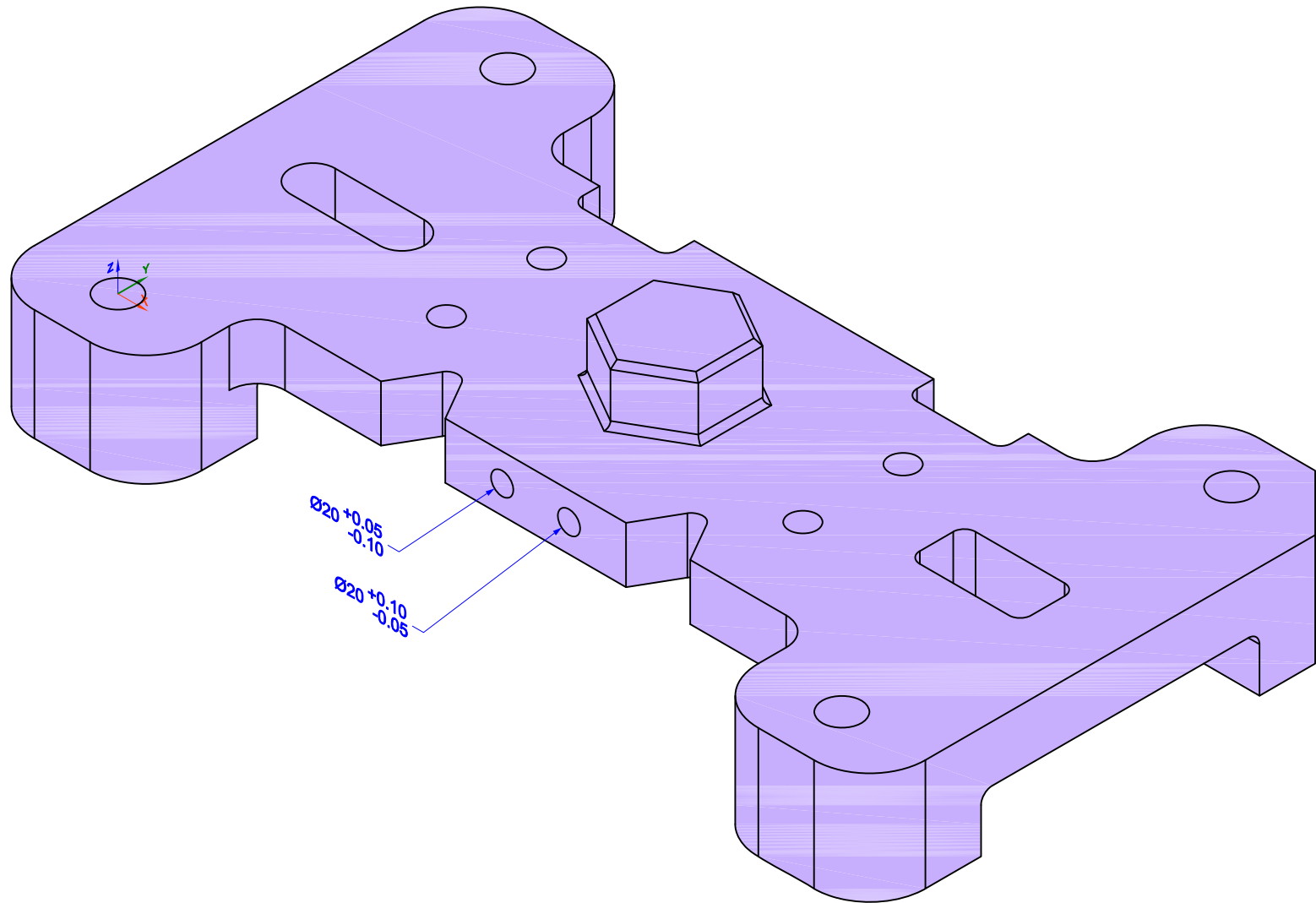


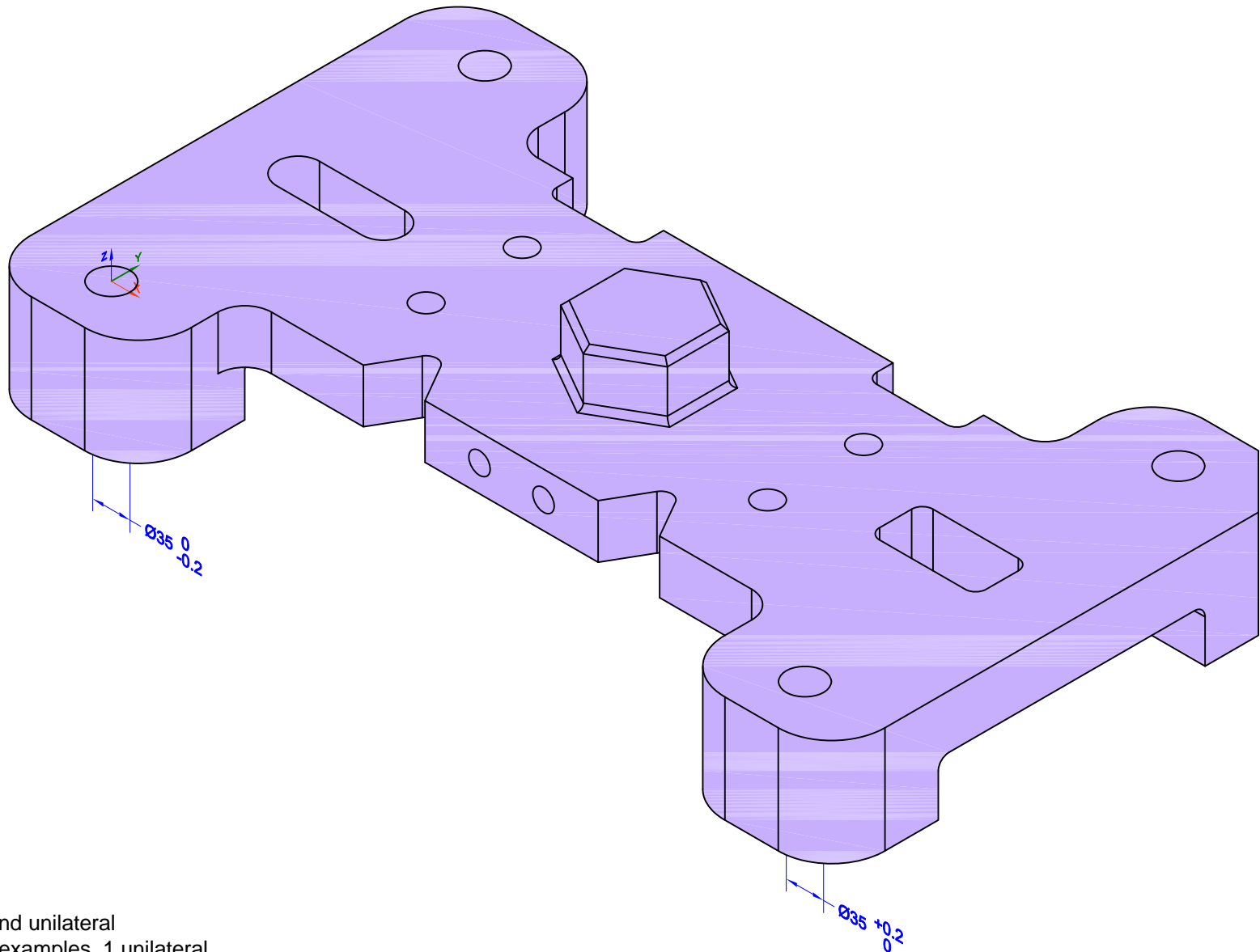
Measurand:
Dimension and equal-bilateral
tolerance.



Measurand:
Dimension and unequal-bilateral tolerance.
2 examples, + more - less, + less - more.

PMI Atomic Test Case 2

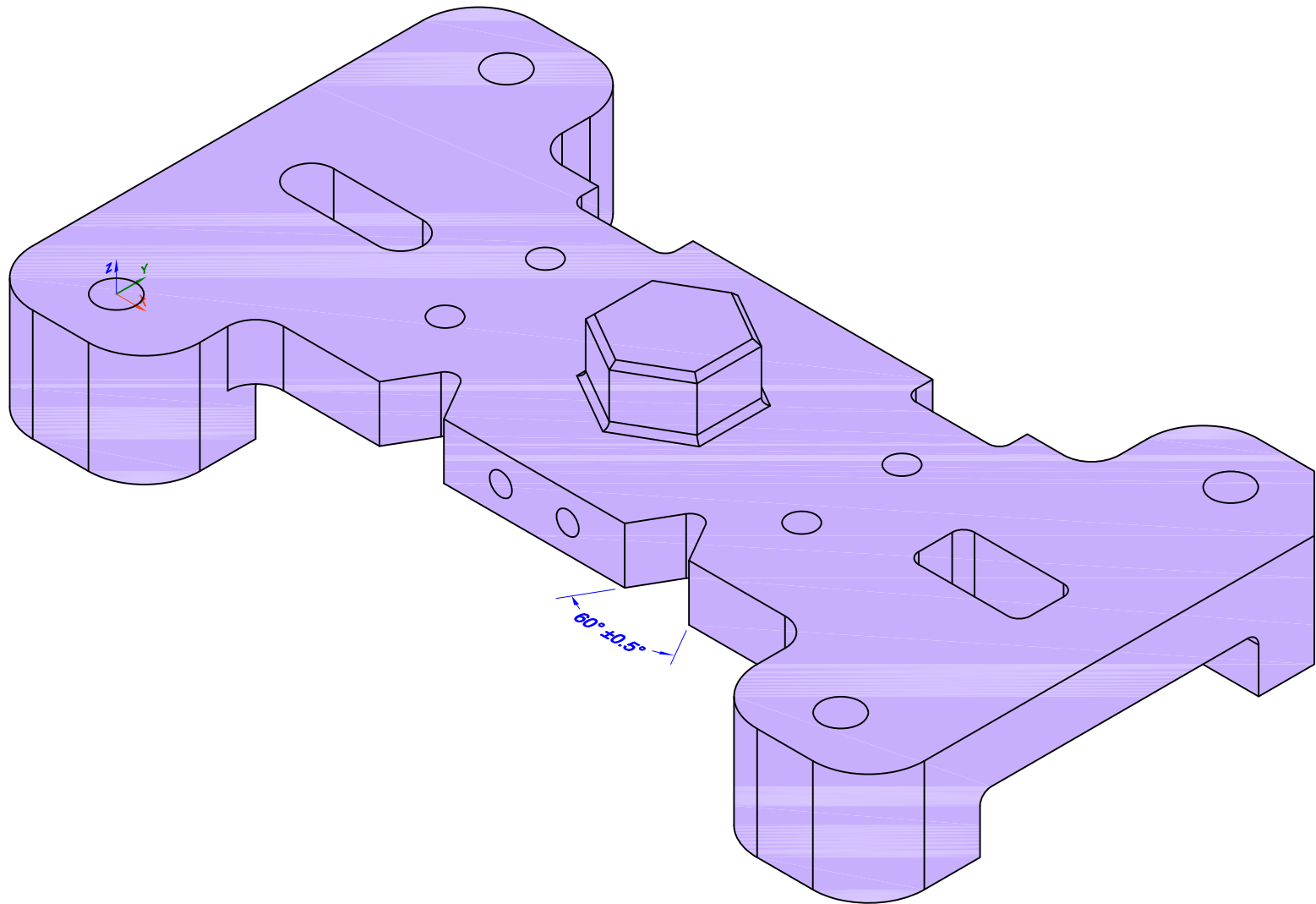
Dimension with Unequal-Bilateral Tolerance: Feature of Size (2)



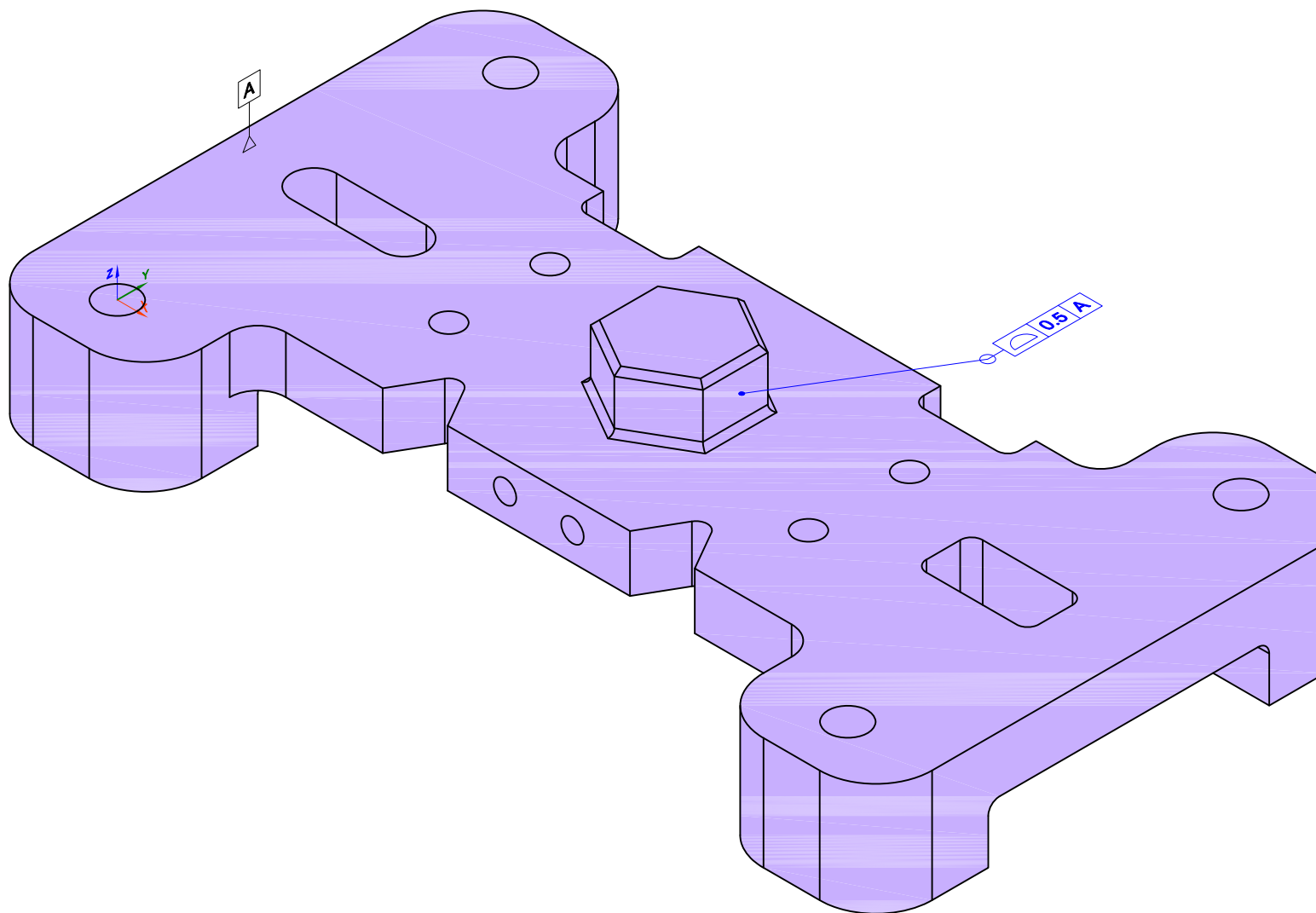
Measurand:
Dimension and unilateral
tolerance. 2 examples, 1 unilateral
positive, 1 unilateral negative.

