

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Materials Laboratory Division
Washington, D.C. 20594



April 15, 2016

MATERIALS LABORATORY FACTUAL REPORT

Report No. 15-130

A. ACCIDENT INFORMATION

Place : Sylacauga, AL
Date : April 27, 2015
Vehicle : Diamond DA20-C1 Katana, N248ME
NTSB No. : ERA15LA200
Investigator : Dennis Diaz, AS-ERA

B. COMPONENTS EXAMINED

Pieces from a disassembled Continental Motors, Inc. IO-200 fuel control unit (throttle body) (see Figure 1).

C. DETAILS OF THE EXAMINATION

The as-received pieces from a fuel control unit are shown in Figure 1. The following inspections were conducted:

1. Dimensional analysis of the shaft (part number 653895).
2. Dimensional analysis of the fuel metering disk cam profile (part number 634864-19 Rev 2/11/08).
3. Inspection of the shaft tapered knurl.
4. Inspection of the chamfer hole on the mixture control lever (part number 630146-4).
5. Inspection of the fuel metering subassembly.

The shaft with fuel metering disk installed is shown in Figure 2. The diameters and total indicator runout values for the shaft were measured at several points as indicated in Figure 2.

The fuel metering disk cam profile was measured at 10° intervals using a dial indicator accurate to 0.0005 inch. A portion of the engineering drawing showing the mechanical arrangement of the fuel metering disk assembly on the shaft is shown in Figure 3. A photograph of the fuel metering disk assembly on the shaft is shown in Figure 4, in an orientation similar to the engineering drawing in Figure 3. The cam profile data is shown graphically in Figure 5 with the manufacturer's profile data overlaid on the graph. The total indicator runout for the adjacent 0.9900 inch diameter round disk is shown in Figure 6.

Examination of the tapered knurls on the mixture control lever revealed several “sets” of knurl impression marks (see Figure 7), consistent with the lever being repositioned on the shaft several times. The surface finish of the tapered area is patinated brown, with no indication of the metering lever sliding relative to the shaft. The tapered knurls on the shaft exhibited deformed crowns consistent with compressive deformation (see Figure 8).

Overall, the shaft exhibited nicks, burs, and raised areas along its length. The surfaces also exhibited marks consistent with rework and aggressive cleaning or sanding.

The fuel metering subassembly (see Figures 9 and 10) was examined for any issues and none were observed. The diameter and radial location of the fuel orifice was measured for the fuel metering plug assembly (part number 646017-1B ASSY) as shown in Figure 11.

Michael Budinski
Chief, Materials Laboratory Division

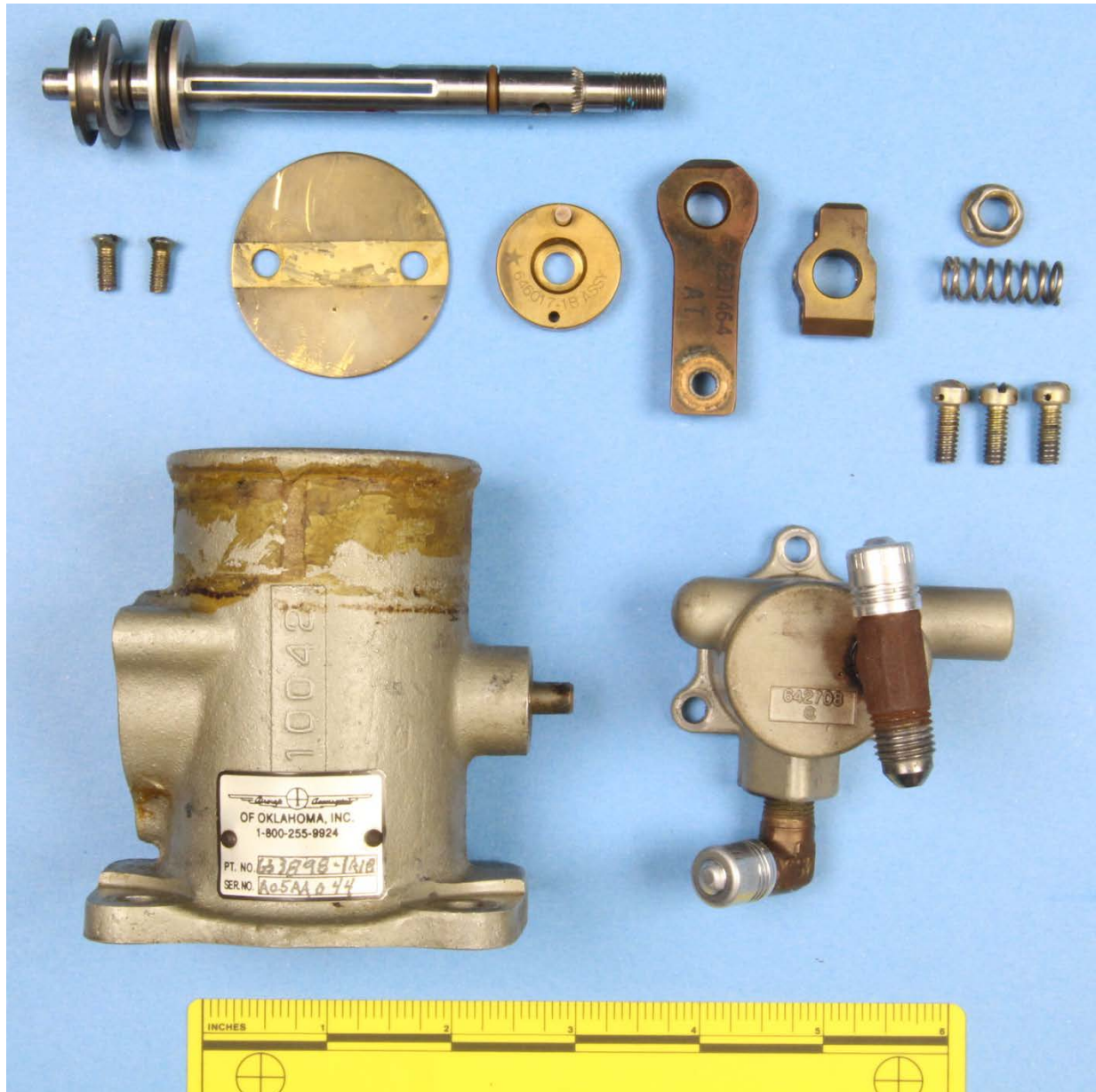
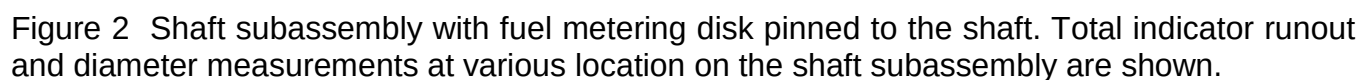


