



Ceramic – E-Book

Kilns for Firing Abrasives



Abrasives include Ceramic and Silicon Carbide Bonded, and Superabrasive wheels, used across industry. NUTEC Bickley has experience in supplying highly flexible batch and continuous kilns to world-leading manufacturers.

Learn more at nutecbickley.com

NUTEC Bickley

A Tradition of Excellence

NUTEC Bickley has extensive experience designing and manufacturing tunnel, shuttle and Carbell® kilns for the Abrasives industry. Our kilns use the latest combustion and control technology to fire abrasives with the best temperature uniformity and

atmosphere conditions to ensure consistent product with uniform porosity.

Special attention is paid to the cycle segments where binders and pore inducers are burnt out.



Fig. 1 NUTEC Bickley's Headquarters

First Shuttle Kiln

Experience

The world of firing abrasives as we know it today would not be the same without all of the technological kiln developments implemented by **NUTEC Bickley** over the years. If we go back in history, we can see that all of the modern kilns we encounter in the abrasives industry today include many of the features that were originally developed by our company.

In the late **1930s**, the shuttle kiln concept was developed in Europe in an effort to counter the major weakness of a tunnel kiln, which was and is its lack of flexibility in response to market and product fluctuations. Basically, the early shuttle kiln was the hot zone of a tunnel kiln with doors on both ends and using tunnel kiln cars. The next completely new type of kiln appeared on the scene in **1954**. The kiln was rectangular in shape and was lifted up and down on hydraulic rams to permit the bottom of the kiln, which was a kiln car, to be moved in and out of the kiln for loading and unloading.



BASCOMEX



10 Tons

10 T

First Shuttle Kiln

Experience

The Bickley Carbell® kiln for abrasives was the first Carbell® kiln ever made. The idea of attaching hydraulic rams permanently mounted to the kiln was a new one and originally developed by **NUTEC Bickley**. The first **NUTEC Bickley** shuttle kiln went into operation in February 1965 and by that time there were about 70 Carbell® kilns in operation. It was a downdraft design, the same as all of the Carbell® kilns that had been built up to that time. This first shuttle kiln was perimeter fired.

One year later, **NUTEC Bickley** built its first cross-fired (with burners in fire lanes) downdraft shuttle kiln, which today is a standard design for high temperature batch kilns.

Today, **NUTEC Bickley** has developed into an international leader in the design and implementation of highly innovative and efficient industrial kilns for all sectors of the ceramic industry, including abrasives, refractories, technical ceramics, sanitaryware, electroporcelain insulators, and heavy clay products. The company serves customers in more than 50 countries around the world, providing high quality, reliable products and services that help clients control industrial firing costs and achieve energy savings.

NUTEC Bickley now also manufactures tunnel kilns for large scale, energy efficient, Abrasive production.



Fig. 2 **NUTEC Bickley**'s tunnel kiln for firing abrasive wheels



State-of-the-Art Equipment

Tunnel Kilns

NUTEC Bickley tunnel kilns for abrasives are designed and manufactured specifically for the industry.

Using our state-of-the-art equipment, process variables are under tight control from the beginning, through the burnout stages to the end of the cycle, assuring superior quality and consistency of your finished products. Tunnel kilns are the best solution when large volumes of product need to be fired in consistent conditions. They offer excellent temperature uniformity and fuel consumption can be **50% lower** than with shuttle kilns.

Fig. 3 NUTEC Bickley's Tunnel Kiln



Multi-Kiln Arrangements

Shuttle Kilns

NUTEC Bickley's shuttle kilns for abrasives are designed and built to meet the precise needs of this sector.

Multi-kiln arrangements with automatic car loading and handling systems are also available. Batch firing of products offers the manufacturer the greatest amount of flexibility and our advanced technologies play an important part in achieving the optimum solution. The kilns come in a wide range of capacities and with a choice of door, combustion and control system designs.

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

Tight seal

Carbell® Kilns

NUTEC Bickley's Carbell® Kilns prove to be the ideal choice for certain abrasive products and processes. The tight kiln-to-car seal around the base of the kiln ensures that no volatile gases can escape during the burnout and porosity forming stages of the firing cycle.

Highly effective exhaust and pressure control in these top hat kilns helps to reduce fuel costs. Also, the addition of heat exchangers and hot combustion air can further reduce fuel consumption by as much as **25%**.



Design Flexibility

Features

1. Close Control

This sector employs a higher temperature process to form strong ceramic bonds which are critical to the strength and performance of abrasive materials and grinding wheels. Uniform firing leads to more consistent fired products which are vital for grinding wheel safety. Volatiles are also given off in this process and they need to be treated with thermal oxidizers.

