



Ceramic – E-Book

Kilns for Sintering Ceramic Cores



Ceramic Cores are widely used in manufacturing industries, particularly aerospace, and help with the precision casting of a wide range of alloys. **NUTEC Bickley** provides the kilns for this sector, as well as being itself an expert in the casting process.

Learn more at nutecbickley.com

NUTEC Bickley

A Tradition of Excellence

NUTEC Bickley has extensive experience designing and manufacturing continuous (tunnel) kilns and batch (shuttle) kilns for sintering Ceramic Cores. Our kilns use the latest combustion and control technology to sinter these cores with optimal temperature

uniformity and atmosphere conditions to ensure consistent products which require minimal post-sinter machining. Special attention is paid to the cycle segments where binders and lubricants are burnt out.

Experience

Ceramic Cores are often complex shapes made from high-purity, stable ceramic materials that are set within a mold when a product is cast, to create interior holes and pathways in the metal after casting and core removal. For example, turbine blades use ceramic cores to create internal cooling air paths that prevent a blade from melting at ultra-high temperatures.

With over 50 years' experience, **NUTEC Bickley** has demonstrated wide knowledge and expertise when it comes to sintering ceramic cores. As most ceramic core bodies contain organic binders and lubricants to allow manufacture, they need careful sintering during their burnout, so our kilns are designed with that in mind.

These kilns are often fitted with thermal oxidizers, RTOs or post-exhaust cleaning systems to protect the environment.



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



Fig. 2 **NUTEC Bickley's** Batch Kiln

State-of-the-Art Equipment

Continuous Kilns for Ceramic Cores

NUTEC Bickley's continuous kilns for ceramic cores are designed and manufactured specifically for the industry. With our equipment, process variables are held under tight control from the beginning, through the burnout stages to the end of the cycle, assuring superior quality, and consistent dimensions of your finished products. Consistent dimensions mean less post-fire machining.

Continuous kilns are the best solution when large volumes of product need to be fired in extremely consistent conditions. They offer excellent temperature uniformity and fuel consumption can be **50%** lower than with batch kilns.



Fig. 3 **NUTEC Bickley's** Continuous Kiln

State-of-the-Art Equipment

Batch Kilns for Ceramic Cores

NUTEC Bickley's batch kilns for ceramic cores are designed and built to meet the precise demands of this complex industry. Multi-kiln arrangements with automatic car loading and handling systems are also available to give large volumes of product.

With great temperature and pressure control even large, dense, packed loads can still produce uniform sized products.

Batch firing of products offers the manufacturer the greatest flexibility. Our batch kilns employ state-of-the-art technology and come in a wide range of capacities and with a choice of car handling, combustion and control system designs.



Fig. 4 **NUTEC Bickley's** Batch Kiln

Features

Jointless® Fiber System

NUTEC Bickley's kilns are lined with either brick, or with its patented Jointless® Fiber System.

NUTEC Bickley's Jointless lining can be made with different densities and thicknesses to cope with higher temperatures and pressures than traditional linings. We also produce insulation brick linings for some higher temperature applications within the ceramic cores sector.



Fig. 5 NUTEC Bickley's Ceramic Fiber Linings

Design Flexibility

Features

1. Best Control System

As well as uniform firing temperatures, many ceramic core products need specific oxygen levels during the sintering process.

Our NUTEC Bickley IMPS® technology is the best available as it focuses on very precise controls for your process. The system leads to lower fuel consumption levels and also helps the user to achieve superior quality in the final product.

2. Excellent Temperature Uniformity

NUTEC Bickley systems control the different variables of the heating curve inside the kiln, such as internal pressure, heating rates, air movement and air/gas ratio with the help of our control software.

The control system allows the user to regulate the temperature in each of the zones of the kiln to have a uniform temperature, lower fuel consumption and to achieve superior quality in the final production.

3. Power Failure Protection System (PFPS)

NUTEC Bickley's PFPS prevents a lot of downtime; it protects the load from being damaged due to a failure in the power supply by keeping the burners alight for up to one minute in the case of a power outage and thereby maintaining kiln safety. This system eliminates the need to manually relight the kiln once a power outage is rectified, thereby maintaining kiln safety.

Features

Incineration Systems, Afterburners, RTOs (Regenerative Thermal Oxidizers)

