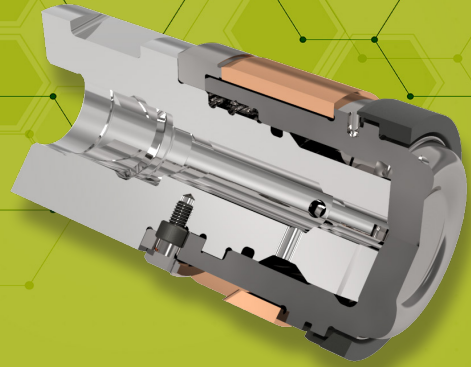


PLUNGER TIPS

ABP

Allper Bush Plunger



PURPOSE

- ▶ Prevent alloy from penetrating between the shot sleeve and plunger, prolonging tooling life.
- ▶ Move smoothly and consistently, with a minimum of lubrication, through the shot sleeve bore increasing casting properties.
- ▶ Maintain a secure seal with the shot sleeve wall necessary for an effective vacuum to be drawn reducing porosity.
- ▶ Cool the biscuit quickly to reduce cycle times.

FUNCTION

The function of the plunger tip is the extension of the plunger rod, which pushes the molten alloy into the mould. There are a number of functions that must be satisfied by an effective plunger tip.

- ▶ To repeatedly transmit the force of the plunger rod, at high temperature, to the alloy.
- ▶ To maintain a seal with the shot sleeve wall during the shot, eliminating flash or blow-by and preventing air from being drawn into the alloy when using a vacuum.
- ▶ To remain thermally and therefore dimensionally stable throughout the shot allowing consistent and repeatable shot velocities.
- ▶ Since the tip is dimensionally stable, and the gap controllable, steel wear rings can be attached to the plunger tip body to provide a guarantee that the seal is maintained.

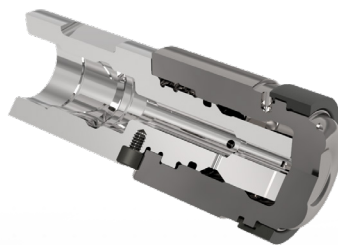
FUNCTION continued on next page

THE ABP PLUNGER

The **Allper Bush Plunger (ABP)** was developed for small to medium size machines, from 40 mm up to 120 mm diameter. It is composed of a Con-Duct plunger body, a nitrided H-13 (1.2344) replaceable split wear ring, an ultra-high strength Beryllium Copper A-52 spring bush and a stainless steel M303 holder with a quick release bayonet coupling. Water flow is from the center of the shot rod, through the stainless holder, and directly to the inside face of the plunger tip where a turbulent flow is generated to maximize the heat transfer.

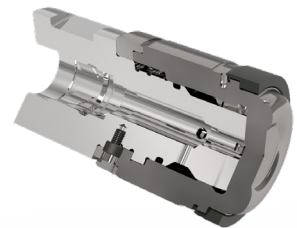
Con-Duct has impact toughness of 100J. The thermal conductivity of Con-Duct is 42 W/mK versus H-13 which is 24 W/mK. Con-Duct has better toughness and thermal conductivity and reduces thermal and impact stress. It is safer to use and has much longer life.

ABP PLUNGER



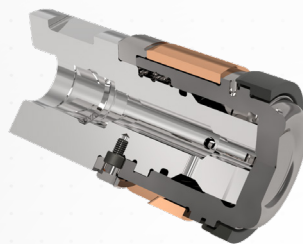
ABP-R 40-50 mm dia

This ABP-R incorporates a forged Con-Duct steel body and a nitride hot work tool split ring.



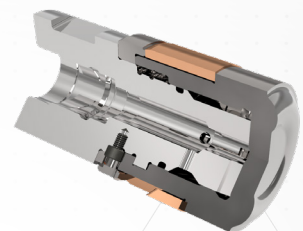
ABP-R 50-80 mm dia

This ABP-R is slightly longer and incorporates a forged Con-Duct steel body, a nitride hot work tool split ring and a steel coupling.



ABP-R 50-120 mm dia

This ABP-R incorporates a forged Con-Duct steel body, a forged BeCu bushing, a nitride hot work tool split ring and a steel coupling.



ABP-A (Solid)

In some cases, because of the die or shot sleeve configuration, it is difficult to use the split ring. In these cases, it is possible to use the ABP without a split ring.

FUNCTION continued..

