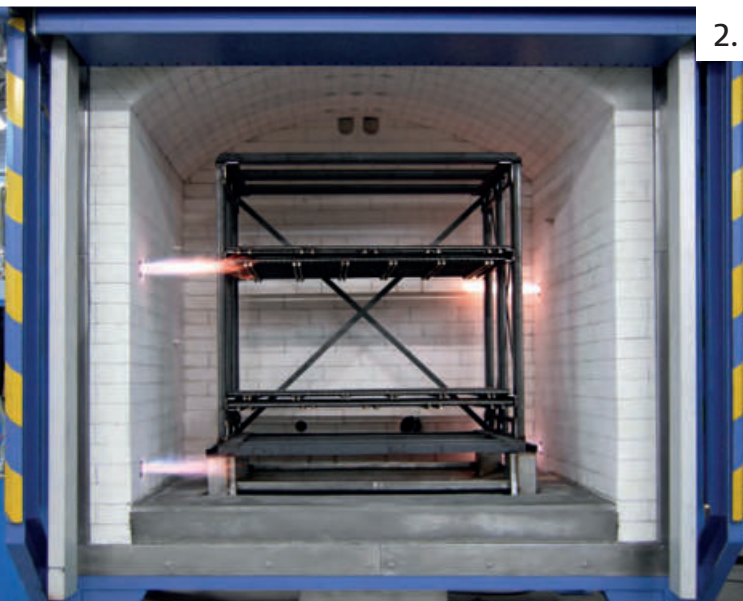
Models	T max. [°C]	Internal dimensions [mm] Width x depth x height	Volume [l]	Power [kW]	Voltage [V]
KK 07/10-WX	1000	180 x 170 x 220	7	1,5	230 1/N
KK 15/10-WX	1000	250 x 250 x 250	15	2,3	230 1/N
KK 20/10-WX	1000	300 x 300 x 200	18	3	230 1/N
KK 45/10-WX	1000	300 x 450 x 315	42	5	400 3/N
KK 125/10-WX	1000	460 x 470 x 580	125	13,5	400 3/N
KK 300/10-WX	1000	590 x 720 x 700	297	22	400 3/N
KK 570/10-WX	1000	710 x 870 x 920	568	40	400 3/N

Gas-fired chamber furnace

Lost wax melting with subsequent firing of the ceramic moulds



1.



2.



3.

THERMCONCEPT supplies electrically and gas-heated furnace systems for melting out residual waxes resp. for melting-out wax from ceramic investment casting moulds with subsequent firing of the ceramic mould/ casting screw. Our furnace systems are used in the production of investment castings mainly from aluminium and titanium materials. The investment casting products are used in the automotive industry, aircraft construction, medical technology, mechanical engineering, etc.

- For dewaxing turbine blades at 800 °C
- The components are placed on an adapted charging rack.
- A thermal afterburner is installed on the furnace system for exhaust gas post-treatment.
- The system is controlled via a Siemens PLC S7 with touch panel.

- 1) Turbine wheels
- 2) De-waxing rack of a gas-fired chamber furnace
- 3) Loading possible by means of forklift stacker or lift truck



Gas-fired chamber furnace

Lost wax casting of investment casting moulds for aluminium and titanium castings

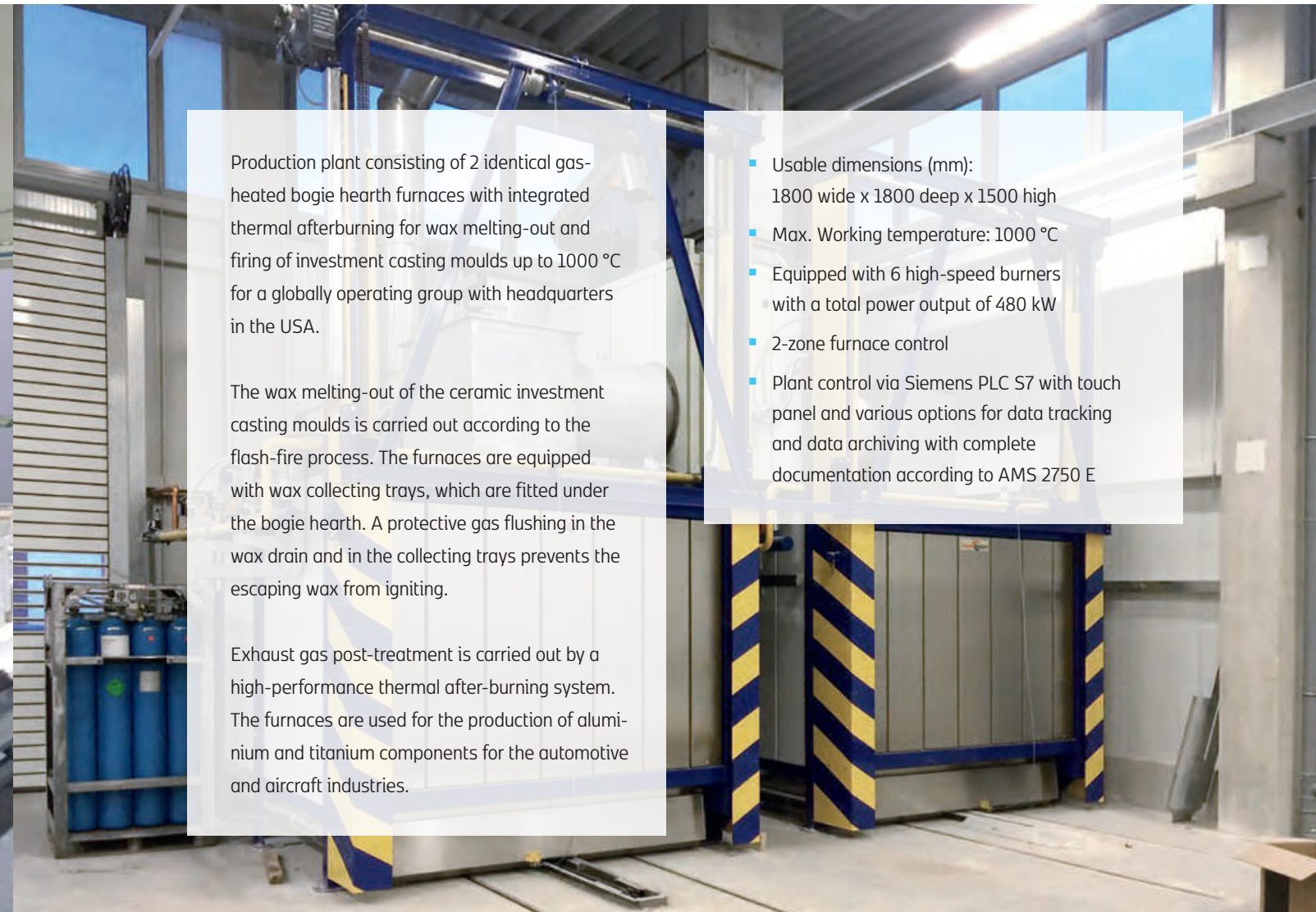


Production plant consisting of 2 identical gas-heated bogie hearth furnaces with integrated thermal afterburning for wax melting-out and firing of investment casting moulds up to 1000 °C for a globally operating group with headquarters in the USA.

