



Metal – E-Book

Industrial Furnaces & Ovens



With over 2,000 kilns sold and installed all over the world, **NUTEC Bickley**, has established itself as one of the best international kiln engineering/manufacturing companies.

Learn more at nutecbickley.com

NUTEC Bickley

A Tradition of Excellence

NUTEC Bickley is focused on understanding our customer's thermal process equipment needs and working to supply the best equipment to meet those needs at the most competitive price. By applying the latest proven

technology, **NUTEC Bickley** can provide innovative solutions that meet or exceed our customer's expectations in equipment quality, production efficiency, and operational economy.

Quality Statement

Using state-of-the-art technology, we design and manufacture kilns and furnaces for the Ceramics and Metals industry, as well as providing industrial heating and insulation systems, consulting, and aftermarket services, to satisfy our customers' requirements and to exceed their expectations.

We achieve this by utilizing a quality system that assures the continuous improvement of our products and processes, and that promotes the development of our employees and organization, to consolidate **NUTEC Bickley's** position as a world-class company.



Fig. 1 **NUTEC Bickley's** Headquarters



Fig. 2 **NUTEC Bickley's** international kilns



Multi-Kiln

Car-Bottom Furnaces & Ovens

NUTEC Bickley provides a heavy-duty line of Car-Bottom ovens and furnaces, from 30 ft³ to over 3,500 ft³ (0.85 m³ - 30 m³), custom-built to match customer production and process requirements.

The Car-Bottom design offers a great advantage, which is the ability to handle large / heavy loads, as the product is loaded into the car(s) when located outside the actual furnace area; this eliminates the damage to the furnace interiors during loading and unloading.

Fig. 3 NUTEC Bickley's Car-Bottom

NUTEC Bickley Car-Bottom furnaces and ovens are provided for temperatures ranging from 300°F to 2,350°F (150°C – 1,290°C) to perform the following process applications:

- Flexible heat treating from **500°F to 2,100°F** (260°C – 1,150°C).
- Annealing.
- Tempering.
- Curing.
- Normalizing.
- Preheating ceramic molds for investment casting.
- Stress Relieving.
- Annealing of aluminum parts.
- Preheating of steel molds and dies for hot processing.
- Aging of aluminum extrusions and non-ferrous alloy parts.
- Homogenizing of aluminum logs and ingots.
- Forging of complete large ingots and parts.

