

CASTOOL TOOLING SYSTEMS

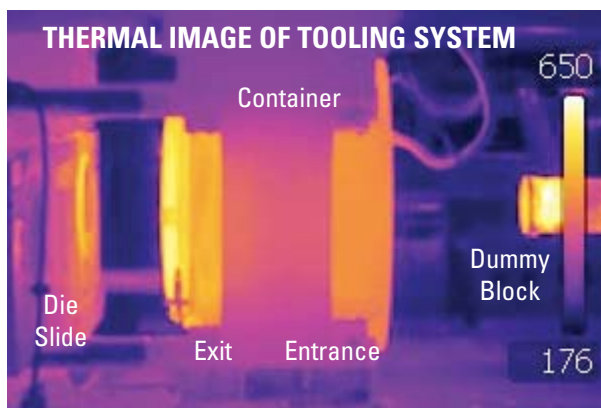
MAKING EXTRUSION BETTER GLOBALLY

A COMPLETE CASTOOL TOOLING PACKAGE

The System Approach to Extrusion

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 2 or 3 parts that most closely affect the performance of each other, but are united in a common cause.



Mechanical and thermal alignment of the extrusion process are both important. The need for mechanical alignment is obvious. The real value of precise thermal alignment, however, is often underestimated.

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

The Tooling Package

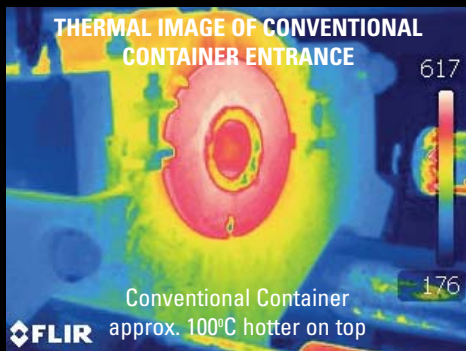
The advantage of considering the process of extrusion as a total system has already been well established and it is practiced by most world-class extruders. The ultimate extrusion system would therefore have all major components designed and produced to work together and be provided by a single supplier.

Castool is the only global supplier to the extrusion industry that can provide both a complete line of products, and trained experienced technicians to help the extruder to get maximum productivity from his system. This service is available wherever Castool products are sold.

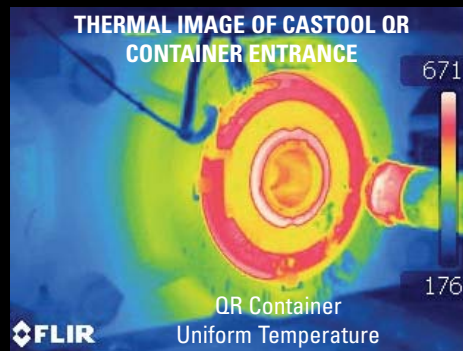
Single sourcing and undivided responsibility distance a complete Castool tooling package from all others. A typical Castool single press tooling package includes all necessary spares.

CASTOOL TOOLING PACKAGE

- 2 - 3 Containers
- 6 - 8 Die Ovens
- 2 - 3 Dummy Blocks
- 2 - 3 Stems
- 1 - 2 Clean-Out Blocks
- 1 PLC Quench
- 1 Lubricator
- 1 Visual Optimizer
- 2 - 3 Pyrometers



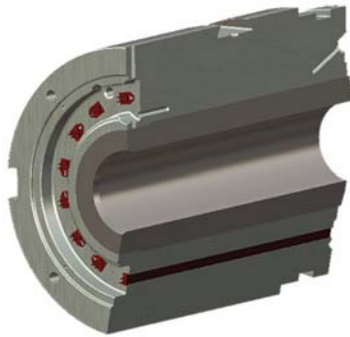
When the container mantle is heated with elements in the container housing, it is impossible to achieve zone control to compensate for the variations in the rate of heat loss from different parts of the container, i.e. top to bottom and back & forth.



Castool's QR control system positions the heating elements immediately adjacent to the liner, where heat is required. The goal is to control the temperature of the liner, so that the alloy exits a preheated die uniformly at or close to optimum temperature and maximum speed.