PMI Atomic Test Case 3

Dimension with Unilateral Tolerance: Feature of Size (2)



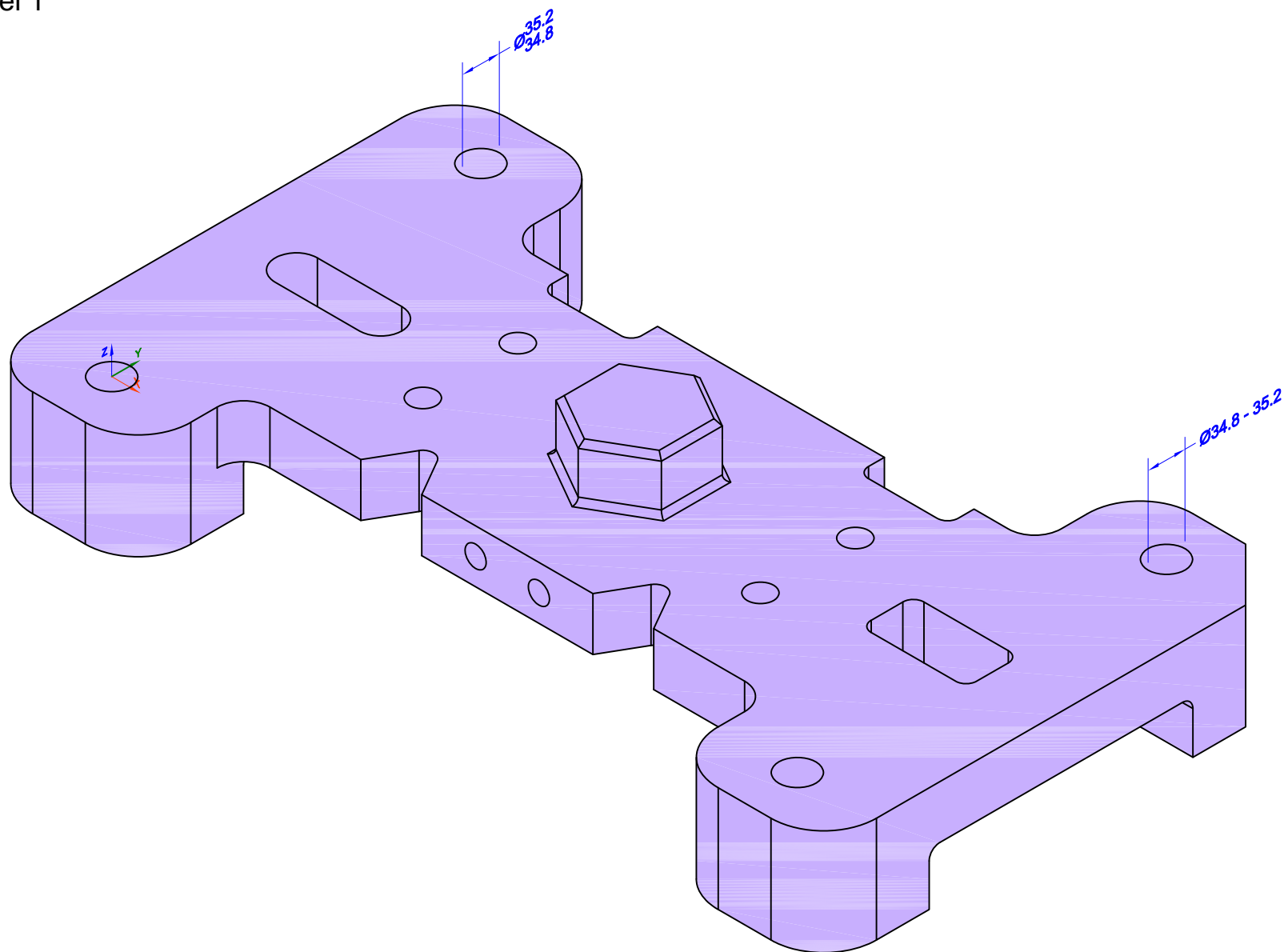
Measurand:
Angular dimension and
equal-bilateral tolerance.



Measurand:
Leader-directed feature control frame -
Profile of a Surface. Applied all around.

PMI Atomic Test Case 7

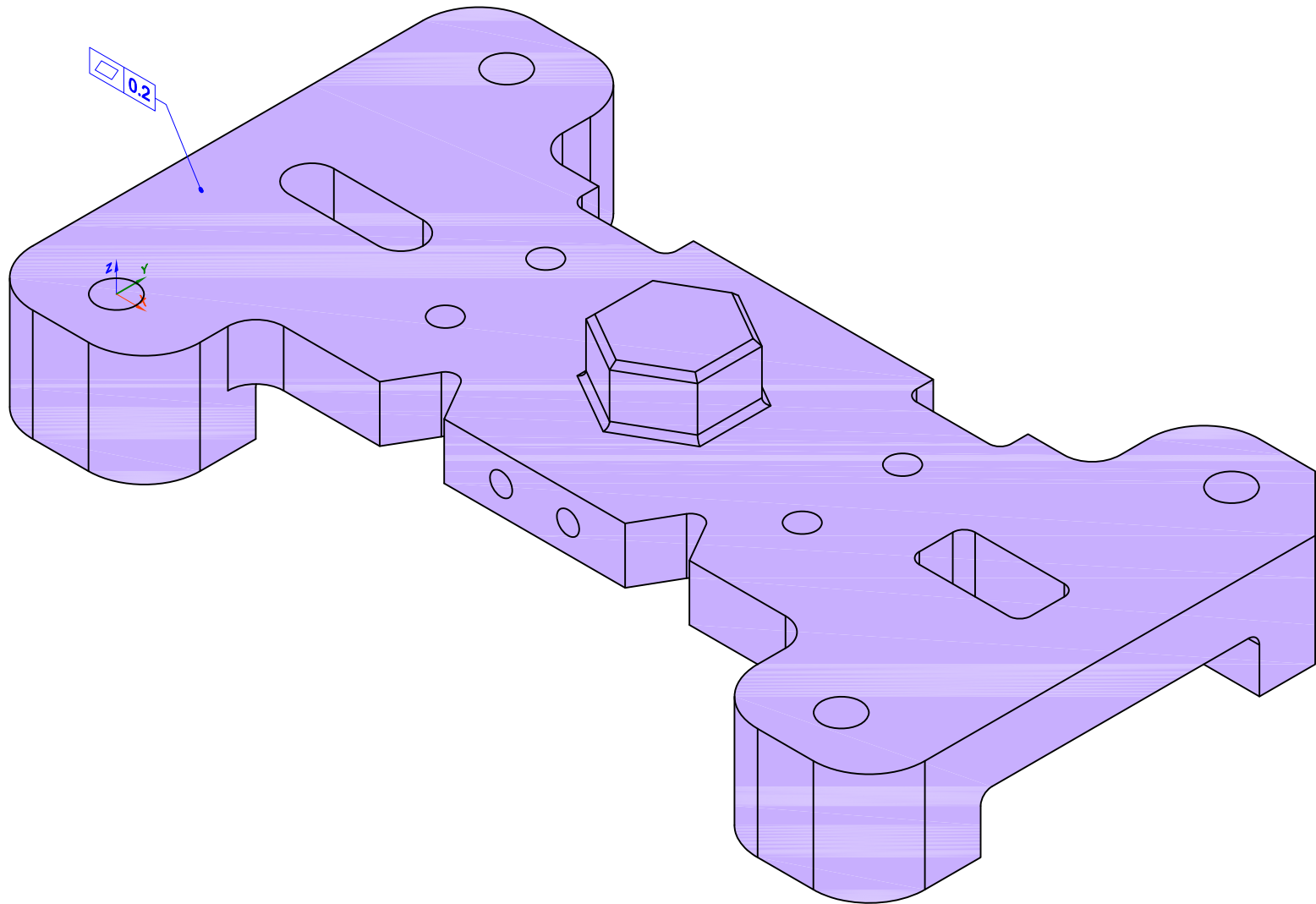
Symbol: All Around (Applied with a Leader-Directed Profile Tolerance)



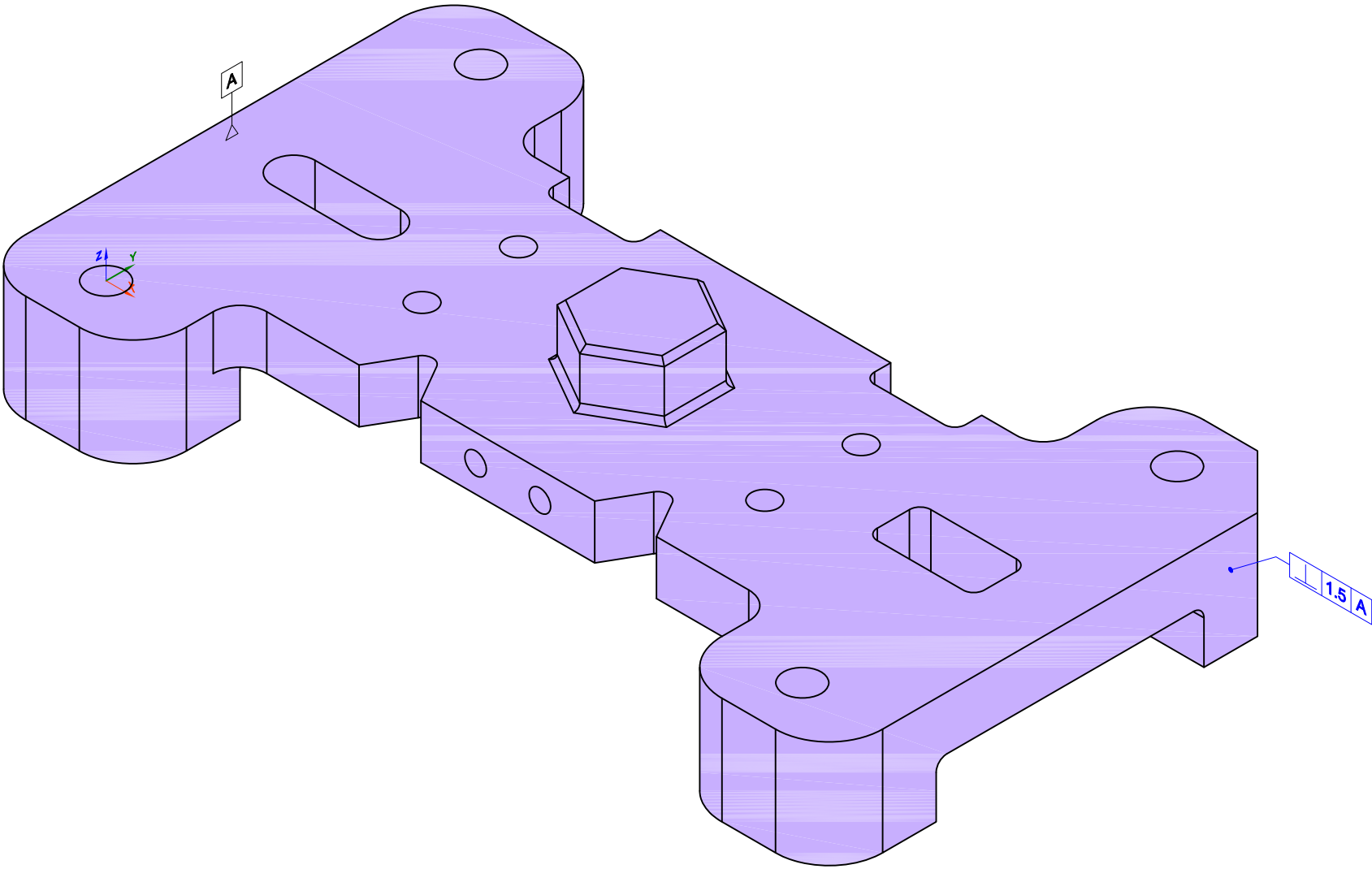
Measurand:
Limit dimension with diameter symbol. 2
examples, 1 horizontal format, 1 vertical format.

PMI Atomic Test Case 8

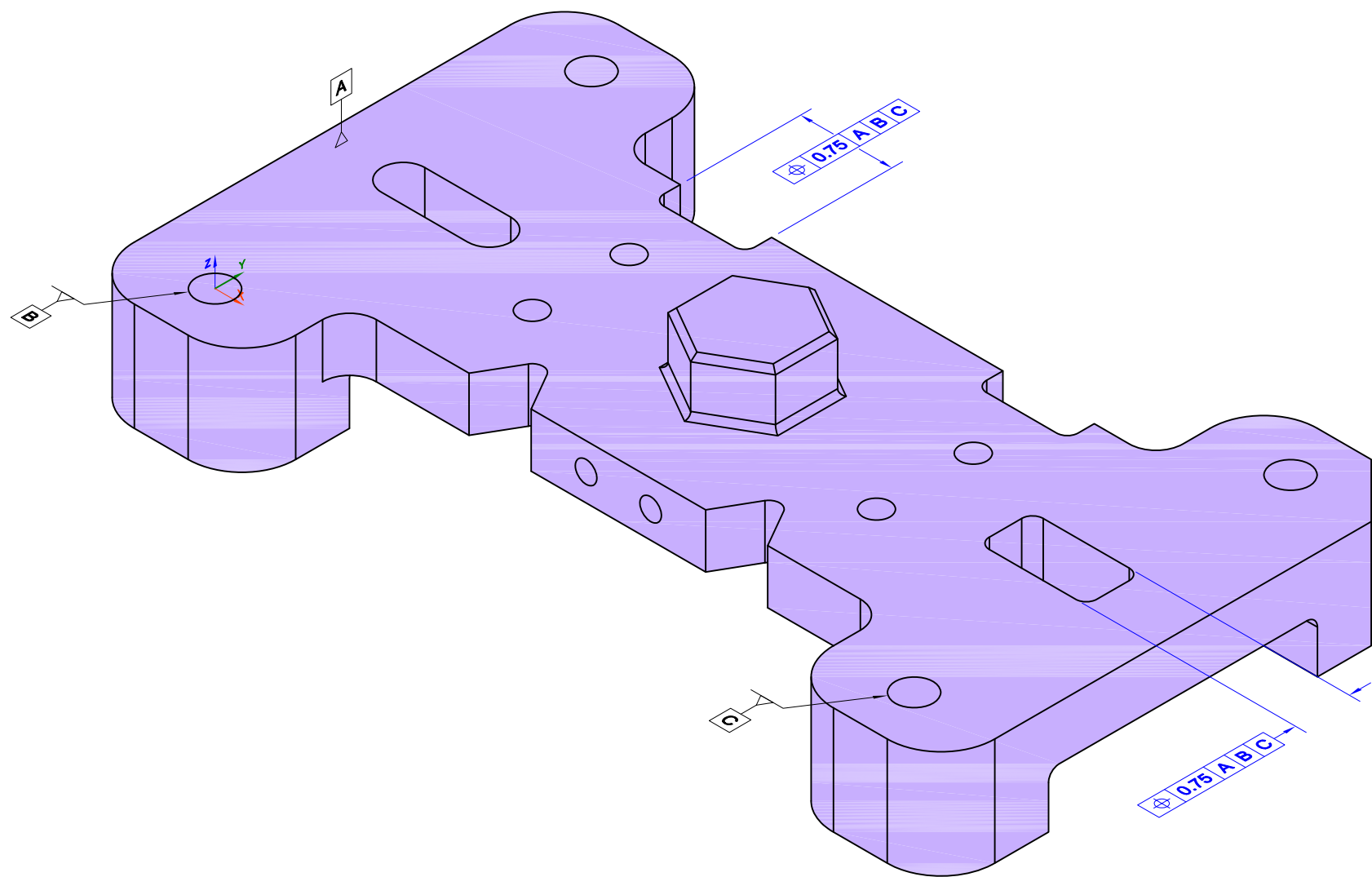
Dimension: Limit - Vertical (Stacked) and Horizontal with Diameter Symbol: Feature of Size (2)



Measurand:
Leader-directed feature control
frame - Flatness.