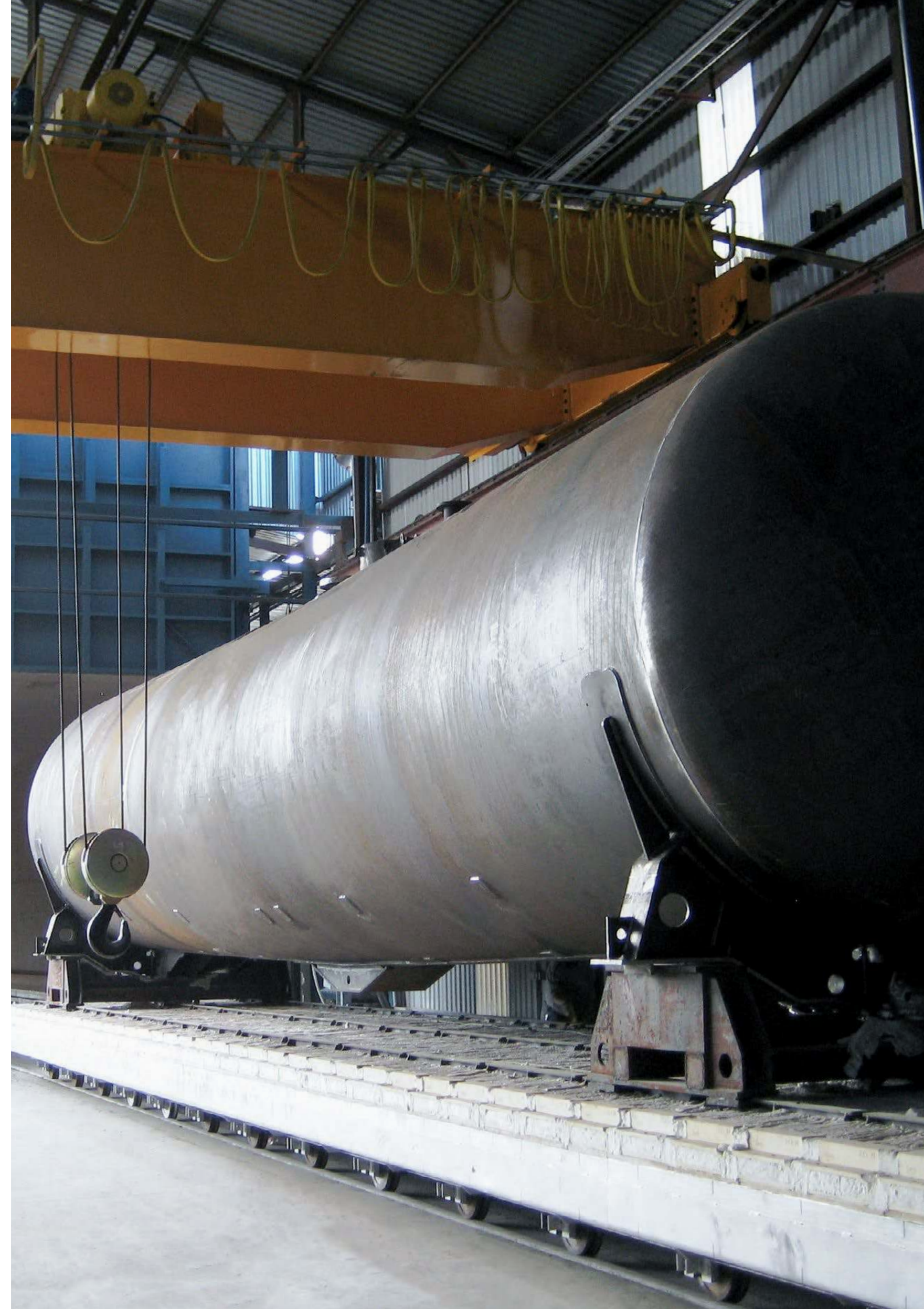


Fig. 4 NUTEC Bickley's Car-Bottom



Box Furnaces

NUTEC Bickley provides a heavy-duty box furnace line, from 30 ft³ to over 3,500 ft³, in custom designs to match customer production and process requirements.

Box furnaces and are provided for temperatures ranging from 300°F to 2,350 °F (150°C – 1,290°C) to perform the following process applications:

- Forging of complete large ingots or parts (box type application)
- Forging of ends and small billets (slot type application)
- Flexible heat treating from 500 °F to 2,100 °F (260°C – 1,150°C)
- Annealing
- Hardening
- Austenitizing
- Tempering
- Normalizing
- Stress Relieving
- Solution and aging heat-treating of aluminum and non-ferrous alloy parts

Fig. 5 NUTEC Bickley's Box Furnace

Chain & Meshbelt Conveyor Ovens

NUTEC Bickley provides custom continuous type ovens and furnaces to match customer production and process requirements.

We review the individual product and process application to determine the best choice of conveyor (mesh belt, cross slats, chain strands, flat wire, etc.) and the best air flow pattern system (vertical flow, side flow, end flow, etc.) to efficiently transfer the heat to the load.

Chain and mesh belt conveyor ovens and furnaces from **200°F to 1,200°F** (90°C – 650°C) to perform the following process applications:

- Tempering of automotive steel parts.
- Aging of aluminum castings and non - ferrous alloy parts.
- Drying of sand cores.
- Aluminum heating for forging.
- Tempering of steel tools.



