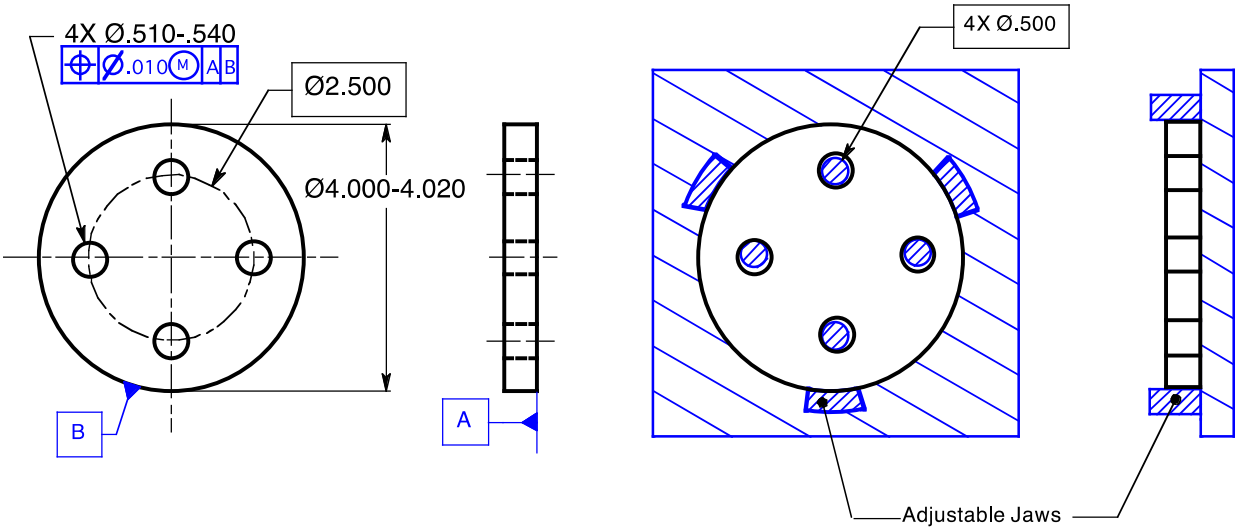
Datum Features of Size Specified with a



Material Condition Modifier[1]

Figure 7-7 Inspection of a hole pattern controlled to a datum feature of size specified at RMB.

Datum features of size specified with a Regardless of Material Boundary (RMB) Modifier

If no modifier follows a datum feature of size, the datum feature applies at regardless of material boundary. Where a datum feature of size is specified at RMB, the datum is established by physical contact between the surface(s) of the processing equipment and the surface(s) of the datum feature. There is no shift tolerance for datum features specified at RMB. A holding device that can be adjusted to center the datum feature, such as a 3-jaw chuck or adjustable mandrel, is used to position the part. In Figure 7-7, the outside diameter, datum feature B, is specified at RMB. The pattern of features may be inspected by centering the outside diameter in a gage consisting of an adjustable chucking device and a pattern of virtual condition pins. If the part can set inside this gage and all feature are within their size tolerances, the pattern is acceptable.

Datum features of size specified with a Maximum Material Boundary (MMB) Modifier

Where a datum feature of size, such as datum feature B in Figure 7-8, is toleranced with a geometric tolerance and is referenced in a feature control frame at MMB, circle M, the resulting maximum material boundary for datum feature B is equal to its virtual condition with respect to the preceding datum feature. In Figure 7-8A, datum feature B applies at its virtual condition with respect to datum feature A, which is its MMC plus the perpendicularity tolerance or 4.020 + .010 = 4.030. Because datum feature B on the part applies at a diameter of 4.030, datum feature simulator B on the gage is produced at a diameter of 4.030. If datum feature B, on a part, is actually produced at a diameter of 4.010, the four-hole pattern, as a group, can shift .020 in any direction inside the 4.030 diameter gage as shown in Figure 7-8A. If other inspection techniques are used, the axis of datum feature B and consequently the four-hole pattern, can shift within a cylindrical tolerance zone .020 in diameter

centered on true position of datum feature B. (See the chapter on Graphic Analysis for the inspection procedure of a pattern of features controlled to a datum feature of size.[1])