Figure 1 As-received pieces from the fuel control unit.



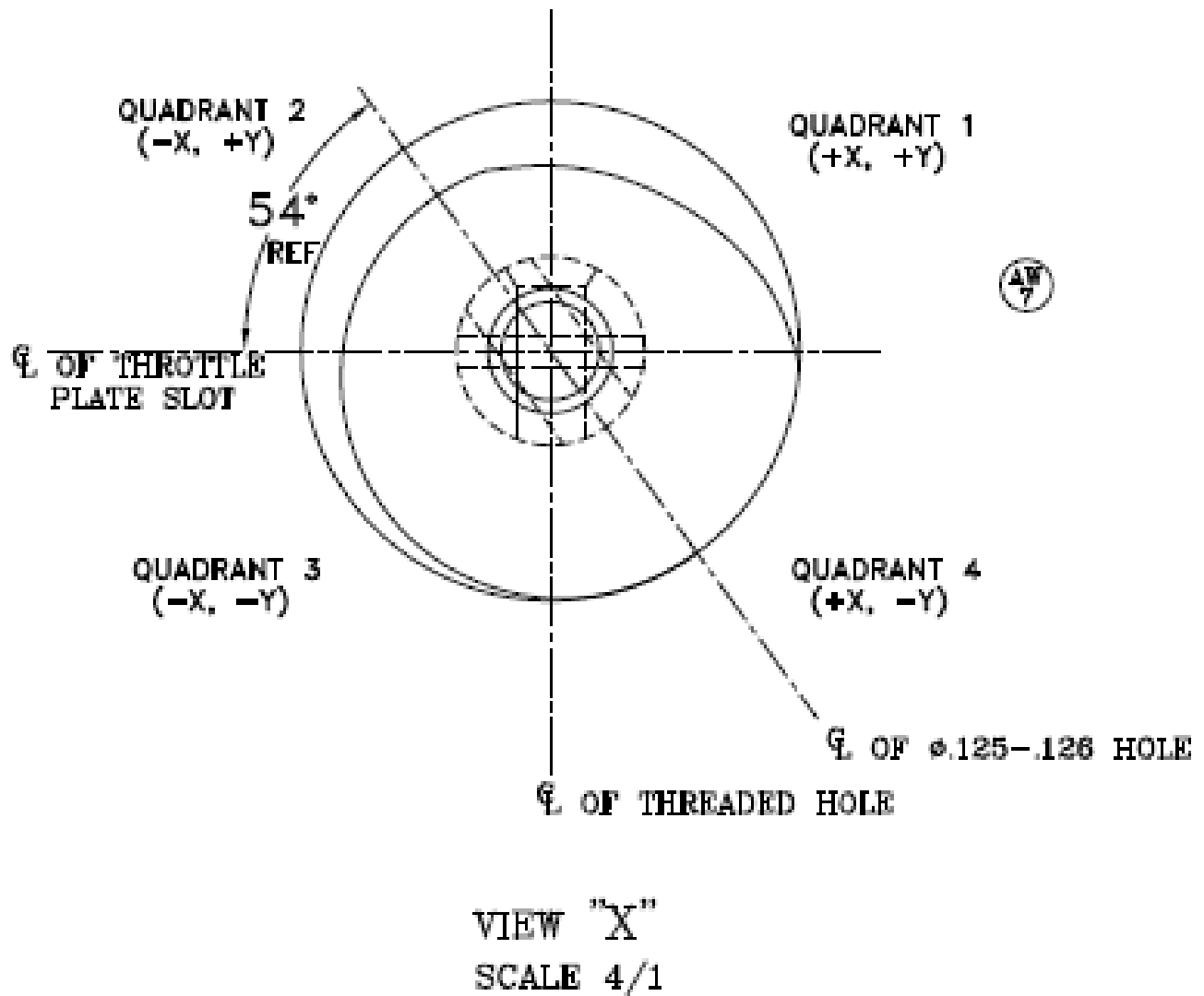


Figure 3 Portion of the manufacturer's engineering drawing show the cam orientation relative to key shaft features.