Fig. 6 NUTEC Bickley's Conveyor Ovens





Tip-Up Furnaces

NUTEC Bickley provides tip-up furnaces and ovens custom-built with sizes to match customer production and process requirements.

Tip-up furnaces eliminate possible door leakage by allowing the entire furnace bottom perimeter to seal against a fiber / sand seal box.

NUTEC Bickley tip-up furnaces and ovens are provided for temperature ranges from **300°F to 2,200°F** (150°C – 1,200°C) to perform the following process applications:

- Flexible heat treating from **500°F to 2,100°F** (260°C – 1,150°C).
- Annealing.
- Tempering.
- Normalizing.
- Stress Relieving.
- Aging of aluminum extrusions and non-ferrous alloy parts.
- Solution heat treat.

Fig. 7 NUTEC Bickley's Tip-Up



Bell Furnaces

NUTEC Bickley provides custom-built bell furnaces to match our customer's production and process requirements.

The advantages of this equipment are the excellent positive seal between the furnace and the base and they can also be used with multiple bases. Different bell lifting methods are available depending on the customer's requirements and layout.

Bell furnaces can be provided for temperature ranges from **500°F to 2,100°F** (260°C – 1,150°C) to perform the following process applications for iron castings and steel parts:

- Flexible heat treating **500°F to 2,100°F** (260°C – 1,150°C).
- Annealing.
- Normalizing.
- Stress Relieving
- Tempering.
- Stress Relieving of forgings and steel plate formed parts.
- Controlled cooling of steel forged parts.

Fig. 8 NUTEC Bickley's Bell Furnace

Basketless Rotary Furnaces

The automotive industry has put increasing demands on manufacturers to reduce costs and increase product quality. Our basketless heat treatment systems are designed for heat-treating automotive cylinder heads, engine blocks and other high-volume castings and forgings, without the conventional requirement of product conveying baskets, carriers, trays or fixtures, which require additional energy for heating, continuous repairs and replacement.

The basketless heat treatment furnaces offer the distinct advantage of reducing capital costs, ongoing maintenance costs and energy consumption requirements over a traditional roller hearth furnace system.

These **NUTEC Bickley** systems are designed to be integrated into fully automated heat treatment cells as a turn-key package.



Fig. 9 NUTEC Bickley's Rotary Furnaces





Walking Beam Furnaces

NUTEC Bickley provides walking beam furnaces for continuous production custom-built to match customer production and process requirements.

The handling system of this type of furnace (fixed beams and walking beams) can be made with hard refractory material or with high temperature steel alloys in custom shapes according to the size of the product.

