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Quenching

by Roger A.P. Fielding, *BENCHMARKS*

Although we can all agree that the extrusion of aluminum is a “conversion process”—during which an aluminum billet, forced at high pressure and temperature through a steel die, is converted into a three-dimensional shape—the complexity of this process is often overlooked. This is never more true than during the specification of a new press installation or the upgrading of an existing press.

When invited to comment on the plans for a new aluminum extrusion press, or, for that matter, the upgrade of an existing press, the response to the question of “product mix” is invariably:

“The press will be used to extrude AA6060 and AA6063 type alloys. And 10 to 15 percent of the mix will be AA6061 and other press-quenchable alloys.”

The reference to “press quenchability” is often left unstated! But the 10 to 15 percent of AA6061 (and other alloys)—which by implication constitutes a “small” proportion of the product mix and will invariably be quenched at the extrusion press—has a major impact on the design

of the extrusion press facility, from the log or billet storage to the finish-cut saw and age ovens.

The extrusion of aluminum employs known thermal and metallurgical processes to achieve accurate three-dimensional shapes (the width and height of the extrusion and the extruded length), and these processes are found in all stages of the conversion process. The ultimate productivity of an extrusion press installation is governed by the degree of control exercised over the processes: The heating of the billet, the die, and the container. The quenching of the billet in a taper quench. The quenching of the extrudate as it leaves the press and passes down the runout table, the cooling, and stretching. And finally the aging process. All are specific to the alloy, and, to some extent, the geometry of the extrudate.

Anyone contemplating a new extrusion press installation or the upgrading of an existing installation is well advised to



focus—in the first instance—on the processes which will be employed to convert the aluminum log or billet to extrudate. The thermal and metallurgical process: heating billet and log, dies, and container; the taper quenching (or heating) of billet; the press quenching and cooling; the stretching and aging systems. These define the ultimate productivity and quality which can be derived from a particular press system.¹

The metallurgical requirements of the press quench system have been discussed by Bryant.² And the principles of “press quenching” were set out by Peterson and Dore in their paper to the first International Extrusion Technology Seminar in 1969.³ The problems which can be

Lawrence R. Difatta
President of Granco Clark



Nearly 50 years ago, we introduced the first direct flame impingement furnace.

Today, hundreds of plants around the world have Granco Clark furnaces, some of them more than 30 years old and still on the job.

And while the design of our furnace has continued to evolve over the years, one thing hasn't changed—it's still the fastest, most energy-efficient way to heat billets and logs.

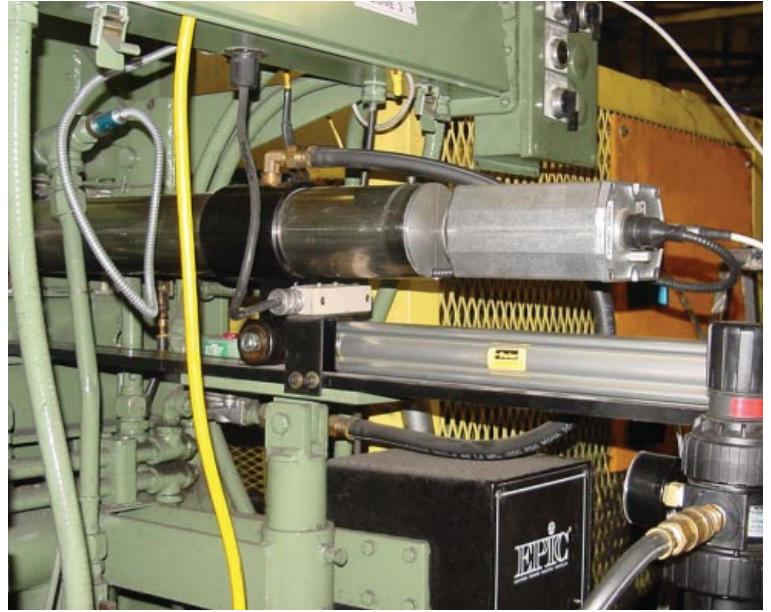
In this newsletter, you'll read about the latest technology Granco Clark is introducing for our furnace—a non-contact temperature measurement assembly. This non-contact probe provides accurate temperature readings without the extensive maintenance required by traditional probes. We're excited to offer this new option to our customers.

We're also proud about earning certification to the new ISO 9001-2000 quality management systems standard, and passing the two quality audits with zero non-conformances. It reconfirms our commitment to continually and reliably serving our customers to the best of our abilities.

Continuous improvement is a challenge we all face, no matter what business we're in. In this competitive business environment, it's essential to keep improving products and service, staying current with advances in technology, evolving to meet changing customer expectations and demands. At Granco Clark, the new non-contact probe and our ISO-9001 re-certification are just two examples of how we're working to meet those challenges every day.

New Temperature Measurement Technology Holds Maintenance to a Minimum

Granco Clark has introduced the first non-contact temperature measurement assembly commercially available to the aluminum extrusion industry. The new probe is now available as an option on Granco Clark furnaces, and can also be retrofitted to existing Granco Clark furnaces with PLC temperature control.



The Granco Clark Non-Contact Probe

Land Instruments International, a leading specialist in infrared temperature measurement systems, designed the Aluminum Billet Thermometer System (ABTS), which is a non-contact radiation thermometry system. The company enlisted Granco Clark's expertise to develop the mechanical components necessary for the ABTS to function properly in the aluminum billet furnace chamber environment.