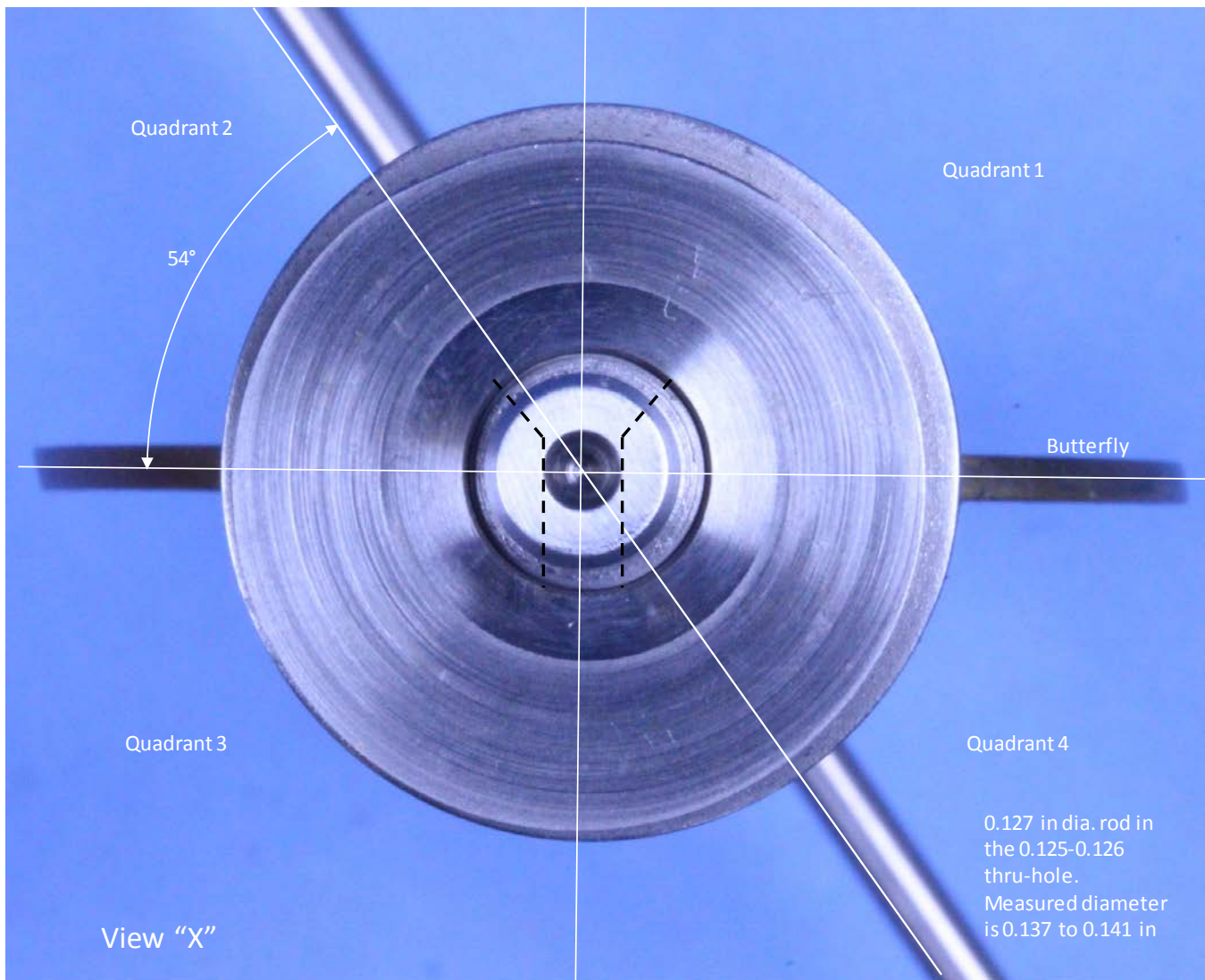


Figure 4 A photograph of the cam portion of the fuel metering disk shown in an orientation similar to Figure 3.

