

ENERGY-SAVING REFRACTORY LININGS

For the Ceramics Industry



www.rath-group.com/ceramics



METALS



CERAMICS



GLASS



SPECIAL
FURNACES



FUELS
CHEMICALS
ENERGY

OUTSTANDING INSIDE
Refractory Solutions®

RATH



WELCOME TO RATH - YOUR REFRACTORY SPECIALIST

RATH develops and produces refractory products and supplies plants all over the world with high quality refractory linings. Whenever it comes to solutions for complex requirements, customers choose products and services by RATH.

DETAILED PLANNING - PERFECT ASSEMBLY AND INSTALLATION

We provide solutions for specific requirements by precisely planning, drawing and calculating the refractory lining in our engineering offices. RATH customers receive a customized construction plan for the equipment, after which the refractory can be installed either by RATH staff or by third-party companies. In many cases, RATH also handles the supervision of installment by third-party staff so that the construction is guaranteed according to RATH's strict quality requirements.

WELL-DESIGNED PRODUCTS THAT COMPLEMENT EACH OTHER

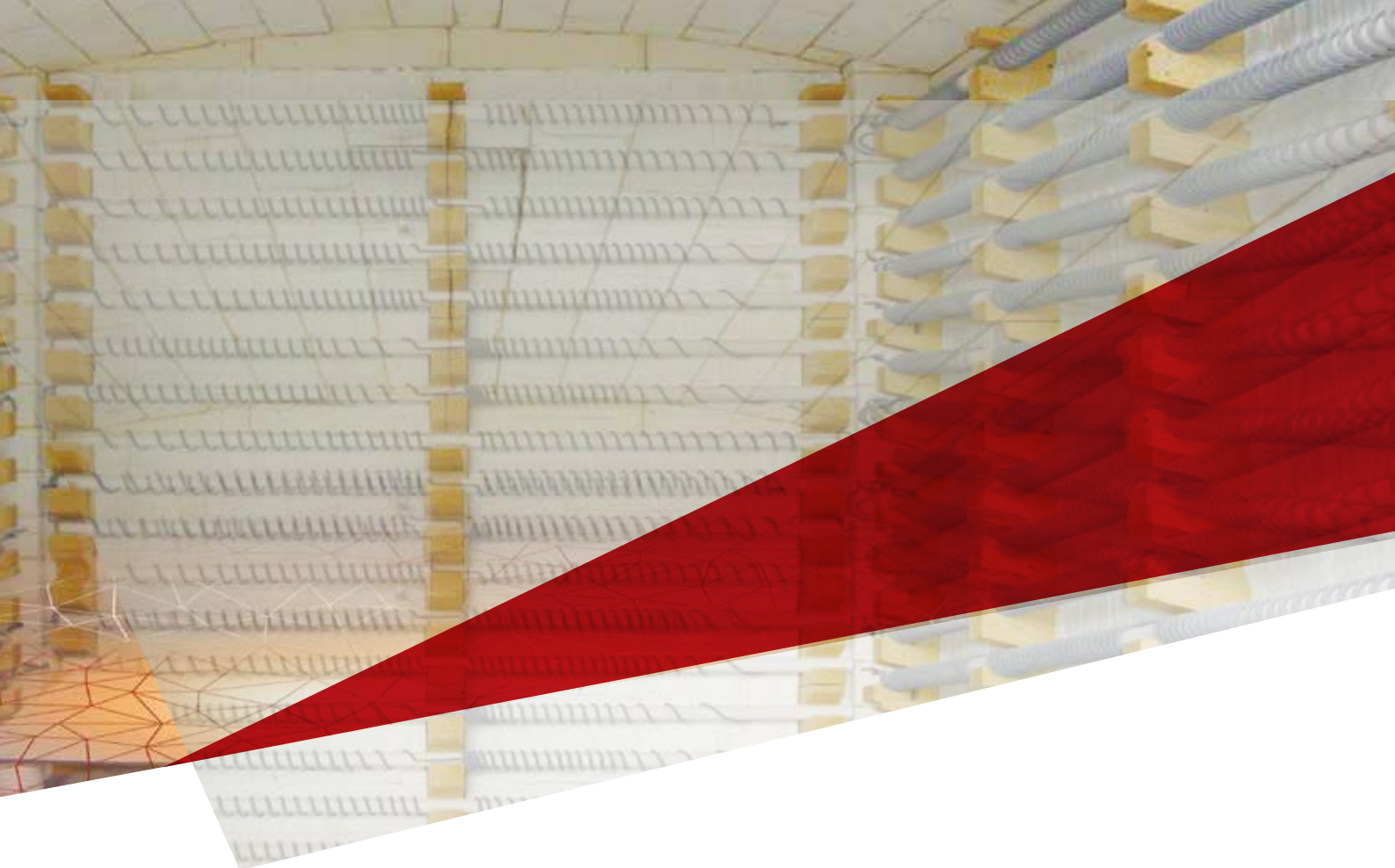
We keep the ease of the assembly of the product in mind right from the start of product development. A good example is Rathloc®, a system in which bricks can be mounted in the simplest way using a standardized push-fit system and always fit perfectly.

