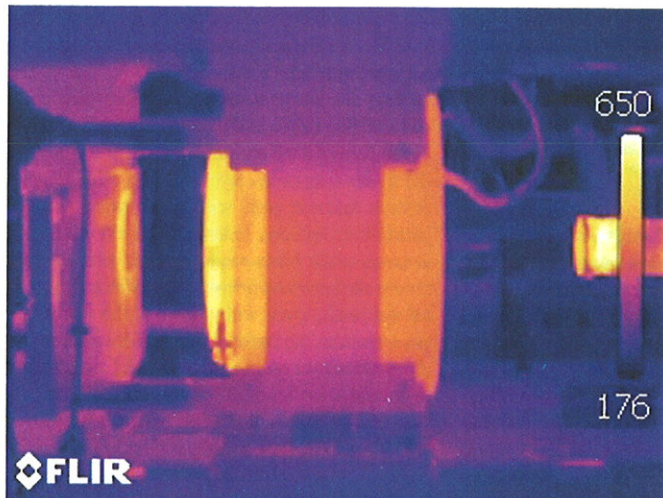


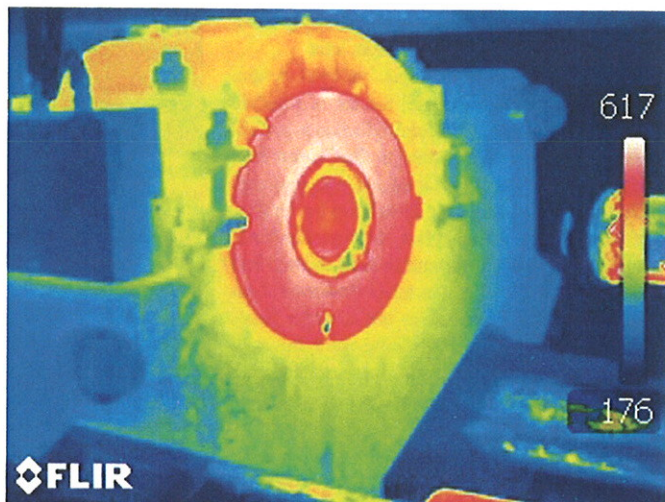
A complete tool package can speed the extrusion process

Feature

This presentation by Paul Robbins General Manager of Castool Tooling Systems, an international supplier to the extrusion industry, based in Canada, demonstrates that all parts of the extrusion process must function closely together as a cohesive system, if maximum productivity is to be achieved.



1 Thermal image of a tooling system



2 Thermal image of a conventional container entrance

The global market for light metal extrusions is changing. Major users are becoming more knowledgeable about the real capability of world-class extruders. Accordingly, they are more demanding. They specify profiles that have never been made before, tolerances that are uncommonly tight, and surface finishes that have previously required a secondary operation.

To remain competitive in this increasingly challenging market, many extruders must change their basic approach to the production process. Too often, parts of the extrusion-process tooling are considered individually, with no regard for the influence of other interacting components. No single part of the production process really operates in isolation. The extrusion process is best considered as a succession of mini-systems, each comprising two or three parts that most closely affect the performance of each other, but are united in a common cause.

In product research and development over a number of years, Castool has found it to be a proven fact that the component parts of the extrusion production process must function closely together as a cohesive system, with all sections operating at a high level of efficiency, if maximum productivity is to be achieved.

The tooling package

The advantage of considering the process of extrusion as a total system has already been well established and it is practiced by most world-class extruders. The ultimate extrusion system would therefore have all major components designed and produced to work together and be provided by a single supplier.

Castool, based in Toronto, Canada, is the only global supplier to the extrusion industry that can provide both a complete line of products, together with trained and experienced technicians to help the extruder obtain

the maximum productivity from his system. This service is available wherever Castool products are sold. Single sourcing and undivided responsibility distance a complete Castool tooling package from all other versions.

A typical Castool single press tooling package includes all necessary spares.

Contents of a complete Castool tooling package

- Two to three containers
- Six to eight die ovens
- Two to three stems
- Two to three dummy blocks
- One to two clean-out blocks
- Two to three pyrometers
- One lubricator
- One visual optimiser

The Quick Response QR container

The time taken to respond to a demand for heat is in direct proportion to the distance between the temperature sensor and the heat source.