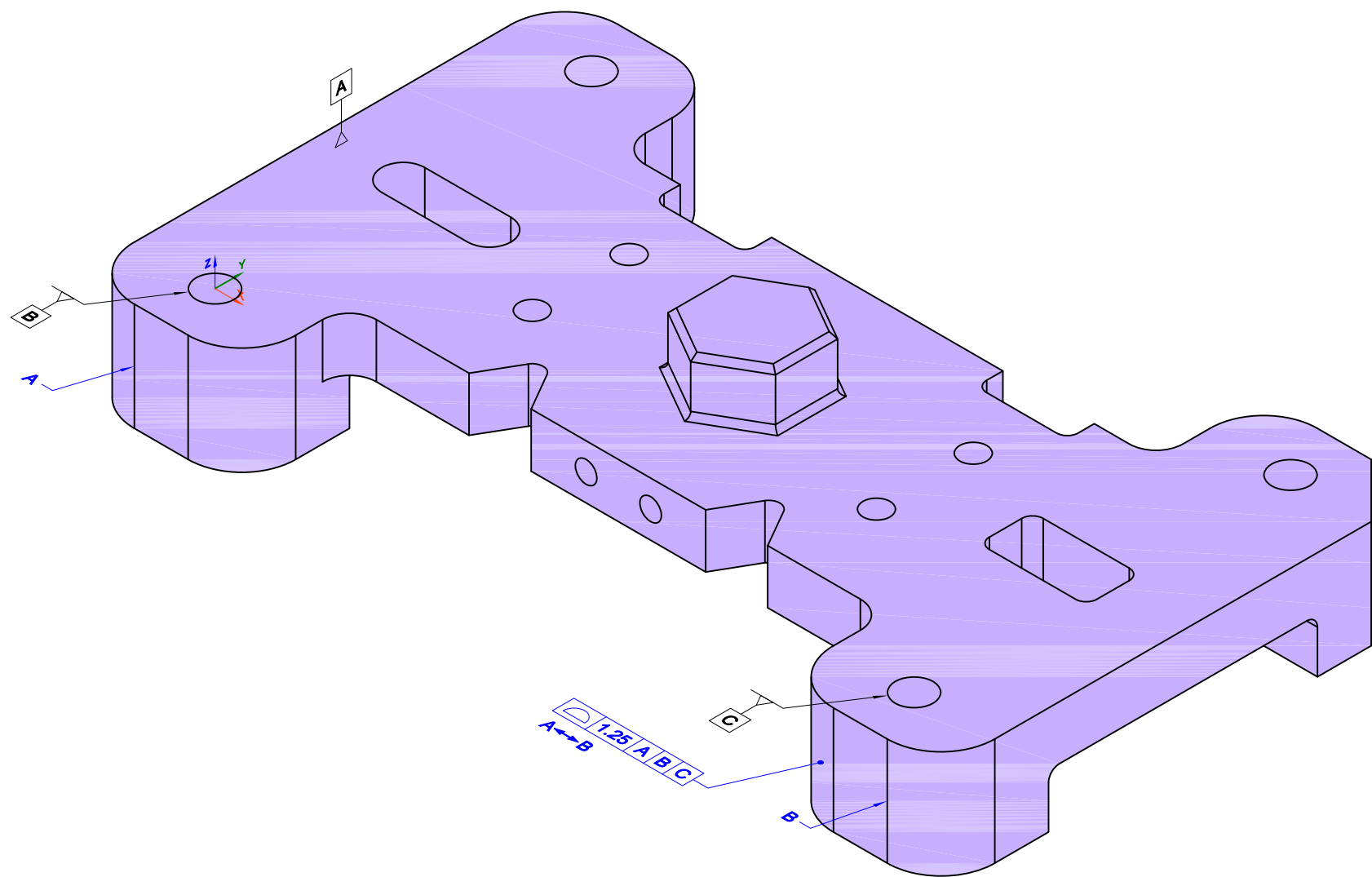
Measurand:
Leader-directed feature control
frame - Perpendicularity.



Measurand:
Feature control frame attached to dimension
w/o dimension value - 2 examples, 1 inside,
1 outside extension lines.

PMI Atomic Test Case 33

Single Segment Feature Control Frame - Attached Directly to Dimension Lines - No Dimension Value (2)



Measurand:
Leader-directed feature control frame -
Profile of a Surface. Applied between
A and B.

Test Model 2

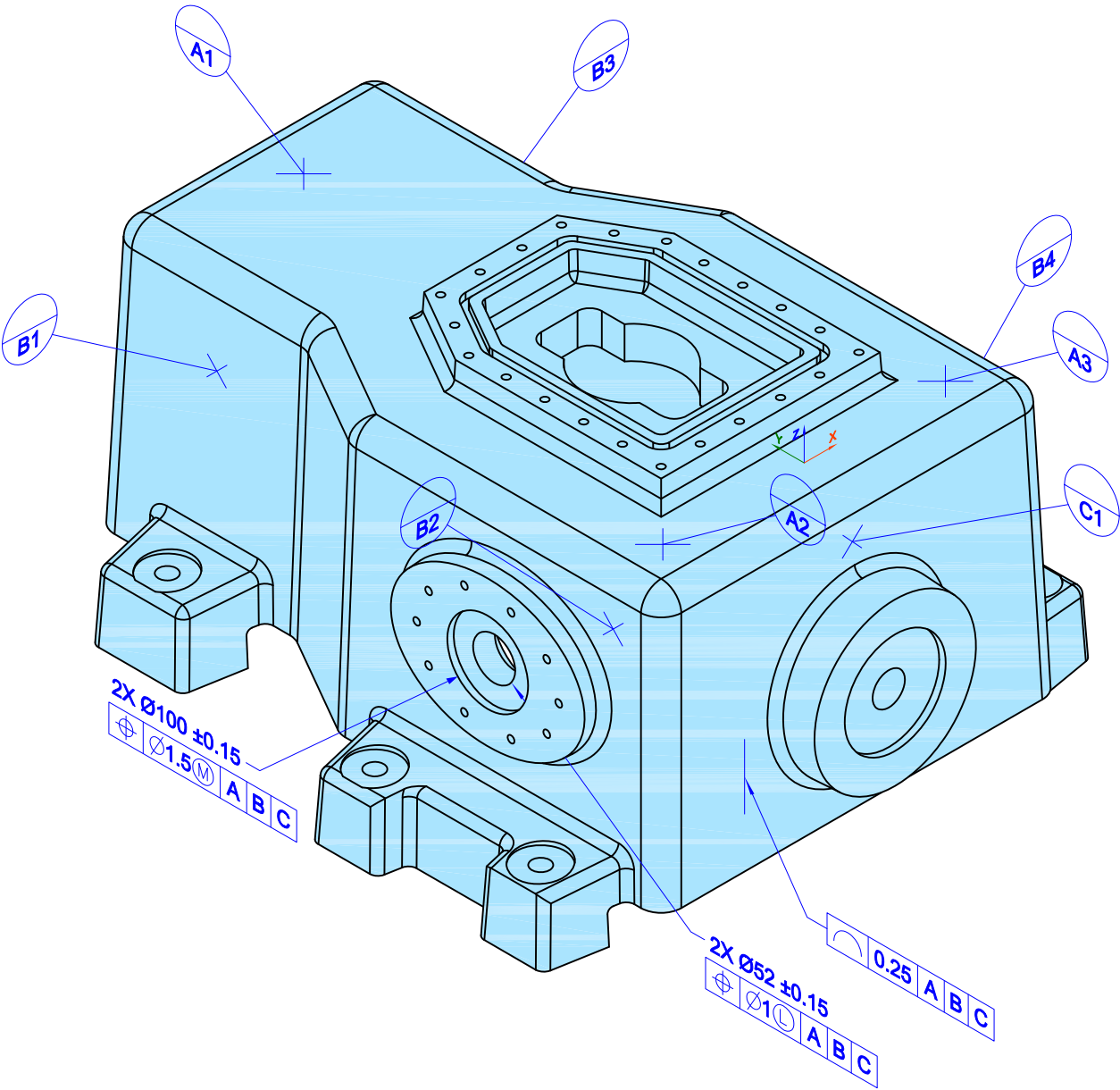
NOTES (UNLESS OTHERWISE SPECIFIED):

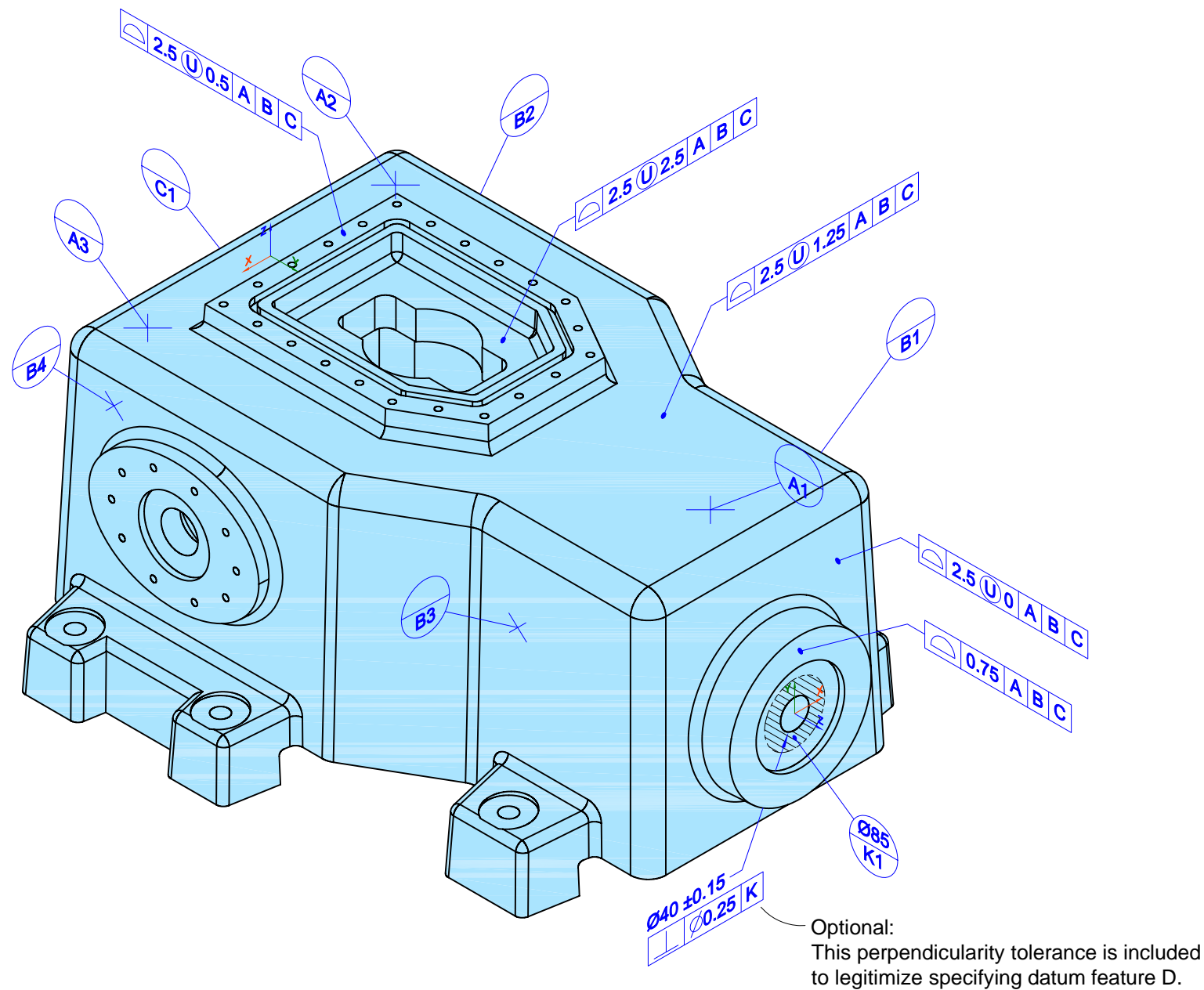
- 1. OBTAIN DIMENSIONS FOR ALL UNDIMENSIONED FEATURES FROM THE MODEL. ALL DIMENSIONS OBTAINED FROM THE MODEL ARE BASIC UNLESS OTHERWISE SPECIFIED.
- 2. ASME Y14.41-2003 APPLIES TO DATASET.
- 3. ASME Y14.5M-1994 APPLIES TO DIMENSIONING AND TOLERANCING.

These notes shall be placed on a static annotation plane (the plane does not rotate with the model).

The intent of ATC50 is to test systems' support for static annotation planes.

Including a feature control frame in a general note will be a test case in the next round of testing.



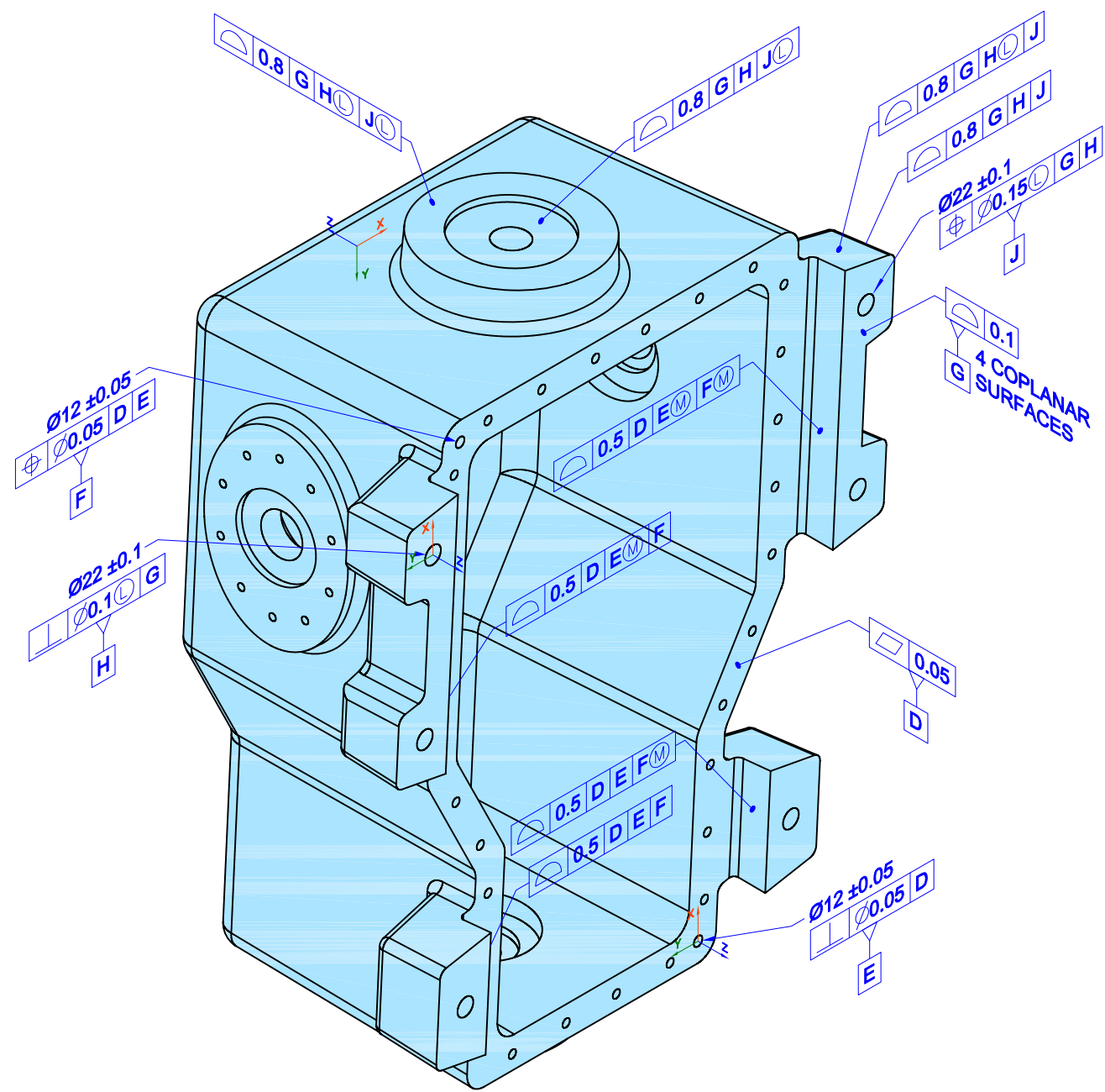


Optional:
This perpendicularity tolerance is included to legitimize specifying datum feature D.