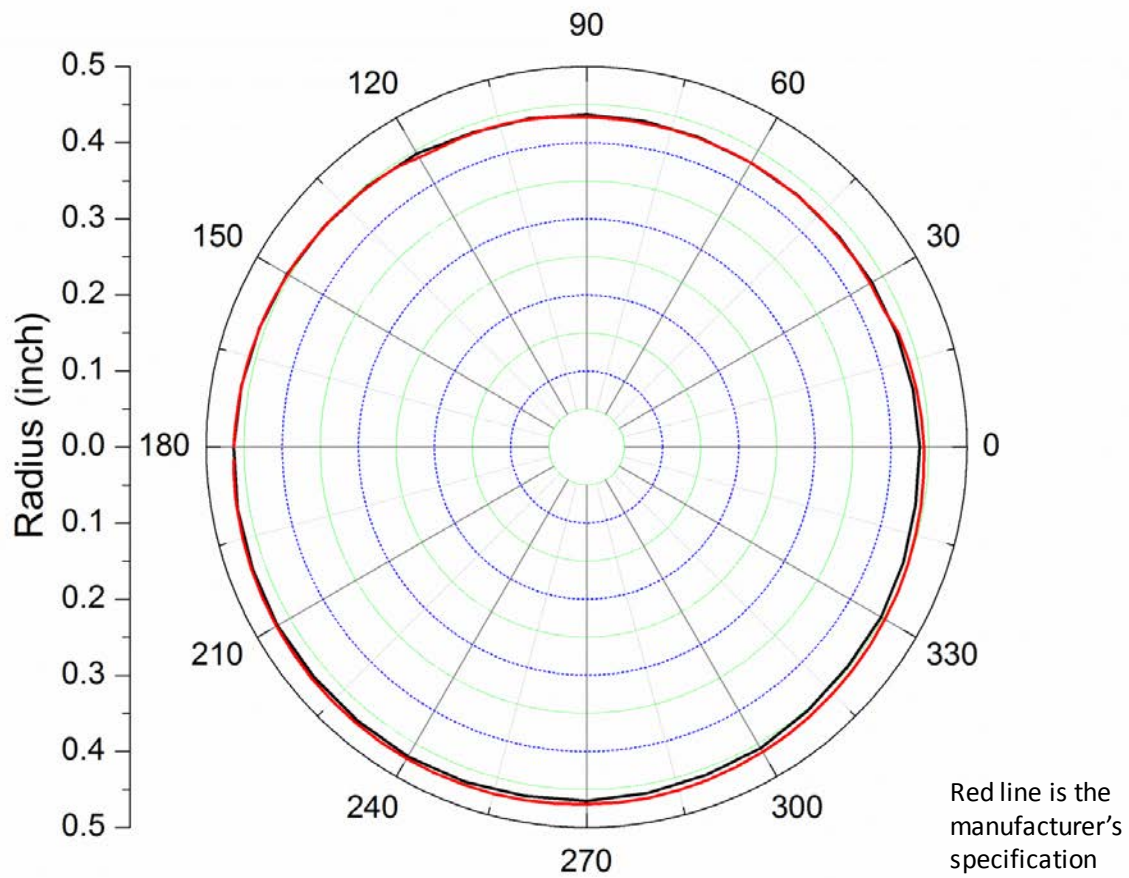


Figure 5 Graph showing the cam profile of the accident cam relative to the manufacturer's data.

