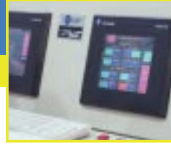




President's  
Message  
p. 2



SCS  
Extrude  
p. 2



Indalex  
Expands  
p. 3

New Equipment  
Installations

p. 4

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## Reheating Aluminum Billet for Extrusion: The Solutionizing Process

by Dr. A.J. (Bill) Bryant and  
Roger A.P. Fielding, BENCHMARKS

Writing for the first International Extrusion Technology Seminar in 1969, E.C. Beatty<sup>1</sup> described three billet reheat practices:

- 1) Reheat to 950°F (510°C) or higher, then extrude.
- 2) Reheat to 950°F (510°C) or higher, cool to a lower temperature, then extrude.
- 3) Reheat to lower temperatures: 750-950°F (400-510°C) and control extrusion speed to attain a temperature above 930°F (500°C) in the extrudate leaving the die.

The first two processes follow the principle of solutionizing the Mg<sub>2</sub>Si before extrusion. The latter process depends on the control of the homogenized billet structure so that any Mg<sub>2</sub>Si present will be small enough to dissolve during the reheating and extrusion operations. It depends on the mechanical work of extrusion increasing the temperature in the extruding billet to complete solutionizing the extrudate before it exits the die. Beatty emphasized that the success of using any of the processes depends, in large part, on the structure of the billet before reheating, and the controls exercised during the subsequent extrusion and cooling.

In the summary to his 1971 paper, Lynch<sup>2</sup> described the conditions required to achieve strength, surface finish, and anodizing appearance in AlMgSi 0.5 (AA6060)

extrusions as follows: Strength and appearance are achieved when the Mg<sub>2</sub>Si is distributed throughout the structure of the extruded section as a fine precipitate of less than 0.25 microns—mostly sub-microscopic size. Surface finish, being a function of the alloy's extrudability, depends mainly on proper homogenization of the billet.

Lynch pointed out that the relatively longer billet preheat times, which are a feature of direct impingement billet furnaces, can result in billet being held for extended periods in the range of 480-800°F (250-425°C) during which rapid precipitation of Mg<sub>2</sub>Si can occur. However, he pointed out that the billet can be “recovered” by heating to at least 930°F (500°C) before extrusion, during which the majority of the Mg<sub>2</sub>Si will be re-dissolved.

Option 1), and specifically option 2), resemble the



The Granco Clark Billet Quench

processes illustrated by Ohmura in 1984<sup>3</sup>, who described its application to AA6063 and AA6061 alloys, as well as the recommendations contained in Reiso's 1996 papers.<sup>4,5</sup>

Option 3) has until recently been seen by some extruders as the best way to optimize productivity, surface finish, and mechanical properties, because of the lower flow stress of the billet and consequent reduced pressure requirements.

Obviously, the thermal history of the billet prior to extrusion has a major effect on extrusion performance. The temperature distribution within the billet during homogenizing and reheating must be as uniform as possible, and taper heating or quenching systems that are employed during or immediately after reheating must be designed to ensure that the extrusion process proceeds isothermally.

see “Solutionizing”, page 3

Lawrence R. Difatta  
President of Granco Clark



*New technology can be a wonderful thing. Things run smoother, faster, more efficiently. But technology can also be incredibly frustrating if it's not designed to fit your needs.*

*For example, suppose you purchase a new piece of technology designed to streamline your life. It has all kinds of nifty bells and whistles...except you don't really need these extra features, so they just make it more complicated to get to the basic functions you actually use. You can store all kinds of information on this new product...but it tends to malfunction frequently, so you can't always access that information. And it automatically corrects typos...only problem is, it "corrects" the right information just as often as it corrects the wrong.*

*With Granco Clark technology, though, you don't have to worry about those kinds of complications. Because every piece of equipment we sell is specifically designed for your exact needs, and every piece is built for reliability and longevity. And if you should encounter any problems, our modem support program means that our service representatives are just a phone call away.*

*In this issue of the newsletter, we explore the ways in which Granco Clark's SCS Extrude system can help your extrusion line run more efficiently. This powerful software system features advanced alarm diagnostics that quickly alert you to any problems, minimizing downtime. It allows you to set up parameters in advance and load them with a push of a button. In addition, the system tracks all production data in real-time to give you fast, easy access to information.*

*We also look at how state-of-the-art Granco Clark technology has helped the Indalex Aluminum Solutions Group increase capacity and capabilities at their plant in Gainesville, Georgia.*

*If you're interested in making technology work more effectively for your extrusion facility, give us a call. We'll recommend the most dependable, cost-effective solutions to help you achieve your goals.*

# SCS Extrude

## More Effective Management of the Extrusion Process From Start to Finish

Looking for a way to cut down on downtime, reduce labor costs, and achieve consistently high-quality profiles? Granco Clark's SCS Extrude software system manages the extrusion process from start to finish, cutting operator intervention—and human error—to an absolute minimum.