Chest ovens inevitably generate scrap, and are often responsible for unnecessary die trials and corrections. The length of time needed to heat a die in a traditional chest oven is several hours, but uneven or inadequate heating is a far greater problem for the extruder than time to temperature.



2 containers are necessary, 3 are preferred. If a container is being relined, for example, any problem with the operating container would shut down production if no spare is available.



6 ovens are usually enough to serve each press, but 8 may be required depending on throughput, length of runs etc.



2 dummy blocks are necessary, 3 are preferred

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 in the centre of the mass of the mantle, 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, increases productivity.

THE SINGLE-CELL DIE OVEN

Every extruder wants to get 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 DUMMY BLOCK

The dummy block is a critical element of the aluminum 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-tech 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.

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.

THE STEM

The stem is an extension of the ram, forcing the softened billet through the die. It must operate under sometimes 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 modeled specifically for the pressure of the press on which they will be used.

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 not damage the liner wall.

The Castool clean-out block is precisely sized for maximum efficiency in cleaning the liner wall of each individual container.

PLC CONTROLLED QUENCH

Finally, a component that makes a real contribution to a better product, but is often overlooked, is the quench.

A new PLC controlled cooling quench is now in the final stages of development and field trials, and will shortly be on the market. Each cooling zone will use the latest technology in nozzles, allowing air, mist, and flooding, from top, bottom or each side, depending on the requirements of the profile. This will include shape, weight per foot, surface area, type of alloy, speed, and function. The function will determine the mechanical properties required.

The extruder will be able to control the air pressure and water flow going to each manifold, and therefore the precise rate of cooling.

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.

Castool's preferred lubricant is Boron Nitride powder. With a special spray gun, the powder is given a high voltage charge causing it to cling to the billet. The amount of lubricant can be very precisely measured, and overspray virtually eliminated.

THE CASTOOL VISUAL OPTIMIZER

If the press operator can know 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 Optimizer, 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 formula.

The Castool Visual Optimizer is customized to fit each extruder's needs, but it will typically include ram speed, dead cycle time, billet temperature, container liner

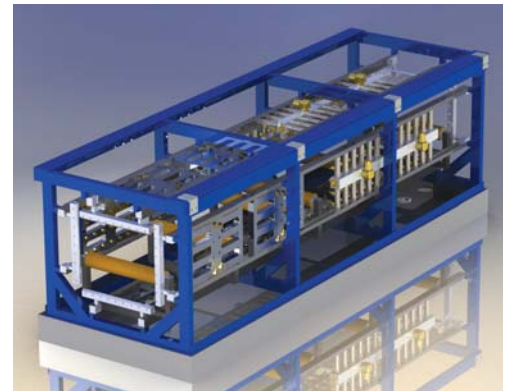
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2 stems are necessary. A third is recommended as insurance while the second is being reworked, stress relieved etc.



A spare clean-out block is recommended.



PLC Quench

CASICOL		TARGET	ACTUAL
RAM SPEED	23	24	INCH/MIN
PRESSURE	2925	2905	PSI
CYCLE TIME	160	165	SEC
DEAD CYCLE	33	23	SEC

DIE#	S29354	# HOLES:	2
		EXTRUSION RATIO:	42

735	824	716	792	1040	510
6063	716	860	EXIT	QUENCH	QUENCH RATE 18 DEG F /SEC

47	90	0	10	125	100
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DIE# S29254	DIE# H6719	DIE# S2857	DIE# H7304	DIE# S23489	DIE# S7801
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Visual Optimizer

temperature, profile exit temperature, quench rate, and the status of each die being preheated. Properly used, the Castool Visual Optimizer can be guaranteed to improve the productivity of any extrusion system.



A third pyrometer is often used to monitor billet temperature entering the container.

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. The 3T remote optical pyrometers provided by Castool are the most accurate and user-friendly available today.

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 proven 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.

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, with factory-trained specialists to assist the extruder in maximizing his productivity, is the ultimate means of increasing market share and improving profit.



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REPRESENTING

ITW Gema

ELECTROSTATIC BN APPLICATOR

BWF Protec

ENGINEERED HEAT FELTS

3T True Temperature Technologies

NON CONTACT PYROMETERS