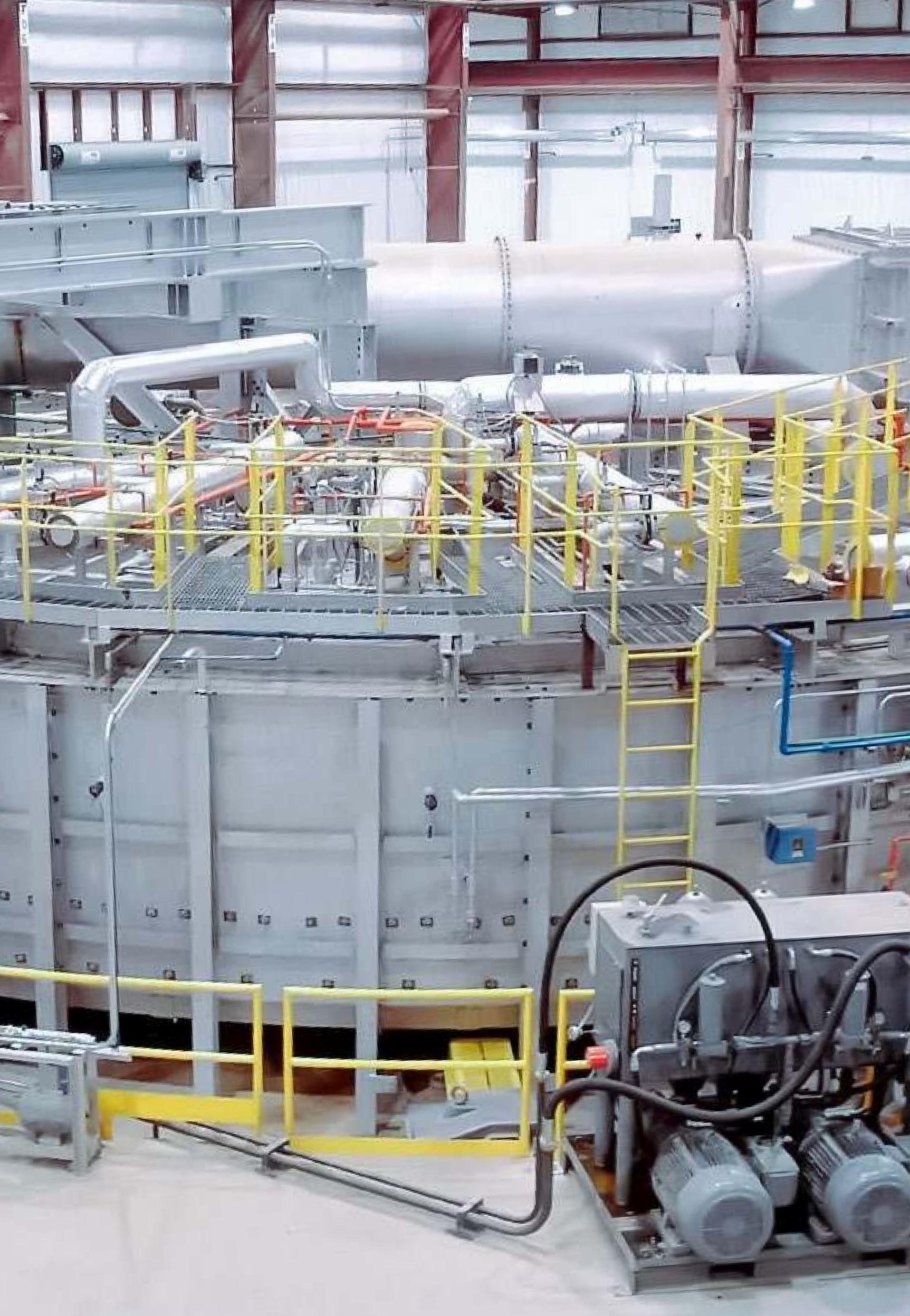
NUTEC Bickley Walking beam conveyor system does not require any cooling system (water or air) and maintenance is very low compared to other systems.

Fig. 10 NUTEC Bickley's Walking Beam Furnaces

NUTEC Bickley walking beam furnaces and ovens are provided for temperatures ranging from **300°F – 2,000°F** (150°C – 1,100°C) to perform the following process applications::

- Austenitizing of automotive suspension parts.
- Austenitizing of leaf springs prior to cambering and quenching.
- Tempering of automotive suspension parts.
- Heating of large plates for normalizing and hot forming.
- Heating of plates for austenitizing and hot forming tools.





Rotary Hearth Furnaces

Rotary furnaces are an efficient method of heating products that can be loaded and unloaded from the same general area using either manual means, dedicated machines or robotics.

NUTEC Bickley has experience in building these types of furnaces including the dedicated machine or robots to load and unload the product.

These furnaces can have several methods for rotating the hearth, including slew drives with servomotors, slew rings with gear motors, roller chains and rack and pinion system. All depending of the hearth size and process requirements.

- Operating temperature ranges: **300°F - 2,350°F** (150°C – 1,290°C).
- Diameters: **5'-0 to 60'-0** (1.5 m - 20 m) or greater.
- Product **1 ton – 45 tons** per hour or greater.

