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Age Ovens

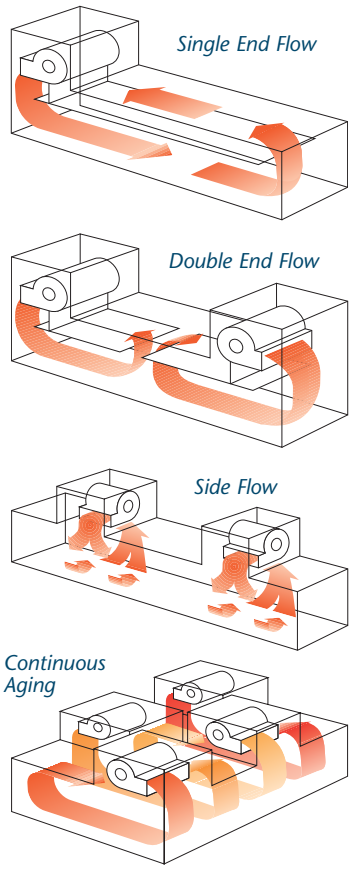
by Roger A.P. Fielding, BENCHMARKS

Reviewing the hundreds of extrusion plants—located all over the world—I've visited in the last 27 years, I'm forced to conclude that the age oven is one of, if not the last thing, on the minds of the planners of new facilities.

Age ovens have often been selected without regard for the configuration of the extruded product and how it is to be stacked in the oven. They have been installed without proper regard for the flow of material and the movement of handling devices. And, very often, they are poorly maintained and operated. But, artificial aging is essential to maximizing the mechanical properties of most common aluminum alloys. Artificial aging is the longest part of the process of converting aluminum billet to an extruded lineal, it is the single major cause of in-process inventory, and, in most cases, the major disruption to the smooth flow of aluminum extrusions between the billet inventory and the packed and shipped extrusions.

Most extrusion plants schedule and sequence dies to the extrusion press in the order that the extrusions are to be shipped. The extrusions move from the extrusion press down a run-out table, where they are transferred to the cooling table, the stretcher, and the saw table. After cutting to a pre-determined, often standard, length, the extrusions are stacked—manually or automatically—in aging baskets, skips, or oven racks. The oven racks are then transferred to the age oven area, where numerous racks are collected to build an oven load. Most extruders load the oven racks "first in—last out" (FILO). Most extruders place the first oven racks to be loaded at the front of the oven, where they are then "buried" under the next two or three oven racks to be packed—further compounding the problem. And most extruders wait for a complete oven load before starting the aging process—which can take 8 or more hours. After aging, the oven racks are removed from the oven to be cooled and then packed.

Planners, please take note—there is a better way! Depending on the finished length of the extruded products, their shape, their configuration in the loaded oven racks, and the availability of space, age ovens are usually configured



to process a fixed number of oven racks with the air flow in the age oven arranged as single end flow, double end flow, or side flow. Although each configuration—if properly maintained and operated—will ensure that the designed load will be uniformly heated to the correct temperature for the correct time, the extrusions

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President's Message

Lawrence R. Difatta
President of Granco Clark

Over the past year, we've found out that a lot of business success stories weren't all they were hyped up to be. The news has been flooded with stories of misstated earnings, stock price manipulation, and corporate greed. As these revelations have emerged, they have reminded us that the road to success isn't usually quick and easy.

More often, guiding our businesses to prosperity requires us to focus on slow and steady gains. It isn't about making the bottom line look better; it's making it better.

"A penny saved is a penny earned" is an adage that's been around for a long time. There's still a lot of truth to the saying. While a penny may seem pretty insignificant these days, saving a penny here and a penny there can eventually add up to big savings. And with the massive amounts of metal moving through our plants, even fractions-of-a-cent variations add up—either in our favor or against it.

In this issue of the newsletter, we discuss choosing the right equipment for your operation's needs and its day-to-day impact on your business. In particular, we focus on the choice between using a billet saw and a log shear for billet cutting, and outline the advantages and disadvantages of each method. We also review the importance of planning when installing age ovens, to ensure that efficiency is maximized and costs are reduced.

Solid business decisions will positively impact the bottom lines of our businesses for years to come—and will turn pennies into big returns.

