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Improving Plant Performance

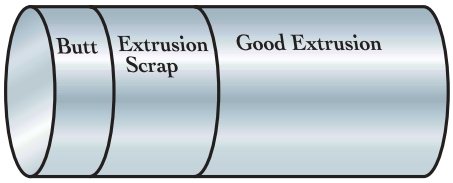
Part 3

by Roger A.P. Fielding, BENCHMARKS

Improving the performance of an extrusion press installation must start with measurement and understanding of the issues. The Recovery Billet—Figure 1—illustrates the factors affecting the overall recovery of aluminum between the supply of log or billet to the extrusion press installation and the delivery of good extrusions to the aging oven.

The Butt

The size of the extrusion butt—which is sheared off at the end of each extrusion cycle—ensures that no "back-end defect" enters the extrusion. The size of the butt is controlled by the quality of the billet, the extrusion alloy, the diameter of the billet in relation to the bore of the liner, the control of the billet "upset," and the removal of air from the container during and after upset.[1]



- First and Last Billet
- Shape Scrap: Bow, Twist, Wave
- Back End
- Transverse Weld
- Longitudinal Weld
- Quench Scrap (Dead Cycle), Distortion
- Table Scrap: Dent, Scratch
- Stretcher Scrap
- Saw Scrap: Length, Chips, etc.

Figure 1: The Recovery Billet

The quality of billet is measured by its conformance to the specified composition limits (and particularly the level of hydrogen gas), the thickness of the shell zone, the level of inverse segregation, and the surface finish of the billet. In general terms, the higher the level of alloying elements (or the "harder" the alloy), the larger the butt. To minimize air entrapment—and at the same time maximize billet weight—the diameter of the billet should be close to the diameter of the bore of the liner. Upset must be controlled to minimize air entrapment; with proper control, a "burp cycle" is usually unnecessary.

Extrusion Scrap

All of the items listed in Figure 1 contribute to "Extrusion Scrap." They can be minimized by using best practices, and by the configuration of the extrusion press, its handling system, the stretcher, and the finish-cut saw.

Best practices recognize that the first and last billet in each production lot should be different sizes from the second and subsequent billets, since this allows for filling the die at the start of production and minimizes scrap at the end of each lot. Similarly, the use of best practices can minimize the back end and the transverse and longitudinal weld scrap.

However, the "shape scrap"—recorded as bow, twist, and wave—is usually a function of the extrusion die and specifically the control of the mechanical and thermal alignment of the extrusion press and container, the billet and the die.

The proper configuration and operation of the press run-out table, the puller(s), the quenching systems, the handling system which moves extrusions into and out of the stretcher, and the finish cut saw have a major impact on minimizing scrap.

Improving Press Performance

While the performance of a given extrusion press installation can usually be quickly improved by improving the recovery of good extrusions from billet, the ultimate performance of the press can only be achieved by controlling every second of available time—where available time is taken to be 7 x 24 hours in

see "Performance", page 2

President's Message

Lawrence R. Difatta
President of Granco Clark

Recently, we had the opportunity to attend an open house for the new installation of the largest press line in North America. Universal Alloy Corporation installed a 16,200-ton direct-indirect extrusion press at its facility in Canton, Georgia, for which Granco Clark supplied the handling equipment (you'll find a photo of this equipment on page 3 of this issue).

It was impressive to see the sheer size of the extrusion line, which will produce the largest extrusions and tubes of high-strength aluminum for the aerospace industry. The handling equipment we supplied will handle extrusions up to 100 pounds per foot.

As exciting as it is to see a new line launch, what's even more rewarding is to see installations of our extrusion equipment years or even decades down the line, still reliably delivering the required performance, day in and day out.

Of course, one of the key ways to extend equipment life and maximize productivity is through preventive maintenance. In the last issue of the newsletter we discussed preventive maintenance of the furnace and shear; in this issue, we turn our attention to pullers. We also look at ways to enhance performance throughout your plant.

Whether you have an 1,800-ton press or a 16,200-ton press, whether you're producing profiles for construction or automotive or aerospace, Granco Clark can help improve productivity of your extrusion line. All of the equipment we build is customized to the specific needs of your operation, optimizing performance. And with our modem diagnostics support and 24-hour parts hotline, we help you maintain that level of performance, day after day, year after year.