Fig. 12 NUTEC Bickley's Rotary Hearth Furnace

Roller Hearth Ovens & Furnaces

NUTEC Bickley provides roller hearth ovens and furnaces in custom designs to match customer productions and process requirements.

The units are designed for batch process applications and for indexing continuous production.

Roller Hearth Furnaces and Ovens are provided for temperature ranges from **300°F-1,700°F** (150°C – 930°C) to perform the following process applications:

- Annealing.
- Hardening.
- Austenitizing.
- Preheating of iron castings for hot processing.
- Drying.
- Tempering.
- Curing.
- Normalizing.
- Stress Relieving.
- Aging of aluminum automotive parts.
- Solution heat treating of aluminum automotive parts.
- Heating of large plates for normalizing and hot forming.





Pusher Furnaces

NUTEC Bickley provides pusher type furnaces for continuous indexing production custom-built to match customer production and process requirements.

The indexing pusher mechanism is located outside of the furnace and pushes a whole train of trays or containers along the length of the furnace. This type of furnace has fixed “roller rails” or “skid rails” on top of the refractory hearth to support the trays or containers along the furnaces.

NUTEC Bickley pusher type furnaces and ovens are provided for temperature ranges from **300°F – 2,100°F** (150°C – 1,150°C) to perform the following process applications:

- Hardening.
- Austenitizing.
- Tempering.
- Normalizing.
- Stress Relieving.
- Aluminum heating for forging.

Fig. 14 NUTEC Bickley's Pusher Furnace





Integrated Heat Treatment Lines

Integrated Heat Treatment Lines NUTEC Bickley has wide experience in this field and can supply all furnace, movement, loading/unloading and automation systems.

The austenitizing heat treatment process involves steel and other ferrous alloys. The material/component being treated is heated to a point that is above its critical temperature and held there for sufficient time for transformations to occur. This is generally followed by hardening, where the component is subjected to quenching at a rate fast enough to transform the austenite into martensite.

A typical approach, based on a continuous process, sees forged components being batch loaded into the system onto a tray. These trays are indexed through the austenitizing furnace in a single row. At the furnace discharge, the tray is removed quickly and placed onto the quench table and lowered into the submerged water quench. An agitation method is employed in the quench tank.

NUTEC Bickley can supply a complete system that runs seamlessly, comprising the entire process line from the furnaces to the quench to the material handling tables and transfer cars – all operating automatically. After the prescribed quench time is achieved, the tray is lifted from the quench tank and indexed via a transfer car – then to the roller table – to be charged into the temper furnace for the final treatment cycle. After leaving the tempering furnace, the forged parts can be indexed along the line where the tray is tilted and parts dropped into a collection bin.

Fig. 15 NUTEC Bickley's Integrated Heat Treatment Lines

Batch and Continuous Oven

Batch and Continuous, NUTEC Bickley product line of industrial ovens can be used for many heating applications. Our designs include both batch processes and continuous ovens with a wide variety of conveyor types (chains, pushers, overheads, rollers, etc.). We manufacture an oven line with operating temperatures of up to a maximum of 650°C (1200°F).

NUTEC Bickley ovens are used in a wide variety of industries. Some of the main applications are curing of composites (such as carbon fibers), aluminum aging, sand core drying, die and mold preheating, aluminum sows (ingots), steel tempering, drying and curing in the electrical industry (motors, transformers), and welding electrodes.

Many oven applications require very tight tolerances, and this is something that the highly experienced NUTEC Bickley engineering team is ideally placed to deliver. We can determine the optimum air flow pattern – whether that be vertical flow, horizontal end/side flow, or reverse flow – to achieve a uniform heat transfer.





Drop Bottom Furnace

Drop bottom furnaces are the best equipment to achieve the aluminum solution heat treatment in a batch configuration.

The combination of the main features, like a customized air distribution furnace system, quick door opening, heavy-duty lifting mechanism and quench tanks with required agitation, makes this furnace the ideal equipment for aluminum heat-treating of castings and forging parts.