Shear vs. Saw

Choosing the Best Method for Your Operation

For your operation to run at peak efficiency, your equipment needs to be just right for your needs. The decisions made during the initial selection phase will impact your bottom line for years to come.

One component that's key in keeping costs under control is delivering the right length billet to the press. Here, we take a look at the considerations involved in deciding whether a hot log shear or a cold billet saw better suits your operation's billet-cutting needs.

Precise Control

Determining the billet length needed to produce the correct amount of extruded product is vital to efficiency. Over-compensate, and create costly scrap. Underestimate, and lose a cut length at the saw (more scrap)—another costly mistake in both time and money.

The cold saw operates on the entry end of the furnace, while a hot shear operates at the exit of the furnace, immediately before the billet is deposited in the press loader. "For this reason, a hot shear can provide a correct length billet every time," says David Jenista, Systems Engineer at Granco Clark. "A cold saw requires a decision about the billet length numerous billets in advance—cutting begins well before the corresponding die has been placed in the press."

Scrap Management

Aesthetically, the two methods produce somewhat different billets. The saw delivers a clean-cut, sharp-edged billet. The shear deforms the material somewhat, creating a billet with a slightly rounded edge.

Although smooth and straight, each cut with the saw will convert a "slice" of aluminum into small chips. This scrap—typically collected by a vacuum collection system attached to the saw—must be recycled, adding to the cost.

A log shear offers improved metal management. With its selectable "no scrap" mode, 100 percent of the log can be consumed.

Minimized Maintenance

When it comes to cost, the saw offers an advantage over the shear with a lower purchase price. Its operating costs also tend to be lower because it's less complex than the shear—the shear has a number of hydraulic motions that must occur on each cut; the billet saw has only two.

In addition, the saw operates at room temperature, while the shear processes 900-degree logs, applying more heat to the components. Over time, the cool-running saw will see less wear on the mechanisms, therefore minimizing maintenance.

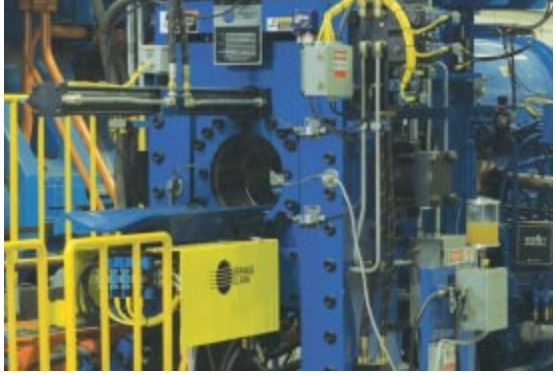
Accommodating Special Requirements

In some circumstances, the deciding factor may come down to plant or production constraints:

Production Cycle Time. With a press line capable of extruding more than 60 billets an hour, a saw will likely be the better equipment option. The hot shear moves the log through multiple steps outside the furnace—requiring more than 20 seconds to complete a cycle—so the log must be brought back up to temperature before the next billet can be sheared. The cold saw can more easily meet the demands of faster cycle times because the billets are cut first, and then wait in the furnace to be discharged directly to the press.

Space Availability. Space constraints and the layout of your plant may point you toward the best choice. Although a saw requires slightly more floor space, it can be installed to accommodate the building layout. The furnace/shear system uses less floor space, but must be installed in a straight line.

The choice between the saw and the shear comes down to which piece of equipment best meets the demands of your extrusion line. Choosing the method that's right for your operation's specific needs will help to increase efficiency and decrease costs. Let us help.



Granco Clark Hot Jet Furnace and Quick Cycle Log Shear

Granco Clark Demand Billet Saw

How the Shear and the Saw Stack Up

Log Shear	Demand Billet Saw
The decision on billet length can be made just prior to its delivery to the press	Billet length must be decided several cycles ahead of when the billet will be needed
Deforms billet somewhat, giving it a slightly rounded edge	Delivers clean-cut, sharp-edged billet
"No scrap" mode allows entire log to be consumed	Cutting produces small chips that must be recycled
Uses less floor space, but must be installed in a straight line	Requires more floor space than shear, but can be located to accommodate building layout
Operates under high heat, placing more stress on components, and also has more moving parts than the saw—which can require more maintenance	Operates at room temperature, resulting in less stress on components and therefore less maintenance
The shearing cycle is a multi-step process that moves the log outside the furnace, which consumes additional time because the log must be brought back up to temperature before the next billet can be sheared	Allows for faster cycle times because billets are cut first, then wait in the furnace before being directly discharged to the press

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leave the oven as much as 16 hours after leaving the extrusion press. Then, each load of extrusions must be "sorted" at the packing station to restore the shipping sequence.