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 a power outage, thereby maintaining kiln safety. This system eliminates the need to manually relight the kiln once the power supply is restored or the emergency generator has started.

Features

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 abrasives sector.



Fig. 8 **NUTEC Bickley's** Ceramic Fiber Linings

Features

Incineration Systems, Afterburners, RTOs (Regenerative Thermal Oxidizers)

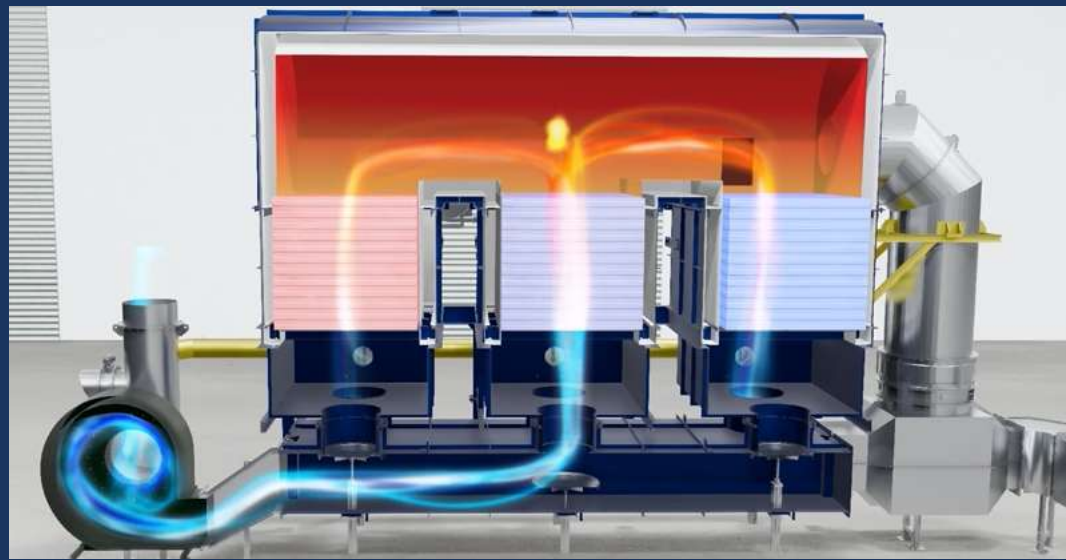


Fig. 6 RTO's Air flow visualization

- 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.

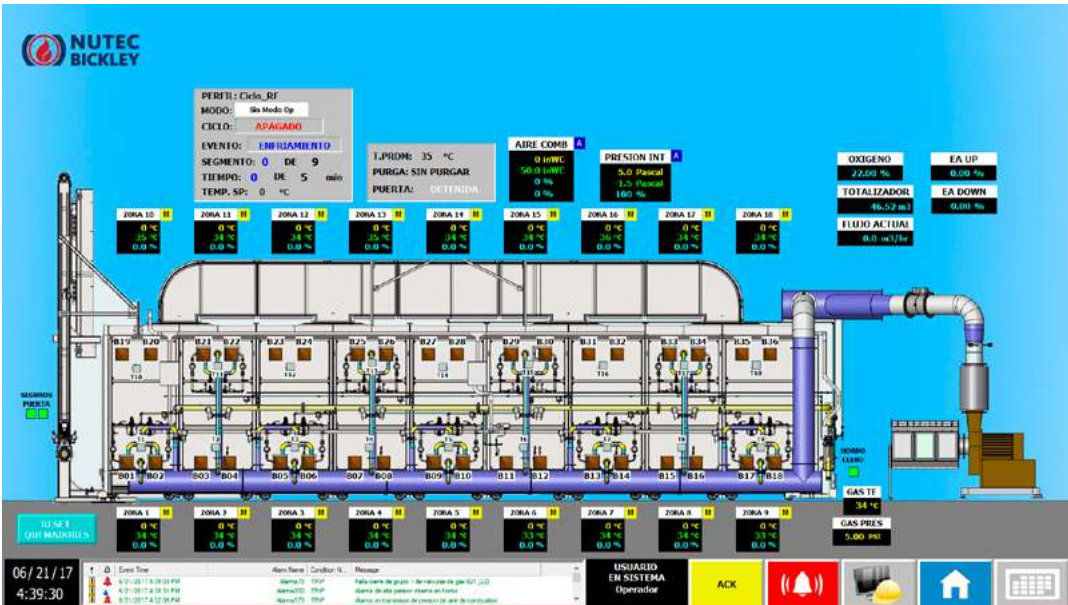


Fig. 9 NUTEC Bickley's SCADA System

Features

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. 10 NUTEC Bickley's Car Handling Systems



Learn more at nutecbickley.com

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