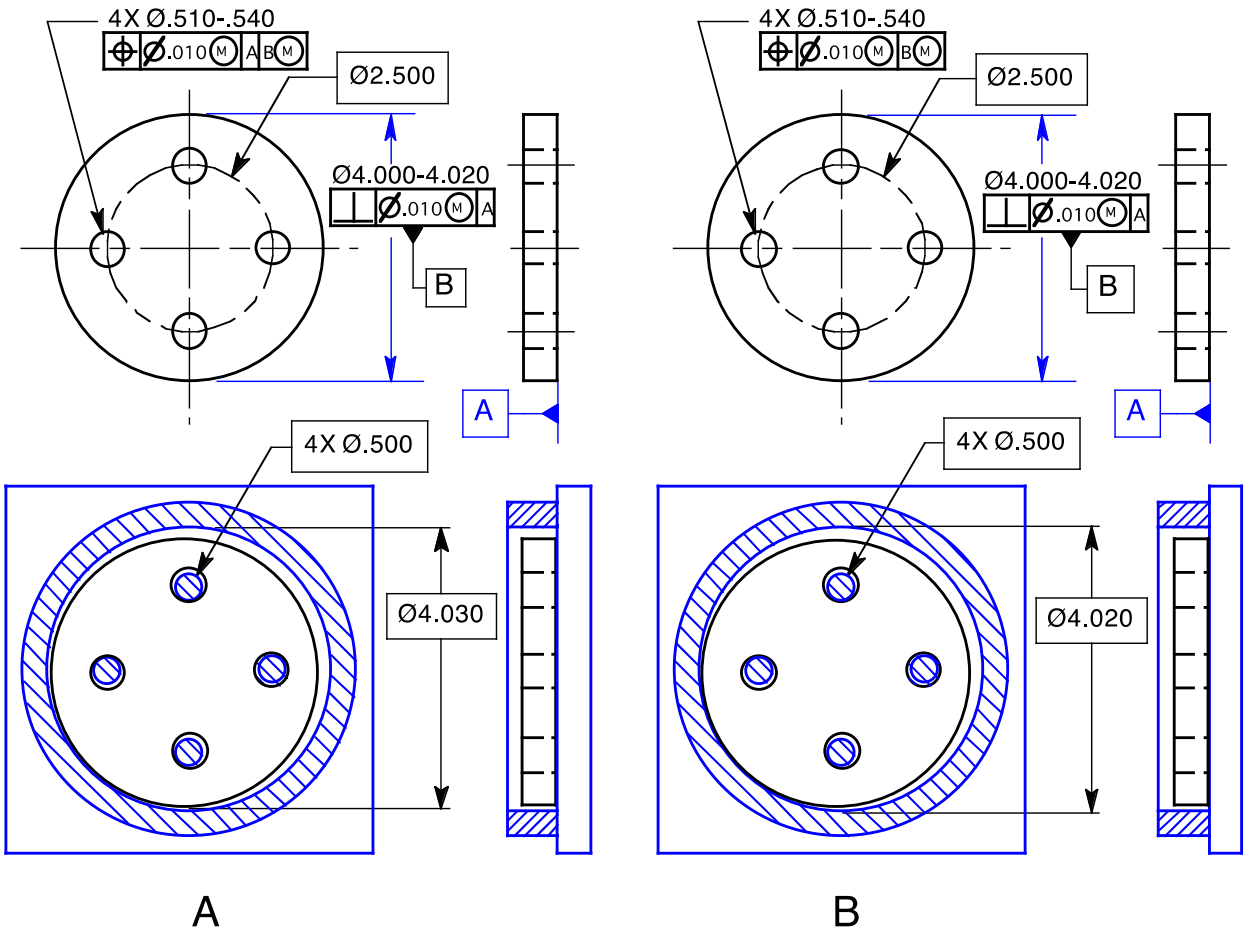


Figure 7-8 Inspection of a hole pattern controlled to a datum feature of size at MMB

Datum feature B in Figure 7-8B also applies at its virtual condition with respect to the previous datum feature, but there is no previous datum feature. Consequently datum feature B applies at its MMC or 4.020 in diameter, and datum feature simulator B on the gage in Figure 7-8B is produced at a diameter of 4.020. If datum feature B, on a part, is actually produced at a diameter of 4.010, it can shift .010 in any direction inside the 4.020 diameter gage as shown in Figure 7-8B.

As the actual size of datum feature B departs from MMC toward least material condition, a shift tolerance, of the pattern as a group, is allowed in the exact amount of such departure. In other words, all four holes of the pattern must shift together. The possible shift equals the difference between the actual size of the datum feature and the inside diameter of the gage as shown on the drawings in Figure 7-8.

[1]Cogorno, Gene R., ***Geometric Dimensioning and Tolerancing for Mechanical Design, Second Edition***, McGraw-Hill, New York, 2011, p. 109 and Chapter 13