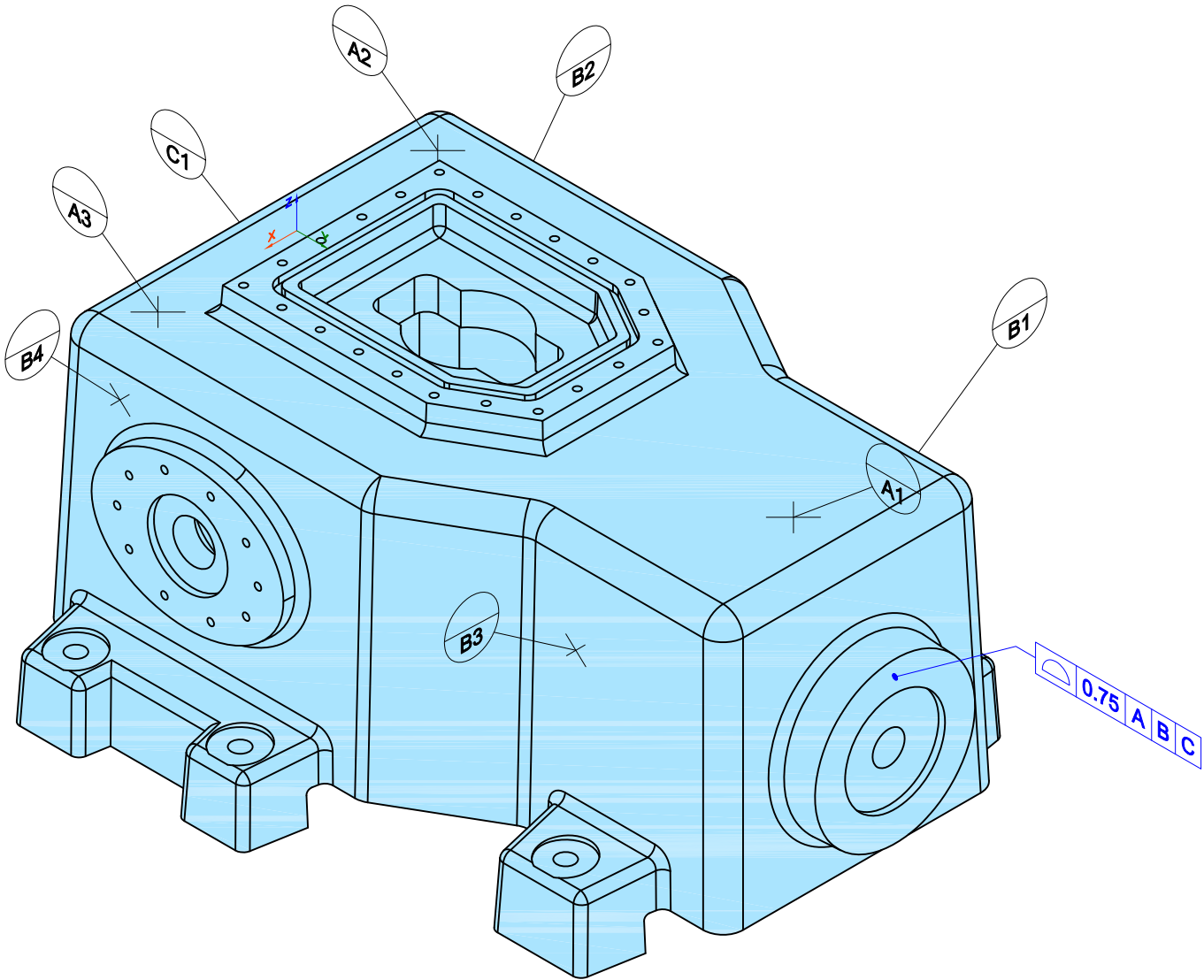
PMI Complex Test Case 2 - View 2 (of 3)
Includes Atomic Test Cases - 26, 31, 41

Test Model 2

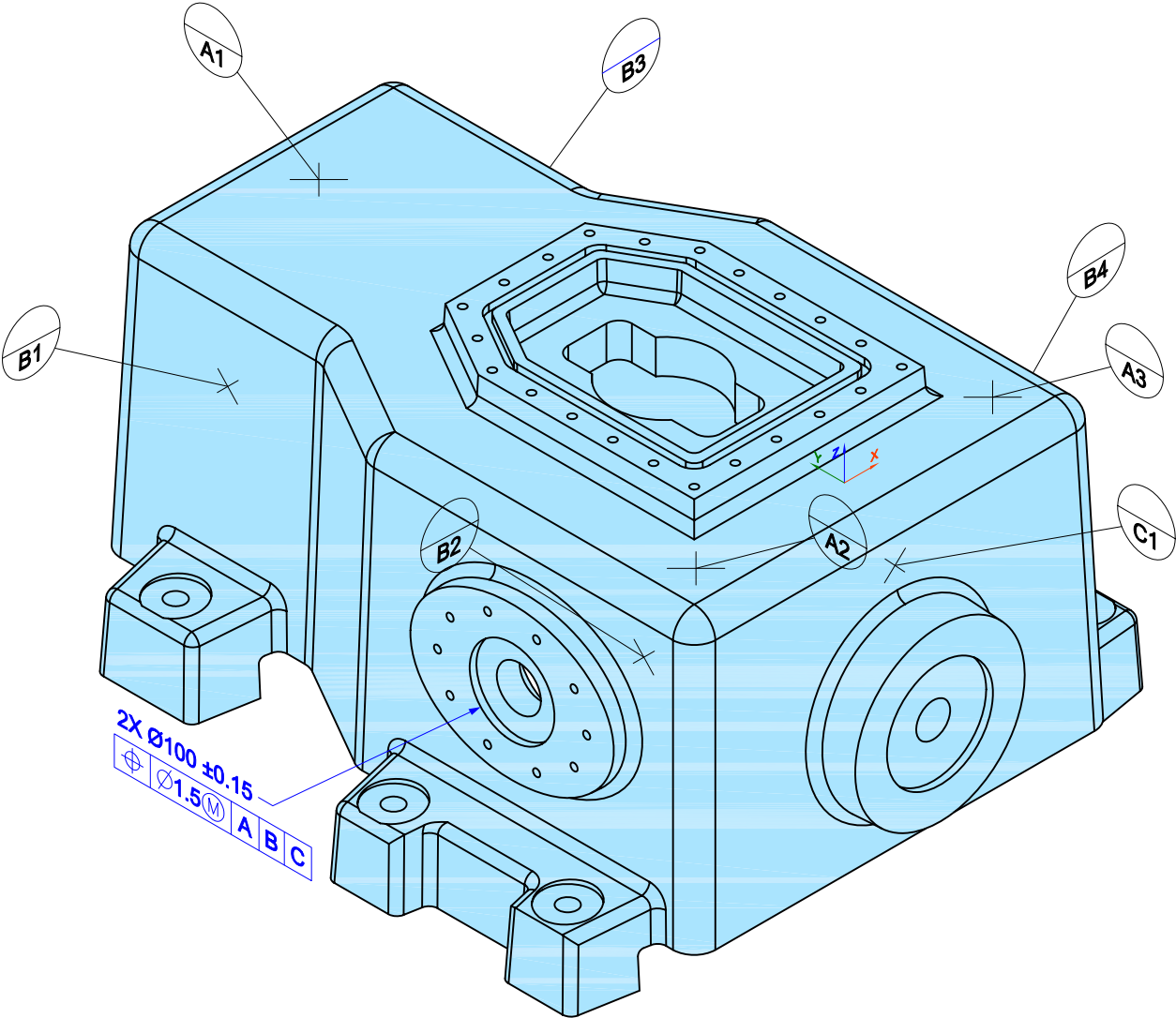
Optional:
The geometric tolerances applied to datum features D, E, F, G, H, and J are not required for the test case. However, the geometric tolerances applied to datum features E, F, H, and J help to legitimize the MMB and LMB datum feature references in the geometric tolerances related to D|E|F and G|H|J. The tolerances are mainly important in calculating the MMB or LMB of the datum feature simulators for E, F, H, and J. The geometric tolerances specified at LMC for datum features H and J are particularly important, as they also make it easier to understand the LMB of the datum features, as a geometric tolerance specified at LMC changes Rule #1 to require perfect form at LMC instead of MMC.



PMI Complex Test Case 2 - View 3 (of 3)
Includes Atomic Test Cases - 34, 35



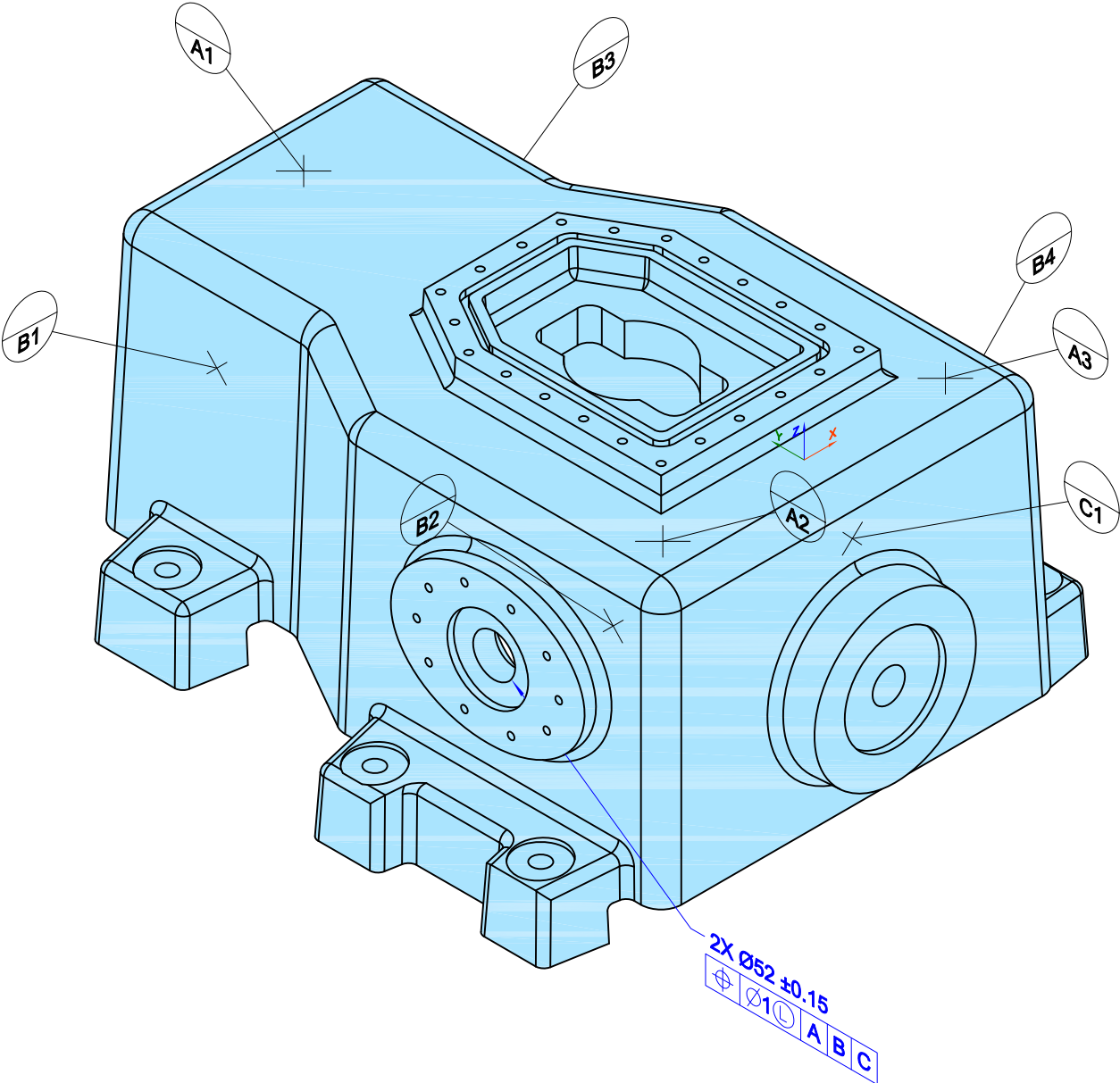
Measurand:
Leader-directed feature control
frame - Profile of a surface.



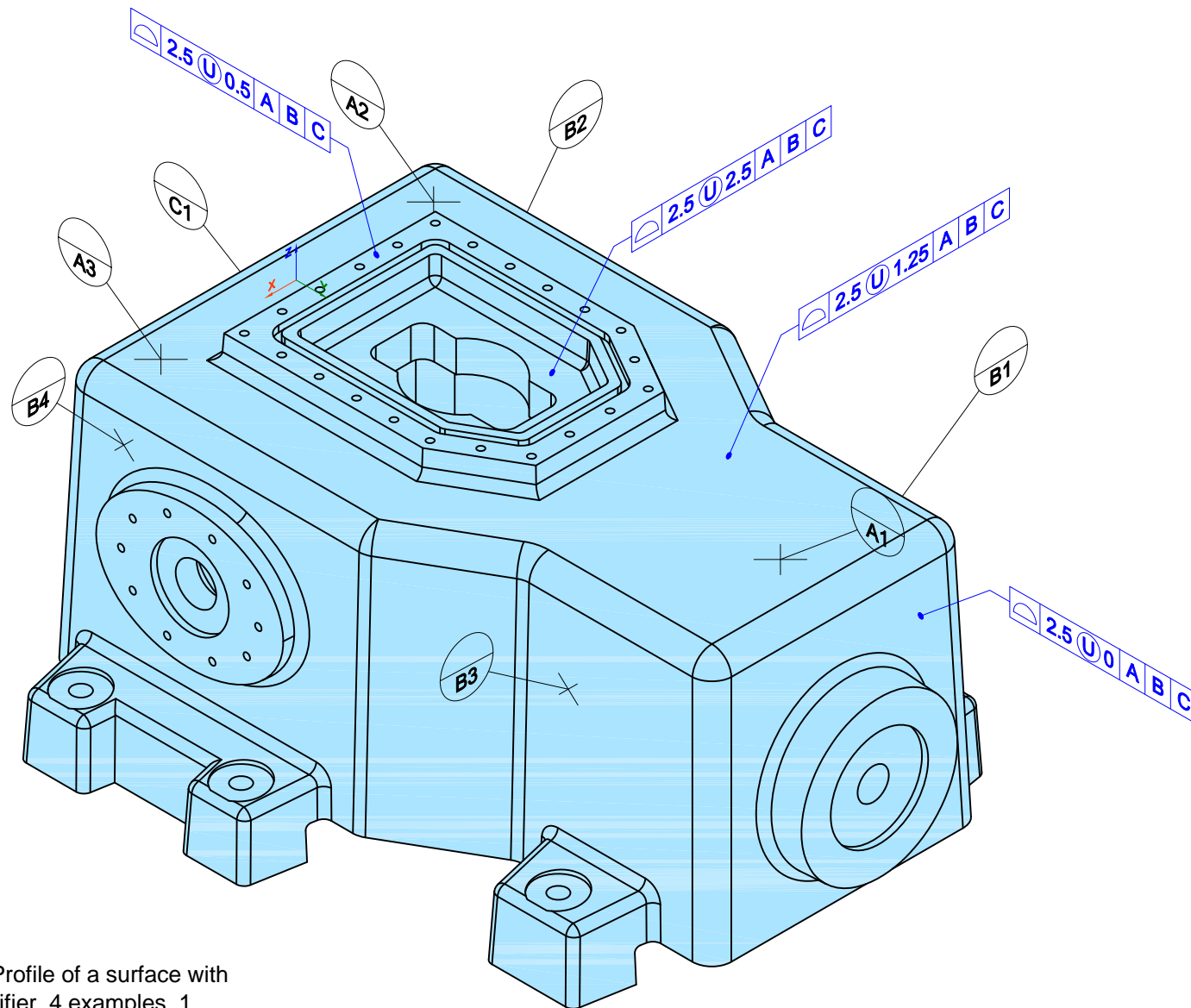
Measurand:
Feature control frame - Position
with MMC modifier.

Test Model 2

Note:
Justification for LMC:
The holes will be machined
after casting.



Measurand:
Feature control frame - Position
with LMC modifier.



