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The Acquisition of Modern Aluminum Extrusion Systems

by Roger A.P. Fielding, BENCHMARKS

Two earlier articles showed that when motivated by the need to improve safety, increase profits, improve quality, reduce lead time (and hence reduce conversion costs), the successful businessman will study available options and define alternative actions. The previous article suggested that specification writing is the critical phase of any capital project.

The article emphasized that for a capital project to be successful, the user must specify the performance expected of the project and define how the completed project will be judged to be successful, without placing undue constraints on the potential suppliers. The potential suppliers can then draw on their varied experiences to offer equipment to meet those performance goals. All too often, a potential user produces a specification which goes beyond performance standards to define how (in the user's mind) the goals will be achieved. In these cases, the user places unnecessary constraints on the suppliers, and effectively takes the responsibility for the ultimate performance away from the suppliers at an early stage in the project.

The best specifications use few words to describe project goals. For example: "...an aluminum extrusion system operated by 3 persons, delivering an average of 4000 lbs per hour of 6063 and 6060 extrusions at 88% recovery."

Faced with such a succinct statement of the project goals, potential suppliers can enter into constructive dialog with the customer and present their best solutions. In the process, the customer becomes fully acquainted with the state-of-the-art, and is then in a position to properly judge each supplier's offerings.

Evaluation

Definition: The act or result of judging the worth or value of something

Key Words:
Fitness for Purpose, Comparison, Price, Alternatives

How do you evaluate a proposal for new equipment?

The teaching provided by each potential supplier should educate the user about

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The Acquisition of Modern Aluminum Extrusion Systems

Motivation:
Definition: Something that encourages.
Key Words: Profit, cost, lead time, productivity, recovery, safety, environment.

Conception:
Definition: What remains in the mind as the product of careful mental activity.
Key Words: Recognition, understanding.

Specification:
Definition: A detailed, precise description.
Key Words: Goals, performance standards, design.

Evaluation:
Definition: The act or result of judging the worth or value of something.
Key Words: Fitness for purpose, comparison, alternatives, price.

Selection:
Definition: The act of choosing.
Key Words: Measurement, cost-benefit analysis.

Commissioning and Start-up:
Definition: To put in working order.
Key Words: Acceptance, performance.

President's Message

Lawrence R. Difatta
President of Granco Clark

It is often prudent for a company to step back and thoughtfully evaluate organizational changes either in process or under consideration. This is particularly important as change has become an everyday way of life rather than an occasional, discrete event occurring after considerable deliberation. This evaluation process is important because any productive change effort requires connection to the goals of the company as it engages in continuous improvement.

At Granco Clark, change continues to impact all areas of the company. New machine tools for manufacturing, migration from AutoCAD to 3-D modeling software for engineering, and the analysis of new enterprise management software head the list. These items and others on the priority list improve efficiencies and capabilities, generating benefits for both the company and its customers.

Against this backdrop of change, Granco Clark has undertaken the formidable task of implementing a quality system that will lead to ISO-9001 certification. While hardly a new concept in industry, it falls short of universal acceptance by mainstream equipment manufacturers to the extrusion industry. Perhaps this is due to its enormous impact, likely seen as disruptive and counterproductive in the short run. Another reason may be the absence of pressure from extrusion equipment customers—a curious point since many extruders themselves seek or have achieved certification. Whatever the case, Granco Clark has chosen to seek this credential for self-serving reasons. To our knowledge, no other competing U.S. supplier is currently certified. In some areas of the world, certification is the major qualification to be considered a serious player. The process will impose a discipline on the company that is critical to strengthening long-term relationships with our customers as we deliver value and reliability in our equipment and support services.

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the key features which are included in the offer. The teaching will show, in words, diagrams and (often more effectively) in computer simulations and videos, how the equipment being offered will work, and how each of the key features contributes to achieving the customer's goals. Only then can the user set out to evaluate the alternatives in a formal fashion, as follows:

What do they (the changes, the equipment etc.) do? What do they achieve? Or, what is delivered?