The wax melting-out of the ceramic investment casting moulds is carried out according to the flash-fire process. The furnaces are equipped with wax collecting trays, which are fitted under the bogie hearth. A protective gas flushing in the wax drain and in the collecting trays prevents the escaping wax from igniting.

Exhaust gas post-treatment is carried out by a high-performance thermal after-burning system. The furnaces are used for the production of aluminium and titanium components for the automotive and aircraft industries.

- Usable dimensions (mm): 1800 wide x 1800 deep x 1500 high
- Max. Working temperature: 1000 °C
- Equipped with 6 high-speed burners with a total power output of 480 kW
- 2-zone furnace control
- Plant control via Siemens PLC S7 with touch panel and various options for data tracking and data archiving with complete documentation according to AMS 2750 E



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Heat treatment plants

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Furnaces for thermal cleaning,
Core removal / Decoating

Electrically heated – Gas heated

Furnace systems

for thermal and thermos-chemical processes



Thermal cleaning/de-coating

THERMCONCEPT supplies electrically and gas-fired furnace systems for the thermal cleaning of components. Chamber and bogie hearth furnaces are mainly used for this process. At temperatures from approx. 430 °C, organic substances are de-composed into smouldering gases and carbon. In thermal afterburning chambers, the carbonization gases are post-combusted at high temperatures and the resulting substances are molecularly de-composed.

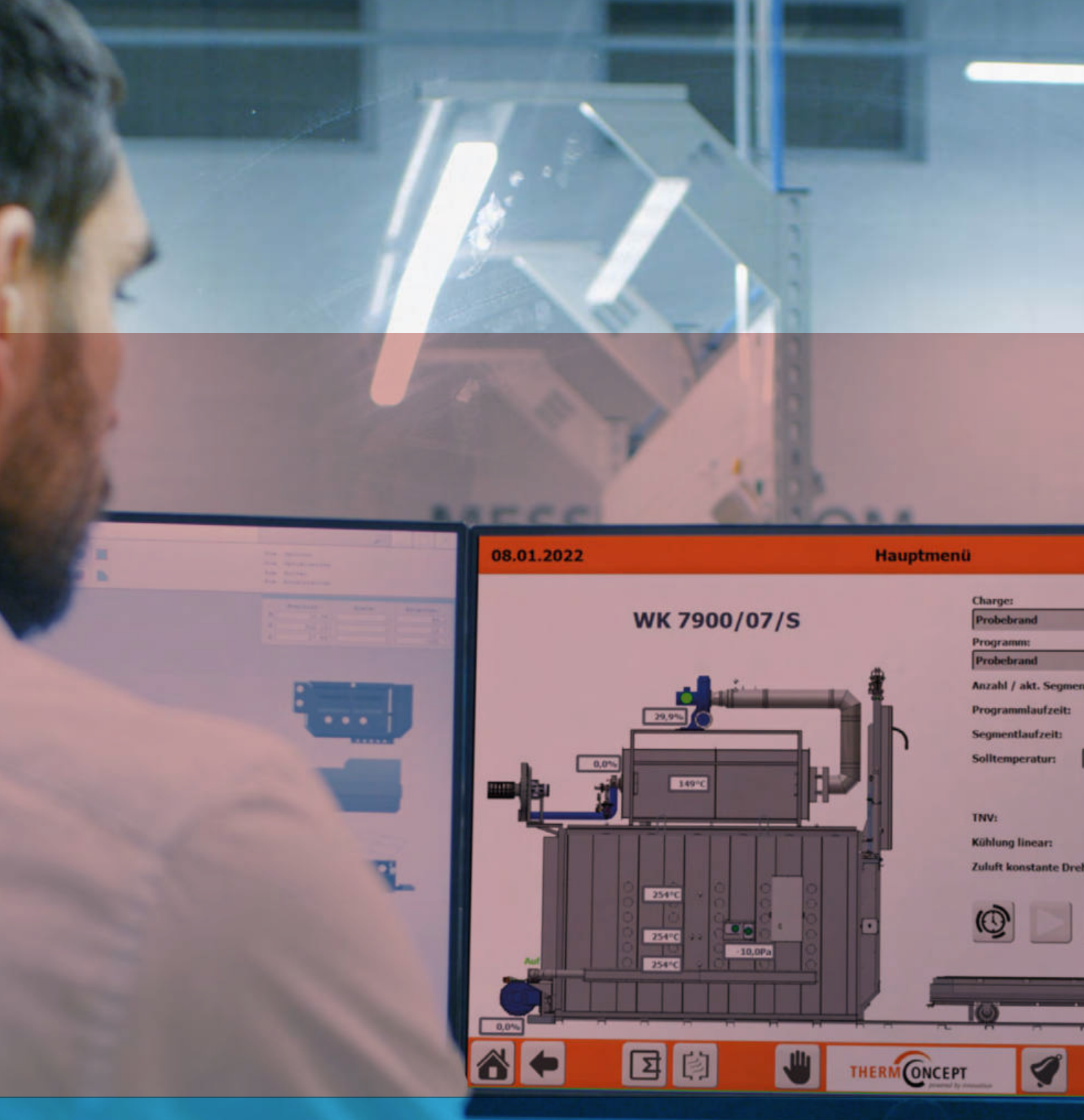
In THERMCONCEPT furnaces, for example, extruder screws, filters, dies, pipelines, press moulds etc. are thermally cleaned. Each application requires a specific cleaning approach.

We supply the individually matched furnace system.



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Heat treatment plants

Process control

Control technology matched to the application and the furnace is part of the basic equipment of THERMCONCEPT furnaces. Controllers from renowned manufacturers ensure extremely precise control of the processes. If necessary, the Control technology with corresponding software for programming, monitoring and evaluating the processes can be extended. PLC controls with touch panels as user interfaces are also available. Our proven standard systems can also be supplied in compliance with factory standards and equipment regulations.