RESEARCH, DEVELOPMENT, MANUFACTURING - ALL FROM A SINGLE CAST

Our specialty is refractory materials for temperatures up to 1800 °C and for hot gas filtration up to 1000 °C. We do all research and development in our own laboratories and produce everything from the base materials to the finished component in our own production facility.

A COMPREHENSIVE PORTFOLIO

- Dense bricks
- Monolithics
- Pre-cast blocks
- Insulating fire bricks
- High-temperature insulation wool
- Vacuum-formed shapes



MEETING COMPLEX REQUIREMENTS IS OUR SPECIALTY

We match the refractory lining to the furnace design.
We can do this because we focus on customized planning and production.
Each part is pre-engineered in the CAD system and checked for precise fit
so everything runs smoothly on the construction site.

RATH COVERS THE COMPLETE RANGE OF CERAMICS FURNACE SYSTEMS

- ▶ Tunnel furnaces
- ▶ Bogie hearth furnaces
- ▶ Bell-type furnaces
- ▶ Roller furnaces
- ▶ Chamber furnaces
- ▶ Pusher plate furnaces
- ▶ Laboratory furnaces and special furnaces

THE FULL-RANGE PROVIDER FOR THE CERAMICS INDUSTRY



By choosing RATH, you have a committed partner with a full range of high-quality refractories produced in Europe and in the USA. We offer you expert know-how and the best solutions to address your specific needs for all types of ceramic applications.

With expertise and many years of real-world experience, our project managers ensure the execution and coordination of industry furnace projects all over the world. This means RATH customers have a reliable partner for refractory plants with a comprehensive service portfolio.

ENGINEERING

The basis of every lining concept is the heat transfer, which will determine the optimum wall construction. Extensive knowledge of thermal and corrosive loads is required. To this end, we use modern heat transfer calculation programs and software systems to calculate thermodynamic equilibriums and phase diagrams. As a manufacturer, we have access to extensive databases required for the calculations.

Upon request, we are also able to carry out economic calculations of refractory linings, taking material and energy costs into account, which provides customers the support they need to make decisions.

MATERIAL SUPPLY

RATH material is made to order for customers, with experienced shipping companies delivering directly to the construction site as ordered. No matter where in the world the construction site is, our logistics experts ensure reliable and punctual delivery.

SUPERVISION OF INSTALLATION

RATH also handles assembly and installation supervision in many cases when installation is performed by third-party companies, so that construction according to Rath's strict quality requirements is ensured.

INSTALLATION

Refractory linings for ceramic furnaces require expert installation during pre-assembly or on site, respectively. Our highly trained assembly staff ensure reliable installation and attach particular importance to high safety standards. This includes continuous monitoring of construction sites by experienced installation supervisors.

We attach great importance to high quality assembly equipment and assembly aids to ensure effective and quality lining.

MAINTENANCE AND REPAIR

We monitor the performance of your refractory lining and provide the necessary maintenance to ensure safe operation of the equipment.

We also offer ongoing predictive maintenance and repair.

