AF-504-2

Aluminum Homogenizing Furnaces

SECO/WARWICK

SECO/WARWICK manufactures custom engineered aluminum log and billet homogenizing furnaces for most process applications. Equipment designs include batch types (both car and tray designs), traveling styles and continuous styles, complete with material handling systems and load cooling equipment. Unique reversing airflow designs and temperature control systems produce fast heating rates with close temperature uniformity throughout the entire load.

Batch style furnace with car

Traveling furnace

Continuous operating system

Batch

With the batch type design, typically an electrically driven insulated car is used to move a load into and out of the furnace. Often, a double-ended furnace (door at each end) is used with two cars so turnaround time is reduced, thus maximizing production.

The alternative to the car bottom design for the batch type units is the tray design. With this design, the load tray rests on a series of support piers within the furnace. A charge machine/transfer car is used for charging/discharging of the tray and transferring the tray from the furnace to a cooling station or to a load/unload station.

A third type of batch unit is the traveling furnace. This furnace uses a pair of fixed load bases to support the load. When the cycle is completed on base No. 1, the furnace moves into position over the second load base and immediately begins heating a new load. The previous load is allowed to cool, then is unloaded and replaced with a new load. This can all be accomplished before the next homogenizing cycle is completed. A traveling furnace provides savings in floor because the two load bases require significantly less floor space compared with a double-ended stationery furnace with two load cars.

Continuous

Continuous log homogenizers are used by plants having higher production levels and a narrow range of product to be homogenized. High velocity jet heating is used to heat each log to homogenizing temperature very quickly. This design uses charging equipment to load one log at a time into a walking beam furnace or a similar semi-continuous type furnace. The logs are advanced through the heating and soaking chambers on specially designed hearth saddles to reduce friction and improve straightness. At the discharge end, each log passes through a specially designed quench chamber and then onto the accumulator table. Automatic controls adjust movements, timing and cycle parameters according to log diameter. SECO/WARWICK can also provide the auxiliary equipment for a complete system.

Airflow Patterns

The patented reversing airflow design with upstream/downstream temperature control using an axial flow fan wheel reverses rotation on a timed basis, which, in turn, reverses the direction of the horizontal airflow through the load. The air stream temperature is monitored and controlled on each side of the load. A thermal head is used during the early stages of the cycle for fast, efficient heating. This design increases both the heating rate and temperature uniformity of the load compared with one-way airflow, resulting in better efficiency, lower fuel cost, and improved metallurgical results.

Patented Baffle Design

SECO/WARWICK holds the patent on the adjustable airflow baffle. These movable baffles greatly increase furnace performance, especially when less than the maximum size loads are being homogenized.

The baffles are adjustable according to the height of the load to effectively limit or block the open space that exists above the load. The blocking of the airstream forces the recirculated air to pass through the spacing between each layer of logs or billets rather than taking the path of least resistance over the top of the load. Thus, an increased airstream velocity through the load is created, providing faster heat transfer and improved load temperature uniformity. One side of each movable baffle is fixed to the stationary horizontal baffle by an engineered hinge arrangement. The other side is connected to roof mounted electric operators. The operators include position transducers and limit switches to provide location information to a PLC. Benefits of the adjustable baffle include:

- Shorter heat up rates due to increased airflow velocity.
- Preventing short circuiting of the airflow when less than the maximum size load is homogenized.
- Preventing overheating of the top layer.
- Lower energy requirements since faster heat-up rates are achieved.
- Increased uniformity since the airflow is channeled more evenly across all load surfaces.

Cooling Systems

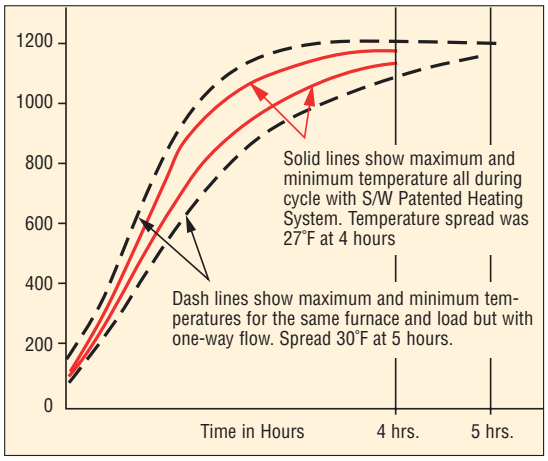
Cooling after homogenization can add significant value to the logs or billets. Production requirements are requiring faster, more uniform cooling of the logs or billets. Evidence increasingly shows that the resulting grain structure and workability properties of the billets are a result of the cooling medium to used after homogenization. While fast cooling is desirable, it must also be uniform throughout the load space or significant bowing of the logs could occur. For batch type loads using a car or tray, SECO/WARWICK offers a variety of load cooler designs such as one-way airflow, reversing airflow, air/mist arrangements, etc., depending on the level of performance required.

These chambers are designed to cool the load uniformly to your specifications. Loads are usually plunge cooled at rates that can approach 700°F/hr in the initial stages of the cycle. The cooling rate can also be controlled using variable speed cooling fans.

Movable baffle (lowered position)

Baffle assemblies

Load cooler



Comparison of one-way and reversing airflow

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The latest design, materials and equipment specifications should be obtained from the company before any reliance is place on the enclosed since changes may occur due to product improvement.

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