The new non-contact probe offers significant savings in maintenance requirements over traditional-style probes, which must be sharpened frequently in order to give accurate temperature readings. For most operations, the traditional temperature probes should be sharpened every day. Fact is, most operations are lucky if they get to it once or twice a week, or even once a month. And if probes aren't sharpened frequently enough, it will result in inaccurate temperature readings that can potentially compromise product quality. The new non-contact probe eliminates those concerns.

"This was really a customer-driven venture," says David Jenista, Granco Clark Systems Engineer. "Customers have been asking for a non-contact probe for a long time, and this new option allows them to reduce time spent on maintenance." ●

Granco Clark Attains ISO 9001-2000 Certification

Granco Clark has earned certification to the new ISO 9001-2000 quality management systems standard. Previously, the company was certified to the 1994 standard, which expires in December of this year.

Dave Walker, Granco Clark's Quality Manager, reports that the process for receiving the new certification took about nine months. To meet the requirements, Granco Clark first had to rewrite the company's quality policy manual, which encompasses all policies, procedures, work instructions, and quality forms. This manual then had to pass the documentation audit of Granco Clark's registrar, Entela, a quality system registration company. After a thorough review, Granco Clark's quality policy manual was judged to have zero non-conformances.

All company employees then went through intensive team training on the new standard. Once Granco Clark "went live" with the system, Entela did a compliance audit to certify Granco Clark to the new standards. Once again, the result was zero non-conformances.



Walker believes that Granco Clark is one of the first companies to have garnered two zero non-conformance audits, and emphasizes the importance of the certification. He says, "The new procedures and standards have a daily impact on our business, helping structure our quest for quality, excellence, and better customer satisfaction and service." ●

Granco Clark Welcomes New Global Systems Manager

Lloyd Fisher recently joined Granco Clark as Global Systems Manager. In this position, he will be responsible for key account sales and marketing in both domestic and international capacities.



Lloyd Fisher

Fisher holds a Marketing Degree from Grand Valley State University, and has over 15 years of international and domestic sales management experience. He served as Vice Chairman of the Michigan District Export Council, and has five years experience working in the aluminum extrusion industry.

He previously worked as International Sales Manager at Belco Industries, and was also employed as International Manager at Envirotronics. ●

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encountered if things are not done properly were described by Bryant et al.⁴

Planning for a new press quench system must integrate the quench with the press platen opening and, specifically, the dimensions of the extrudate.

Planning must integrate the quench with the operation of pullers. Planning must incorporate features to maximize recovery during the press dead cycle and other minor delays. The press quench must not be the limiting factor in maximizing press productivity and recovery.

In this writer's experience, those planning a new extrusion press installation, or the upgrading of an existing installation, most often fail to account for the water quality, quantity, and pressure required. The supply is undersized, the capacity of the system too small, and maintenance of quality—both temperature and cleanliness—inadequate to efficiently quench the extrudate, where "efficiency" includes measures of dimensional stability, metallurgical properties, press productivity, and recovery. ●

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New Equipment Installations

North America

Hydro Aluminum North America

Monett, Missouri, USA

In 2000, Hydro Aluminum North America acquired a facility in Monett, Missouri. The company has significantly increased the productivity of the Monett extrusion department since its acquisition. As a result, additional aging capacity was required to process the higher output from the extrusion press lines.

Hydro Aluminum has selected Granco Clark to supply an end-flow aging oven. To fit a specific footprint in the plant, the interior of the oven needed to be 15 feet wide. In order to meet this requirement, Granco Clark incorporated a specialized "buckstay" design to support the roof panels.

Granco Clark provides age and anneal ovens in end-flow, side-flow, and reversing-end-flow designs to meet a wide variety of process requirements and floor plans.

Kaiser Aluminum and Chemical Corporation

Tulsa, Oklahoma, USA

Kaiser's Tulsa plant recently selected Granco Clark to supply another double puller and runout conveyor for its expanding facility. This state-of-the-art rod and bar plant will utilize the Granco Clark double puller as a key element in this highly productive operation. The 1000-pound double puller is used to provide continuous production of rod and/or bar from a billet without stopping the press.

Kaiser has also selected Granco Clark to supply a Model 812-40-6 billet furnace for this plant. The Granco Clark billet furnace features the "Hot-Jet" recuperative design, providing a continuous average of 55 percent efficiency.

Aisin Light Metals

Marion, Illinois, USA

Granco Clark has been awarded an order by Aisin Light Metals, LLC, to supply the equipment for their new extrusion press line in Marion, Illinois.

Although new to the U.S. market, Aisin Light Metals has a long history of supplying aluminum extrusion to the automotive industry through its Japanese parent company, and will exclusively produce shapes for this industry. This new U.S. production facility will house a 4,000-ton UBE extrusion press, with Granco Clark supplying the billet heating and extrusion handling equipment.

The billet heating equipment includes the patented Granco Clark Taper Quench, adding a greater level of control to the extrusion process. The system also includes belt-style handling equipment with cooling, puller, and finish saw. Provisions have been made to later expand the system length to 164 feet from the current 120 feet and add a profile stacker.



The Granco Clark Profile Handling System

Mark your calendar for ET 2004, May 18-21, at the Gaylord Palms Resort & Convention Center in Orlando, Florida. You won't want to miss this opportunity to see the latest in aluminum extrusion

technology—be sure to visit Granco Clark at booth #323. For more information on ET 2004, visit www.etfoundation.org.

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