TUNNEL FURNACE

Continuous-flow furnaces, also known as tunnel furnaces, are used in the ceramics industry mainly for the firing of sanitary ceramics, porcelain, tableware, roof tiles, clinker bricks, refractory materials and technical ceramics, e.g. for exhaust gas catalysts or diesel particulate filters. RATH has been providing refractory linings for tunnel furnaces for many decades.



Tunnel furnace

The refractory lining of a tunnel furnace must meet the specific requirements of the respective application. Whether furnaces consisting exclusively of masonry or furnaces with metal casing, new linings, repairs or refurbishments - RATH has great experience in the field of tunnel furnaces, especially for the ceramics industry, and creates the optimum lining concept based on the customer's requirements.

In the heat insulation lining, our refractory products contribute to enabling a firing sequence in the tunnel furnace that aims to achieve optimum material circulation at low cost. Here particular attention is paid to specific energy consumption, which is kept low through use of modern thermal insulation materials. Depending on the application, dense bricks, refractory castables, insulating fire bricks or even modules made of high-temperature wool are used. Here, too, flexibility in the lining concept is one of RATH's strengths.



Tunnel furnace for the firing of sanitary ceramics and clinker

BOGIE HEARTH FURNACE

Thanks to its extremely good temperature distribution and low specific energy consumption, the bogie hearth furnace is a particularly flexible firing unit with excellent quality results for a wide range of applications.



Bogie hearth furnace for the firing of ceramic pipes
Height: 8 m; width: 4 m; temperature: 1650 °C

For many years, well-known furnace manufacturers have relied on refractory linings by RATH for the firing of exhaust gas catalysis converters and diesel particulate filters. However, RATH products are used also in bogie hearth furnaces for firing porcelain, tableware, refractory materials and structural ceramics.

In these systems, minimization of specific energy consumption through lining with HTW modules, which permit an operating temperature of up to 1600 °C, plays a significant role. However, linings with hollow-sphere corundum bricks for operating temperatures of up to 1750 °C are also used successfully and constitute a robust cladding in the high-temperature range even for corrosive and reducing atmospheres.



Electrically heated bogie hearth furnace with lining made of Altra modules for application temperature of up to 1600 °C

BELL-TYPE FURNACE

Bell-type furnaces are used for the firing of refractories, exhaust gas catalyts, diesel particulate filters, ballistics, bioceramics and structural ceramics. They are characterized by a hood or bell design charged from below.



Bell-type furnace with HTW modules

Thanks to its extremely good temperature distribution and low specific energy consumption, the bell-type furnace is a particularly flexible firing unit for a wide range of applications.

It is mainly used to fire refractory materials, ceramic bodies for particle filters and catalytic converters, and technical ceramics. For many years, RATH products have been successfully used by well-known furnace manufacturers.

For bell-type furnaces up to 1600 °C, Altra linings play an essential role. For higher temperatures up to 1750 °C, hollow-sphere PORRATH bubble alumina bricks are preferred.



Bell-type furnace plant by CTB, lined with Altra modules, among others

ROLLER FURNACE

The roller furnace is a modern firing unit for glost firing as well as co-firing of porcelain, earthenware and stoneware in many fields of application. For technical ceramics there is the roller furnace for up to 1600 °C.



Roller furnace for tableware ceramics

Newly developed roller furnace designs ensure maximum product quality with a minimum of maintenance and personnel expenses. High temperature uniformity across the charge cross-section in the various furnace sections and significant reduction of specific energy consumption and throughput time are further advantages of this furnace system.

Refractory material with good thermal insulation properties and low heat storage are common requirements in these furnaces. High thermal shock resistance of the products is likewise essential. For roller furnaces, RATH provides insulating fire bricks, high-temperature modules, dense bricks and pre-cast refractory castable parts for high requirements on flexible and innovative heating cycles, depending on the application.



Roller furnace for annealing alumina mats

PUSHER PLATE FURNACE

The pusher plate furnace is used to sinter ceramic parts at temperatures of up to 1750 °C. This type of furnace is lined with dense bricks or insulating fire bricks. There are also designs with fiber covers, but these are limited to applications with a maximum temperature of 1500 °C.



Pusher plate furnace

Pusher plate furnaces are used for continuous firing of ceramic products in multi-gas atmospheres. Typical firing products are diesel particulate filters, ferrites, powders, battery components, fuel cells and piezoceramics.

