SWINDELL DRESSLER
BELL KILNS
High Tech Firing Machines
For Technical Ceramics
Advantages of Swindell Dressler Bell Kilns

• **Flexibility**
Bell kilns are batch fired and therefore are inherently flexible. Firing time, temperature and profile can be changed from cycle to cycle to fire different products if required. The number of times a bell kiln is fired per week can be varied to accommodate varying product volume requirements.

• **No Down Time**
Bell kilns are always supplied with a double set of cars so one set can be unloaded and reloaded while the other set is firing. The typical time to raise the bell, remove the fired car, move an unfired car into place, lower the bell and start the next firing cycle is 30 minutes.

• **No Doors**
Bell kilns differ from shuttle kilns in that they do not have doors and therefore are easier to seal. This is especially important when firing to high temperatures (above 1500°C) or when there is other than an air atmosphere in the kiln.

Wide Range of Sizes
Swindell Dressler builds bell kilns from 1 cubic meter (35ft³) setting space to 50 cubic meters (1750ft³). Bell kilns can be built as a single car kiln as shown in Figure 1 or as a multi car kiln as shown in Figure 2.

Temperatures to 1800°C
Swindell Dressler builds bell kilns with fiber linings up to 1500°C and insulating brick linings up to 1800°C. Kilns for use over 1500°C are often equipped with a stack recuperator system to preheat the combustion air with waste heat.

Fuel Versatility
Swindell Dressler bell kilns are available for use on Natural Gas, LPG, Light Oil (Diesel) and Heavy Oil.

Control Systems
Swindell Dressler bell kilns are normally supplied with multi zone programmed temperature control, programmed excess air control and automatic pressure control. Data storage and retrieval varies from a simple strip chart recorder to complete computer systems.
Swindell Dressler Bell Kilns Are Available With Four Different Jet Firing Systems

1. Standard Excess Air System
For Normal Oxidizing Atmospheres

Used for firing in air atmospheres with little or no burnout problems and temperatures below 1500°C. This system produces high velocity circulation at lower temperatures by blending varying amounts of excess air with the combustion products. The curve in Figure 3 shows burner jet temperature versus percent of excess air. With this system, the excess air is independently programmed so the burner jet temperatures track the programmed kiln temperature. This is accomplished by increasing the proportion of combustion gases while decreasing the proportion of excess air.

2. Pulse/Proportional System
Ability To Fire With Or Without Excess Air

This system combines the standard proportional excess air system described above with a pulse firing system. The pulse firing system makes it possible to have high velocity circulation at lower temperatures without the use of excess air. Since all burner systems generate maximum velocity at maximum fire, the pulse system operates only at maximum fire (pulse) to generate circulation, but is turned to low or off so as to not overheat. The kiln temperature is controlled by varying the pulse on/off time. Figure 4 shows heat input of a burner at various ratios of on/off pulse times.

This versatile system can be used on pulse for part of the cycle and then switch to proportional control or vice versa.

3. Pulse/Hi-Off System For Reduction Firing

For reduction firing in the absence of oxygen, the pulse/Hi-Off system is used. With this system, the maximum fire position or pulse is set to be reducing and in between pulses, the burner is completely turned off so no oxygen can enter the kiln. This system provides good circulation at all temperatures without oxygen.

4. Preheated Combustion Air System
Temperatures to 1800°C

The Swindell Dressler stack recuperator system is designed to save fuel and/or to achieve higher kiln temperatures. Figure 5 shows how the hot exhaust gases from the kiln pass through the recuperator and transfer heat to the incoming combustion air. The heated combustion air then flows to the burners through insulated pipes. The hot combustion air raises the flame temperature in the burners which increases the efficiency and also makes it possible to fire to higher temperatures.

Recuperators are usually required to efficiently fire to temperatures over 1600°C. At temperatures between 1400°C and 1600°C recuperators can often pay for themselves with fuel savings.
Figure 6. High temperature bell kiln (5m³) designed for firing Alumina to 1760°C with preheated combustion Air Firing System. This kiln uses heavy oil as fuel.

Worldwide Commitment To Quality

Swindell Dressler kilns for technical ceramics and refractories mean efficiency and reliability to manufacturers around the world.

No matter where our customers are located, they can expect turnkey kilns and plant packages for firing products up to 1850°C. Depending upon a customer's need, we will design and build shuttle kilns, bell kilns, tunnel kilns, and Roll-A-Flow™ roller hearth kilns. We ship kilns to your sites in pre-assembled sections, reducing on-site field erection time from months to weeks. We'll also design, build, ship, and install complete car-handling systems such as transfer cars and car haulages.

Swindell Dressler. We build creative ceramic solutions that keep customers satisfied. Contact our sales department at 412/788-7100 or Fax 412/788-7110. Swindell Dressler International Co. 5100 Casteel Drive, Coraopolis, PA 15108-9767. www.swindelldressler.com