

Dist

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M/700 BOLT HANDLE

The M/700 Bolt Handle processed as an investment casting, has been the cause for investigation of new processes and sources in order to meet the improved standards of the 1969 version of the M/700 Bolt Action rifle. The following are some of the problems we have encountered in using the investment cast handle.

- 1) Porosity: During the entire year of 1967, Hitchner Mfg. Co., our supplier, was experiencing porosity problems. An attempt to "hand-grind" porous areas resulted in an extremely high reject rate of these parts by our inspection department. Functional surfaces were destroyed by hand grinding and general appearance was far below our acceptable quality level. Several contacts were made with the vendor to review defects and although the "hand-grinding" has been eliminated, we find porosity to be a factor of much concern. Approximately twenty (20) of four-hundred and fifty (450) Bolt Assemblies are rejected daily due to areas of heavy porosity. (See Exhibit A). If the Bolt Body can be salvaged, the Bolt Handle is usually removed from the assembly and scrapped. Although porosity can be minimized by various gating and venting techniques, it is considered impossible to eliminate completely from the casting process.
- 2) Inclusions: (See Exhibit B) Inclusions in material cannot be finished to meet our standards of quality. In most cases a variation in polished surfaces will be noticed. These variations will not blend in polish or color.
- 3) Voids: (See Exhibit C) The 1969 version of the Bolt Handle was changed for improved appearance. In an attempt to supply a production sample of this new design a void in the material was detected. Although these voids can occur anywhere in the part, it was the opinion of the vendor that the constriction at the base of the ball and the position of the ball made casting without voids impossible. Because the voids could

not be controlled, it was necessary to revert to the old design of the part.

Each of the aforementioned items has been encountered with the Bolt Handle as manufactured by Hitchner Mfg. Co. These problems have caused not only a threat to our volume of production, but stability of purchase price. Material costs have fluctuated considerably, varying with the casting problems. In order to expand our sources for the Bolt Handle, an order was placed with Casting Engineers of Chicago. In addition to the problems experienced with Hitchner Co., a "sink" condition has been prevalent in all shipments received from this company. This sink condition and general overall quality has prevented us from accepting to date any shipments from Casting Engineers of Chicago.

Because of the high cost, heavy reject rate and restriction of design, the pursuit for an improved process should be continued. Samples made by a cold-form process have been assembled to Bolt Bodies. (See Exhibit D). These samples, made on temporary tools, have an appearance which is generally acceptable and, of course, would be free of porosity, inclusions and voids. An evaluation of the cold-formed part indicates a sizeable annual savings. The cold-formed process as well as other processes are open for further development so that we may produce an acceptable part at a realistic cost.

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