

FIXED DUMMY BLOCKS

Introduction

The dummy block is a critical element of the aluminum extrusion production process. It is a component on which both quality and productivity depend. The Castool dummy block has evolved from a simple yet effective basic tool, to a technically sophisticated device that incorporates the results of extensive research and development using finite element analysis and three-dimensional numerical modeling to improve its performance.

The Castool dummy block does not, of course, operate in isolation. Its successful operation depends on a number of factors. For example, press alignment, both thermal and physical, lubrication, maintenance, and so on. The most important factor in the effective operation of any dummy block, however, is its efficient interaction with a round, straight, thermally and therefore dimensionally stable container.

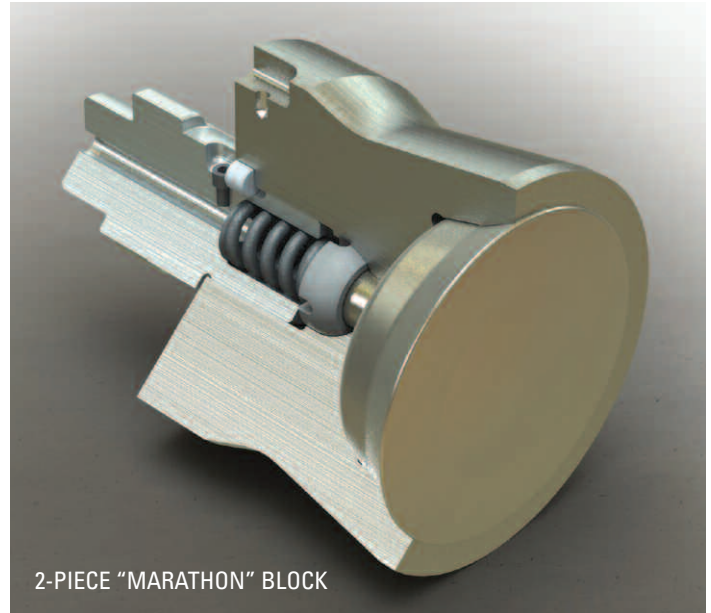
The Dummy Block Function

Initially the function of the dummy block appears deceptively simple. It is the extension of the ram and stem which pushes the softened alloy through the die. This is, of course its main purpose. If the extruder is aiming for 100% quality and maximum productivity, however, there are a number of functions that must be satisfied by an effective dummy block.

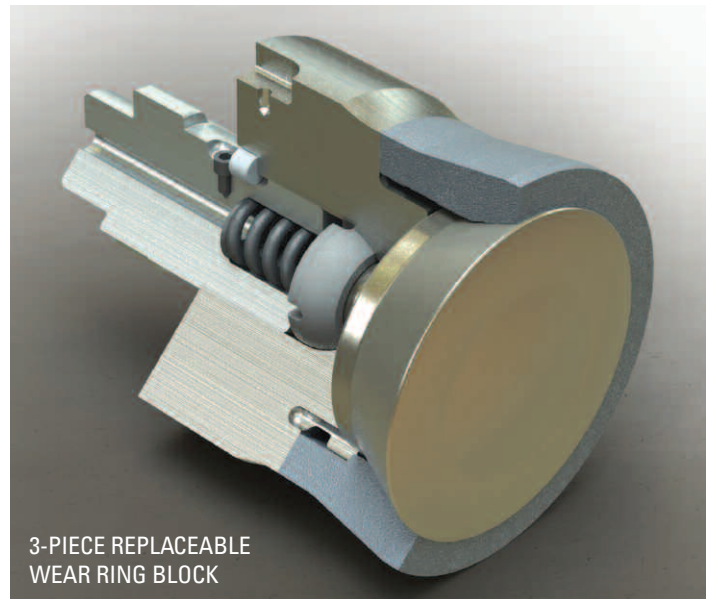
- To repeatedly transmit the force of the ram, at high temperature, to the alloy
- To expand quickly under load and maintain a secure seal with the container wall, leaving only a thin film of alloy on the liner
- To separate cleanly from the billet at the end of the stroke
- To contract immediately, and return through the container without stripping the film of alloy from the liner
- To cause no gas entrapment that can result in blistering, or damage the face of the container and/or dummy block
- To compensate for minor press misalignment
- To be quickly and easily removed and replaced
- To function effectively until a production run is complete

The Castool RR Replaceable Wear Ring Dummy Block

Today's Castool RR dummy block is likely the most technically advanced block yet developed. It addresses the most common problems that occur with conventional dummy blocks. For example, with any dummy block, most wear occurs at the front



2-PIECE "MARATHON" BLOCK



3-PIECE REPLACEABLE
WEAR RING BLOCK

edge of the shell. A conventional dummy block is then returned to the maker to be either replaced or reshelled.