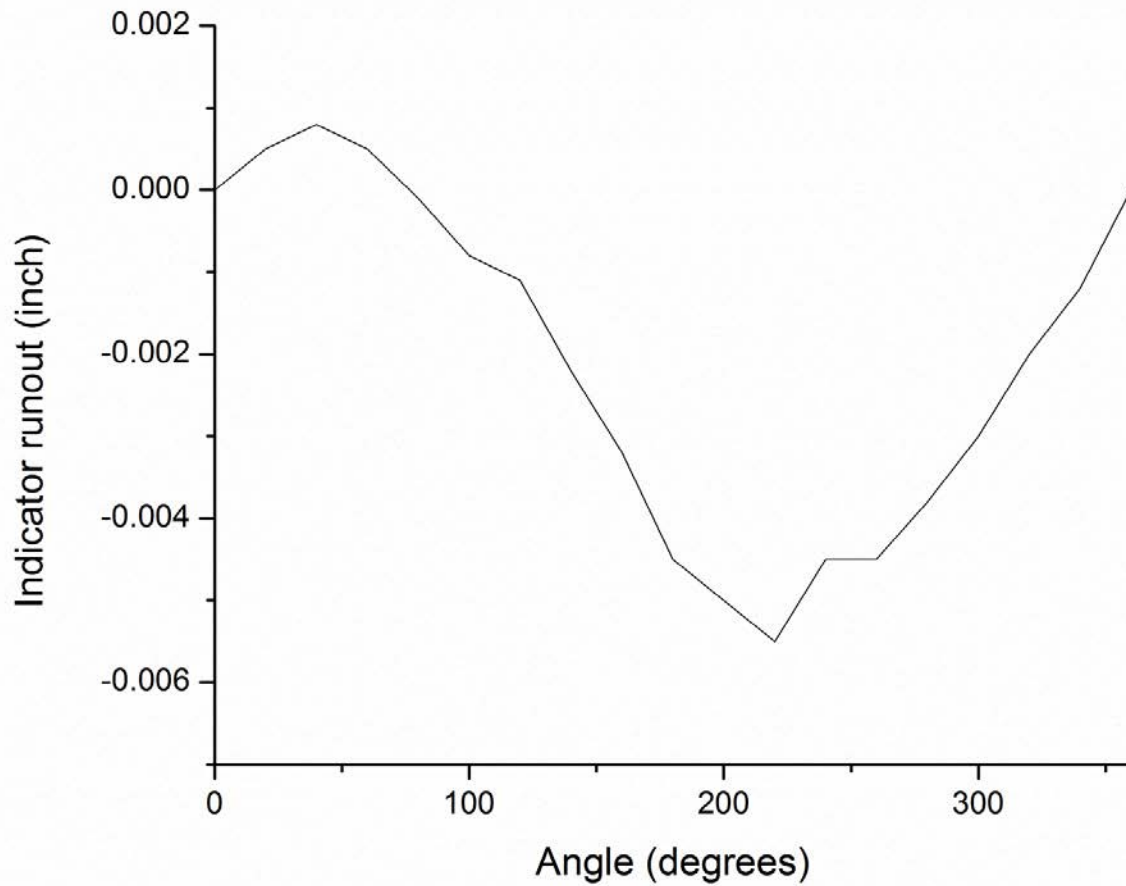


Figure 6 Total indicator runout of the 0.9902 inch diameter portion of the fuel metering cam (see figure 2).

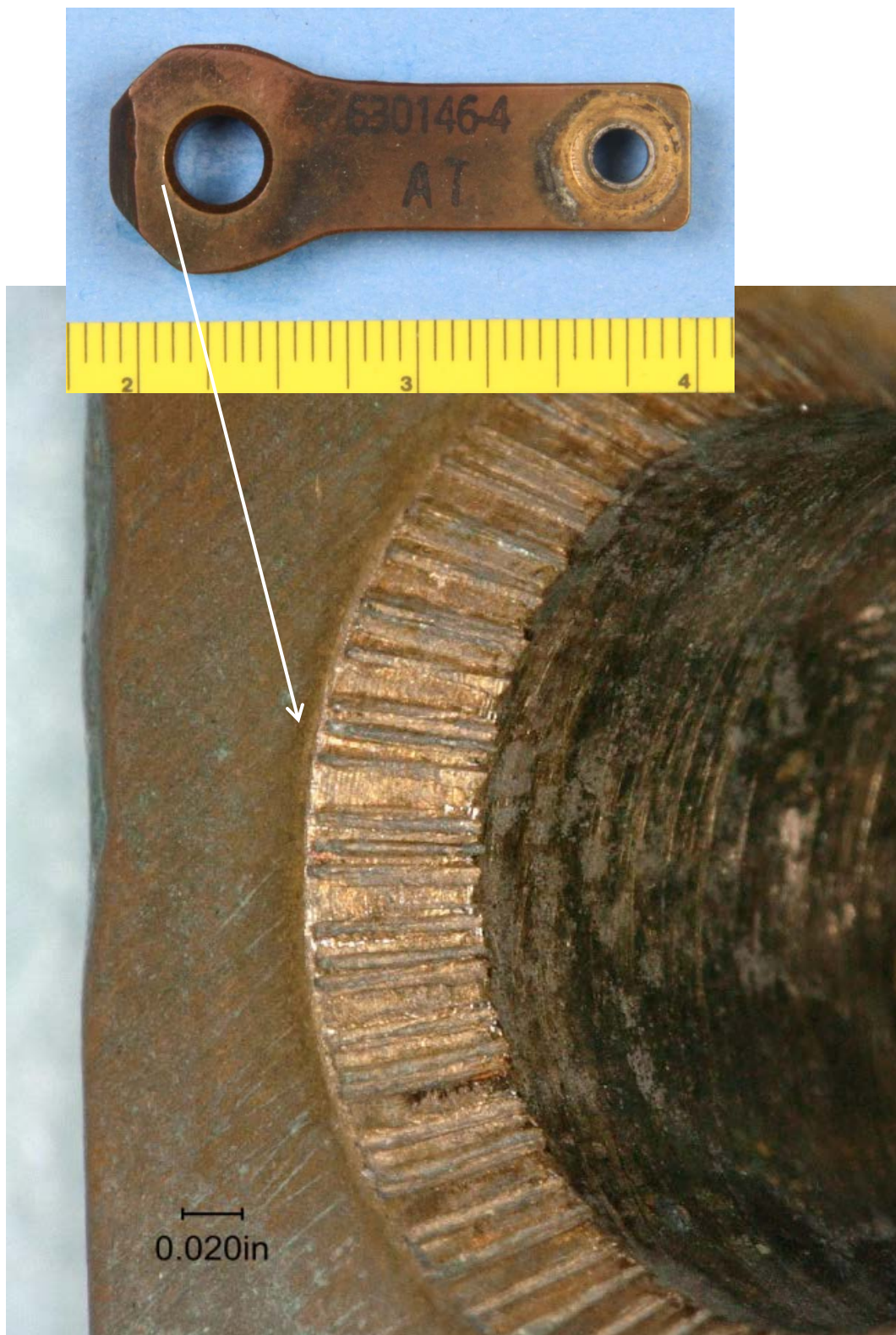


Figure 7 Image of the mixture control lever and a higher magnification image of the tapered knurls.