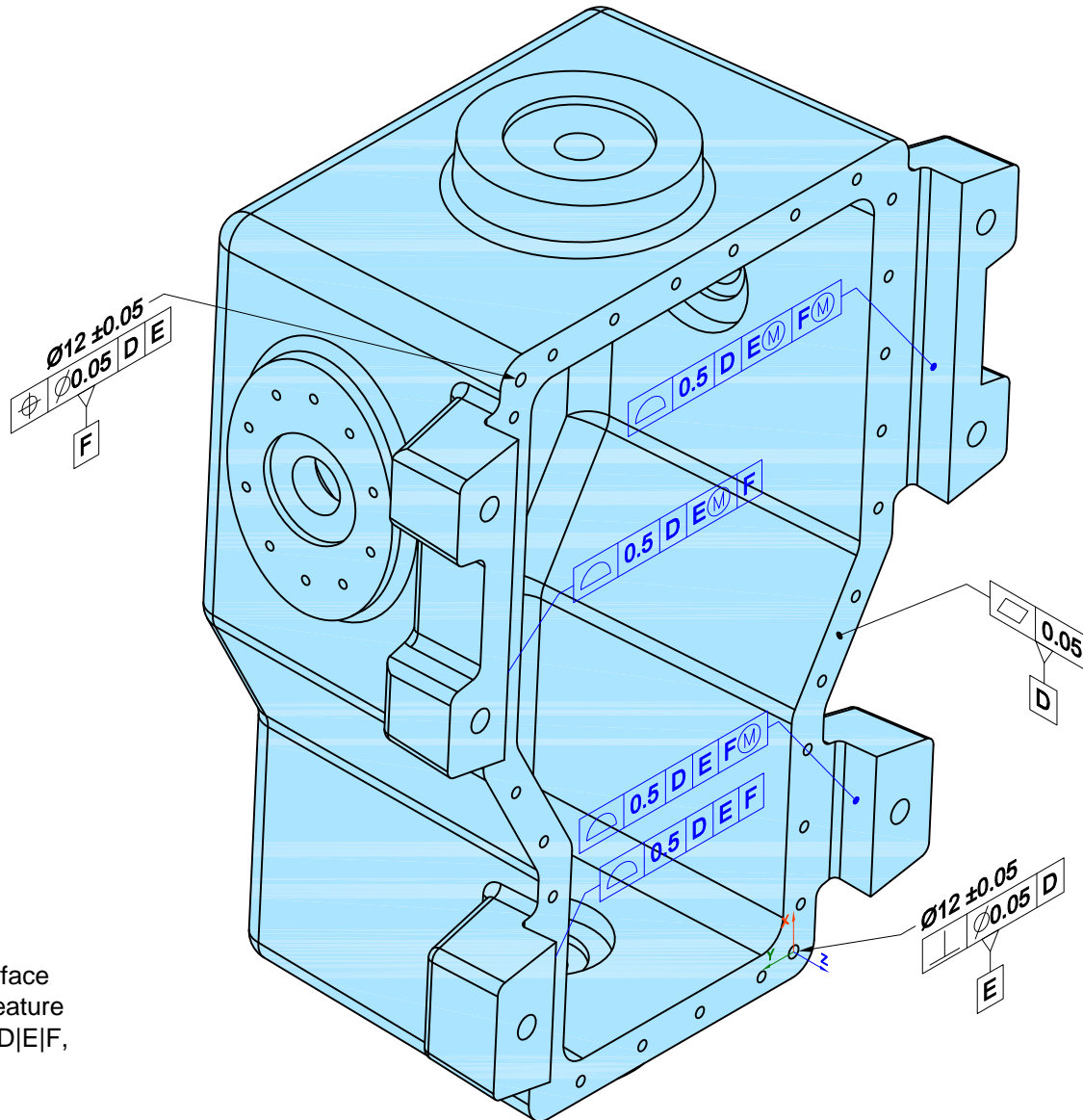
Measurand:

Feature control frame - Profile of a surface with unequally-disposed modifier. 4 examples, 1 equal-bilateral, 1 unilateral positive, 1 unilateral negative, 1 unequal-bilateral. Tests ASME Y14.41-2003 requirement.





Test Model 2

Optional:

The geometric tolerances applied to datum features D, E, and F are not required for the test case. However, the geometric tolerances applied to datum features E and F help to legitimize the MMB datum feature references in the geometric tolerances related to D|E|F. The tolerances are mainly important in calculating the MMB of the datum feature simulators for E and F.



Measurand:

Feature control frame - Profile of a surface with MMB modifier applied to datum feature E and/or F references. 4 examples, 1 D|E|F, 1 D|E|F, 1 D|E|F, 1 D|E|F.

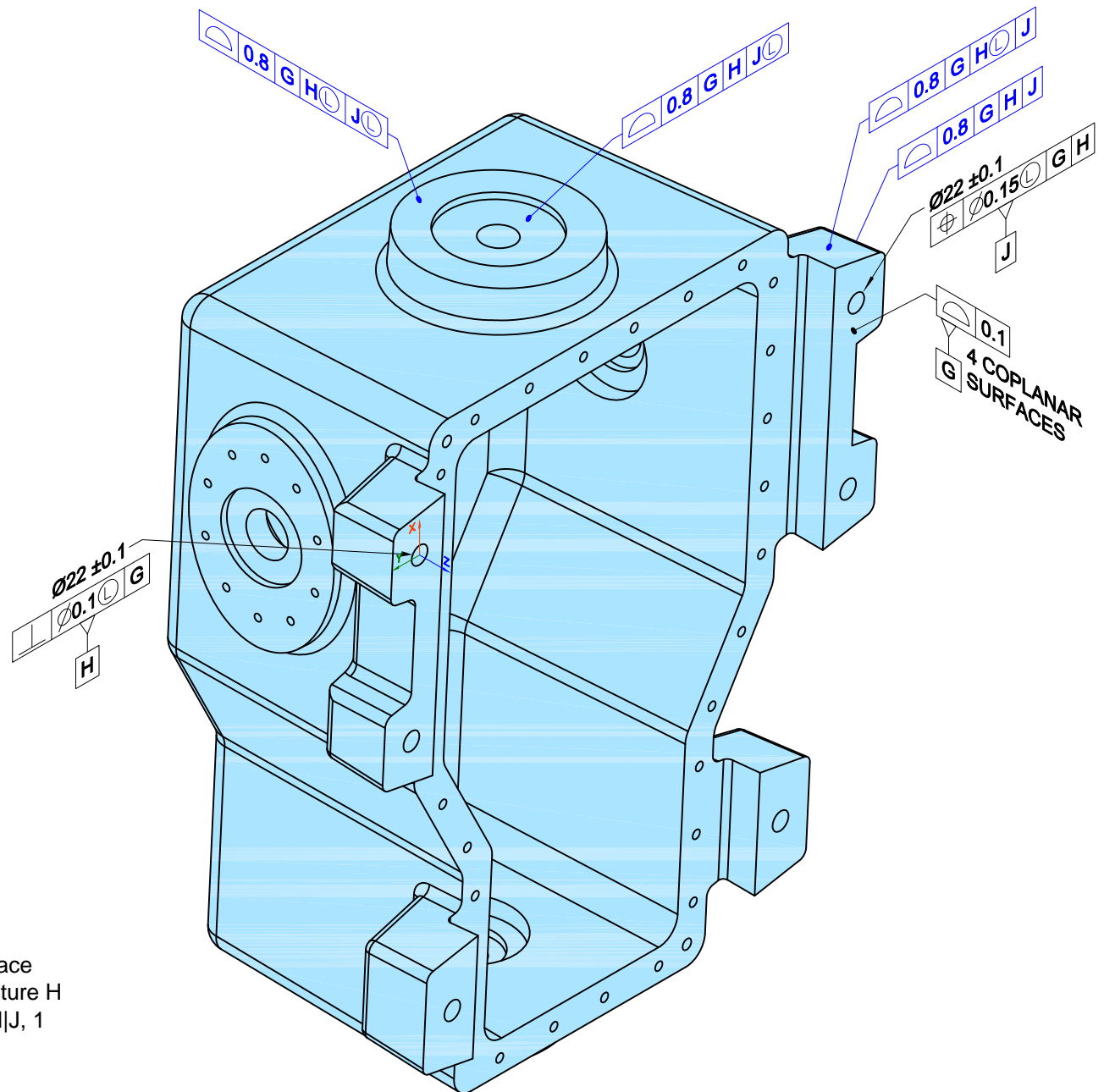
Test Model 2

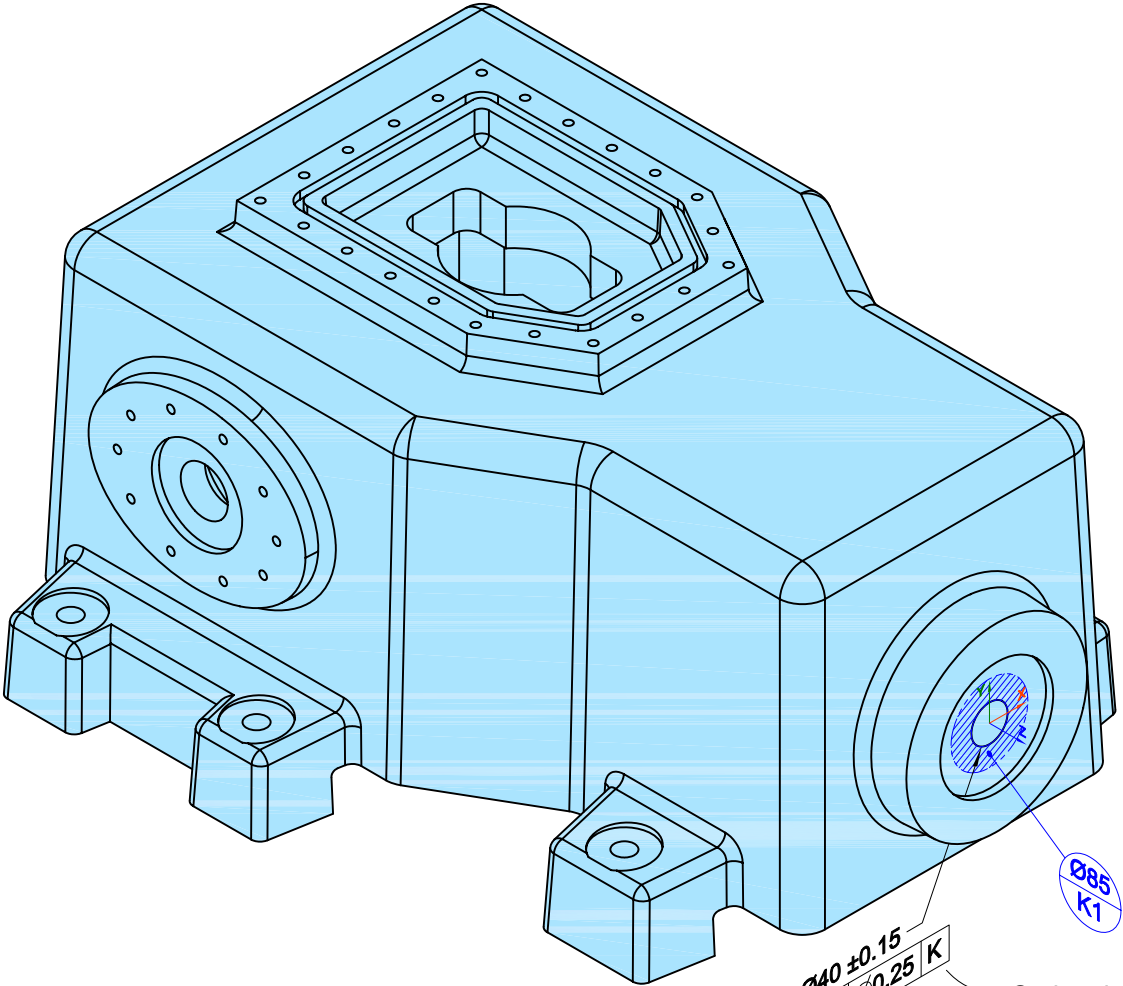
Optional:

The geometric tolerances applied to datum features G, H, and J are not required for the test case. However, the geometric tolerances applied to datum features H, and J help to legitimize the LMB datum feature references in the geometric tolerances related to G|H|J. The tolerances are mainly important in calculating the LMB of the datum feature simulators for H, and J. The geometric tolerances specified at LMC for datum features H and J are particularly important, as they also make it easier to understand the LMB of the datum features, as a geometric tolerance specified at LMC changes Rule #1 to require perfect form at LMC instead of MMC.

Measurand:

Feature control frame - Profile of a surface with LMB modifier applied to datum feature H and/or J references. 4 examples, 1 G|H|J, 1 G|HⓁ|J, 1 G|H|JⓁ, 1 G|HⓁ|JⓁ.

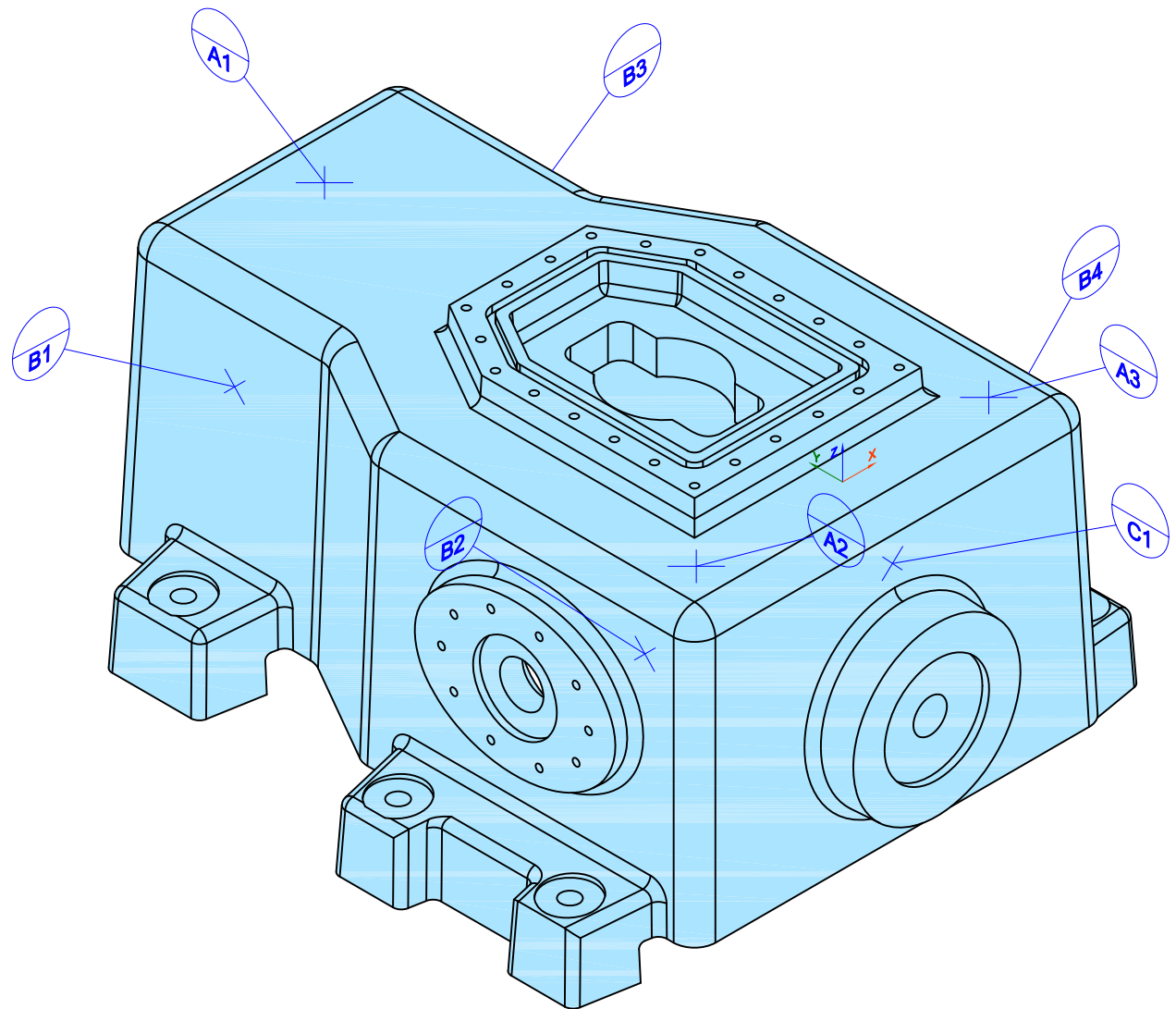




Measurand:
Datum target symbol and circular datum target area. Diameter of area defined in datum target symbol. Datum target area shown on part.

Optional:
This perpendicularity tolerance is included to legitimize specifying datum target K1.