Granco Clark Employee Serving in Iraq

Granco Clark employee Chris Larsen, who has served for 10 years with the Michigan Army National Guard, was recently called to active duty in Iraq.

A welder fabricator at Granco Clark, Chris is an E5 Sergeant with the 1073rd Maintenance Company. He is currently stationed at a base near Fallujah. Our thoughts are with Chris and we thank him for his service to our country.

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Sergeant Chris Larsen

Performance from page 1

each and every week.

Rigorous measurement is (again) the only way to understand where time is lost in the production system.

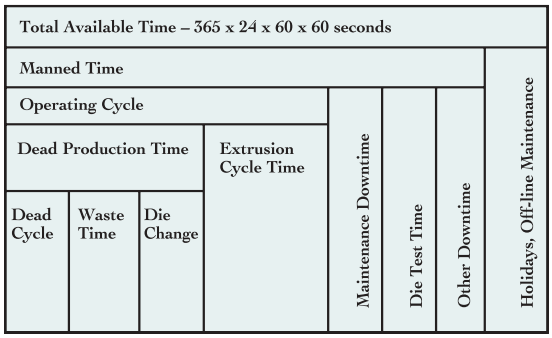

Figure 2: The Extrusion Press Cycle

The "Dead Cycle" is established by the mechanical design of the extrusion press. Any time lost over and above the original manufacturer's timing is referred to as "Waste Time," as is other time lost—waiting for the billet, lubricating the die, or, more commonly, operating the press manually instead of using the automatic-repeat-cycle control.

In an extrusion press equipped with double die-slide, much of the "Die Change" time occurs within the dead cycle, and the only lost time is that taken to lead out the front end of the extrusion.

The "Extrusion Cycle Time" is self-explanatory, and for any extrusion alloy it can be minimized by the use of best die design, optimizing the composition and structure of the extrusion alloy billet and using best extrusion practice to achieve the highest extrusion speed while achieving the desired mechanical properties.

"Maintenance Downtime" can be reduced by the care taken in the original design of the extrusion press, its hydraulic systems, and the electrical and electronic control systems. Proper maintenance of the press and its attendant systems and specifically the employment of autonomous maintenance by the press operators will minimize maintenance downtime.

Full tables are the most common cause of "Other Downtime" and are generally caused by an imbalance between the productive capacity of the extrusion press and the finish-cut saw. The extrusion press—being the prime production unit—should be the bottleneck to production. All downstream devices should be capable of working faster than the extrusion press.

1) Jowett, C. W., "Upset," Eighth International Extrusion Technology Seminar ET '04, Orlando, Florida, May 18-21, 2004, Volume 1, pp. 23-37

Keeping Puller Performance on Track

When your puller is performing at its peak, it significantly boosts overall productivity and profile quality—reducing scrap, improving line efficiency, and delivering even, twist-free profiles. Those returns can diminish, though, if preventive maintenance is neglected.

Here, we look at a few of the key ways to combat the impact of normal wear and tear and keep your puller running smoothly.

Maintaining Proper Pulling Power

To maintain accurate, consistent pulling tension, the friction offset should be adjusted monthly, or whenever any part of the drive or carriage has been changed. Using a biasing scheme to cancel out frictional losses ensures that the pulling tension the operator specifies is the pulling tension actually received.

Give the puller a command to move, then incrementally increase the motor torque until the head begins to move. This will indicate that the torque setting is sufficient to overcome frictional losses. The data can then be stored and applied to future operating cycles to keep pulling tensions consistent and repeatable.

Keeping It Clean

Debris in the runout area can interfere with profile quality. To maintain a clean environment, clear debris from the chip trough and puller rail on a daily basis. Every six months, check the puller jaw teeth for build up and ensure the jaws can move freely; clean and lubricate as needed.

Running at the Right Height

Maintaining proper running heights for puller heads is critical to smooth operation—particularly for double pullers. Large differentials between the running heights of puller #1 and puller #2 can cause marking during handovers and extra wear and tear on the puller heads.

Puller head running heights should be checked weekly. A good general guideline for double pullers is to adjust head #2 so the lower jaw rides 1/4" above the highest point on the runout conveyor. Once the height of the head #2 jaw has been adjusted, adjust head #1 so the lower jaw rides 3/8" higher than that of head #2. This allows the extrusion to easily pass from head #1 to head #2, while limiting jaw height differential that can result in excessive extrusion movement during the handover.