The system operates from an industrial PC workstation with a touch screen, in the user-friendly environment of Microsoft Windows NT/2000/XP. It automatically tracks and diagnoses faults, executes production schedules, loads equipment parameters and recipes, and logs production data—and that translates into lower labor costs as well as increased accuracy and consistency.

### Advanced Fault Diagnostics

SCS Extrude's state-of-the-art alarm diagnostics ensure that potential problems are identified quickly. The system monitors each piece of equipment in the extrusion line, detecting and diagnosing faults to reduce downtime.

When a fault is identified, SCS Extrude provides detailed images of the alarm source and step-by-step troubleshooting instructions to help you get straight to the source of the problem. In addition, the system stores the alarm history, providing details on any previous problems.



### Automatic Equipment Setup

With SCS Extrude, you can download the production schedule from an office system or input it directly on the plant floor. All operating parameters can be set ahead of time, then loaded with a single push of a button when the job is run. As work orders move through the system from station to station, SCS Extrude sets up each piece of equipment automatically.

"This reduces setup time and guesswork and improves consistency, so you get higher-quality product," says Jeff Ryan, Granco Clark product manager for SCS Extrude.

### Minimized Manual Tracking

With SCS Extrude, manual entry of information can be greatly reduced or eliminated entirely. No longer do you need to record data like start and stop times of work orders, number of billets extruded, or good finished pieces produced per shift—SCS Extrude keeps track of it all. It records all of this information automatically as jobs are run and reports real-time information. Data is easily accessible in a relational database, as well as via industry-standard reporting tools such as Crystal Reports.

### Easy Access to Information

A personal web application running on the SCS Extrude system allows you to view a real-time schedule from any web browser in your organization. SCS Extrude is also fully supported by Granco

# Indalex's Gainesville Plant Expands Capacity, Capabilities with Installation of Fifth Granco Clark Handling Line

Indalex Aluminum Solutions Group, headquartered in Plainfield, Illinois, is North America's second largest supplier of extruded aluminum components and the largest producer of soft alloy extrusions. Recently, the company expanded its Gainesville, Georgia, plant as part of an effort both to increase capacity and to expand its presence in the larger-shape market.

Indalex's Gainesville plant has changed dramatically since it first opened 16 years ago. Back then, it was a 125,000-square-foot facility with one press and one paint line. Today it's 375,000 square feet with five press lines and two paint lines.



*The Twin Puller with Adjustable Hot Saw is installed in a double-length configuration. Each puller head has its own 20 HP A.C. Vector drive, and pulling tension can be adjusted from 50 to 1000 pounds.*

One thing that hasn't changed, though, is that Granco Clark is still the supplier of choice for the facility's handling systems. Granco Clark has provided complete handling systems for all five of the Gainesville plant's press lines—from its first line, installed in 1987, to its latest addition, a 3600-ton press line installed in fall 2002. The new press line features a double-length handling system, twin puller with adjustable hot saw; one man/no man stretcher, extrusion stacker, and furnace shear system.

According to John Young, vice president and general manager of the Gainesville plant, all phases of the expansion unfolded smoothly and according to plan, as well as under budget.

To read more about the new installation, see "Gainesville Thriving in Challenging Marketplace" on pages 50-52 of the February 2003 issue of *Light Metal Age*. ●



*The Granco Clark High-Pressure Spray Quench provides the maximum heat transfer available in a profile quench, so it's capable of cooling even large shapes quickly.*



*Granco Clark's Controlled Vertical Crush Stretcher delivers maximum gripping control with minimum distortion. The design uses a pivoting upper jaw that can be set to any closing dimension.*

## SCS Extrude from page 2

Clark's modern support program, ensuring that any problems that arise are solved as soon as possible.