With at least four temperature control zones, vertical as well as horizontal, Castool's Quick Response container has temperature sensors located near the liner. Double thermocouples monitor both liner and heater temperatures simultaneously. Cartridge heaters are positioned close to the sensors, instead of being sited in the centre of the mantle mass, as in most conventional containers. Their purpose is to heat the liner, not the mantle, and thus to maintain a consistent temperature in the die.

The Castool QR container reduces energy costs and increases productivity. In a typical application, two containers are necessary and three are preferred. For example, if a container is being relined, any problem with

the operating container would lead to production being shut down if no spare was available.

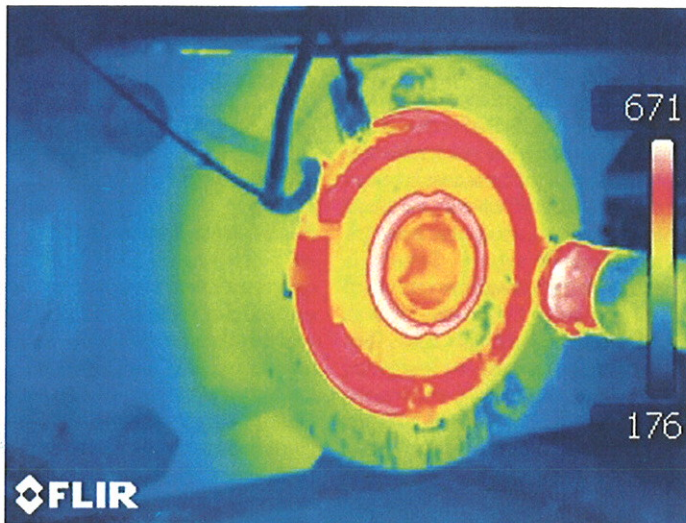
The single-cell die oven

Every extruder strives to obtain a good product, from the first push to the last, in every run. The most usual reason why this doesn't always happen is that the first one or two billets are needed to bring the new die completely and uniformly to operating temperature. This results in scrap, lost production time, and the danger of unnecessary die correction. The basic problem is inconsistent die temperature. The traditional chest oven is an inefficient and often inaccurate way to heat dies. In today's market, any extruder who is not using single-cell die ovens can no longer remain competitive. Castool's single-cell die oven brings each die uniformly to the calculated optimum operating temperature rapidly, accurately, economically, and safely. The number of die ovens to serve each press is usually six in total. However eight die ovens may be required depending on such factors as throughput and length of runs.

The dummy block

The dummy block is a critical element of the aluminium extrusion press. It is a component on which both quality and productivity depend. Castool's dummy block has evolved from a simple yet effective basic tool, to a high-technology device that incorporates the results of extensive research and development to perfect its function.

With the Castool RR Replaceable Wear Ring dummy block, the lip of the shell is replaced by a high-strength steel expanding wear ring that is quickly and easily removed or restored. The speed and economy of replacing only the ring benefits the extruder immediately.



3 Thermal image of a Castool QR container entrance

The Castool Marathon dummy block was originally developed for large volume single-use extrusion at above normal cycle times and pressure. Designed and produced for the press on which it will be run, the Marathon block continues to set new records for longevity and economy.

Castool dummy blocks can help any extruder to achieve better extrusion and increased productivity. Two dummy blocks are necessary although three are preferred.

Knockoffs

A problem that is shared by most extruders is the unscheduled downtime that is caused when a die must be replaced before the production run has been completed. Usually known as knockoffs, this can be caused by many factors. The incidence of knockoffs has proved to be greatly reduced, and often completely eliminated by the adoption of Castool single-cell die ovens, quick response containers, and controlled expansion dummy blocks. Each contributes to improved productivity. Combined, these three interactive Castool components combat a number of costly problems that have traditionally been considered inevitable by many extruders.

The clean-out block

After each change of alloy, and also at least once each day, a clean-out block should be used to remove the build-up of oxide skin from the container liner. Castool's clean-out block is long enough to sit on the billet loader and then travel straight and smoothly through the liner. It is designed to be used at room temperature to make handling safer and to achieve better dimensional control. It is hollow to reduce weight, and wire-cut on both ends to allow it to flex slightly and prevent damage to the liner wall. The Castool clean-out block is precisely sized for maximum efficiency in cleaning the liner wall of each individual container. Access to a spare clean-out block is recommended.