- ▶ Because the rings is flexible, it makes continuous contact with the inside of the shot sleeve. Flash, which is a major cause of wear, is essentially eliminated. Shot speeds are consistent.
- ▶ Since the expanding wear ring ensures a secure seal between the plunger and the shot sleeve, a better vacuum can be drawn.
- ▶ An additional advantage is that the face of these is considerably cooler than that of other plunger tips. This cools the biscuit much faster, and reduces the cycle time significantly.

BENEFITS OF THE CASTOOL ALLPER PLUNGER TIP

- ▶ Reduce cost per shot
- ▶ Increase plunger life
- ▶ Increase shot sleeve life
- ▶ Improve vacuum seal
- ▶ Reduce scrap rate
- ▶ Reduce downtime

With the Allper Plunger Tip, Castool again sets a new standard of excellence in the die casting industry.

Results may vary depending on individual press characteristics and setup.

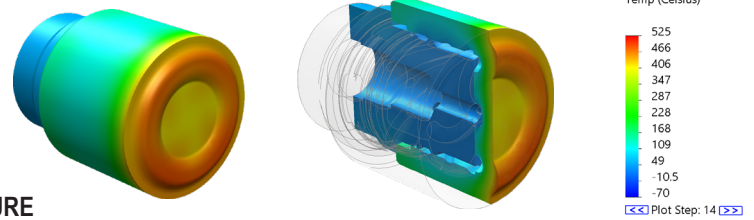


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SIMULATION



TEMPERATURE

The temperature and cooling affect of the plunger tip is important for both longevity and cycle time. The plunger tip must remain relatively thermally and dimensionally stable so that the critical gap between the shot sleeve and plunger tip can be managed. The time taken to solidify the biscuit is also critical to minimize cycle time and maximize productivity.

COMPONENT PARTS

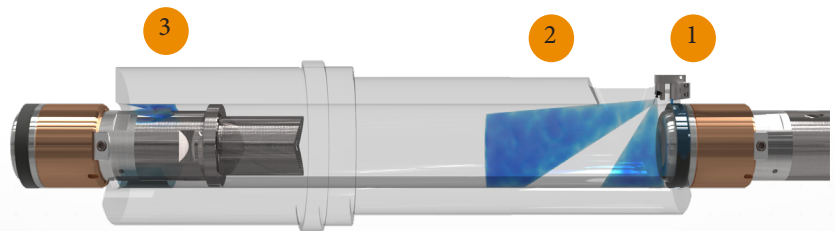
HOLDER: A stainless steel tip holder is screwed onto the shot rod, and the body is securely fastened to it with a quick release bayonet type connector. The front of the steel holder lies in full contact with the inside face of the plunger tip and absorbs the total pressure of the shot. The face can then be very thin for better heat exchange. The water flow is from the center of the shot rod, through the stainless holder, and directly to the inside face of the plunger tip where a turbulent flow is generated to maximize the heat transfer. It then goes through four channels to the circular external coolant return passage. Approximately 10 to 20 l/min. of water flow are necessary to use this system depending on plunger diameter.



RING: Replaceable wear rings create a superior seal for vacuum applications and reduces cost. The internal radius has been increased by 8 times, reducing the stress concentration factor by 1/3. The overlap length has also been reduced. The total effective stress from the reduced overlap and increased radius reduces the stress to at least 1/5 of the original milled ring.

Two pin hoods are now being machined into most rings. The split is kept away from the pour spout and also erosion prone area of the shot sleeve, under the pour spout. The ring complies to the ID of the shot sleeve better than with a single hood opposite the split. It is also easier for the operator to access the split for removing and installing a new ring.

LUBRICATION



Lubrication should only be applied where it is needed. Every effort should be made to eliminate the possibility of non-metallic substance getting into the casting.

- 1) For small shot sleeves, the bolt-on Allper Lube Drop (ALD) or a slot and lubrication channel can be machined into the shot sleeve that delivers lube on top of the plunger ring.
- 2) For medium shot sleeves, the bolt-on Allper Combi-Lube (ACL) system delivers a precisely measured amount of lubricant directly on top of the plunger or plunger ring and on shot sleeve bore under the pour spout.
- 3) For long shot sleeves, Castool Rod Lube (CRL) systems delivers a small amount of lube on the die-end bore of the shot sleeve prior to plunger return.



CASTOOL MAKES DIE CASTING BETTER