Keeping Communication On Course

Communication between the control system and puller heads can become erratic if debris accumulates on the conductor rail or the sliding shoes become worn. Regular inspection and cleaning will help maintain the integrity of the electrical connection.

Sliding shoes should be inspected weekly. Inspect the shoes for uneven wear on the sides and sliding surface; replace as necessary.

Granco Clark Twin Puller

Over time, airborne contaminants in the plant and dust produced as the sliding shoes wear down can accumulate on the conductor rail, degrading communication. To keep communication flowing smoothly, clean the conductor rail monthly, or more often as needed.

For additional information on puller 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.

Granco Clark Supplies Handling Equipment for Largest Extrusion Press in North America

Universal Alloy Corporation (UAC), a division of ALU Menziken Aerospace, recently installed a 16,200-ton press at its facility in Canton, Georgia. The Granco Clark handling equipment is designed to handle large, heavy extrusions of up to 100 pounds per foot.

New Equipment Installations

North America

Indalex Aluminum Solutions
Connersville, Indiana, USA

Indalex Aluminum Solutions is one of the world's largest aluminum extrusion companies, supplying markets including transportation, construction, electrical, and consumer durables. The company has chosen Granco Clark to supply an automatic profile stacker and de-stacker for an existing 3,600-ton press line at its recently acquired Connersville, Indiana, plant.

Granco Clark Stacker

The automatic profile handling system handles 60-foot-long profiles for the transportation industry and features a fully automatic spacer collection system. Revisions to the existing handling system—furnished by Granco Clark in 2000—will lengthen the saw gauge from 52 feet to 60 feet.

This system is designed to handle up to 8,000 pounds per hour without manual intervention. A manual unpacking station using a scissor-lift allows Indalex to take a full rack of 60-foot profiles and operators to unload one layer of metal at a time for packing.

Aluminum Extrusions Inc.
Senatobia, Mississippi, USA

Aluminum Extrusions Inc., a full-service aluminum extruder specializing in curtainwall systems, has selected Granco Clark to supply a "Hot Jet" billet furnace for its new 1,800-ton press line. The Model #69-30-3 will supply the press with 5,000 pounds of seven-inch aluminum billets per hour.

Vistawall
Midway, Tennessee, USA

Vistawall, a leading supplier of storefront, entrance, and curtainwall systems, is adding a 2,500/2,750-ton extrusion press at its facility in Midway, Tennessee. The company has chosen Granco Clark to supply the heating and handling system for the new line.

The heating system consists of a Model 69-35-3 "Hot Jet" log furnace intended for processing eight-inch diameter logs. The furnace and integrated log shear will supply the press with 6,500 pounds per hour of eight-inch diameter billet.

The handling system has a 160-foot cooling table and is equipped with the proven Granco Clark double puller with an enhanced chip collection system. Undertable and overhead air cooling systems provide balanced cooling from top and bottom.

Granco Clark is also supplying the facility with a second age oven, complete with an automatic conveyor system. The equipment will be controlled by Granco Clark's SCS*Extrude* software system.

This is the second time Vistawall has selected Granco Clark to supply the handling equipment for a press line at this facility. The first line was installed in 1999.

Kaiser Aluminum
London, Ontario, Canada

Kaiser Aluminum, a manufacturer of fabricated aluminum products for aerospace, automotive, and custom industrial applications, has selected Granco Clark to upgrade the handling system for its 1,800-ton press line at its plant in London, Ontario.

The upgrade includes a 500-pound puller and runout conveyor. Granco Clark's cut-on-the-fly double puller will reduce scrap and improve positioning of extrusions for downstream operations. The new runout conveyor is a raise/lower design with high-temperature, fabric-covered rollers.

According to Kaiser, this is the first stage of a multi-year plan to upgrade the entire line to state-of-the-art technology.

Indalex Aluminum Solutions
Pointe Claire, Québec, Canada

Indalex Aluminum Solutions has selected Granco Clark to provide a new handling system for an existing 1650-ton press line at its plant in Pointe Claire, Québec. The handling system upgrade consists of a runout conveyor, belt cooling table, 35-ton one-man/no-man stretcher, and ECS-408 extrusion cutoff saw. The upgrade ties into the existing Granco Clark double puller and "Hot-Jet" billet furnace with integrated log shear.

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