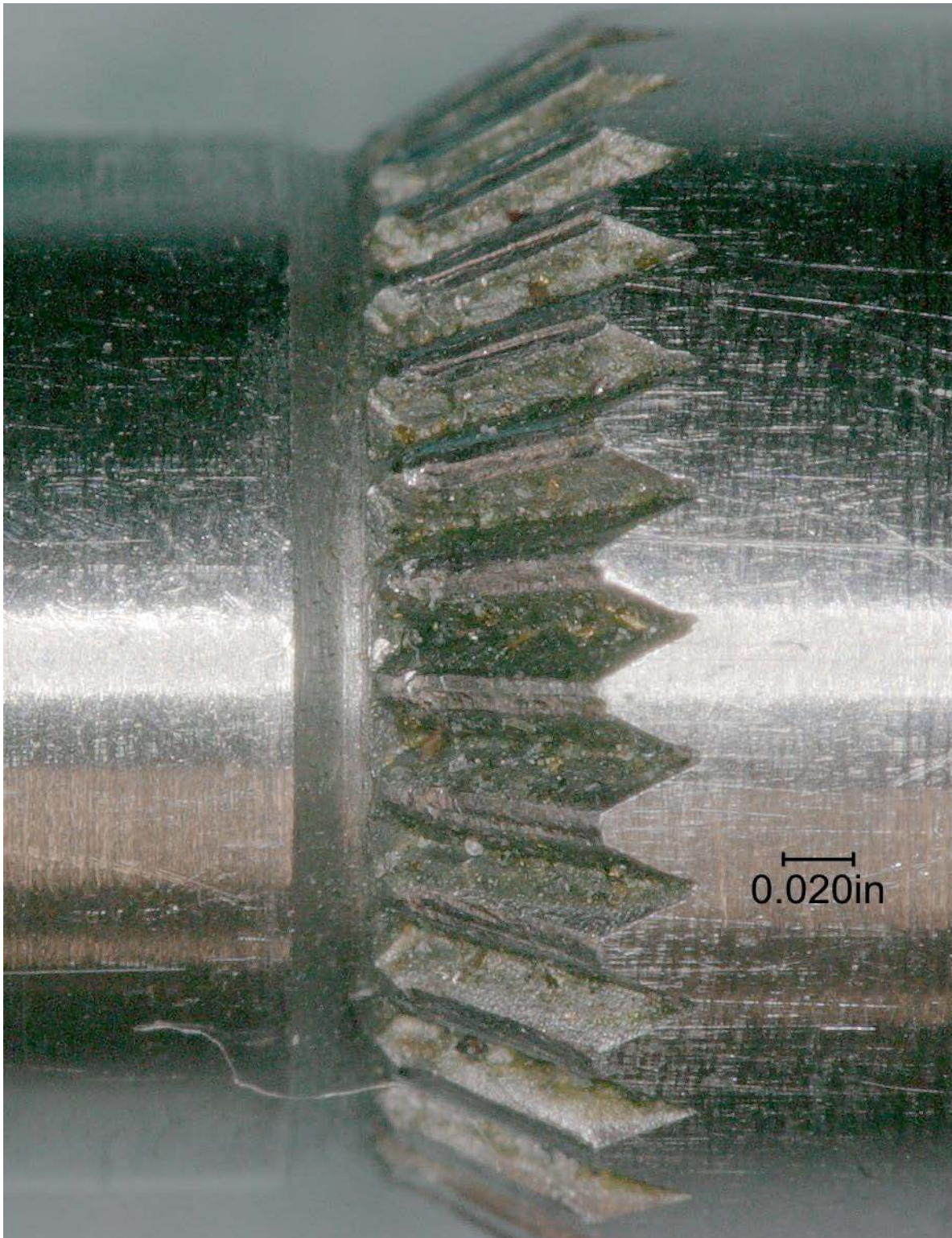


Figure 8 Image showing the tapered knurls on the shaft.