Heating element control

Contactors

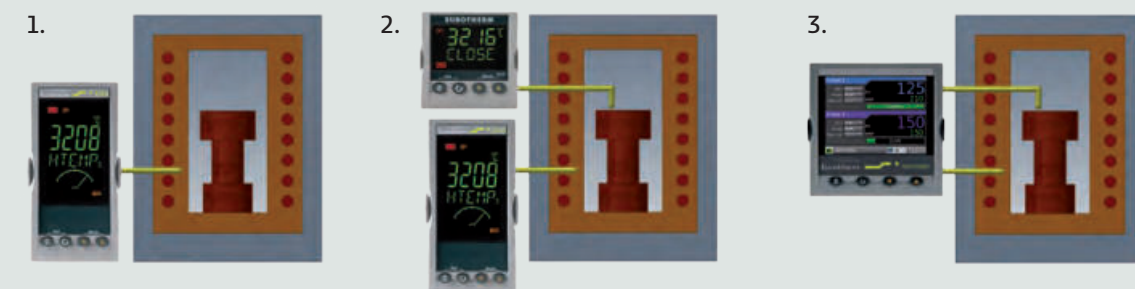
- Practice-oriented switching frequencies, sufficient for many processes
- Cost-effective and efficient solution

Solid state relay (SSR)

- High switching frequency and thus fast response time for temperature control
- Wear-free and quiet
- Inexpensive solution for higher demands on control and temperature accuracy
- Heating circuit monitoring with notification of defective heating elements as an option

Thyristors (phase angle control)

- Extremely precise temperature control
- Also wear-free and quiet
- Constant mains load, no mains fluctuations, protection of heating elements
- Heating circuit monitoring with notification of defective heating elements as an option



Furnace temperature control

Furnace chamber control 1

- Measurement at a mechanically protected position in the furnace chamber, which experience has shown to be a good average value for the control

Furnace chamber control with batch measurement 2

- Independent display of the measured temperatures
- For manual checking of the programmed temperature values
- No influence on the regulation

Batch control (cascade) 3

- Temperature measurement and control in the furnace chamber and directly at the batch
- Display of both temperatures
- Very precise temperature control through continuous balancing of furnace chamber and batch temperature



Eurotherm 3208/3216

- 1 program with 8 segments (4 ramps and 4 hold times)
- 1 extra function
- RS 485 interface and iTools software as option
- Multi-zone control optional

Eurotherm 3216i/32h8i

- Can be used as temperature limiter or adjustable temperature selection limiter
- Alarm message as plain text
- Can also be used as a permanently mounted temperature display, optionally also with interface for documentation via iTools software

Eurotherm Nanodac

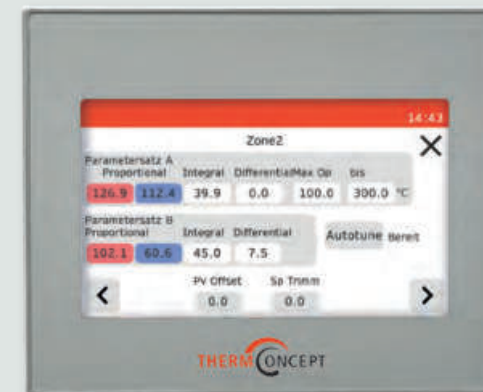
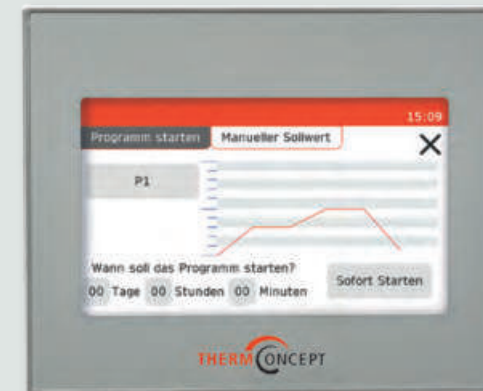
- Can be used as a program controller/recorder combination for multi-zone or cascade control
- Clear colour display
- Freely programmable as a program controller with 100 programs with 25 segments each
- 4 thermocouple inputs freely configurable
- USB port for removable media, integrated flash memory
- Ethernet interface
- Incl. software for programming, control and documentation





THERMCONCEPT PID controller TCP 400 with 4.3" and TCP 1000 with 10" touch panel

- 100 programmes with 24 segments each
- PID programme controller with input via touch panel
- Precise temperature control, self-optimisation
- Clear and intuitive operation largely language-neutral via pictograms
- Up to 5 programme-controlled event functions / control contacts possible
- Resistive touch screen, operation also possible with gloves
- Programmes can be individually named with plain text
- Display of up to 3 operating states (depending on the furnace version)
- Graphical view of the programme progress
- Language selection (DE, GB, FR, CZ, NL, ES, IT, PT, CHN)
- Alarm messages in plain text
- Real-time display with date and timer for up to 20 days lead time
- History display of the last 48 h on the display
- USB interface for reading out data history on USB stick integrated (plug-in socket optional)
- Ethernet interface for connection to a PC with corresponding software integrated (plug-in socket optional)
- Excel script for simple graphical evaluation of the measurement data
- Holdback for guaranteed warm-up time



Optional



- Module for cascade control:
Programme controller with furnace chamber and batch temperature control with 1 thermocouple each, switchable between furnace chamber and batch control for optimum temperature control in each case
- Multi-zone control module: For precise temperature control over multiple heating zones in the furnace chamber.
- Webviewer to monitor and operate the furnace via mobile phone or computer
- Temperature controller with 7-day preselection clock for programmable switching between day and night temperature, especially for furnaces in shift and continuous operation

Control and documentation



Control

For the control of complex processes and program sequences, considering may necessary safety devices. THERMCONCEPT uses the Siemens SPS S7 PLC control system. These are developed individually and specifically for the respective application designed and optimised in close cooperation with the user.