We offer customized design solutions and optimum use value of your production facility through our well-known products.

Depending on the application, for the very demanding requirements of the flexible and innovative production combinations of dense bricks, refractory castables, insulating fire bricks and high-temperature wool are used. In many such systems, severe corrosive attack must be prevented by careful material selection.



Pusher plate furnace for ferrite firing

CHAMBER FURNACE

Chamber furnaces are primarily lined for the firing of technical ceramics and porcelain and are characterized by low space requirements, excellent temperature uniformity and short firing cycles. This type of furnace does not require rails and furnace cars.



Test chamber furnace 1600 °C

Test chamber furnaces are likewise special. These furnaces for research and development can be used for temperatures of up to 1600 °C. The optimized results of the test firings can be directly transferred to production.

Chamber furnaces are preferably equipped with high-temperature module linings. These allow for a very flexible temperature control and can thus realize any heating and cooling processes. However, linings with insulating fire bricks are also frequently used, e.g. in electrically heated plants.



Electrically heated chamber furnace for porcelain firing

SPECIAL FURNACES

Due to the variety of requirements, laboratory furnaces and special furnaces for up to 1800 °C require highly specialized refractory lining. These furnaces require individual parts precisely manufactured for the respective furnace type and a product range that is precisely matched to the respective application.



RATH offers many years of experience and expertise in the lining of special furnaces, such as laboratory chamber furnaces, elevator furnaces, bottom-loading furnaces or dental furnaces.

Special furnaces are highly individual in terms of application and require precise and conscientious refractory lining in accordance with your geometrical, thermal and atmospheric requirements.

Your benefits

- ▶ Uncompromisingly adapted to your requirements
- ▶ Individual shaping in highest quality
- ▶ Applicable up to 1800 °C



laboratory chamber furnace



Dental-furnace lining

ECOREF®

ENERGY-SAVING INSULATION CONCEPT

Companies with industrial high-temperature processes are facing major challenges and changes in current and future discussions of energy and environmental issues. With the ECOREF concept, we can help you reduce costs by using the optimal refractory material.



WHAT IS ECOREF?



ECOREF is an analytical and conceptual approach that helps determine the best refractory lining for your application.



Based on your technological, ecological and economic objectives, as well as numerous process parameters, the most appropriate lining concept is mutually determined.



The concept shows the possible energy savings in kw/h and enables the savings potential to be defined as a percentage.

Our experienced application engineers develop the best lining concepts taking into account technological, ecological and economic aspects.

ECOREF follows 5 steps, which we guide you through:

- 01 Clarifying the need for change
- 02 Determining your objectives
- 03 Analyzing your plant and operating parameters
- 04 Calculating energy performance
- 05 Proposing your optimal lining

Contact our experts - we will be happy to check your individual savings potential:

www.rath-group.com/ecoref

ALTRA® COMPOSITE SYSTEM (ACS)

The ALTRA® Composite System (ACS) is a specially designed insulation system that eliminates common problems such as material reduction, cracking and roof sagging, making the complete failure of high-temperature ceramic insulation boards in furnace chambers a thing of the past.



Industrial furnace

Its modular design allows ACS insulation systems for laboratory and industrial furnaces up to 1800 °C to be manufactured in many geometries and sizes.

Thanks to the unique design of the ACS components and the self-supporting roof construction, rapid furnace cycles are possible, unlike with a conventional design.

Properties of the ACS

- > Modular design
- > Operating temperature up to 1800 °C
- > Heating rate 200 °C/h
- > Cooling rate 100 °C/h
- > Good thermal insulation thanks to low thermal conductivity
- > Extremely good thermal shock resistance
- > Low thermal storage capacity due to low gross density



HT furnace up to 1700 °C with ACS components in roof and wall

Application areas

- > Laboratory furnaces
- > Industrial production furnaces for:
 - > Ceramics
 - > Electronics
 - > Medical devices



ACS roof for HT furnace

Design, delivery and service

- > For individual production of chamber furnaces, bogie hearth furnaces and elevator furnaces
- > The components are standardized and can thus be purchased as individual parts
- > We supply complete lining systems integrating all refractory materials
- > RATH offers design and construction services for custom furnaces and combustion chambers.