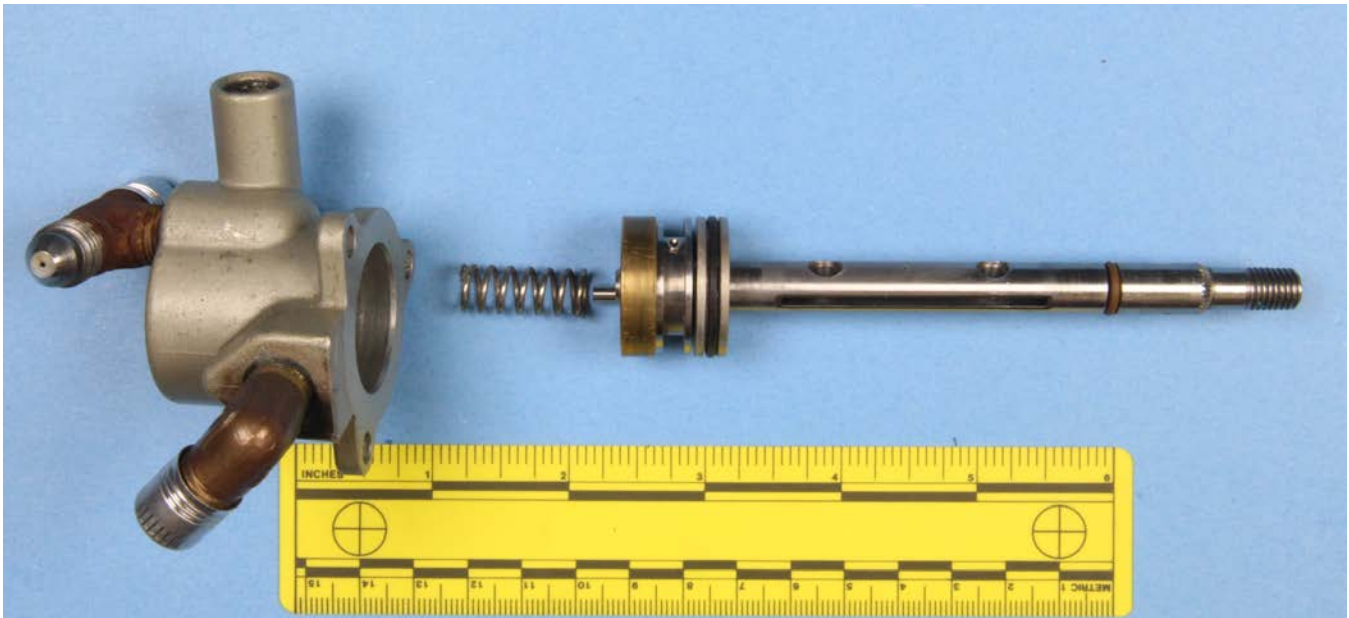


Figure 9 Fuel metering subassembly.

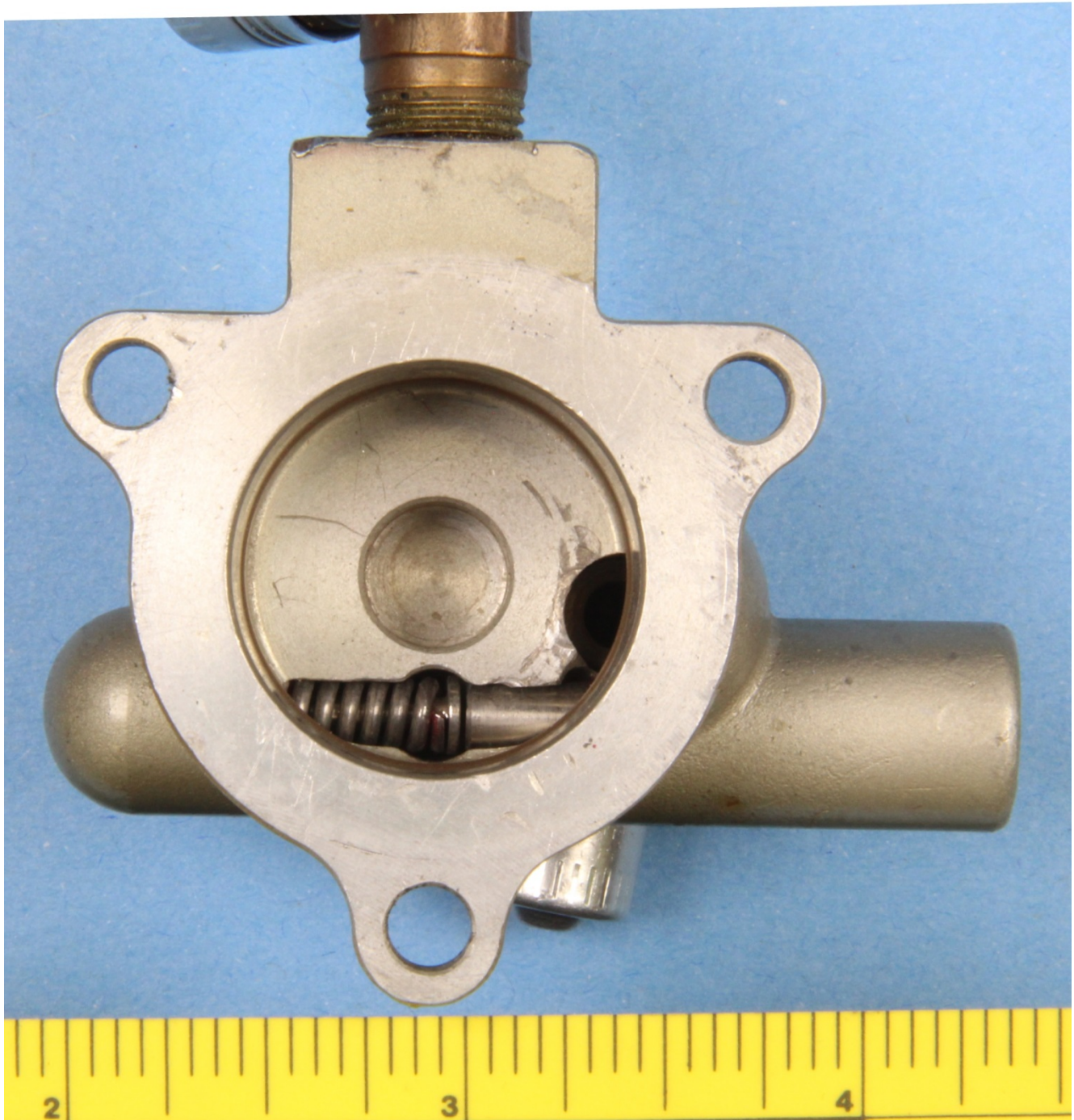


Figure 10 View inside of the fuel metering housing.