Siemens SPS S7 control/operator interfaces

- Individually matched and programmed to the furnace and process
- Customised, individual user interfaces as an option
- Optimal solution for systems with a wide range of functions and high process reliability
- Detailed process messages with full text output (multilingual)
- Simple tabular programme input via touch panel
- Clear colour display

Documentation

The documentation of all process-relevant data plays an important role as proof of compliance with heat treatment regulations and for quality assurance. THERMCONCEPT offers a range of options for this purpose:

- Eurotherm iTools and Eurotherm controllers with connection to a PC for programming, monitoring and documentation
- Digital recorders with up to 18 channels, USB interfaces, Ethernet, memory cards
- Process standard compliant recorders such as Eurotherm Aerodac 6100A, 6180A, 6100XIO, Nanodac

Software for control and analysis:

- Eurotherm iTools for professional process control and documentation of temperature-time profiles and batch data
- Multiple furnaces can be managed simultaneously
- Control from a central PC or via a Network
- Great operating comfort

International Aerospace Materials Standard AMS 2750 G

This standard covers requirements for temperature measurement in heat treatment plants of the aerospace industry and belongs to furnaces plants as well as their thermocouples, temperature controllers and displays. The documentation of heat treatment processes as well as regular system accuracy tests and temperature uniformity tests are important for quality assurance and thus ensure that components have been heat-treated in accordance with the applicable standards.

Here the heat treatment lines are divided into furnace classes (temperature distribution in the usable space) and instrumentation version (execution of pyrometry).

Instrumentation

Version A: controller, display, control thermocouple, recorder, over-temperature protection with alarm as well as high & low temperature sensors and min. 1 batch thermocouple

Version B: controller, display, control thermocouple, recorder, over-temperature protection with alarm as well as min. 1 batch thermocouple

Version C: controller, display, control thermocouple, recorder, over-temperature protection with alarm and high & low temperature sensors

Version D+: controller, display, control thermocouple, recorder, over-temperature protection with alarm

Version D: controller, display and control thermocouple



International Automotive Industry Standard CQI-9

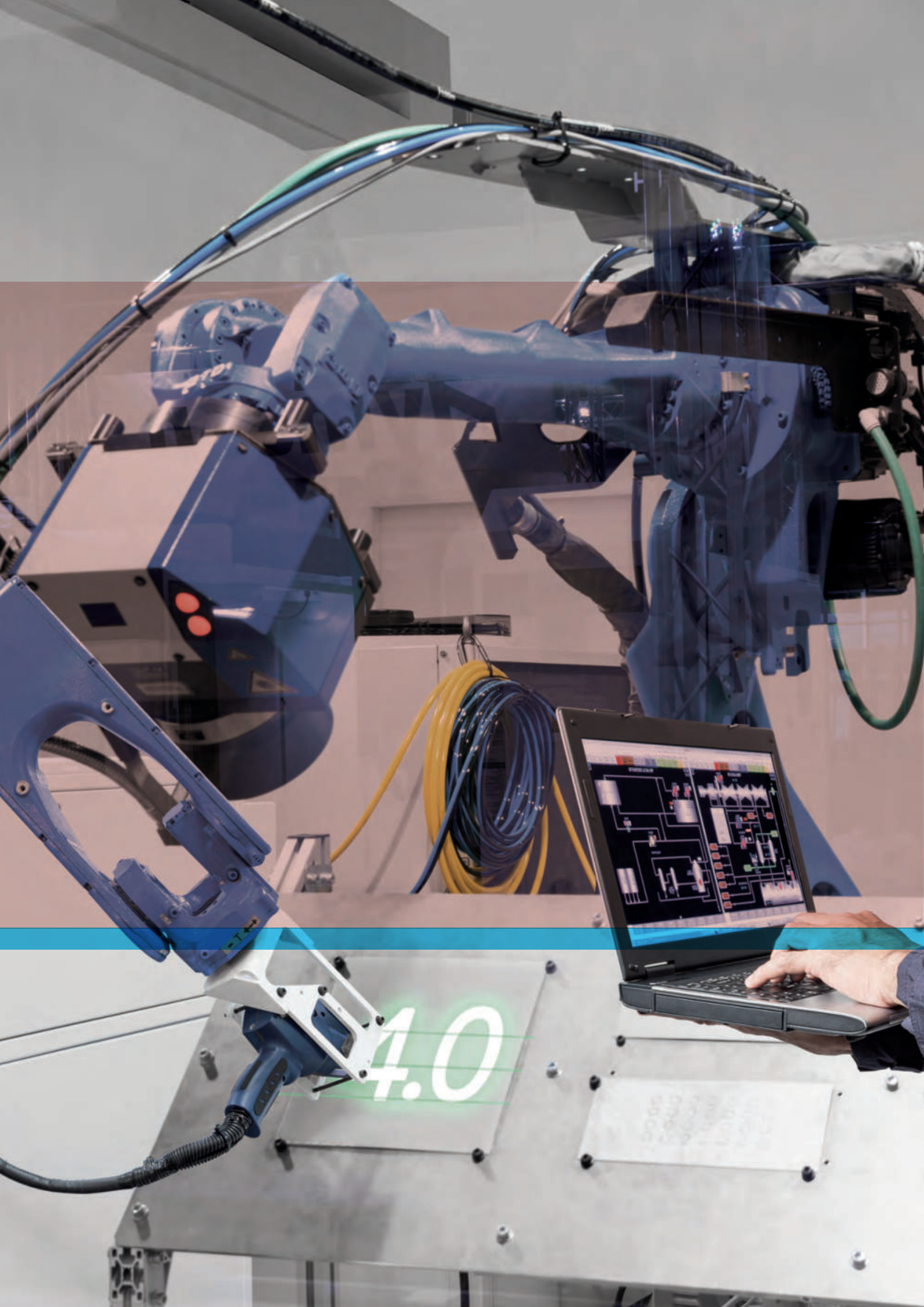
The CQI-9 is a self-assessment for the heat treatment of components in the automotive industry and was introduced by a working group of leading international automotive manufacturers and suppliers as well as the International Organization for Standardization (ISO) for continuous improvement, fault prevention and reduction of process deviations.

Relevant contents were taken from the AMS 2750 and adapted to the heat treatments in the automotive industry with regard to application, requirements, available furnace technology and test frequencies.

Temperature uniformity

Furnace class 1	+/- 3 °C	Furnace class 4	+/- 10 °C
Furnace class 2	+/- 6 °C	Furnace class 5	+/- 14 °C
Furnace class 3	+/- 8 °C	Furnace class 6	+/- 28 °C





Plant periphery

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Plant automation

Quenching and cleaning baths
Exhaust air purification systems
Energy efficiency concepts

Plant automation

The need for automation in all areas of industrial production is constantly increasing. THERMCONCEPT adds integrated systems to furnace systems.