ACS COMPONENTS

Your benefits

- Individual furnace sizes and formats possible
- Higher throughput due to rapid furnace cycles
- Long-time transmittance safety
- Stability of the design, even with material cracks
- Repair of individual segments may be possible
- Efficient energy use
- Overall higher productivity



Self-supporting composite roof



Tongue-and-groove with support system



Tongue-and-groove laminated composite elements

Composite roof

Layered bonding processes are used to produce stable and sagging-free roof modules from KVS 174/400 or KVS 184/400 laminates with Kerasetter support. These modules are attached to the furnace housing via a ceramic suspension system.

Tongue-and-groove walls

Consist of KVS 174/400 or KVS 184/400 layered composite elements, which are provided with a tongue-and-groove system. These wall elements can be erected up to a height of 1000 mm without internal support system.

Door

Consists of KVS 174/400 or KVS 184/400 layered composite elements with fiber orientation perpendicular to the hot face over the entire thickness of the material.

Floor

Consists of KVS 174/400 or KVS 184/400 with additional layers of KVS 164 and KVS 144. The floor can be individually adapted to the process requirements in order to accommodate heavier loads, for example, with special support elements or high-density plates.

Materials

- KVS materials for oxidizing applications up to 1800 °C
- KVR materials for reducing applications up to 1600 °C
- Alumina or aluminosilicate fiber, adapted to the particular application as back-up insulation and sealant
- Technical ceramics based on mullite, corundum or SiC for the structural elements of the ACS
- Completion of the system with gasket seals, bricks and moldings

PRODUCTS

INNOVATIVE SPECIAL PRODUCTS

For the lining of the diverse ceramics furnaces, innovative special products with a high degree of finishing made of dense bricks, insulating fire bricks, vacuum-formed shapes, but also pre-cast blocks play an essential role. RATH supplies the latter as burner bricks, quarl bricks, furnace components, cover parts or tunnel furnace car parts, among many other things.



Depending on the requirements, lining with refractory bricks is increasingly supplemented with pre-cast blocks, since castables can be poured into individual shapes and larger components or sections, respectively.

In one of the most modern production facilities for pre-cast blocks, almost all of our refractory castables can be poured into almost any geometric shape. Depending on the intended use, these components can be annealed and pre-fired at up to 1750 °C and thus offered in ceramic bonded form as well.



Dense bricks

RATH's refractory bricks are stable up to 1800°C and can be used in almost all areas of industrial furnace construction.



Insulation fire bricks

Consist of complete range of heat-insulating bricks for industrial applications up to 1800°C



Vaccum-formed products

Vacuum-formed products made of mineral and high-temperature wools can be used at application temperatures of up to 1800°C.



Pre-cast blocks

Due to the diversity of materials as well as the wide variety of pre-firing temperatures, RATH's pre-cast blocks are unique and can be used at up to 1800°C.

INDUSTRIES AND APPLICATIONS



Forging furnace



Glass production



Aluminum melting furnace

Thanks to their many projects, RATH employees have a great deal of experience and knowledge that they contribute to the development and planning of refractory linings.

RATH HAS EXPERIENCE AND EXPERTISE IN SPECIFIC INDUSTRIAL APPLICATIONS

Metal-processing industry

- Metallurgical heating furnaces
- Heat treatment furnaces
- Aluminum smelting furnaces
- Direct reduction plants
- Hot-gas filtration

Petrochemistry, chemistry

- Carbon black reactors
- Reformers and cracking furnaces
- Chlorine reactors
- Sulfur extraction plants
- Hot-gas filtration

Energy & environmental engineering

- Biomass firing systems
- Wood distillation, grate stoker furnaces
- Hot-gas generation
- Fluidized bed reactors
- Rotary kilns
- Waste incineration plants
- Heat exchangers
- Hot-gas filtration

Tiled stoves and domestic fireplaces

- Complete oven systems
- Biological combustion chamber plus
- Flue systems
- Combustion chamber linings
- Inspection window doors
- Mortars and adhesives

Ceramic industry

- Technical ceramics, sanitary ceramics, pottery ceramics, refractory ceramics
- Tunnel kilns
- Rotary furnaces
- Hood-type furnaces

