Model 710 Trigger FEA

Brian Rages

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PURPOSE

The purpose of this report was to evaluate the stress state occurring in the Model 710 trigger when it is squeezed.

PROCEDURE

A Solidworks model of the most recent iteration (a.2) of the Model 710 trigger was used for the analysis. A 0.100 diameter circle was sketched on the face of the trigger that contacts the trigger stop screw. This was sketch was used in a split face operation on that face. A split face operation was performed on the hoop of the trigger to place a split line level with the center of the hoop across the faces of the inside of the trigger hoop.

The model was then imported, using a Parasolid import, into ANSYS. A mesh was placed on the model.

A mesh was placed upon the model. Element divisions on many of the lines were manually set to produce an even mesh of about 20,000 elements.

The model was constrained in ANSYS as follows: The trigger was constrained to allow rotation about the trigger pivot hole. No displacement along the axis of the trigger pivot hole was allowed. The 0.100 diameter area that had been placed on the trigger earlier was constrained to disallow movement in the direction normal to the area.

The nodes along the split line placed level with the center of the trigger hoop were selected. The load on the trigger was applied as a force divided among these 43 nodes. The loads used in the analyses were 20,40, and 50 pounds.

CONCLUSIONS

The design of this part results in a high levels of compressive stress at the top ends of the reinforcing ribs that circle the hoop of the trigger. Somewhat lower levels of tensile stress can be found opposite these points on the inside of the trigger hoop. Compressive stresses were 326 ksi, 261 ksi, and 130 ksi for 50, 40, and 20 pound loads, with tensile stresses of 196 ksi, 157 ksi, and 78.5 ksi, respectively.

The blank drawing for this part specifies a material of MPIF MIM-2200 with a hardness spec of HRB 40 min apparent. This hardness spec indicates the material is not heat-treated. The finish drawing of the part describes no heat treat. Without a heat treat, MIM-2200 has a yield strength of 18 ksi and an ultimate strength of 42 ksi.

The peak Von Mises stresses in the analyses performed here were 280 ksi, 230 ksi, and 114 ksi for loads of 50, 40, and 20 pounds, respectively. If a linear-static situation is assumed, some yielding of the trigger should occur for pulls over 3.2 pounds.

The area of peak stresses is fairly small and a slight yielding is likely to reduce stress concentration at the point of peak stress.