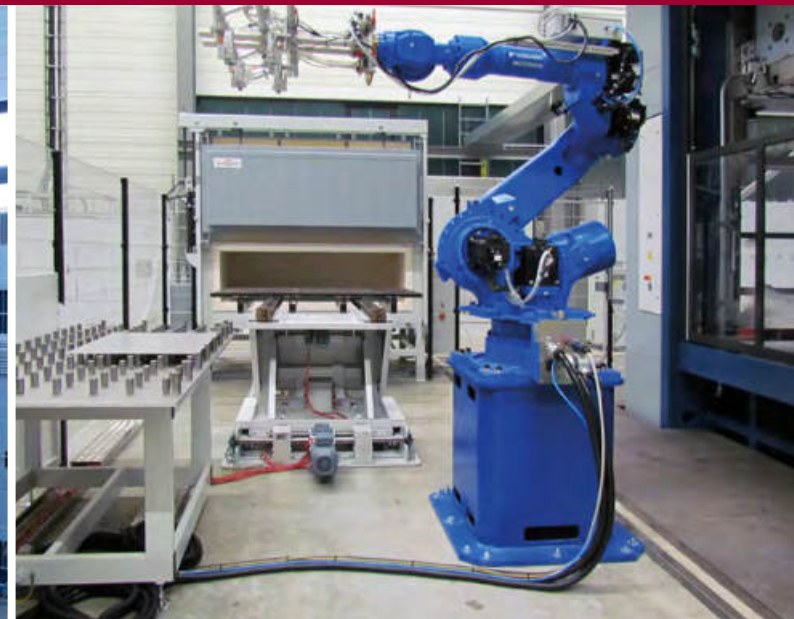
- for loading and placing products on batch carriers, tables and bogies outside the furnace,
- for direct loading and unloading of an furnace chamber
- with systems for transport into and out of the furnace

These systems can be manually controlled, operate to the temperature process or can work fully integrated in the production process.

The following systems are used:

- Suspended transport systems
- Roller conveyor
- Automatic transverse shifting devices for rail-mounted bogie hearths
- Rail-bound linear conveyors
- Fully automatic loading and unloading systems based on 6-axis industrial robots

Automation is carried out in close coordination and cooperation with the user and the respective suppliers of individual assemblies.





For a wide range of heat treatment processes, THERMCONCEPT supplies quenching and cleaning baths, from the 50 litre standard bath for mounting on the hardening system up to free-standing individual special baths.

Water quenching bath

mounted in a pit between 2 drop bottom furnaces for solution annealing of aluminium components in the automotive industry.



For larger plants, baths are designed according to the process data and individually adapted to the requirements. Hardening oils as well as polymers or water are used as quenching media. Charging racks and baskets in connection with charging trolleys for easy loading and unloading are available as well as stirring equipment for fast and uniform quenching and cleaning.

Quenching bath

for quenching spring steel, capacity 2500 litres incl. 3 pneumatic charging devices, heating, oil cooler, 2 agitators and fume extraction with flame trap.

Double water quenching bath

for aluminium components after solution heat treatment, integrated in a sequenced conveyor furnace.

Catalytic and thermal exhaust air purification systems

Volatile organic substances are released during many thermal processes in industry. Compliance with emission limits requires the use of downstream exhaust air purification systems.

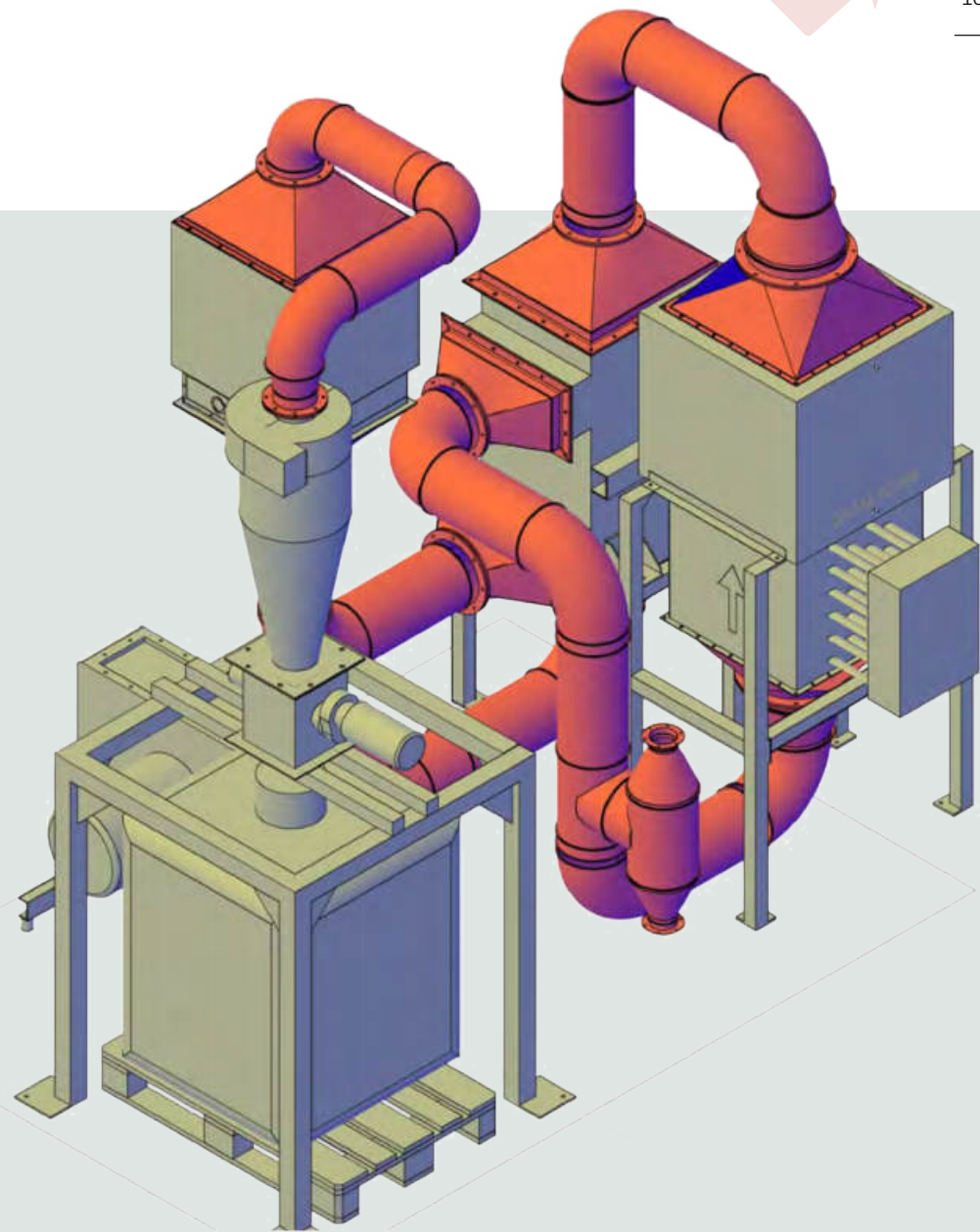
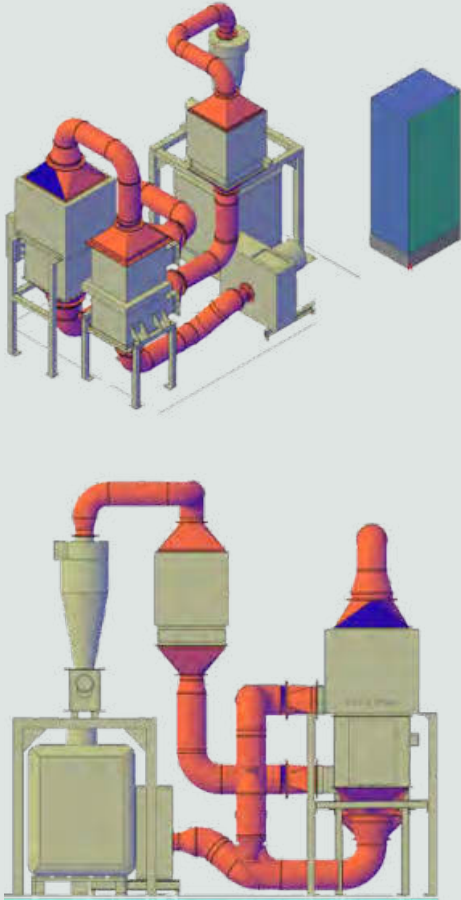
THERMCONCEPT supplies catalytic and thermal exhaust air purification systems that are individually adapted to the process.