The stem

The stem acts as a column, transmitting the force of the main cylinder to the billet. It must sometimes operate under extremely high loads without bending, cracking, or upsetting. It is essential that the load be uniformly applied. Uneven loading will eventually

cause bending or breaking. Care must be taken to avoid this situation, as a stem break can be catastrophic, resulting in damage to the press, lost production time and possible injury. Castool stems are custom designed and modelled specifically for the pressure of the press on which they will be used. Two stems are necessary although a third is recommended as insurance whilst the second is being reworked, stress relieved, etc.

often used to monitor the temperature of billets entering the container. The 3T remote optical pyrometers provided by Castool are the most accurate and user-friendly available today.

The Castool Visual Optimiser

If the press operator can monitor the temperatures at several critical areas during the extrusion cycle, plus the ram speed, he can positively control the process while the press is running. He will then have a much better opportunity to operate considerably closer to optimum productivity. Castool makes this possible. Recent advances in the technology of remote temperature measurement, plus the development of smart containers, has made it possible for Castool to develop the Visual Optimiser, the best tool yet devised to help the extruder improve his productivity. At the operator's post, above the press, a large back-lit monitor screen shows the actual temperature or speed at each point being monitored, plus the target temperature or speed from a previously calculated recipe. The Castool Visual Optimiser is customised to fit each extruder's needs, but it will typically include ram speed, dead-cycle time, billet temperature, container liner temperature, profile exit temperature, quench rate, and the status of each die being preheated. Properly used, the Castool Visual Optimiser can be guaranteed to improve the productivity of any extrusion system.

Summary

The global market for light metal extrusion is expanding. Large multi-national extruders are increasing their market share. They are bringing extrusion technology, product complexity and quality, and productivity, to levels never before imagined. When estimating the real value of any part of an extrusion system, there are only two valid measures: How will it affect production of the product? How long will it last? Considering extrusion as a holistic system, and constantly measuring the real worth of all parts of it, is a proven formula for better productivity. In an increasingly competitive market, improvement is essential to success.

A complete Castool extrusion tooling system, backed up with factory-trained specialists to assist the extruder in maximising his productivity, is the ultimate means of increasing market share and improving profit.

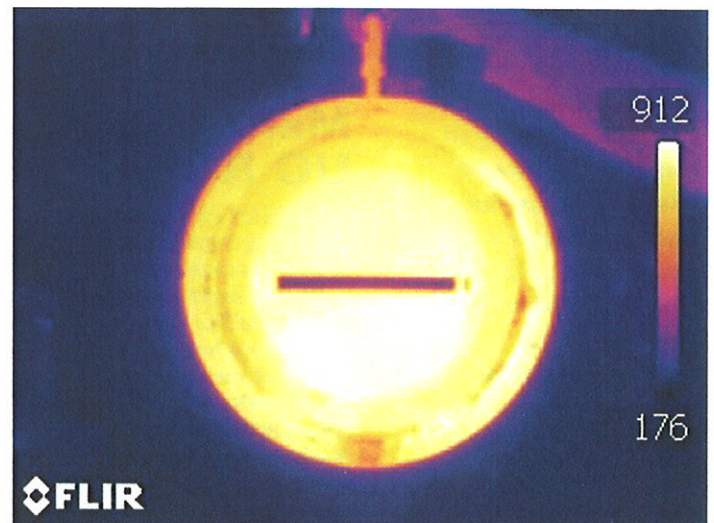
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Lubrication

At the end of each extrusion cycle, the dummy block must separate instantly and cleanly from the butt, without pulling the extruded section from the die, and without breaking the mandrel cone in the dummy block. Sticking can be a serious problem, especially when using the softer alloys, and when making large extrusions. It is absolutely essential, therefore, to lubricate the billet to facilitate separation. After an extended period of testing and comparison, Castool's preferred tool release lubricant is boron-nitride powder. This product was developed specifically for use by aluminium extruders. The method by which boron-nitride powder is applied is both unique, and uncommonly effective. With a special spray gun, the powder is given a high voltage charge. This causes it to cling to the billet, shear, and dummy block by electrostatic attraction. The amount of lubricant can be very precisely measured, and overspray virtually eliminated. The effectiveness and economy of boron-nitride powder lubricant are unmatched.

Remote optical pyrometers

The 3T company is justifiably considered to be the world leader in the measurement, recording, and control of temperatures, for the light metal extrusion industry. These ultra-precise remote optical pyrometers consistently measure real temperatures with 1% accuracy, despite changing emissivity, and ambient interference of dust or smoke between the pyrometer and the target subject. Pyrometers are usually used to measure the press exit temperature, and also the profile immediately after the quench on the run-out table. A third pyrometer is



4 Thermal image of a die being removed from a chest oven