NUTEC Bickley provides custom-built Drop Bottom furnace sizes to match the customer's production and process requirements.

Fig. 17 NUTEC Bickley's Drop Bottom Furnace

Some of the typical process and design features are as follows:

- Low maintenance fiber lined sections using the large module system to reduce the number of joints.
- Gas fired, indirect gas fired and electric heating systems available.
- Recirculated fan systems to provide large volume and high velocity recirculating airflow through the work to insure the uniformity and efficient heat up of the load.
- Customized air distribution designs to match the air flow pattern requirements according to product / load arrangement.
- Quick opening door system.
- Heavy duty mechanism for load lifting and quenching.
- Quench system specifically designed depending on product in order to provide excellent quenching results.



R&D At NUTEC Bickley

NUTEC Bickley has invested heavily in an excellent R&D facility to offer furnaces and ovens with the latest technology.

Our R&D lab offers the following services:

- Energy Efficiency Analysis.
- Temperature Uniformity Surveys.
- Thermal simulation using computational fluid dynamics software.
- Toll Firing from **100°C up to 1,800°C** (210°F - 3,270°F).

Spare Parts, Service and Retrofits

If advances in firing technology, kiln lining materials, and instrumentation have made your kiln obsolete, NUTEC Bickley can update kilns to provide “as new or better” performance for a reasonable capital investment.

NUTEC Bickley's Service and Parts Group offers quick response times and outstanding technical service to all kiln owners. You are assured of always getting the correct components on time, every time. NUTEC Bickley can also provide regularly scheduled surveys and maintenance visits that will keep your kiln at the peak of operating efficiency.

NUTEC Bickley offers a full range of kiln retrofit services, including the construction of designed systems, installation, commissioning services, and upgrades for instrumentation.



Fig. 19 NUTEC Bickley's Spare parts & Service

Control and Data Acquisition System

NUTEC Bickley's broad control system design experience ensures your kiln will have the necessary tools to maintain your process under control.

Our control systems include controllers, hybrid systems, PLCs, operator interfaces, industrial panel PCs, desktop computers, customized supervisory control and data acquisition software (SCADA), and more. In addition to full-process control, our systems allow for faster service and troubleshooting by providing remote monitoring capabilities.

