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Improving Plant Performance

Part 2

by Roger A.P. Fielding, BENCHMARKS

In the last issue, we described analyses that have been demonstrated to enable understanding of the factors affecting the performance of an extrusion press. The data describing lost time and—in the case of press recovery—lost aluminum, can readily be associated with the responsibilities of plant managers and supervisors, maintenance and process engineers, die correctors, and press operators. Realistic targets for improvement can be set, and progress can be monitored. No more references to vague targets of "5% per annum" or the like!

To get a better understanding of the achievements of the "benchmark" extruders, the author devised two additional measures:

1) The Utilization of Men, Machines, and Metal

The recovery of aluminum, measured at the finish cut saw, is the measure of the utilization of the aluminum billet delivered to the extrusion press. Contact utilization or machine efficiency is the ratio of contact time to total production time, and is therefore a measure of productive utilization of the extrusion press and its press crew.

The effect of improving the recovery and the contact utilization (or machine efficiency) can easily be calculated.

Productivity increased from 15 to 18 million pounds per year by increasing recovery from 82 to 84%, and increasing machine efficiency from 65 to 77%.

2) The "Consistency" of Extrusion Operations

The average extrusion speed achieved at the press is a function of the extrusion dies, the billet quality, and—above all—the control of the extrusion "process" parameters. The extrusion process parameters—the temperature of billet, container, and dies—must be controlled to maximize ram speed.

Dead production time is the sum of the mechanical dead cycle, the average die change time, and the time wasted due to minor delays at the extrusion press: waiting for billet, lubricating the tooling, etc.

A comparison of "benchmark" extrusion press operations shows the effect of increasing the effective extrusion speed and reducing the dead production time: Productivity is increased from one to two million pounds per month by doubling the effective extrusion speed and reducing the dead production time from 50 to 35 seconds.

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President's Message

Lawrence R. Difatta
President of Granco Clark

If it ain't broke, don't fix it.

It's a pretty common attitude towards preventive maintenance. When there are plenty of actual problems to be dealt with, why worry about something that seems to be working just fine?

Truth is, ignoring a maintenance issue doesn't make it go away…it usually just means you'll end up paying more to fix it later. Put off spending a couple hundred dollars to repair your vehicle's brakes now, risk paying a thousand or so dollars later to repair additional damage caused by delaying the repair. Put off fixing a minor water leak in your home now, face costly repairs to replace rotting wood or remove mold later.

There's also a good chance that a problem that would only have been a minor inconvenience to fix earlier will turn into a much bigger disruption. For example, according to AAA research, more than five million breakdowns could be avoided each year if motorists simply performed basic maintenance on their vehicles.

The same maintenance principles apply to extrusion equipment. Regular preventive maintenance is key to extending equipment life, avoiding costly downtime, and keeping your system running at its peak.

In this issue, we focus on several of the maintenance steps that should be performed regularly on the furnace and shear. We also look at more ways to identify opportunities for improving plant performance.

Whenever you have questions about maintenance or repair issues, Granco Clark stands ready to help, with our modem diagnostics program and 24-hour parts hotline. So if it's broken, we'll help you fix it. And if it isn't broken, we'll help you keep it running right.

Optimizing Furnace and Shear Operation

Preventive maintenance is an area that's often skimped on when time and budgets are tight. In the end, though, this approach usually backfires. Investing in preventive maintenance upfront ultimately saves both time and money.

A preventive maintenance program helps you avoid surprises. It brings potential problems to light early on, so you can order replacement parts and schedule service—instead of dealing with unexpected breakdowns that interfere with a full production schedule.

Preventive maintenance doesn't just help keep your equipment up and running—it also helps you get the most out of your system. Regular maintenance enhances thermal efficiency, reducing energy expenditures, and helps maintain the tight temperature control essential for high-quality profiles.

Below, we'll look at a few of the steps that are key in optimizing the operation of your furnace and shear.

Keeping Temperature on Track

Regular sharpening of thermocouple probes is an essential part of furnace maintenance. Probes that aren't adequately sharp may produce false temperature readings, affecting your operation down the line. Incorrect temperature readings translate into billets coming out of the furnace over-heated or under-heated, potentially impacting profile quality.

On a daily basis—or every couple days, depending on the number of shifts you're running—check the condition of the probe rods and sharpen if necessary. The probe rods should be sharpened approximately every third eight-hour shift. More frequent sharpening may be required when running hard alloys or with insufficient probe cooling.

Maintaining Thermal Efficiency

The Granco Clark Hot Jet furnace is built for efficiency—delivering an average thermal efficiency of 55%. Regular preventive maintenance will help keep your furnace performing at that high level of efficiency.

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On a monthly basis, check the condition of the furnace exit door. Make sure there's a tight seal to prevent cold air from entering the furnace, and adjust as necessary.

Another component of the furnace that should be inspected each month is the burner blocks, which can also negatively impact thermal efficiency if damaged. Check the burner blocks to make sure they're fully intact, and replace or repair as necessary.

Running Smoothly

Proper lubrication is one of the most important—and simplest—steps you can take to keep your system running smoothly. At a minimum, lack of sufficient lubrication will shorten the lifespan of your bearings—and can ultimately cause significant damage to major components such as fan assemblies or the shear frame.

On the furnace, oil all drive chains and grease the hot jet fan bearings weekly. Grease all bearings on a monthly basis.

On the shear, grease the moving shear block and fixed shear rings daily, also checking the rings for aluminum build-up. Each week, grease all fittings on the shear.

Sustaining Proper Pressure

The shear's hydraulic system should also be inspected regularly. On a weekly basis, check the hydraulic system for any leaks and refill the reservoir if necessary. Replace the return filter if hydraulic oil is changed; otherwise replace the filter as needed. Once a month, check the system hydraulic pressures, adjusting as necessary.