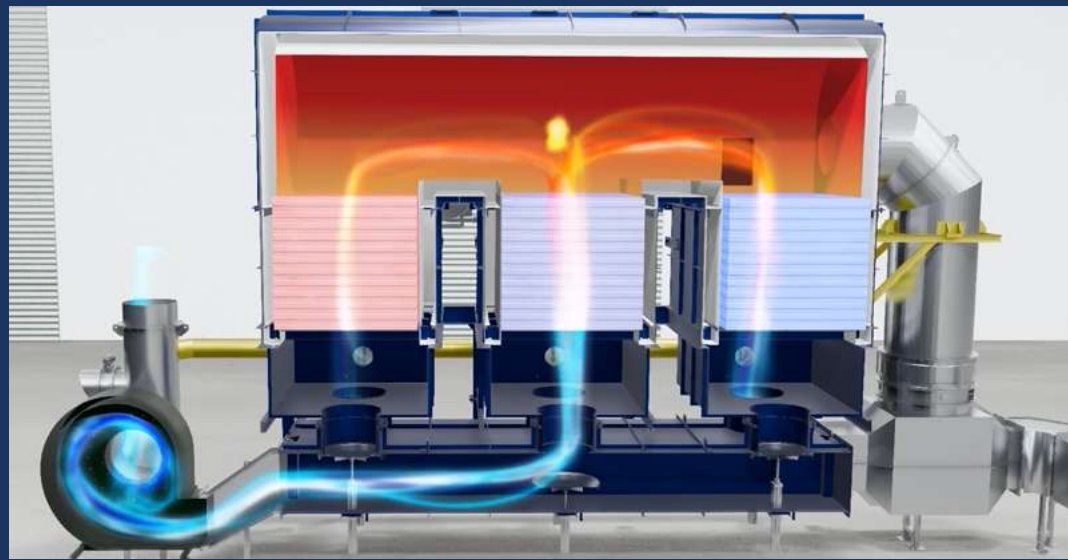


Fig. 6 RTO's Air flow visualization

- Reducing emissions with the addition of an afterburner or incineration system for products that have any volatiles or flammable materials.
- Energy recovery systems to ensure the lowest fuel consumption.

The energy that is introduced into the kiln via the burners is typically used to heat the product, kiln walls, kiln furniture and cars. The remaining energy is usually lost in what we term 'loss to atmosphere'.

Regenerative Thermal Oxidizers (RTOs) are designed to undertake the critical task of destroying volatile organic compounds (VOCs), hazardous air pollutants (HAPs), and other industrial organic contamination. Their deployment is just one of the strategies aimed at enhancing sustainable processing and manufacturing, mitigating environmental impacts, reducing the level of harmful emissions, and conserving fuel resources.

What **NUTEC Bickley** heat recuperation systems seek to achieve is the reuse of energy carried by the gases that normally exit via the flue, in order to reduce overall gas consumption.



Fig. 7 Regenerative Thermal Oxidizer (RTO) systems

Features

SCADA Systems

With our **SCADA** systems, kiln operators are able to have complete but simple control of their firing process, enhancing efficiency and productivity. Different access levels are password protected.

Our latest Industry 4.0 platform integrates state-of-the-art technology to monitor the process, and also to keep the kiln operating at peak performance with smart maintenance protocols.

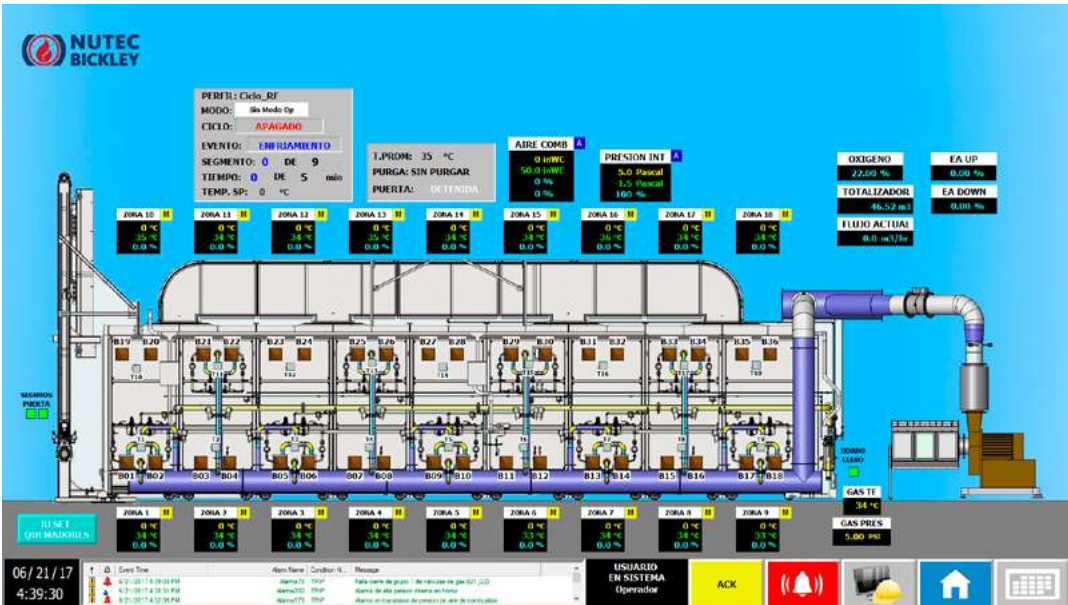


Fig. 8 NUTEC Bickley's SCADA System

Features

Integrated Car Handling Systems

NUTEC Bickley provides heavy-duty automated systems for kiln car loading and movement, to make product loading and unloading easier. Equipment includes manipulators, transfer cars, turntables, elevators, pushers, plus combined equipment such as elevator/turntables, transfer cars with integrated roller conveyors and transfer cars with pusher systems, among others.



Fig. 9 NUTEC Bickley's Car Handling Systems



Learn more at nutecbickley.com

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