CASTOOL™
TOOLING SYSTEMS

SHOT SLEEVES

The shot sleeve is a critical element of the aluminum die casting process. For maximum productivity and also maximum operating life for both shot sleeve and plunger tip. The plunger must consistently more smooothly, and at a steady speed through a perfectly round, straight, shot sleeve.

This does not always happen however, because when heated, metal expands. If partially filled with hot molten alloy, the shot sleeve will become distorted.

PURPOSE

► Stabilize temperatures to maintain a round and straight shot sleeve, so that the plunger tip can seal on to the shot sleeve wall, extending tooling life

► Allow plunger to move through the shot sleeve smoothly and consistently, reducing scrap

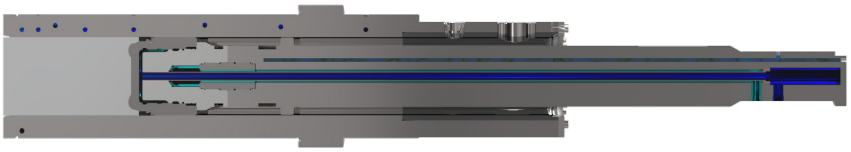
► Provide a long life, minimizing unscheduled downtime

FUNCTION

The function of the shot sleeve is to contain the molten aluminum being pushed into the mold by the plunger tip.

TEMPERATURE

Typically, a shot sleeve may become **100-150 °C (200-300 °F)** hotter at the bottom under the pour hole, than at the top in front of the hole. If the temperature of the sleeve is much higher at the bottom than at the top, unequal expansion will cause it to become oval instead of round. This will also cause the sleeve to become slightly bowed rather than straight. This results in allowing some of the alloy to enter part of the gap between the plunger and the sleeve, affecting the seal between the plunger and shot sleeve, and leading to premature wear and inconsistent shot velocity.



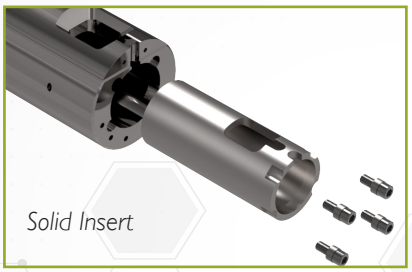
The temperature of a sleeve surface directly under the pour hole can reach as high as 680 °C during pouring for structural alloys, for example Silafont. At such a high temperature the integrity of nitride and steel is destroyed. Castool collaborates with steel manufacturer to create Tuff Temper (TT), which is modified premium W.Nr. 1.2367 steel. The Tuff Temper steel has higher Molybdenum content. The high Molybdenum content increases the corrosion resistance and soldering resistance. The tempering resistance of TT is 45 °C higher than W.Nr. 1.2344 (H-13). The Tuff Temper sleeve insert reduces the total crack length by 50% than W. Nr. 1.2344 (H-13). The TT permits higher temperature nitride treatment and more thermally stable nitride.

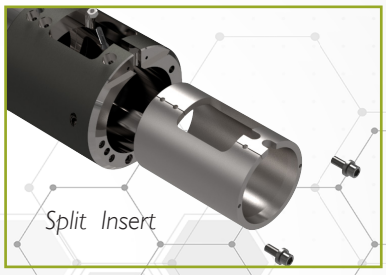
The shot sleeve design should incorporate a wall thickness 1/3 of the bore, and the pour spout of no more than 2/3 of the bore.

H-13 (1.2344), Tuff-Temper, Con-Duct Heat Treated, Nitrided and 3P Coated

NEW SHOT SLEEVE INSERT

- Castool offers replaceable inserts for shot sleeves when erosion is the main cause of wear
- Castool has added a post-nitriding process we call 3P, which has extended the insert life
- With advanced manufacturing techniques, there are no fit problems as in the past.





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BENEFITS OF THE CASTOOL ALLPER PLUNGER TIP

- Reduces scrap and unscheduled downtime.
- Aids consistent shot velocity.
- Extends life of shot sleeve.
- Extends life of plunger tip.
- Cooling can be automatically controlled.

With the Thermally Controlled Shot Sleeve, Castool again sets a new standard of excellence in the die cast industry.

Results may vary depending on individual press characteristics and setup.

NADCA CORPORATE MEMBER

ISO 9001:2015 CERTIFICATION™ QUALITY
ISO 45001:2018 CERTIFICATION™ SAFETY
ISO 14001:2015 CERTIFICATION™ ENVIRONMENT

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SHOT SLEEVE WITH WATER JACKET

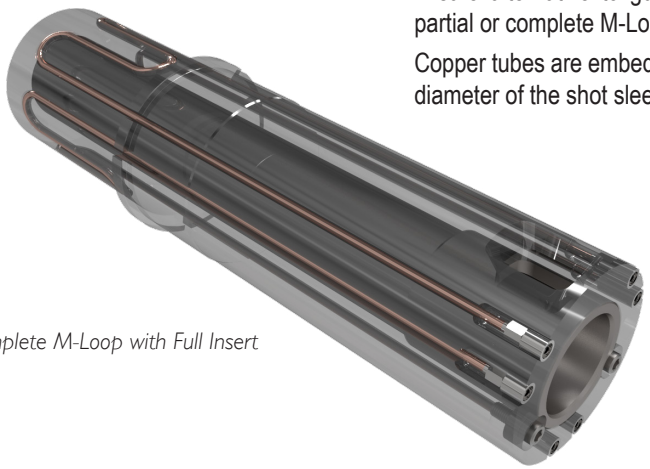
Medium diameter shot sleeves may require thermal control depending on the application, and when necessary can often use an external cooling saddle. The pour end of the shot sleeve where the temperature is highest, is obviously where cooling is most necessary. Accordingly, the pour end cooling saddle effectively and economically puts shot sleeve cooling where it is needed most, directly below the pour spout.

Water saddle with Lube Drop

SHOT SLEEVE WITH M-LOOP

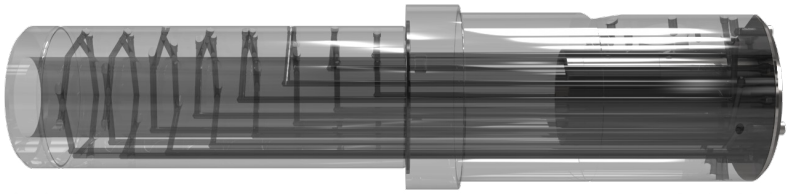
A safe alternative to gun-drilling is using partial or complete M-Loop.

Copper tubes are embedded in the outside diameter of the shot sleeve.



Complete M-Loop with Full Insert

SHOT SLEEVE WITH GUN DRILLED



PRESSURE TESTED 300 PSI / 20 BAR CASTOOL LEAK TESTED

All gun-dilled Shot Sleeves are flow tested and pressure tested at 300 psi /20 Bar

For larger shot sleeves, to avoid too much variation in thermal expansion. In most cases where vacuum is being used, it is necessary to use a thermally controlled shot sleeve.

A series of gun-drilled holes are located along the length of the shot sleeve under the pour spout, and connected to similar holes around the die end of the shot sleeve.

A thermal control unit can be used to manage the temperature and flow of a medium, usually oil, to improve control of the shot sleeve temperature and dimensions during production.

SCHMELZMETALL HIGH VACUUM COPPER
ALLPER PLUNGER SYSTEMS
Deutsche Edelstahlwerke HOT WORK TOOL STEELS

CASTOOL MAKES DIE CASTING BETTER

September 2021