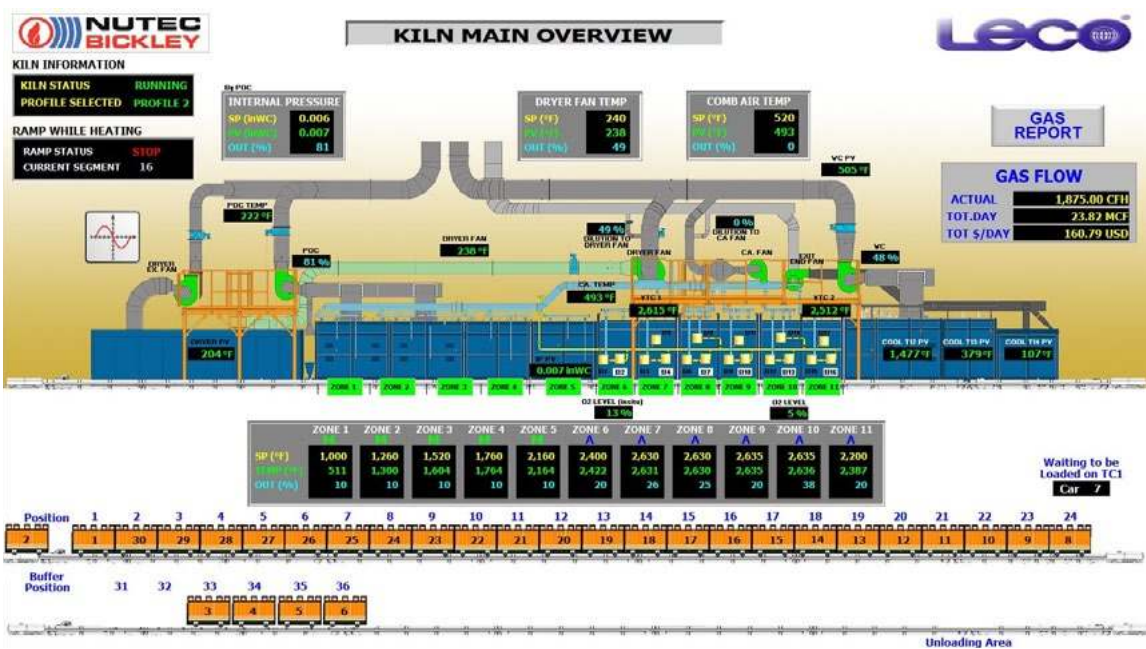


Fig. 20 NUTEC Bickley's Kiln Main Overview

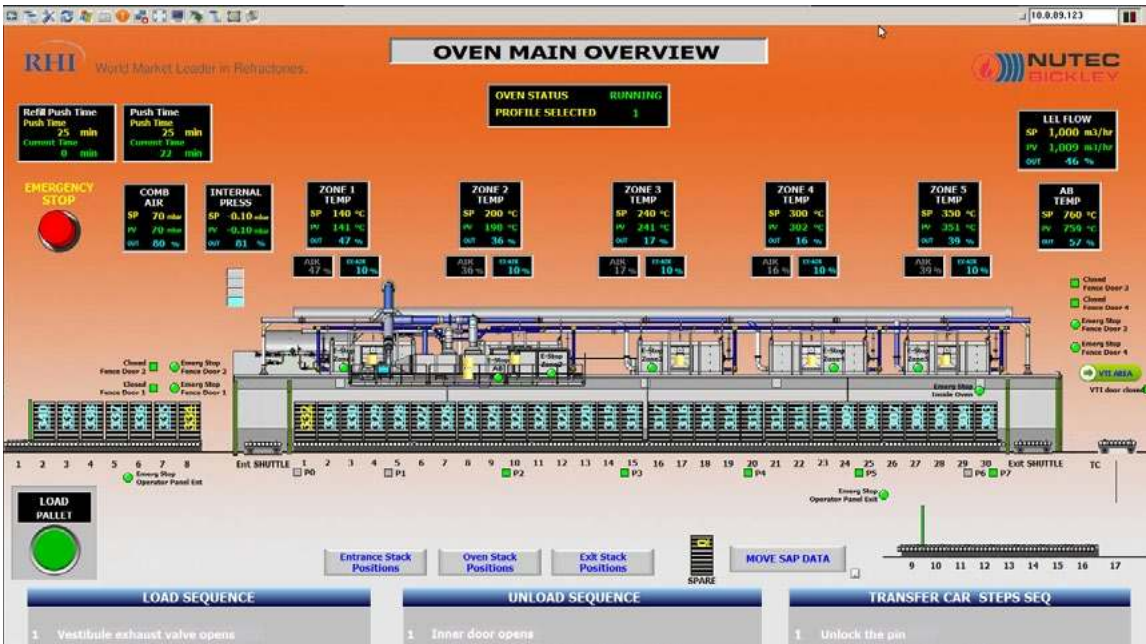


Fig. 21 NUTEC Bickley's Oven Main Overview



Learn more at nutecbickley.com

US Office

21240 Spell Circle Drive
Tomball, Texas 77375, USA

Headquarters

Carr. Saltillo - Monterrey No. 100 (Km. 62.5)
Santa Catarina, N.L. 66359, Mexico

P: +52 (81) 4170 7421

Sales & Services Offices

USA / Canada

P: +1 (873) 498 1203

Europe

M: +(44) 7717 880888

Kilns and Furnaces

E: sales@nutec.com

Spare Parts

E: spares@nutec.com

Technical Support

E: techsupport@nutec.com