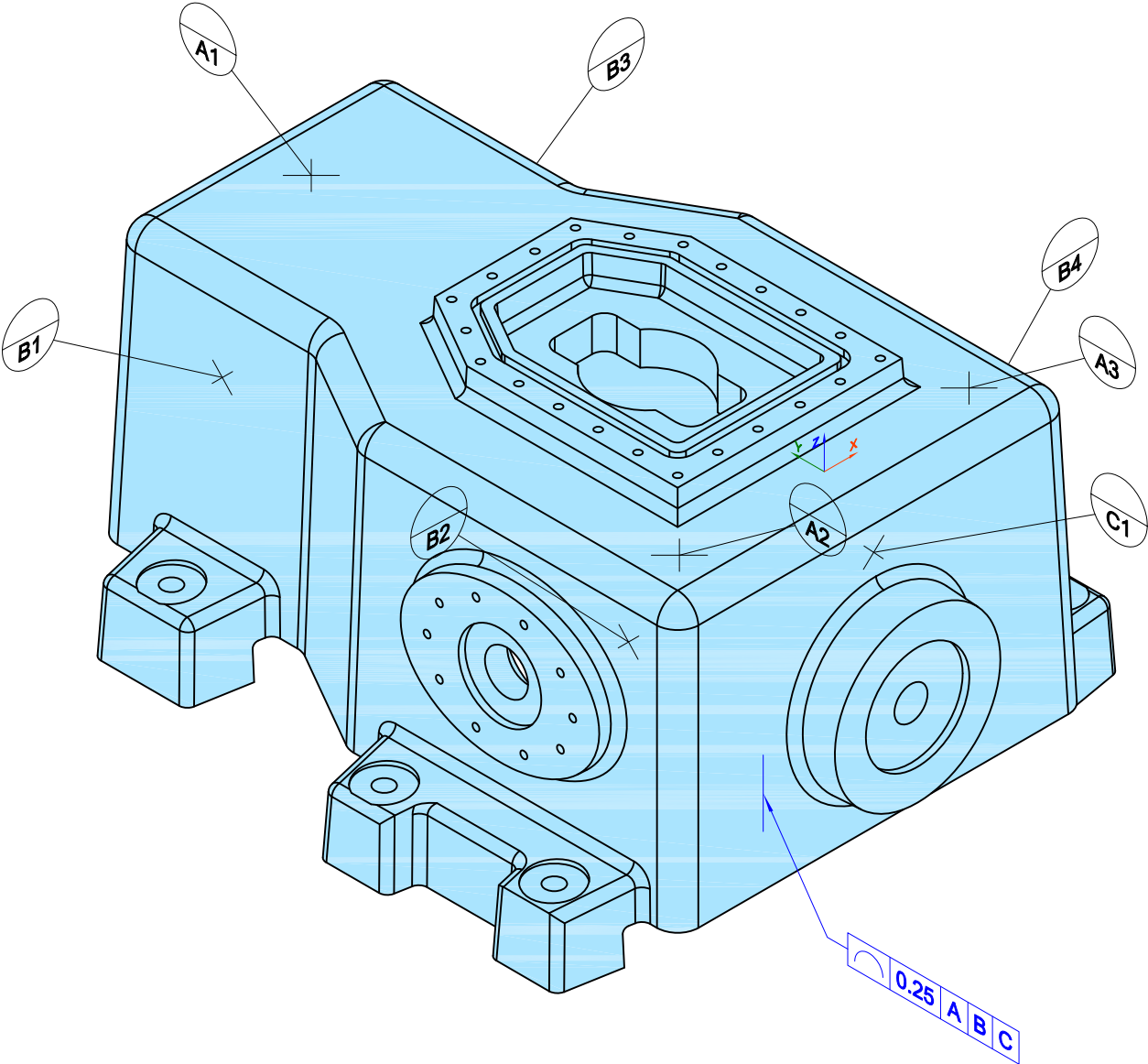
PMI Atomic Test Case 41



Measurand:

Leader-directed datum target symbols and
target point symbols applied to surfaces.

A1, A2, A3, B1, B2, B3, B4, C1.



Measurand:
Leader-directed feature control frame -
Profile of a line. Directed to supplemental
geometry (represented line element).

Test Model 2

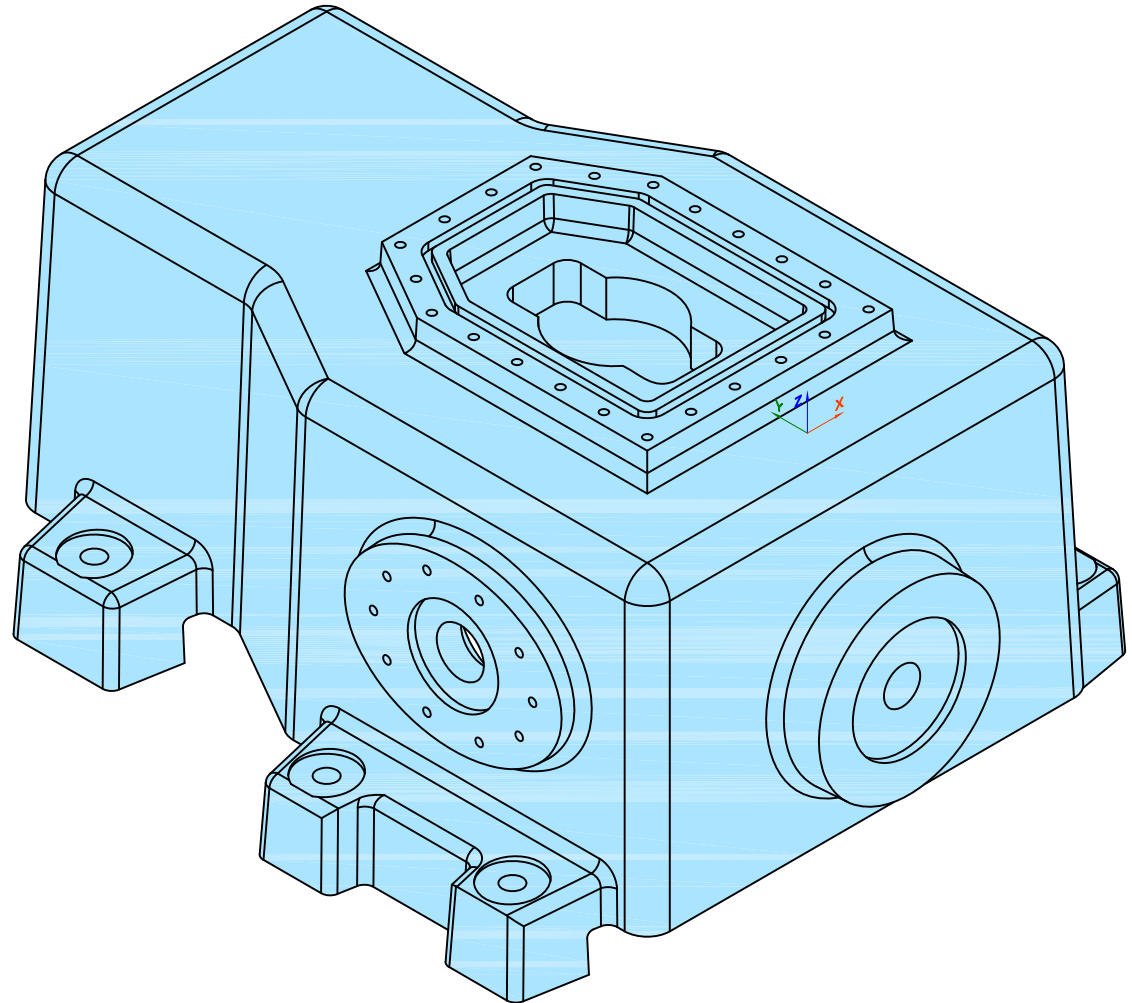
NOTES (UNLESS OTHERWISE SPECIFIED):

1. OBTAIN DIMENSIONS FOR ALL UNDIMENSIONED FEATURES FROM THE MODEL. ALL DIMENSIONS OBTAINED FROM THE MODEL ARE BASIC UNLESS OTHERWISE SPECIFIED.
2. ASME Y14.41-2003 APPLIES TO DATASET.
3. ASME Y14.5M-1994 APPLIES TO DIMENSIONING AND TOLERANCING.

These notes shall be placed on a static annotation plane (the plane does not rotate with the model).

The intent of ATC50 is to test systems' support for static annotation planes.

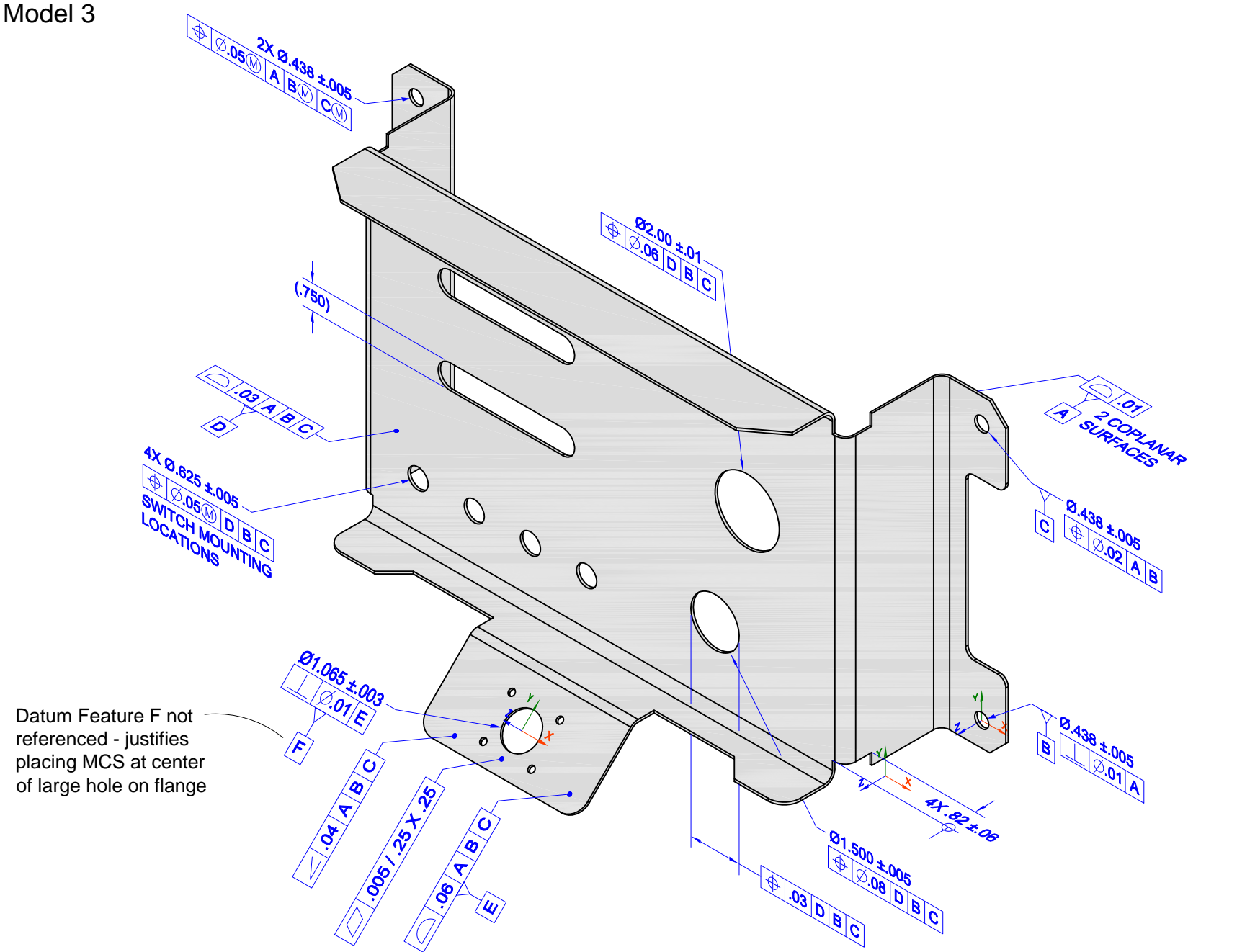
Including a feature control frame in a general note will be a test case in the next round of testing.



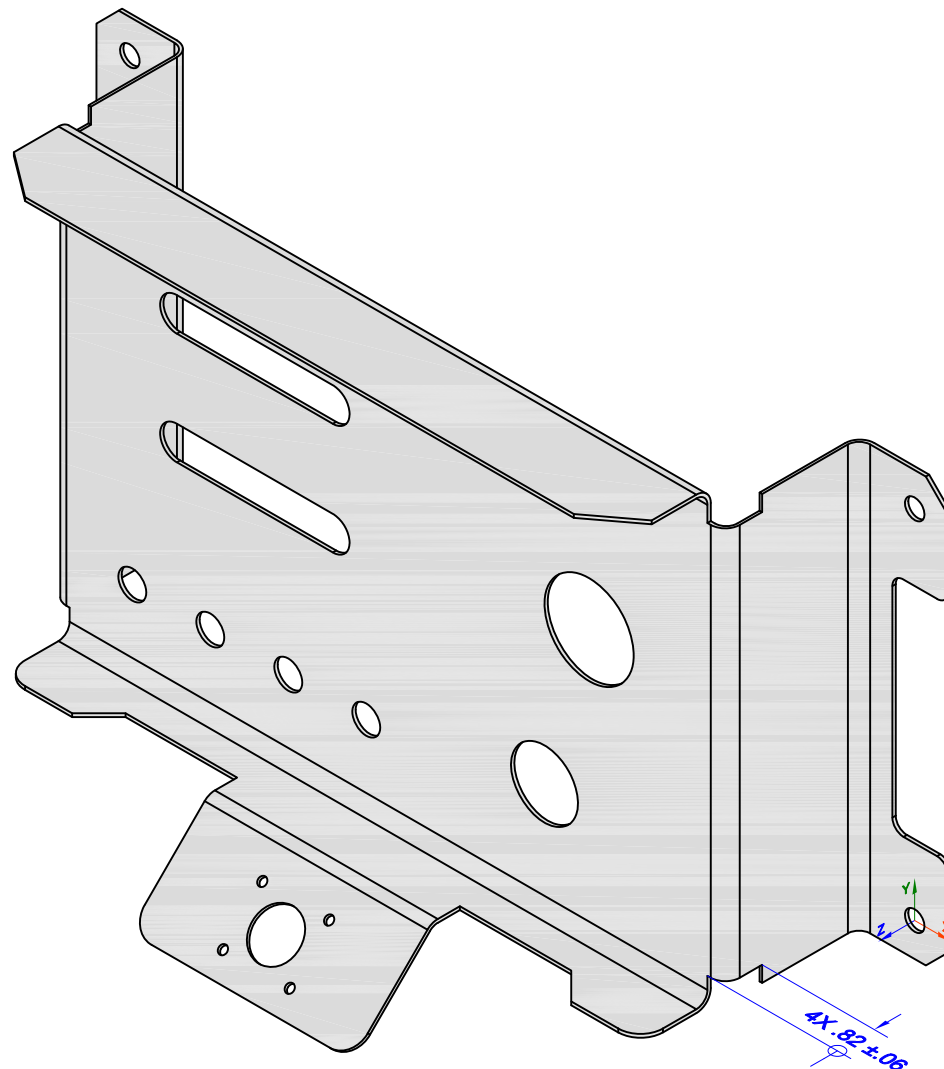
Measurand:

Annotation on a static annotation plane. Static annotation plane.