1) Listing the suppliers' claims against the performance specification: safety, quality, reliability, productivity and yield, reduced lead times and hence reduced conversion costs.

   Extrusion production systems have diversified in recent years to the extent that similar results can often be achieved with very different equipment. This is particularly true of pullers, run-outs, handling systems, stretchers, saws and stackers. Hence the need for the customer to fully understand and compare each of the features being offered, listing each of the features and its contribution to meeting performance specification.

2) Through correspondence, meetings and discussions with potential suppliers, the user then brings each offer into line so that each will deliver the specified performance.

   Aluminum extrusion systems encompass all the equipment from handling of billet and log to the stacking and ageing of the extruded lineals. Suppliers, and there are many, have approached the design and manufacture of extrusion systems in different ways, affecting the execution of the extrusion process, the time cycle(s) of the equipment, and the yield which can be achieved.

3) If any supplier will not or cannot meet the performance specification, the user must reject their offer, or allow for increased operating costs or reduced profits throughout the life of the project.

   The flexibility of the extrusion process often means that different extruded products (alloys and shape combinations) must be produced on the same extrusion press. In this case, compromises must be made. But, the cost must be understood.

4) The user can only compare the prices submitted by potential suppliers when all offer the same performance.

to be continued...

Achieving Isothermal Extrusion

Superior Performance of the Granco Clark Triple-Patented Taper Quench

Isothermal extrusion—maintaining a constant metal temperature during the extrusion process—is necessary for the production of uniform, high-quality profiles. Three methods for regulating extrusion temperature are currently in use: press slowdown, differential heating and taper quenching. Because isothermal extrusion requires very precise temperature control, not all of these methods are equally effective, nor do they all offer the same level of productivity, efficiency and product quality.

Press Slowdown

Isothermal extrusion can be accomplished mechanically by adjusting the speed at which the billet is extruded through the press, slowing it down in order to maintain a constant temperature. Press slowdown can be automated with the use of inexpensive software. Although press slowdown can result in a slight increase in production, this process is detrimental to product quality. The front to rear profile variations actually increase due to the changing die face pressure.

Differential Heating

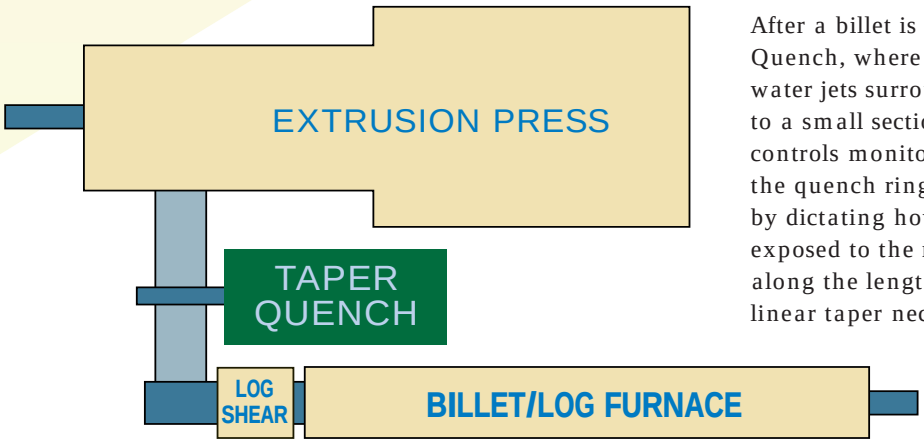
This process is used to create a pre-extrusion temperature gradient within the billet to compensate for the heat generated during extrusion. Shock Heating, Induction and Flame Impingement are the methods most often used. The taper created by differential heating is non-linear, however, and does not create the precise temperature gradient necessary for isothermal extrusion. Differential heating is also impractical for heating short billets (less than 24" long) because the temperature gradient decays nearly as fast as it is created. In addition, the cost of acquiring and operating the necessary induction equipment can be substantial.