### Seamless Interface with EPICS

Although *SCS Extrude* is a stand-alone solution, we've built in an interface to Foy Inc.'s EPICS, the industry's leading extrusion-management software. This feature helps to create a seamless link between the plant floor and the office.

An EPICS production schedule can be downloaded to *SCS Extrude*; then *SCS Extrude* collects production data as the EPICS work orders are run. As work orders are actually completed, they are posted real-time to EPICS from a workstation at the finish saw, needing no data entry. ●

## Solutionizing from page 1

The process enabled by the combination of direct impingement billet heaters and the taper quench systems has been defined in the industry literature as contributing to improved quality and increased press productivity. ●

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# New Equipment Installations

## North America

### Hydro Automotive Structures

Holland, Michigan, USA

A leading supplier to the automotive industry, Hydro Automotive Structures chose Granco Clark to upgrade the handling system on their existing 2750-ton press line.

The new partial handling system integrates with the existing runout/puller and sawing systems. It includes an automated belt cooling table, stretcher crossover belt table, and a 75-ton CVC (Controlled Vertical Crush) one-man/no-man stretcher system.



The Granco Clark CVC Stretcher

This turnkey project gives Hydro a competitive edge by providing a system that yields higher quality profiles while reducing scrap and labor.

### Daymond Aluminum

Chatham, Ontario, Canada

Daymond Aluminum is a major supplier of extruded components and assemblies to the North American automotive, transportation, building, appliance, and consumer product industries. Daymond has commissioned a Model 57-25-2 SST-Hot-Jet billet furnace from Granco Clark, with the goal of upgrading product quality and increasing output through the use of this new furnace.

### AFCO Industries, Inc.

Alexandria, Louisiana, USA

In business since 1946, AFCO Industries, Inc., is an employee-owned company that supplies aluminum extrusions and fabricated components for some of the most recognized manufactured products. The company recently purchased a Granco Clark precision sawing system (Model PCS 824-21) for use in its Alexandria, Louisiana, facility.

The system consists of a backgauge loader, precision finish saw, and chip-collection system with a rotary valve. The stand-alone measuring unit allows all personnel to obtain uniform measurements of saw-cut parts.

This system will provide AFCO Industries with the ability to supply superior finished cut parts featuring excellent squareness, and minimal burr.

### Indalex Aluminum Solutions

Mississauga, Ontario, Canada

Indalex recently upgraded portions of one of its older automated extrusion lines at its plant in Mississauga, Ontario. Granco Clark upgraded the double puller to the modern hex-guide-rail design. Cam follower guides reduce travel friction, which further enhances the puller's performance, resulting in better tension control and higher speed operation. A new AC V/F drive was also added to the puller.

The second part of the upgrade was the replacement of a 15-year-old early-design

log shear with a modern-design shear. The new shear's enhanced ring design will provide Indalex with a higher quality cut, expanded control capability, and greater operational flexibility.

## Abroad

### ECOHTSA

Tegucigalpa, Honduras

Electroconductores de Honduras, a division of Phelps Dodge, is in the process of upgrading its aging capacity with the purchase of a Granco Clark single-end-flow aging oven for use in the production of aluminum wire. This is the second oven Phelps Dodge has purchased from Granco Clark. The first oven was installed in Valencia, Venezuela, in 1999.

### Tostem

Pathumthani, Thailand

Granco Clark has completed plant trials on another two furnace/shear systems for Tostem, a leasing Japanese extruder. These particular units are destined for the Tostem facility expansion in Thailand. One set features our Model 69-35-4 SST-Hot-Jet log furnace along with our Model 6/8 log shear. The other features our Model 69-35-4 SST-Hot-Jet log furnace with our Model 8/10 shear. The equipment was built to exacting Japanese specifications. Tostem relies on the productivity, performance, and durability of their Granco Clark equipment to manufacture its high-quality products.



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David Jenista . . . . . Systems Engineer  
Michael Werner . . . . . Sales Engineer  
Andrew (Andy) Bucko . . . . . Saw Systems Manager

7298 N. Storey Road, Belding, MI 48809  
e-mail: [ginfo@grancoclark.com](mailto:ginfo@grancoclark.com)  
Phone: (616) 794-2600

[www.grancoclark.com](http://www.grancoclark.com)  
Fax: (616) 794-2878