Identifying Common Causes of Failure in Ejector Sleeves

Criteria that can be used in making ejector sleeves, which will minimize or eliminate failures as well as improve the performance and function of ejector sleeves and minimize maintenance.

Cliff Moberg

B asically, the function of an ejector sleeve in a mold is to eject either an entire finish molded piece part or apply ejection force to some portion of the molded piece part to assist with part ejection, in combination with other ejection features designed into the mold.

There are also cases where the ejector sleeve contributes to partial ejection or repositioning of the molded part, or the sleeve functions to “shut off” some feature for multi-shot molding. These later ejector sleeve applications function principally to support the multi-shot requirement and tend to be challenging as well as unique.

Sleeves can have actual molding detail on the inside and/or outside surface or function with shut off features or just have the basic “molding surface” on the very end of the sleeve, which in effect becomes the molded surface where the ejection force is applied. The mold design and piece part design determine the exact functionality, quantities and sizes of sleeves for a given mold and the relative piece part.

The following information is intended to aid in identifying common causes of failure as well as minimize maintenance with ejector sleeve assemblies, highlighting just some of the basic criteria that can be used in making ejector sleeves.

Tool Steel Sleeves

The basics of making ejector sleeves when using tool steel do require specific steps in manufacturing procedures as well as heat treatment steps that assure the maximum attainable life and performance possible. Even the maximum attainable life is often far less than expected with a heat treated and precision manufactured component.

Sleeve failures can present as “going out of round,” where the component measures to be “egg shaped” without evidence of any wear or metal lose. This condition leads to a combination of tightness in the component assembly while at the same time excess clearance to the component assembly, which may present as flash on the piece part. Galling is also a common problem, which is typically the result of hardness or metallurgical incompatibility, or incorrect running fit allowances or lack of lubrication in the assembly. These failures or conditions when using tool steel sleeves can best be categorized and attributable to not following required manufacturing procedures and where the development of out of round, size of shape changes relates to a condition that is defined by metallurgists as retained Austenite.

Retained austenite is a metallurgical structure or phase that occurs in
At Hommer Tool, our core business is producing the highest quality custom components for your molds. We are focused on serving your needs, with a full complement of in-house processes that include:

- Zeiss scanning CMM
- Precision machining
- Polishing
- EDM capabilities
- Computerized traceability of every job

For custom mold components delivered on-time and on-budget, rely upon Hommer Tool as your single direct source.

Custom sleeves made using aluminum bronze alloy that are TDC (thin dense chrome) coated to prevent galvanic reactions between tool steel inner core and plastic resin additives (also note “vent” or vacuum relief hole on standing sleeve on the right).

the heat treatment of tool steel and is generally most notable and problematic in tubular parts, such as ejector sleeves. To minimize the presence or the effects of the retained austenite condition on the finish machined sleeves, a combination of machining and heat treatment processing needs to be followed.

The steps are as follows:
1) Rough machine sleeves adding \(\frac{1}{16}\)" oversize stock to all finish dimensional requirements.
2) Then stress-relieve or anneal the sleeves.
3) After the stress relieve process, further machine the components leaving stock allowance for finishing after heat treatment.
4) At this point then heat treat the component as specified for the tool steel to final hardness.
5) Now this is the important part to minimize the potential for retained austenite. Include without exception a double draw and deep freeze process.
6) Then finish machine the components to final dimensions Anything less than using these six steps, leaves an open field for problems with the tool steel based sleeve or the assembly.

Rotating Core Applications
In ejector sleeve applications with rotating cores, such as unscrewing molds for closures for packaging, not only is there potential lineal wear from the straight line ejector sleeve stroke,

MOLD AND DIE REPAIR
MoldMender MICRO WELDER
Permanently Repairs Ferrous Metals with Metallic Ribbon, Wire, Powder, or Paste. H-13, S-7, A-2, 420SS, P-20, M-2, Nickel, etc.

Parting Lines Corners / Edges
Pin Holes Scratches / Dents
Design Changes D. C. Arcs

- Low Heat / No Shrink
- Adjacent Surfaces Unaffected
- Rotary Handpiece for Continuous Welds
- Easy Operation - Portable
- Minimal Finishing On Repairs
- Fully Hardened Non-Arcing Welds

Rocklin Manufacturing Co.
110 South Jennings Street
PO. Box 1259
Sioux City, Iowa 51102-1259 USA

WEB SITE: www.rocklinmanufacturingco.com
E-MAIL: info@rocklinmanufacturingco.com

FOR LITERATURE - CD - DEMO
CALL: 800-255-6046 FAX: 712-252-5619
there is also the potential for rotational wear from unscrewing the part and then the rotary motion again to reposition thread orientation.

Venting the Assembly
Proper and adequate gas venting of the assembly is critical to sleeve performance. Without correct venting, molding gasses will accumulate in the fit diameters, between the pin and sleeve as well as the sleeve and outer bore the sleeve is fitted to. This accumulation of gases tightens fits, causes component misalignment and also reintroduces gas contaminants into the molding area during operation of the ejector sleeve. Proper and adequate venting eliminates these problems and also retains just enough gas residue, which acts as a lubricant for the moving assembly.

Vent Holes
Different than gas vents, having a vent hole in the side wall of the sleeve prevents a vacuum condition from interfering with part release at the completion of the ejector stroke. This is particularly important in ejector sleeve applications where there is not a through hole in the molded part at the sleeve location.

Orientation or Anti Rotation Features on Sleeves
Orientation or keying of sleeves is important so that at each mold assembly, the components are retained in the position or orientation that the components have worn in too. Some believe that free radial float of a sleeve actually increases the wear life of a sleeve.

An assortment of custom made sleeves using aluminum bronze alloy ranging to fit inner cores from under .250” up to over 3”, typically with wall thickness of not less than .030” per side.
Mastercam works for Jim Quinn.
It has to!

“Some jobs are more demanding than others. With its new streamlined, simplified interface, Mastercam helps me get even the toughest jobs done right and on time. And we all know how important that can be.”

– Jim Quinn (JQ), Engineer/CNC Specialist, Orange County Choppers, Montgomery, NY