With the Castool RR block, the front edge of the shell is replaced by a high-strength steel expanding wear ring that is readily removed and replaced. The speed and economy of replacing only the wear ring benefits the extruder almost immediately.

The Castool Marathon Dummy Block

Developed originally for large volume single use extrusion at above normal pressure, the Marathon Dummy Block reflects

Castool's knowledge, talent, and many years of experience. A typical application is for extruding heat exchange tubing, due to the soft alloys and extended press cycles.

Designed and produced for the press on which it will be run, and sometimes actually for the product which will be made, this extra strong 2-piece block emphasizes quality of product plus length of operating life. Previous records of dummy block operating life continue to be broken. The sturdy single-use Marathon dummy block has no replaceable parts, and is not reworkable. It is simply replaced when it loses its ability to retract at the end of each cycle, and remains permanently expanded.

The Mandrel Spring

A common problem with conventional dummy blocks is that the lip of the shell eventually loses its spring-back. The mandrel fails to eject, and the shell remains expanded. With Castool's dummy blocks, installing a strong spring behind the mandrel solves this problem. The spring overcomes the friction between the mandrel and the shell, or wear ring. Under pressure the mandrel will compress the spring. The spring will then eject the mandrel as soon as pressure is released.

Coupling

There are several methods of attaching the fixed dummy block to the stem. The coupling used must, of course, be strong enough to withstand the repeated cyclic loading when the block is pulled back through the container.

Most manufacturers use a threaded connecting rod which is simply screwed into the stem. Castool dummy blocks are firmly secured to the plunger rod by a patented quick-release coupling. This makes it much easier and faster to replace the block than with a conventional screw type coupling. This block is also designed to limit some lateral movement by use of a stabilizing stud, in addition to the bayonet.

Press Alignment

To achieve maximum productivity, the dummy block must, of course, pass smoothly through the container. For this to happen, the press itself must be in absolute alignment.

Misalignment can usually be quickly detected, because it soon causes uneven wear on the expanding edge of the dummy block shell. This can be easily seen, and appropriate corrective action taken. A useful aid for checking press alignment is a Castool Alignment Tool Stack. When the Alignment Tool Stack is sitting in the die holder with the container sealed, the operator can look through the platen hole and check the alignment of the container to the die stack.

The key to maintaining good press alignment is regular, diligent

and detailed inspection. Emphasis must always be on prevention, not correction. (*Ask for Fact Sheet: Alignment Tool Stack*)

Temperature

The fixed dummy block is a very highly stressed component. It operates at high temperatures, and is made of a hot work tool steel, usually H-13. The block must always be preheated before use. Preheating increases the toughness of the steel, and reduces the possibility of cracking due to thermal shock. The dummy block should be preheated to a minimum of 600°F (300°C).

As well as the temperature of the fixed dummy block, the temperature of the billet, container and die can all affect its operation. An extremely hot billet, above 950°F (500°C) reduces the amount of pressure needed to upset the billet, and may limit the expansion of the dummy block. This can allow alloy to pass the dummy block, reducing its useful life. Similarly, an extremely hot container, or one that is not uniformly at the same temperature, may have the same result. (*Ask for Fact Sheets: Containers and Liners, Single Cell Die Ovens*)

Lubrication

At the end of each extrusion cycle, the dummy block must separate cleanly from the butt, without removing the 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 with larger billets.

This problem has been largely eliminated by the introduction of boron nitride lubricants and efficient applicators.

Dummy Block Maintenance

The dummy block should be inspected daily. It should be visually checked for aluminum build up on the face and land. The land should also be checked for signs of explosions. On blocks with springs, the mandrel should be free, and forward from the face of the dummy block. This confirms that the spring is functioning. At the same time the cap screws securing the bayonet lug and keys should be checked for tightness.

Once each week, the dummy block should be removed from the press and cleaned in caustic. It should be visually inspected for wear, and accurately measured across the face, the dimension recorded, and compared to the delivered diameter. The dummy block will eventually take a set to a larger diameter during use. As the diameter increases, blisters may result. Operating life is decreased.

For Better Extrusion

Castool dummy blocks will help any extruder to achieve better extrusion. You can count on it.