Catalytic exhaust air purification (KNV)

THERMCONCEPT catalytic converters work with ceramic honeycomb bodies coated with needle perovskite crystals, which have a high resistance to most catalyst poisons. The design of the catalytic exhaust air purification systems is based on the exhaust gas volume flow and the composition and concentration of the organic constituents. Depending on the application, these are catalytically oxidised at temperatures between 280 °C and 500 °C and completely converted into carbon dioxide and water.

THERMCONCEPT supplies integrated plant systems consisting of the furnace system, the catalytic exhaust air purification system and a PLC overall process control system.

The plant system also includes the required safety technology according to EN 1539.



Photos left: :
Catalytic exhaust system,
individually designed for process-
specific exhaust gas quantities and
components

Photos right:
Larger standard catalytic converter
with different cleaning stages via
honeycombs and chutes
as well as heating coils.



Catalytic and thermal Exhaust air purification systems



Thermal exhaust air purification (TNV)

THERMCONCEPT develops, builds and supplies thermal afterburners for various applications. This robust and versatile type of exhaust air purification is usually used in the case of an undefined raw gas or when catalyst poisons preclude the use of a KNV. Organic components in the exhaust air are completely incinerated.

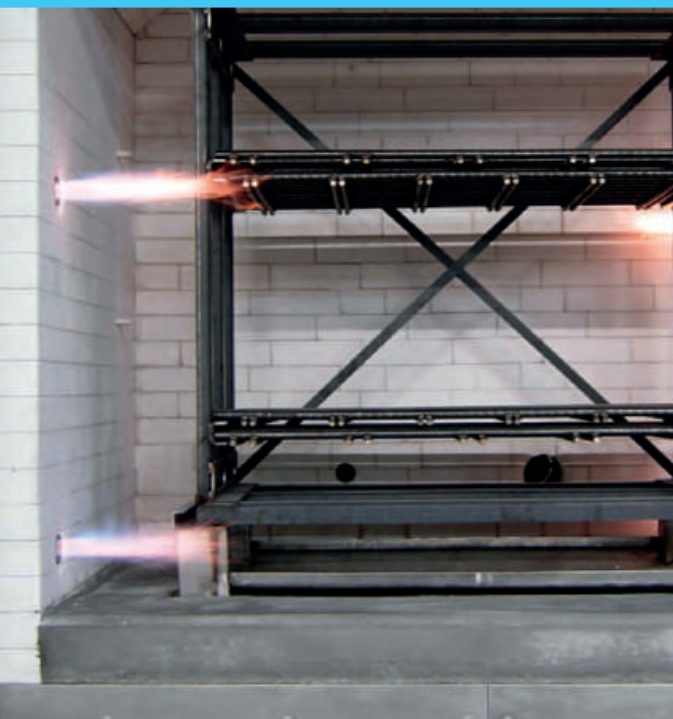
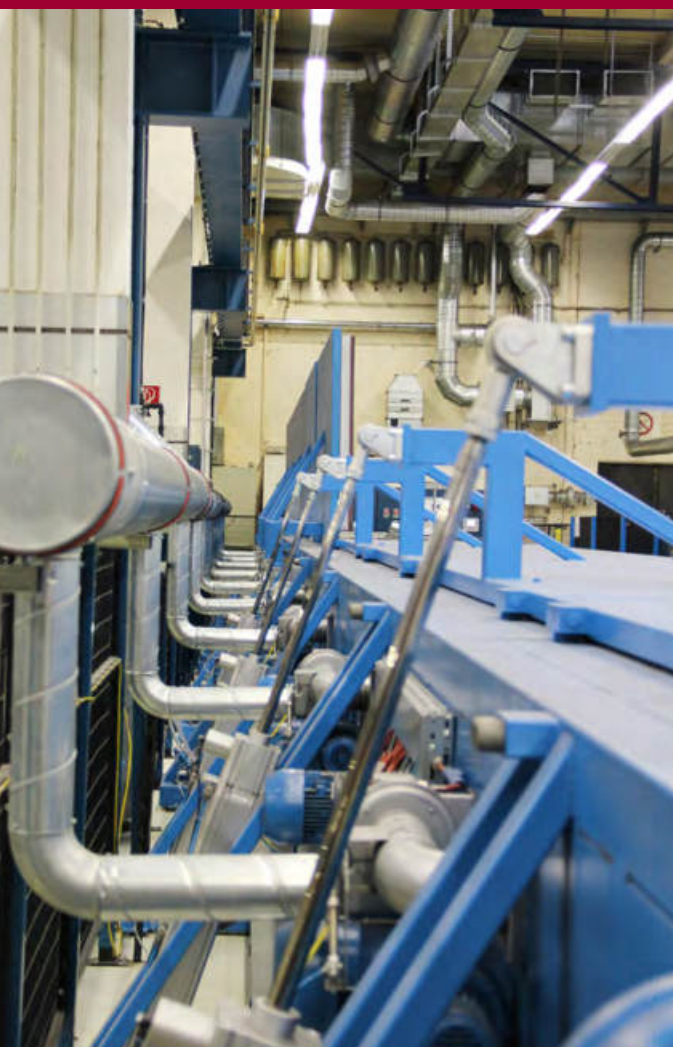
- Version in upright, horizontal or suspended design
- With sound insulation measures (Installation of silencers, soundproof booths)
- Insulation with high-quality ceramic fibre for combustion temperatures up to 1200 °C
- Heating via gas or oil burner, electric heating also possible
- Volume flows from 50 nm³/h to 15,000 nm³/h
- Can be equipped with heat exchanger for heat recovery
- Plant system equipped with the required safety technology