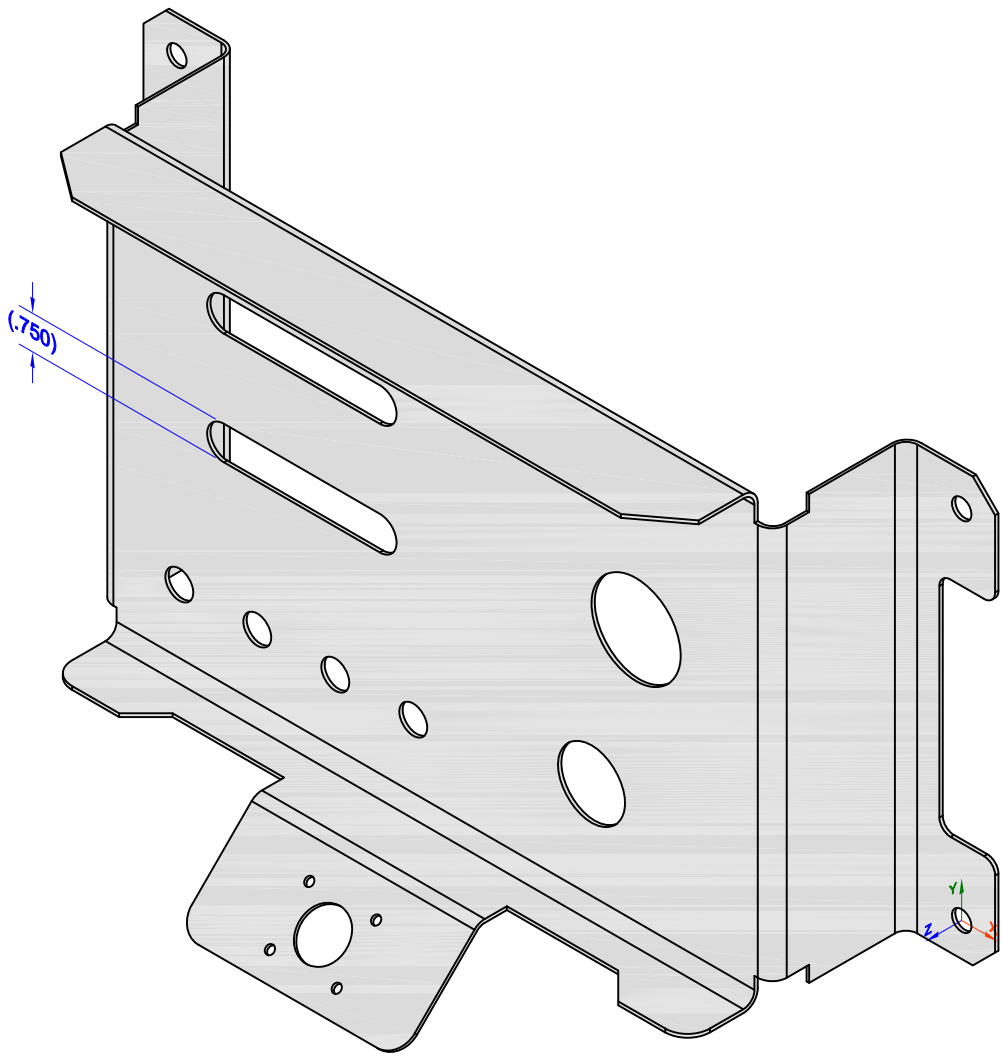
Test Model 3



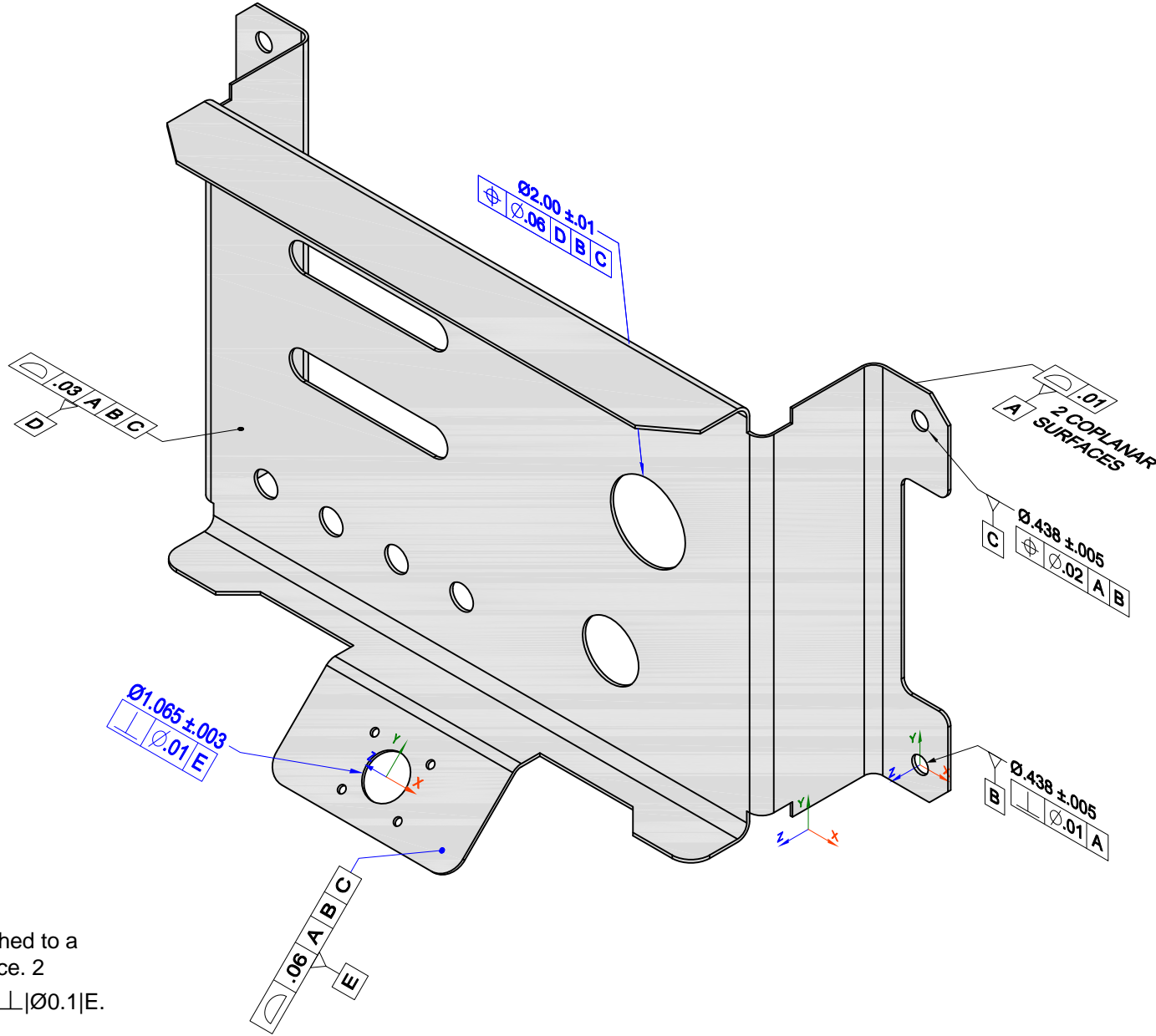
Datum Feature F not referenced - justifies placing MCS at center of large hole on flange



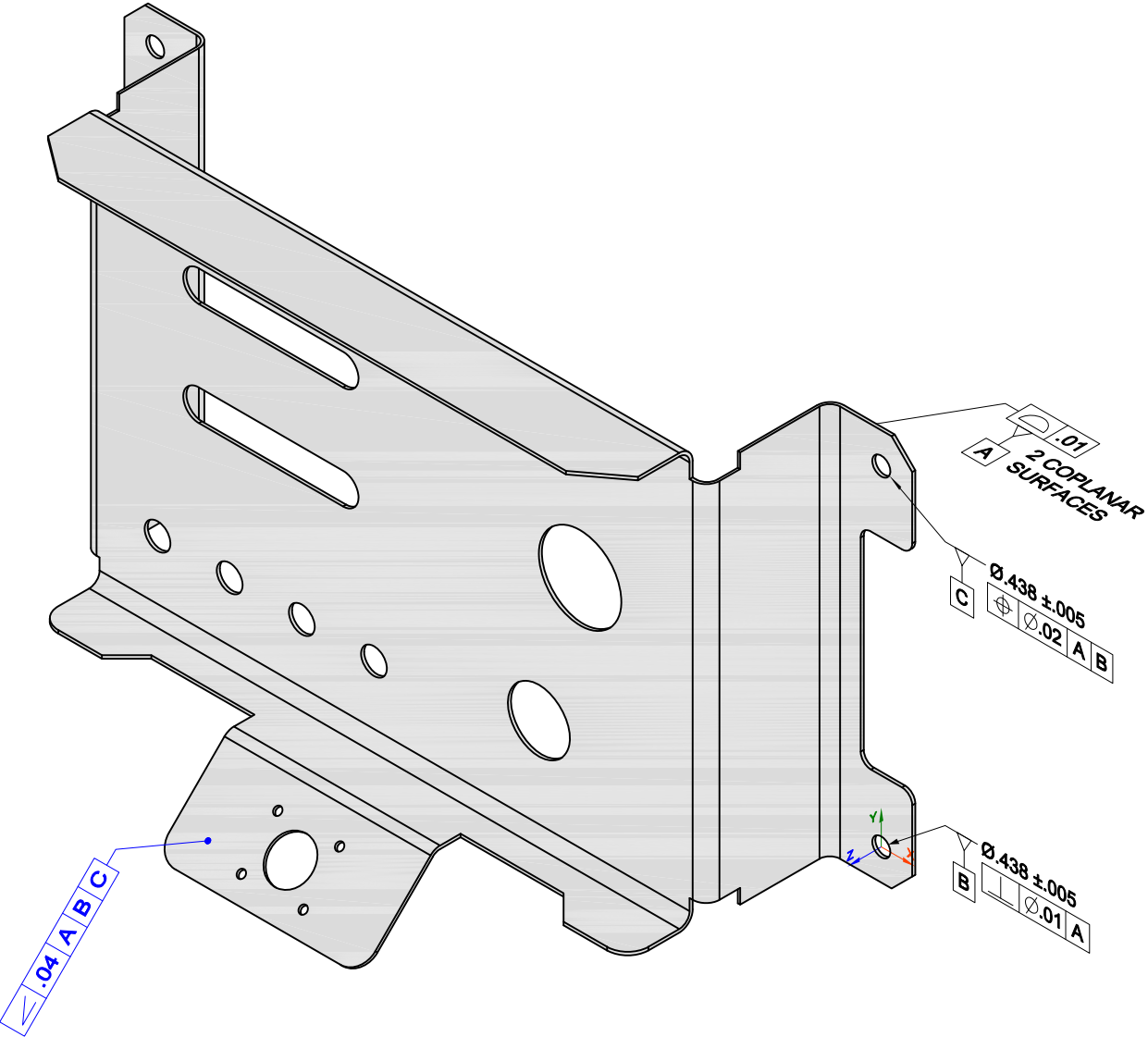
Measurand:
Directly-toleranced dimension
with dimension origin symbol.



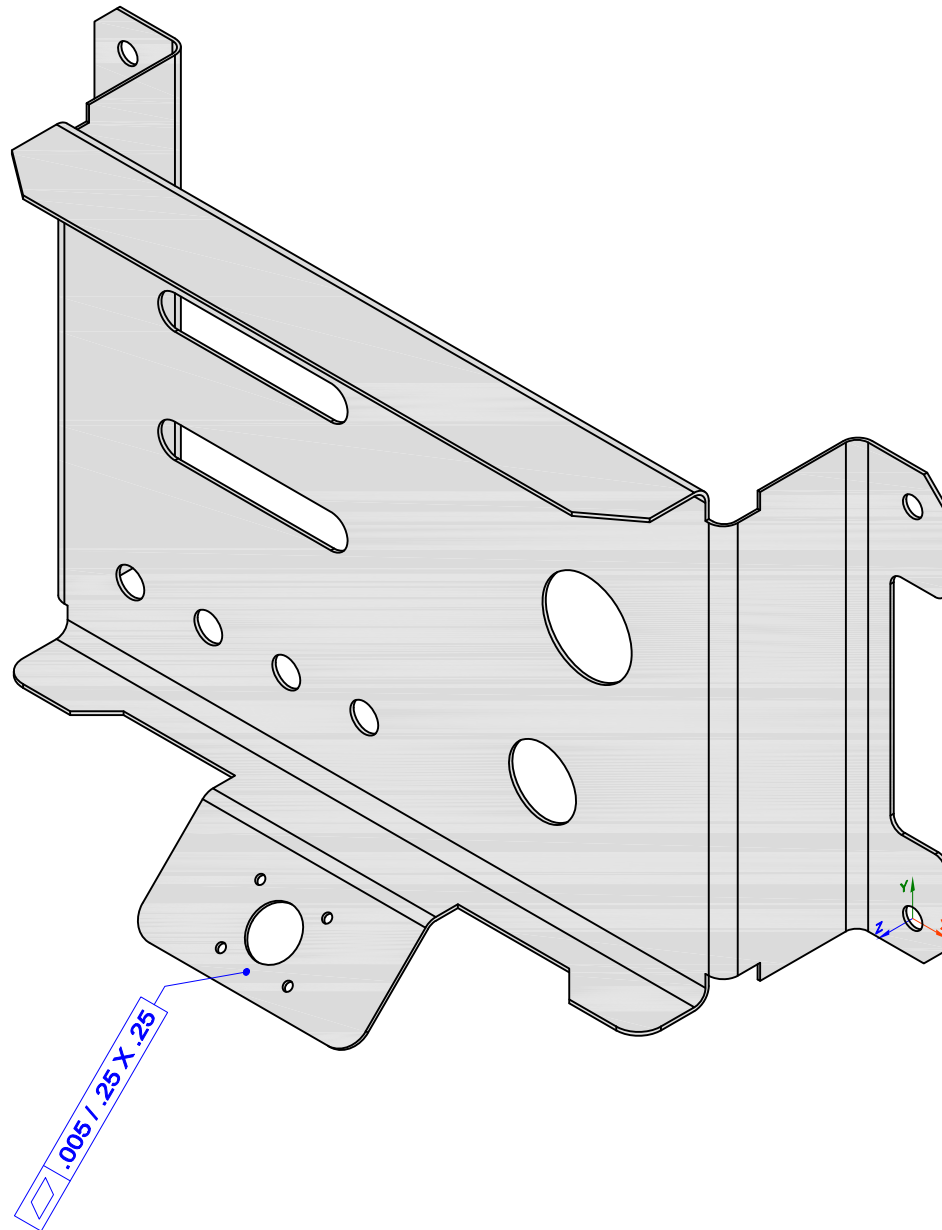
Measurand:
Reference dimension.



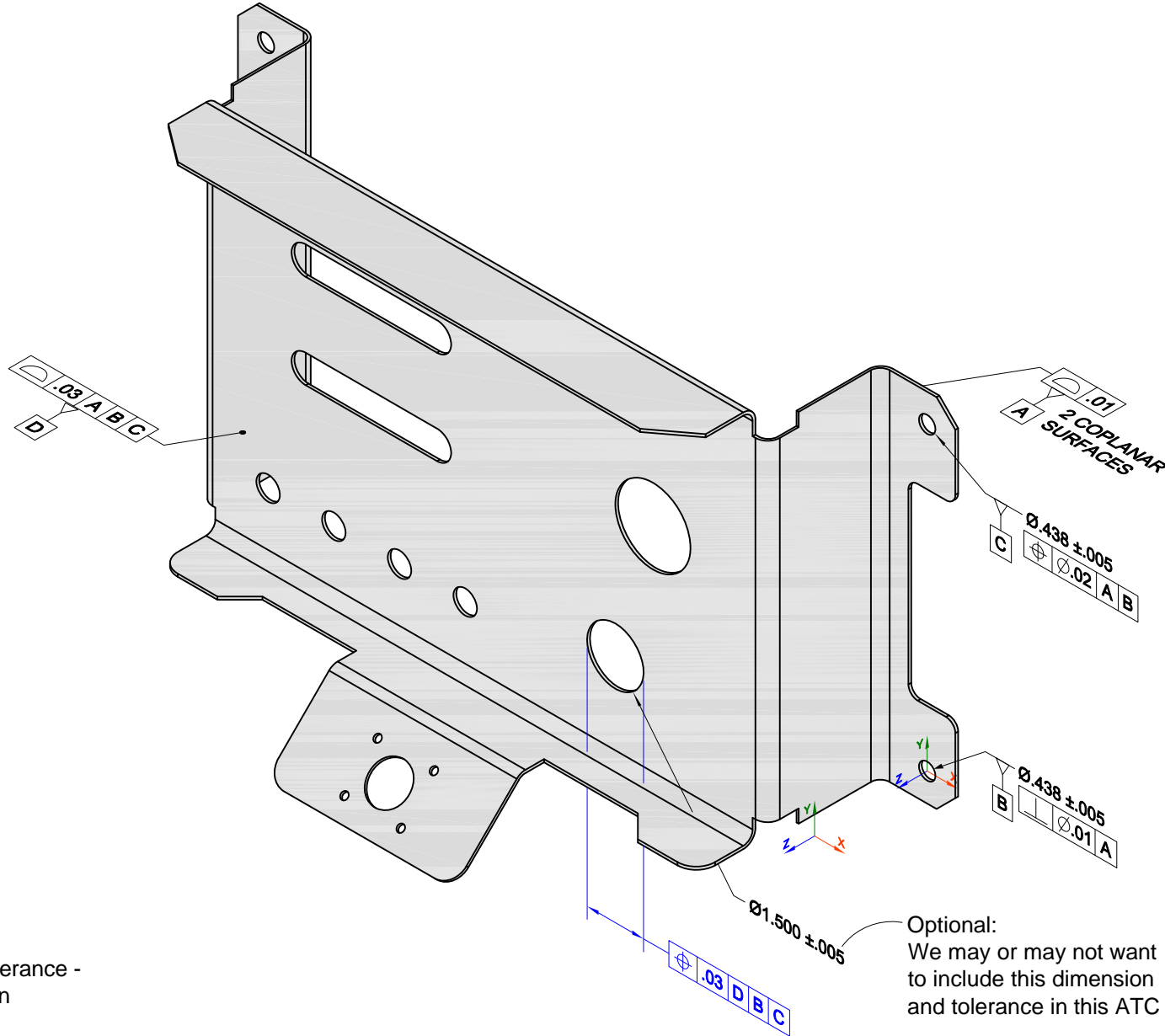
Measurand:
Feature control frame attached to a size dimension and tolerance. 2 examples, $\varnothing |\varnothing .06$ D|B|C, $\perp |\varnothing .01$ |E.



