

Rolled-Ring Forging

By Clint Hall

In a specialized field like rolled-ring forging, it pays to deal with folks who've been around the block a few times. At Thermal Products & Solutions, our design engineers have been involved in projects for several of the key rolled-ring manufacturers in the nation. On more than one occasion, our people have been involved in supplying all the original combustion equipment for new rolled-ring plants. Using Kromschröder and WS Thermal Process Technology equipment, as well as our own unique control systems, we can completely outfit the furnaces necessary for rolled-ring forging.

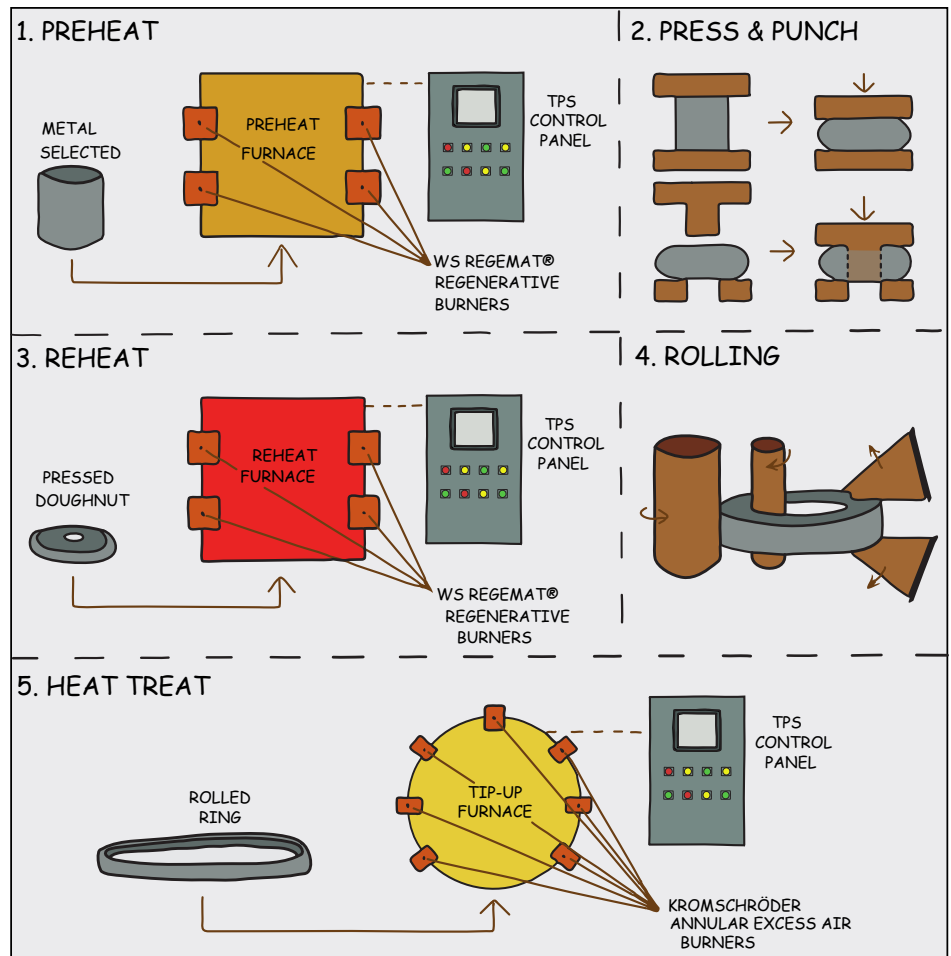
The Furnaces: Preheat and Reheat

The Preheat and Reheat furnaces are usually identical; one is located upstream of the press, the other downstream. We favor WS REGEMAT® regenerative burners for these furnaces, with one zone of control, chosen primarily for their phenomenal fuel efficiency. Utilizing pulse-fire technology, these furnaces create temperatures between 800 and 2,350° Fahrenheit, using four or five burners each. We use only Kromschröder gas and air valves, which have the highest lifetime duty cycles of any valves in the industry, ensuring that you not only see fuel savings, but maintenance savings as well. Within these furnaces, the ingot is heated to the proper temperature to be pressed and then reheated to the point where it can be rolled into its final form.

Heat Treat

Our specially designed tip-up furnace is a sophisticated heat treatment system with one or two zones of control that allow rolled-ring manufacturers to take their process to the next level, tempering the material to a specified, optimal hardness. For this application, the easy choice is the Kromschröder Annular Excess Air burner, which was designed specifically for rolled-ring forging and supplies a tremendous amount of convection to promote uniformity

in the furnace. The tip-up will house anywhere from seven to sixteen burners and operate at temperatures from 250 to 1,900° Fahrenheit, with uniformity that meets or exceeds $\pm 10^\circ$ at the low end, and $\pm 25^\circ$ at the high end. This uniformity is the single biggest contribution that the Annular Excess Air burner makes, achieved through on/off firing. Once the ring has been tempered, it has only to be machined to specification before it is ready to be put to use.



Rolled-ring forging process: Step 1: An ingot is selected and heated inside the Preheat furnace; Step 2: The heated ingot is taken to the Press, where it is formed into a doughnut shape; Step 3: The pressed doughnut is heated inside the Reheat furnace; Step 4: The heated doughnut is rolled into its final shape; Step 5: The rolled-ring is heat treated inside the Tip-up furnace for optimal hardness.

The Controls

There are several things that we incorporate into our control systems that make rolled-ring forging more efficient. Some rolled-ring manufacturers we've worked with keep up to seventy-five different base materials on hand. For them, we offer sophisticated recipe management, which allows them to easily juggle these different materials. Not only that, we have perfected a module we call the Time of Day Recipe. This program can begin the ramp and soak process hours before a shift starts on Monday, ensuring that the furnace is ready for its first load the minute your crew comes on the clock. And, with the heat treat furnace in mind, we've developed controls that use only the

Project Data			
Furnace	Volume	Capacity	Burner Range
Preheat/Reheat	4521.6ft ³	20,000 lbs	800-2350°F*
Tip-up	1728ft ³	35,000 lbs	250-1900°F**
Fuels			
Manufactured Gases	Propane	Butane	Natural Gas

*WS REGEMAT® regenerative

**Kromschröder Annular Excess Air (BICR)

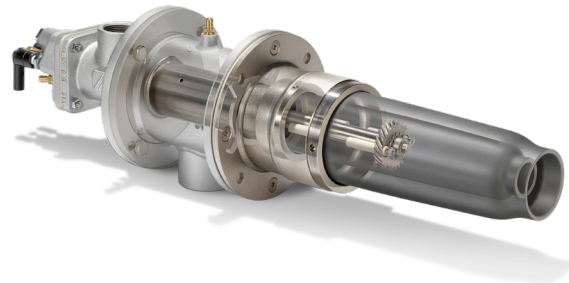
amount of excess air needed to allow the tip-up furnace to run efficiently at low temperatures.

If rolled-ring forging is what you do, you want to take a look at what TPS systems, with the incorporation of Kromschröder and WS Thermal

Process Technology equipment, can offer your process. Having been a part of over 30 furnace installations for this application, we've got a good, long track record and a reputation for precision. If we've piqued your interest, contact us today.



The WS REGEMAT® Self Regenerative Burner boasts phenomenal fuel efficiency and is perfect for pulse-fire applications. This burner has a capacity of 400,000 to 700,000 BTU/hr and is capable of the patented low-NOx "FLOX®" mode.



The Kromschröder Annular Excess Air Burner is specifically designed for the pulse-fired heat treating of rolled-rings. This burner has a capacity of 70,000 to 280,000 BTU/hr.



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