THERMCONCEPT range of services:

- Planning and design of exhaust air purification systems for new and old plants
- Accompaniment of official approval processes and emission measurements
- Connection to upstream and downstream process steps
- Integration into existing conveying and handling solutions

THERMCONCEPT uses thermal afterburners for electrically or gas-fired furnace systems. The focus is always on supplying a complete solution individually tailored to the user's process, which includes the furnace, the thermal afterburner, the safety technology and also the process control.





Large amounts of waste heat are generated, especially in gas-fired furnace systems. The heat potential of the burner exhaust gases can be used for downstream processes, thus improving energy efficiency overall. The economic efficiency of the overall process increases.

The heat recovery of THERMCONCEPT industrial furnace systems takes place via heat exchangers. Air-air heat exchangers or air-water heat exchangers are used.

THERMCONCEPT provides intelligent solutions for heat recovery that lead to significant savings in energy costs and also protect the environment.

The photo shows the heat recovery system for a gas-fired 6-chamber furnace with a heating capacity of 1800 kW. Heat recovery takes place via an air-to-air heat exchanger. The waste heat from the furnace is used to heat the production hall.



- Up to 50 % of the energy from the previous batch can be transferred to the new batch at a continuous production with comparable load weights and application temperatures.
- The air circulation direction is changed so that the hot air from one chamber is blown into the other chamber.
The hot air preheats the new batch and is then blown back. The full power of all 8 fans is used to transfer the energy as quickly as possible.
- The cycle continues until both chambers have the same temperature.
- After the heat recovery step has been completed, one chamber continues to cool down while the other one the next heat treatment cycle begins

Description of the process

1. Start of the cycle and first cycle run

- New baskets are moved by forklift truck into the right-hand chamber furnace
- Scanning the barcode to enter the batch data into the PLC
- Start of the 1st heating cycle in the right-hand furnace chamber
- In the meantime, new baskets with untreated batches are placed in the left-hand chamber by forklift loaded, scanning the barcode to enter the batch data into the PLC

2. Heat recovery

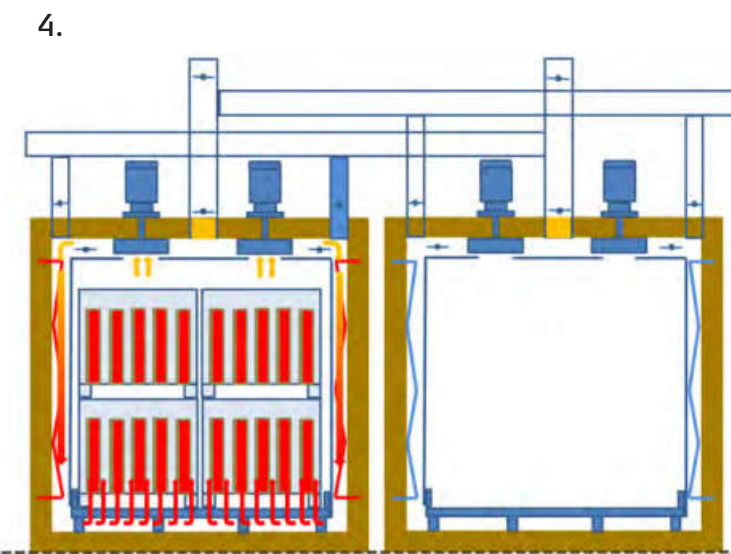
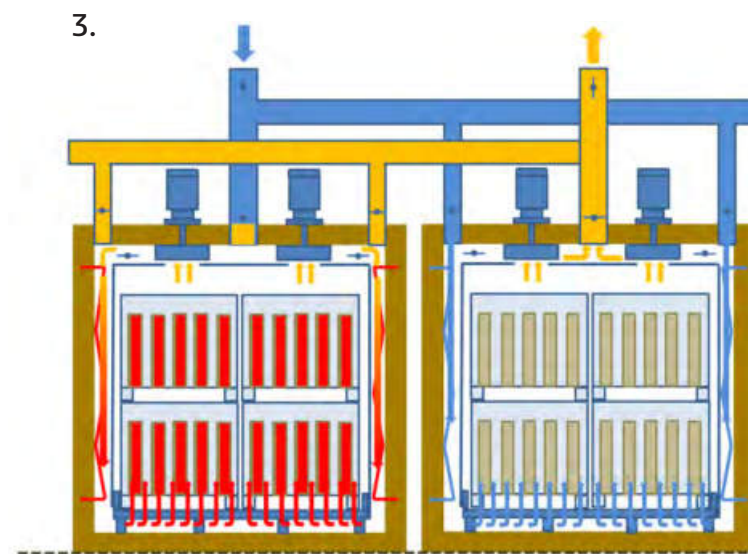
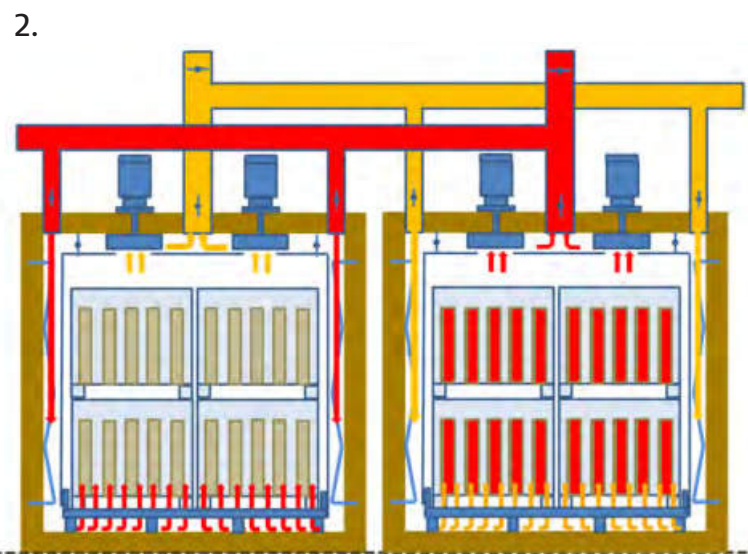
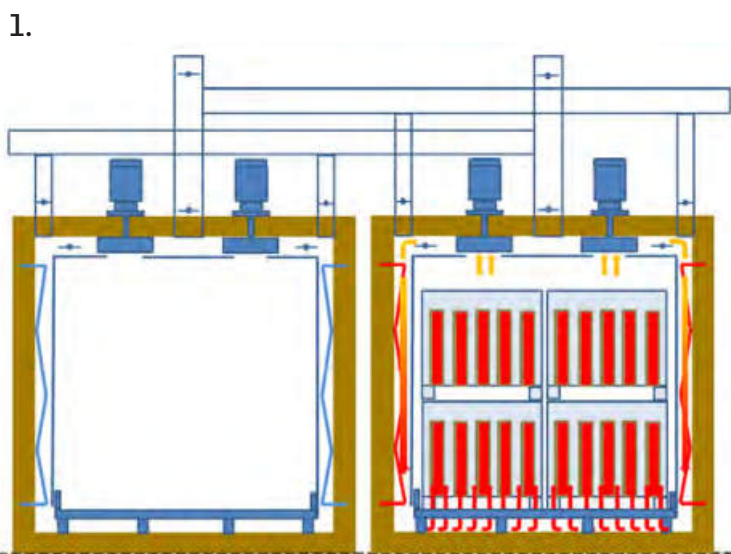
- When the process in the right-hand chamber is finished, energy recycling starts automatically.
- The heat energy is transferred from the right to the left chamber.
- In this step, the heating is switched off in both furnaces.
- This cycle step runs for a predefined time until thermal equilibrium is reached