Special furnace construction

- Laboratory furnaces
- Dental furnaces
- Analytic devices

Glass industry

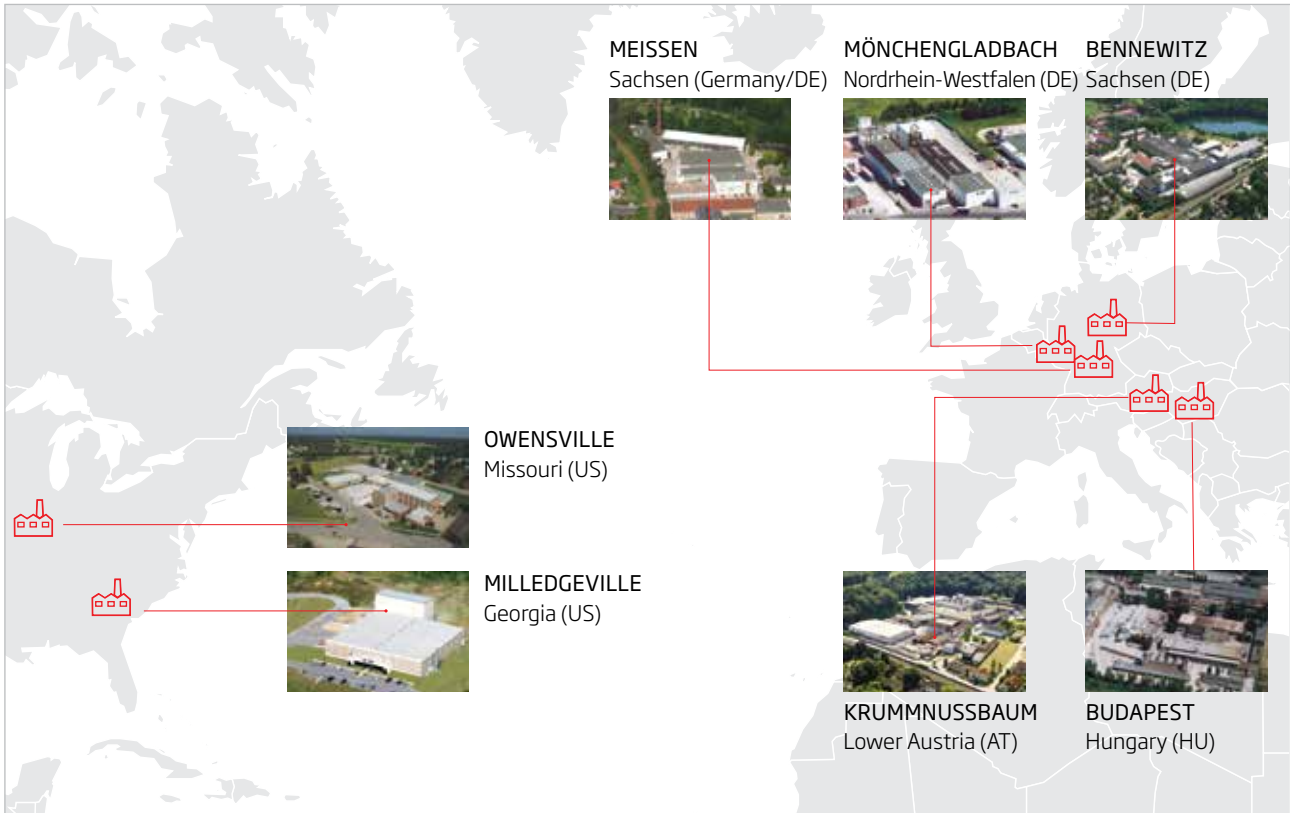
- Regenerator chambers
- Melting ends
- Working ends
- Forehearths
- Basins for glass processing

IN-HOUSE MANUFACTURING AT HIGHEST QUALITY LEVEL



Seven production sites in Europe and America are constantly exchanging information about manufacturing procedures to guarantee best products.

Quality at RATH is not just a buzz-word but a vivid corporate culture. Each individual employee strives for the best solution and does not give up until it is achieved.



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