For additional information on furnace and shear maintenance, consult your Granco Clark service manual. Always disconnect and lockout the external power source, following established lockout procedures, prior to performing maintenance or service on any equipment.

Discussion

While correctly focusing on the operation of the extrusion press, it is essential to ensure that the subsequent—downstream—operations of handling, sawing, aging, and packing are configured so that they (or the manner in which they are operated) do not delay the extrusion press.

In the recent past, it could be shown that handling systems (including the press run-out, cooling tables, and stretching), together with the finish cut saw and their collective operation, were often the cause of "full tables". And, although press crews could be trained to work together to minimize the incidence of delays, delays did occur.

In the extrusion plant, the prime production device—the extrusion press—must define the ultimate output from the plant. It must be the "bottleneck". Belt handling systems, automatic or semi-automatic stretchers, wide saw tables, and automatic or semi-automatic racking systems have been combined to minimize or eliminate full tables. But, at considerable cost, automatic handling systems cannot be justified on many of the presses currently extruding less than 2500 pounds per hour of AA6063 or AA6060 type alloy extrusions.

Rightly or wrongly (it was not always the correct solution), the wide saw table was probably the first attempt to remove a downstream bottleneck, thereby allowing the extrusion press to reach its full potential. The development of a practical run-out table puller followed. Automatic racking of sawn extrusions and the development of automatic stretching systems came next. But improvements to aging systems have been slow to follow, with many extrusion plants still relying on batch age ovens, loaded (and unloaded) every six to eight hours.

Conclusion

Although most extruders monitor recovery and average productivity, few monitor every element of the extrusion cycle to identify opportunities for improvement. Many extruders accept a level of recovery and productivity that is within the capability of the press crew to consistently deliver. There are few improvement programs in place, and when upgrades or replacements to key equipment—for example, the extrusion press—are made, the lack of understanding of the factors that control productivity at the press results in sub-optimal performance.

The specific performance data contained in this paper covers the range reported by numerous extrusion presses. The numbers exceed those of many, many presses, and were only achieved after considerable development of process and equipment, combined with rigorous operator training.

Improvement to benchmark performance can only be achieved following a program that sets out to measure, understand, control, improve, and optimize production—before automating!

Abridged from "Managing the Performance of an Extrusion Plant," Proceedings of the Eighth International Extrusion Technology Seminar ET '04 Orlando, Florida, May 18-21, 2004, pp. 565-570

New Equipment Installations

North America

Universal Alloy Corporation

Canton, Georgia, USA

Universal Alloy Corporation (UAC), a division of ALU Menziken Aerospace, has installed the largest extrusion press in North America at its facility in Canton, Georgia. UAC chose Granco Clark to supply the handling system, including controls, for the 16,200-ton direct-indirect extrusion press.

The Granco Clark handling equipment is designed to accommodate very large, heavy extrusions. The runout for the new system, which incorporates an existing heat-treat furnace and 350-ton stretcher, consists of a series of individually driven, heavy-duty rollers. The roller pallets are height-adjustable, allow a maximum extrusion weight of 100 pounds per foot, and are installed on top of the longitudinal die slide of the press. The tables that move the extrusions from the press to the heat-treat furnace and then into the stretcher and finish saw are a combination of traversing beam and belt tables that also allow a maximum profile weight of 100 pounds per foot.

Granco Clark Profile Handling System

For more than 40 years, UAC has supplied aircraft manufacturers worldwide with quality hard-alloy aluminum extrusions. The new press will allow the company to expand its capabilities to the largest extrusions and tubes of high-strength aluminum for the aerospace industry.

Bon-L Canada

Pickering, Ontario, Canada

Bon-L Canada has chosen Granco Clark to supply the billet heating system for a new 2750-ton extrusion press at its facility in Pickering, Ontario.

The Model 69-45-5 "Hot Jet" billet furnace, intended for processing primarily nine-inch diameter billets, will produce 9,900 pounds of nine-inch billet per hour. The furnace and handling equipment have been modified to heat and handle billet lengths down to nine inches. This allows for the use of very short billets, which reduces the container friction and optimizes the unit pressure available for high-strength alloys.

Hydro Aluminum North America

Guaymas, Mexico

Hydro Aluminum's Phoenix operation has placed an order for a Granco Clark Model PCS-824-21 Precision Sawing System. The system, consisting of a precision finish saw and chip collection with a rotary valve, will be installed at the Hydro Aluminum plant in Guaymas, Mexico.

Hydro Aluminum will use the saw to precision saw cut parts from .375" through 252". The saw will increase Hydro Aluminum's capacity to cut parts to extremely close tolerances with a precision quality of finish, as well as providing the company with a high volume of cutting capacity.

This is the second Granco Clark precision sawing system purchased by Hydro Aluminum. The first, located at its operation in Sidney, Ohio, continues to meet the expected production rates and tolerance levels.

Granco Clark Welcomes New Sales Engineer

Bruce Spletzer

Bruce Spletzer recently joined Granco Clark as Sales Engineer. In this position, he will be responsible for the sale and service of equipment for both new and existing customers.

Bruce, who holds a bachelor's degree from Michigan State University, brings 15 years of experience with industrial equipment to this position. He previously worked as a manufacturer's representative in the electric motor and gearing industry and for a pneumatic pump and motor manufacturer.

"I've worked with a variety of industrial equipment and mechanical applications, which has helped me appreciate how important an extruded part's dimensions are to a product's ultimate performance," says Bruce. "The equipment Granco Clark manufactures helps the extruder meet required dimensions, minimize the amount of unusable extruded material, and reduce scrap costs."

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