3. Completion of the heat treatment in the right chamber

- The heat treatment in the right-hand chamber is completed. At this stage, the finished products still have a temperature of 250 – 300 °C.
- Now the furnace system offers the following alternatives:
 - Unloading of the warm batch and direct loading of the untreated boxes for best energy efficiency
 - Further cooling of the finished batch before unloading and transport to the next transshipment point (lower energy efficiency)

4. Operation of the next cycle

- While the heating cycle is running in the left chamber, the right chamber is ready to receive new and untreated boxes
- After completion of the heating cycle in the left chamber, energy recycling from the left to the right chamber starts automatically





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THERMCONCEPT Service

Professional service

We make your furnace project ours

Success through consultation

Trust in the experience we have gained over the years in industrial furnace construction. We turn your special wishes into optimal solutions.

Your application is the focus

We support you in selecting the right furnace system so that you make the right investment decision.

Everything from one source

As a system provider, we not only advise you on the selection of the right furnace system. You can also contact us when it comes to plant automation and the use of supplementary aids, tools and systems.



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Qualified service staff

With our qualified staff, we offer a wide range of professional services around the furnace system, for your safety right from the start. Our service technicians are involved in the production at our headquarters and thus keep their knowledge up to date at all times. They are specialists for

- Insulation
- Control and regulation technology
- Heating technology
- Software
- Electrical engineering/electronics
- Mechanics

The holistic support and maintenance of your furnace system is our focus.

Retrofit and adaptation to standards

THERMCONCEPT furnaces are known for their durability. After many years of hard use, they are far from being old iron. We take care of your systems and make them fit for the future. Often, considerable energy savings can be achieved with little effort. Adaptations to current standards are also possible, so that the furnace system can also be used for additional applications and processes. Modern control systems increase the ease of operation and expand the possibilities of process documentation.

Fit for Future

What you can expect from us is a comprehensive package of professional services to keep your furnace fit for the future.



Furnace inspections

During a furnace inspection, we thoroughly check the condition and functionality of your furnace system in detail. On request, this also includes the measuring of the temperature uniformity according to DIN 17052-1, SAT, TUS, as well as the whether your system still complies with applicable standards.

The results are summarised in a test report. In addition, we provide you with profitability analyses for the necessary retrofit measures.

Preventive maintenance – Predictive maintenance – Life-cycle costing

Unexpected system downtimes cause trouble and considerable follow-up costs. That's why we offer you flexible maintenance contracts with regular inspections as well as preventive and cost-effective replacement of critical spare parts. The maintenance work is comprehensively documented and analysed. This is the prerequisite for optimising life cycle costs.

Spare and wear parts – Only the original is first choice

Spare and wear parts from THERMCONCEPT offer you:

- always original equipment quality
- are 100 % safe to use and a perfect fit
- maximum service life
- a better price-performance ratio than supposedly cheaper replica parts
- constant availability
- the adoption of product improvements also for spare parts
- responsive logistics

Online monitoring/online support

With online support, we offer our customers an extremely economical service for support, e.g. for programme optimisation, troubleshooting, etc. This often avoids costly on-site visits by service technicians.





Our product range



Foundry

The foundry programme includes electrically and fuel-heated melting and holding furnaces for light and heavy metals, which are designed both as bale-out and tilting furnaces. We also supply furnaces for a wide range of heat treatments in foundry use. .



Metall | Industry | Production

THERMCONCEPT manufactures industrial furnaces and plants for a wide range of applications and a temperature range from 50 - 1300 °C. You have the choice between different furnace types, electrically heated and gas-fired systems and furnace systems operating under inert gas. The main areas of application are heat treatment of steel materials, non-ferrous metals, plastics and fibre-reinforced composite materials



Technical Ceramics | Bio-Ceramics High-End-Ceramics

THERMCONCEPT furnaces and heat treatment systems are used for many applications in industry for the development and production of technical ceramics. Our chamber furnaces, bogie hearth furnaces and hood furnaces are electrically or gas heated. In addition to a wide range of practical standard models, we also supply furnace systems specially tailored to your application, plant automation systems and suitable exhaust air cleaning systems.



Laboratory | Research | Development

Furnaces for research and laboratory applications are available for temperatures from 200 °C to 1800 °C. Our programme includes muffle furnaces, tube furnaces, drying furnaces, elevator furnaces and high-temperature furnaces.

THERMCONCEPT GmbH

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