Taper Quenching

Taper quenching employs a narrow ring of water to selectively remove heat from the billet, creating a precise temperature gradient that anticipates the heat generated during extrusion. This process was invented by Granco Clark, originators of the triple-patented Taper Quench.

Taper Quench

How It Works



After a billet is uniformly heated, it moves through the Taper Quench, where the "water impingement ring" — a band of water jets surrounding the path of the billet — limits cooling to a small section of the billet at any given time. Computer controls monitor the rate at which the billet passes through the quench ring, regulating the degree and extent of cooling by dictating how long any particular part of the billet is exposed to the ring. By selectively and rapidly extracting heat along the length of the billet, taper quenching creates the true linear taper necessary for isothermal extrusion.

Efficiency

The Granco Clark Taper Quench can apply a temperature gradient of 50° to 250° F anywhere along the length of the billet. It typically takes less than ten seconds to achieve a gradient of 200° F, for a total cycle time of less than 25 seconds. The linear taper is created with speed and precision, promoting high efficiency and uncompromising quality. The Taper Quench also allows for the extrusion of longer billets, which further increases productivity and recovery.

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Automation

The Granco Clark Taper Quench can be installed independently. A typical installation connects to the press controls with three wires. It can also be connected to the Granco Clark Supervisory Control System for automated download of the temperature model for each profile.

A standard feature of the Taper Quench is an intelligent control package that tunes the billet taper without operator intervention. This patented program works in conjunction with a constant-speed controller to provide isothermal extrusion.

Value

The Granco Clark Taper Quench has the lowest acquisition cost, and when combined with a gas-fired billet heater, the lowest operating cost of any option that provides the required temperature gradients for isothermal extrusion.

Taper quenching is the only way to truly achieve isothermal extrusion while optimizing efficiency, productivity, quality and value. The Granco Clark Taper Quench can give you the competitive edge.

For additional engineering and performance specifications, contact us at (616) 794-2600 or via e-mail at gcinfo@grancoclark.com.

New Equipment Installations

Caradon Mideast Aluminum

Mountaintop, Pennsylvania

This division of Caradon Limited has recently nominated Granco Clark as the supplier of an automated extrusion system for its expanding Mideast Aluminum site. The Granco Clark system will accompany a new 2750-ton press. The line, to be installed next spring, features a double length handling system incorporating twin pullers and positioning hot saw. This state of the art extrusion line will enhance Mideast's ability to produce its high-quality extrusions at improved production rates.

MI Metals

Olds Mar, Florida

This successful extruder recently purchased a new 2250/2500-ton extrusion press complete with a Granco Clark automated extrusion handling and heating system. It includes a billet furnace, double puller, cooling belt system, one-man/no-man stretcher, belt storage and an automated saw and gauging system.

International Extrusions

Waxahachie, Texas

International Extrusions purchased a new Granco Clark log-sawing system for its cast house, which serves four extrusion lines. The new system will function as a primary log-trimming device, processing logs from 6" to 9" in diameter and up to 23´ long.

Aluminum Company of America (Alcoa)

Cressona, Pennsylvania

Granco Clark recently delivered an ageing oven to this Alcoa facility. The oven will be used for large and heavy products, with a design load of up to 107,000 pounds of aluminum.

Caradon Indalex

Gainesville, Georgia

Indalex Gainesville, a leading supplier of extrusions to construction markets of the southern USA, is relocating and enhancing a Granco Clark automated system that was originally installed in another plant. The system is being modified to fit the requirements of the new site. It includes standard components of the Granco Clark automated system such as a furnace/shear, double puller, transfer belts, one-man/no-man stretcher, auto saw gauge and age oven. The leadout table is being lengthened to enable Caradon's double puller to operate at higher extrusion speeds, and additional cooling is being incorporated to accommodate increased production.

Metalex

Valencia, Venezuela

This successful copper extrusion company recently installed two "SST-Hot-Jet" copper billet heating furnaces. The first unit (model 69-30-3) was installed on an existing press extruding 7" billets. The second furnace (model 69-55-5) was installed on a newly refurbished 9" press.

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