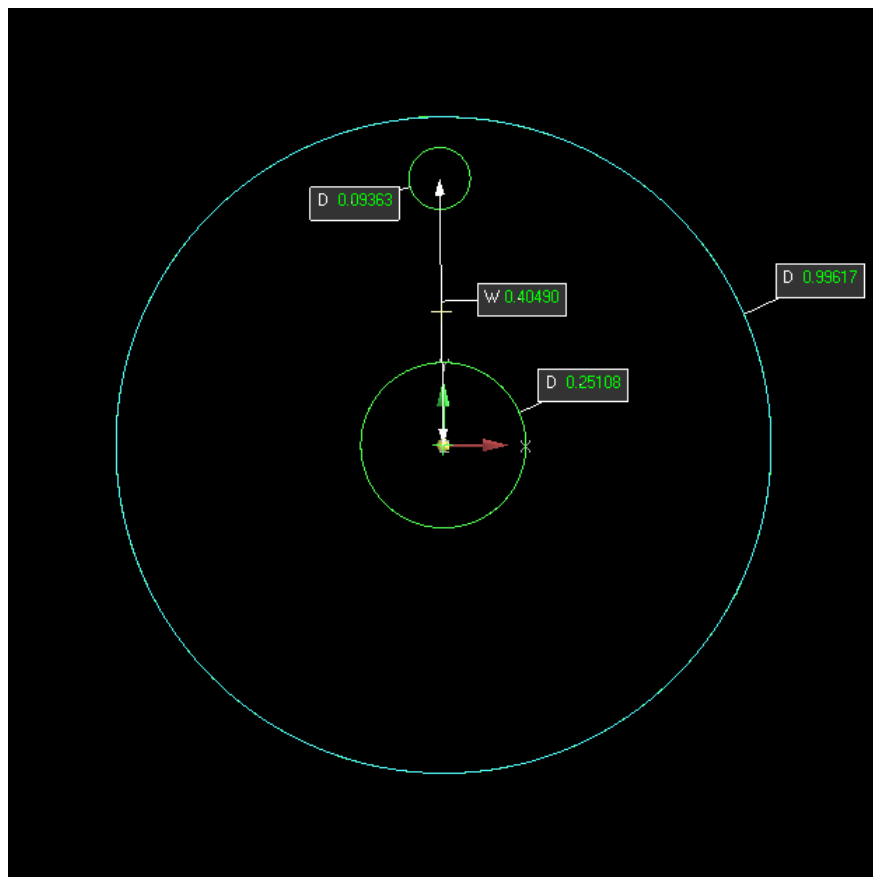
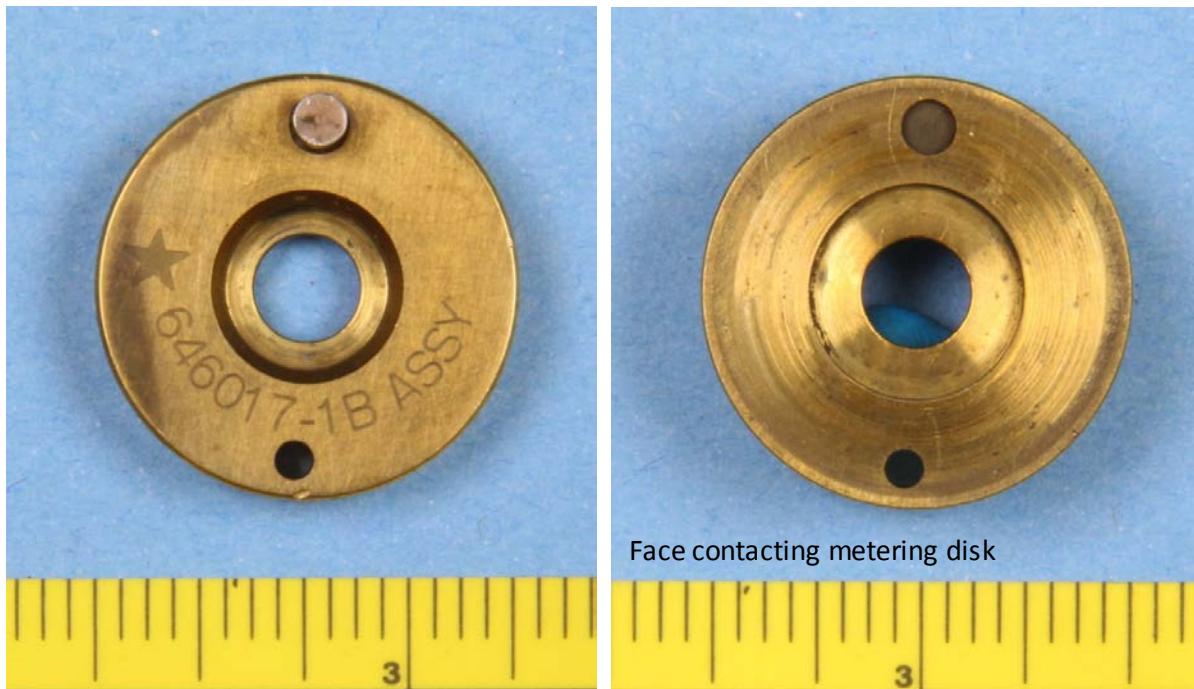


Figure 11 Images of the fuel metering plug assembly and key dimensions.