Continuous aging is the solution: automatic indexing of oven racks through a properly configured oven ensures continuous production flow—with the oven racks flowing one-by-one through the oven. When matched to a stacker at the saw that is equipped to load the extrusions to be handled "first in—first out" (FIFO), the lead time—from delivery of billet to the press, to the arrival of extrusions at shipping—is minimized. The in-process scrap that is generated during multiple handling of oven racks and extrusions is also minimized.

The continuous oven, handling oven racks one-by-one, is not new. Other attempts have been made at transporting racked extrusions through an age oven—as in an anodizing or paint line. And the concept of aging full-length extrusions, demonstrated by Boal and reported at ET '96, has merit because it reduces in-process inventory and each extruded length is aged before the finish cut saw, further reducing in-process scrap.

New Equipment Installations

North America

Extrudex Aluminum

Woodbridge, Ontario, Canada

Extrudex Aluminum is performing a major refurbishment and upgrade of their 5000-ton press line, and has selected Granco Clark to supply the heating and handling system for the updated line.

The heating system consists of a Granco Clark Model 1116-45-4 "Hot Jet" billet furnace for processing both 12" and 14" diameter billets. This furnace can provide the press with up to 14,400 lbs. per hour of 14" diameter billet. A Model 1114 Billet Taper Quench offers a precision temperature gradient for achieving isothermal extrusion.

With the proven Granco Clark Double Puller, the handling system is capable of operating in both "double length" and "cut-on-the-fly" operation. A custom, two-chamber high-pressure spray quench solves a problem of press structure interference with the puller rail. Under-table and overhead air cooling systems provide balanced cooling from top and bottom.

The runout is a raise/lower design with high-temperature fabric-covered rollers. The entire handling system is new, including automated stretching, batching, and sawing systems. The extrusion cutoff saw provides a cutting window 12" high by 48" wide.

Granco Clark has previously supplied heating and handling equipment for this facility, as well as for Extrudex's North Jackson facility.

Kohler Co.

Union City, Tennessee, USA

To meet increased demand, this major manufacturer of shower doors is expanding its capacity with the addition of a new 2500-ton press line. Granco Clark has been selected to supply the heating and handling system for the new press line. The line will feature Granco Clark's "Hot-Jet" billet heating furnace, double end flow aging oven, and die oven, and will be complete with an extensive cooling system, all-belt handling system, and auto saw gauge system. The new equipment will help Kohler achieve superior finishes, ensuring that their shower doors meet high quality standards.

Whitehall Industries, Inc.

Ludington, Michigan, USA

With over twenty-five years in business, Whitehall Industries serves the market as a single source supplier offering capabilities in product design/ development, raw extrusion, fabrication, finishing, assembly, and packaging.

To complement their facilities, Whitehall Industries has contracted with Granco Clark to purchase a Precision Sawing System (Model PCS 824-25). With a cutting window of 24" wide x 8" high and a cut-length capacity of .357" to 288", this system will allow them to increase throughput while producing cut parts superior in dimensional accuracy, squareness, and quality of RMS finish. A unique backgauge clamping mechanism, combined with a drop-away roller arrangement, provides for the fastest cycle times in the industry.

Hydro Aluminum North America

Sydney, Ohio, USA

Hydro Aluminum North America recently purchased a Granco Clark Precision Finish Sawing System for its facility in Sydney, Ohio. The system consists of a backgauge loader, precision finishing saw, powered exit conveyor, powered off load belts, and chip collection system with rotary valve.

A major supplier to the automotive industry, Hydro Aluminum North America manufactures a variety of components, almost all of which begin with saw cuts. The company stated that they chose the Granco Clark Precision Finish Saw for its ease of set up, extremely close tolerances, superior squareness, minimal burr, and—most importantly—fast production rates. Together, these benefits will dramatically improve the quality and process flow at the Hydro Aluminum North America facility.

Granco Clark Precision Saw

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