Measurand:
Leader-directed feature control
frame - Angularity.

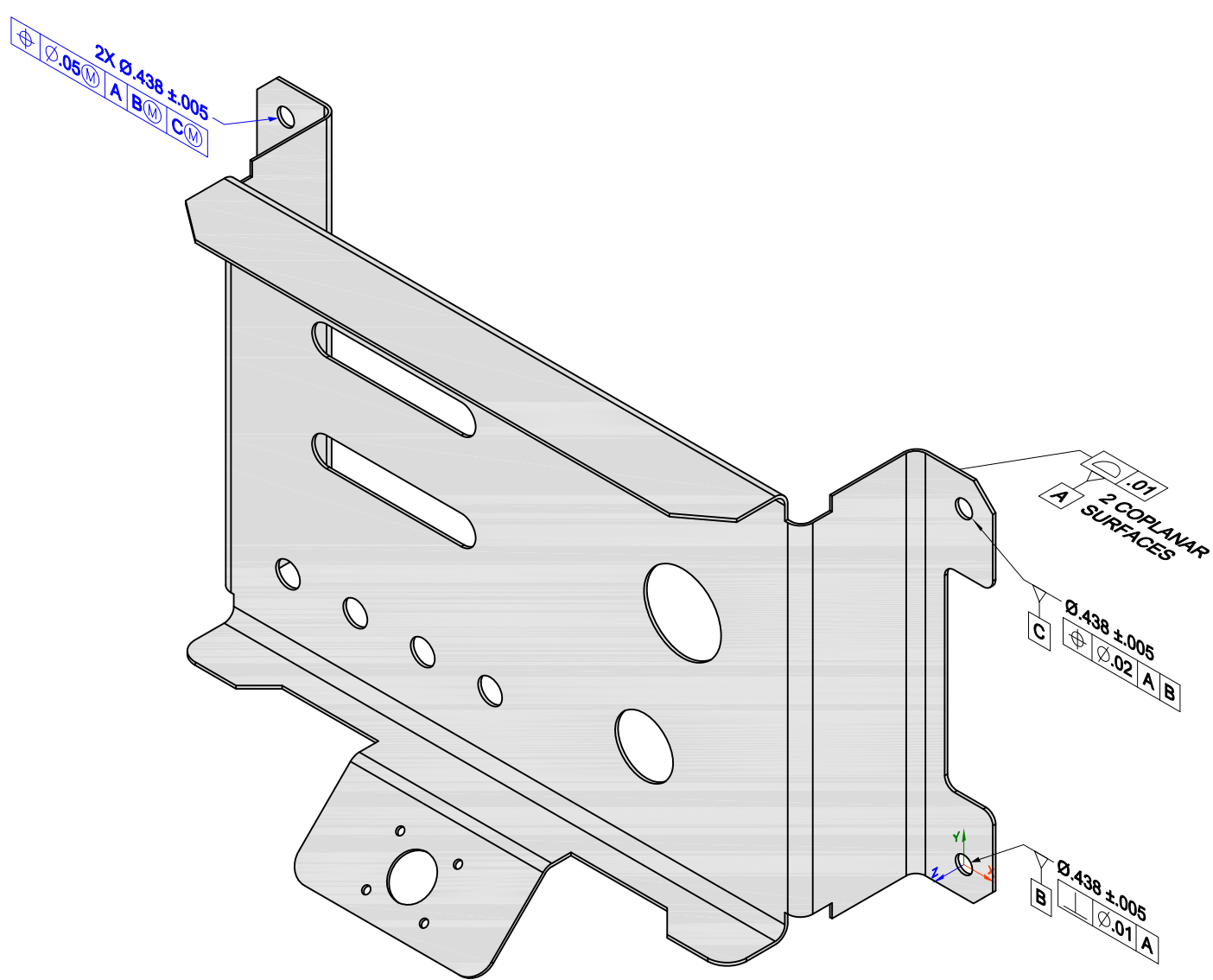


Measurand:
Leader-directed feature control
frame - Flatness applied on a
unit-basis.

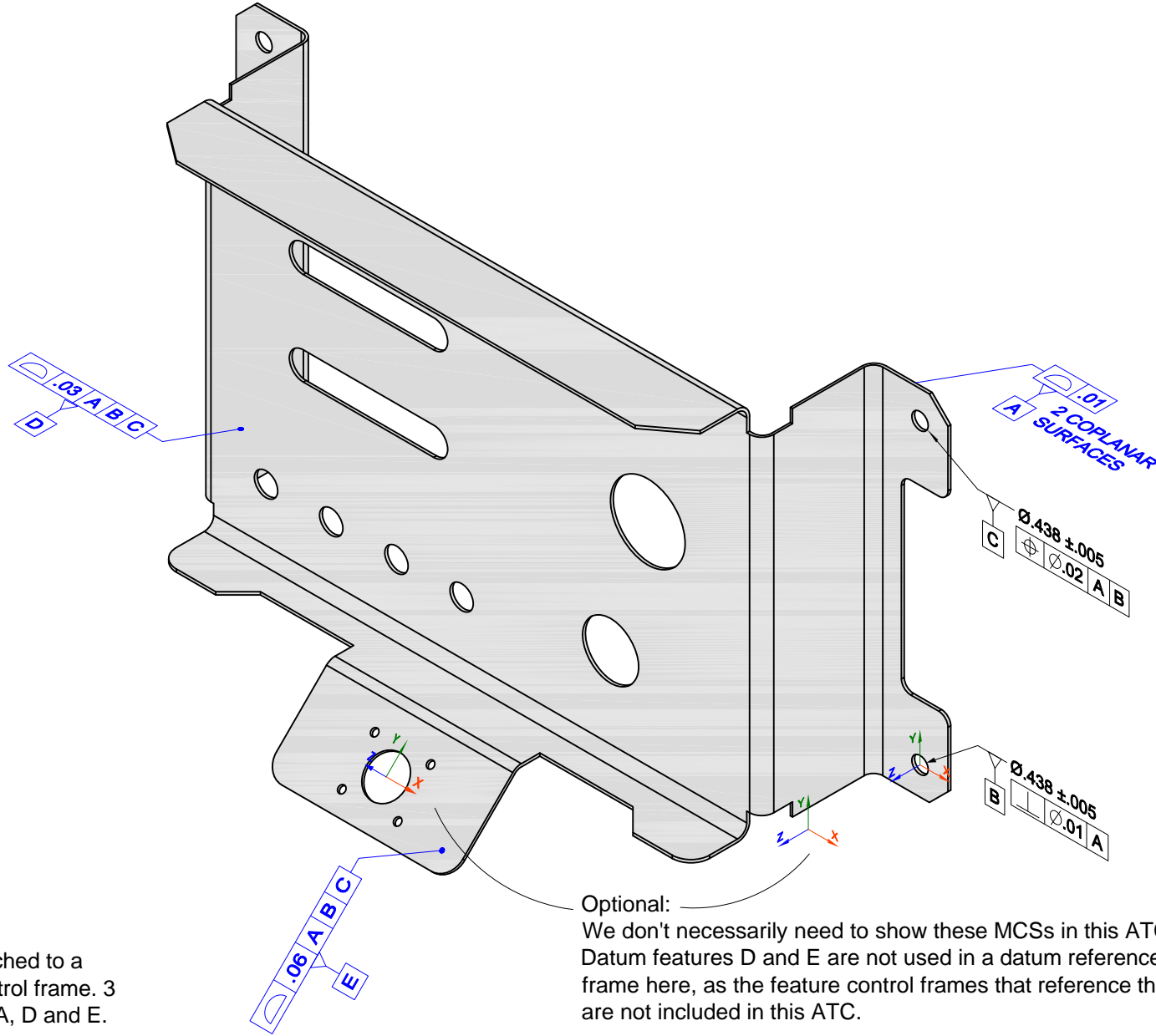


Measurand:
Unidirectional geometric tolerance -
Position. Note: presentation
indicates direction.

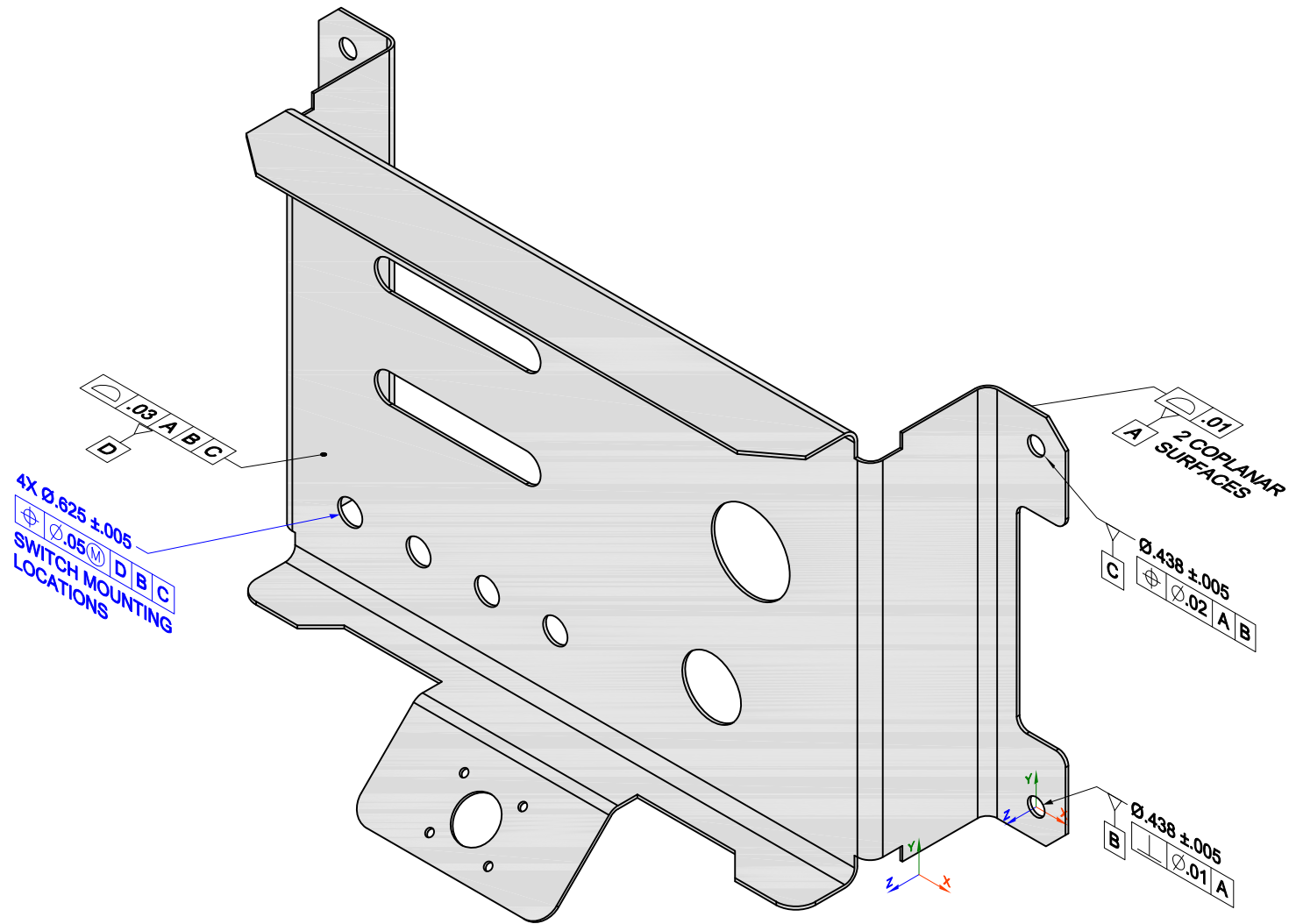
Optional:
We may or may not want
to include this dimension
and tolerance in this ATC



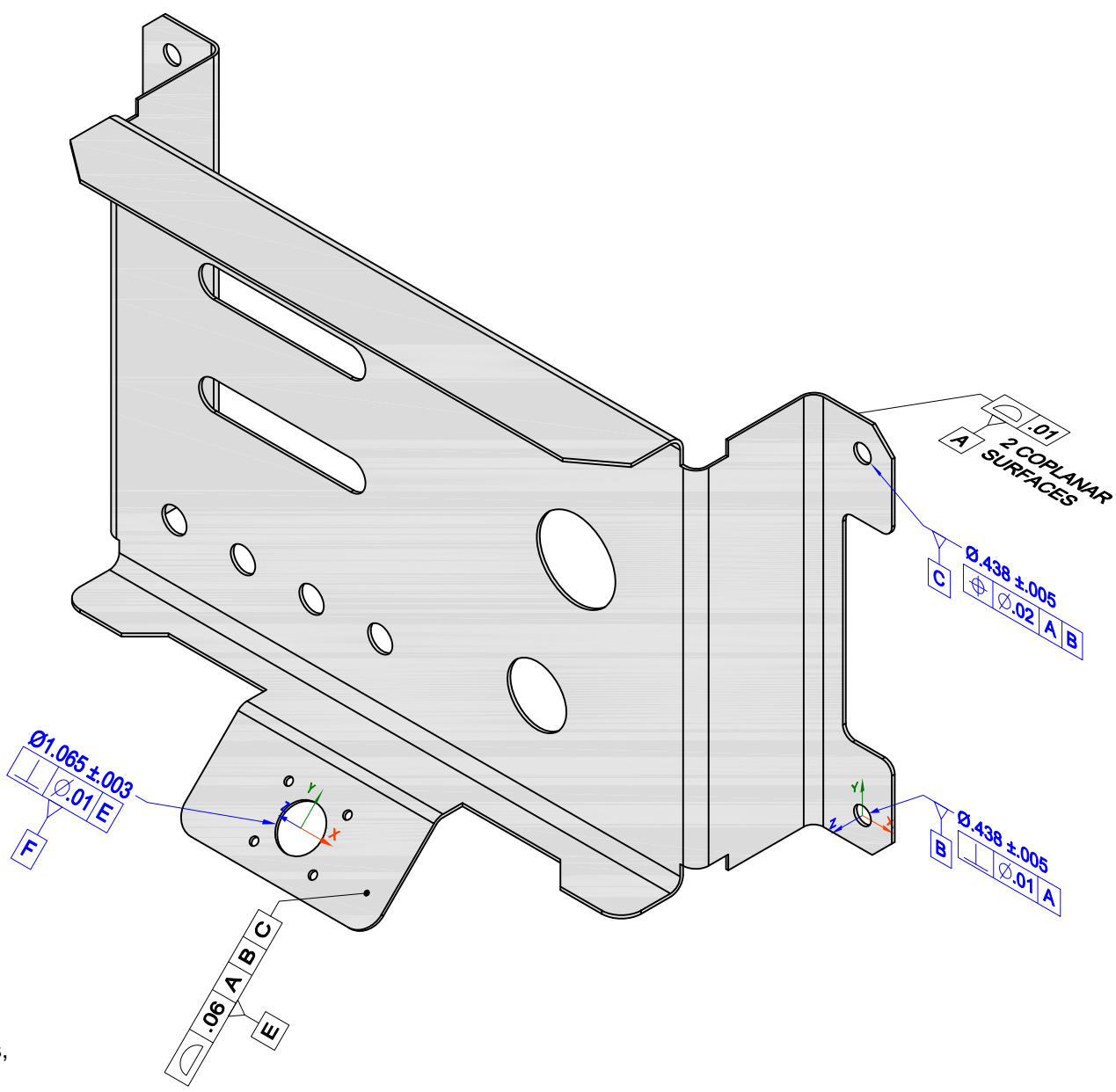
Measurand:
Feature control frame - Position
with MMC and MMB modifiers.



Measurand:
Datum feature symbol attached to a leader-directed feature control frame. 3 examples, datum features A, D and E.



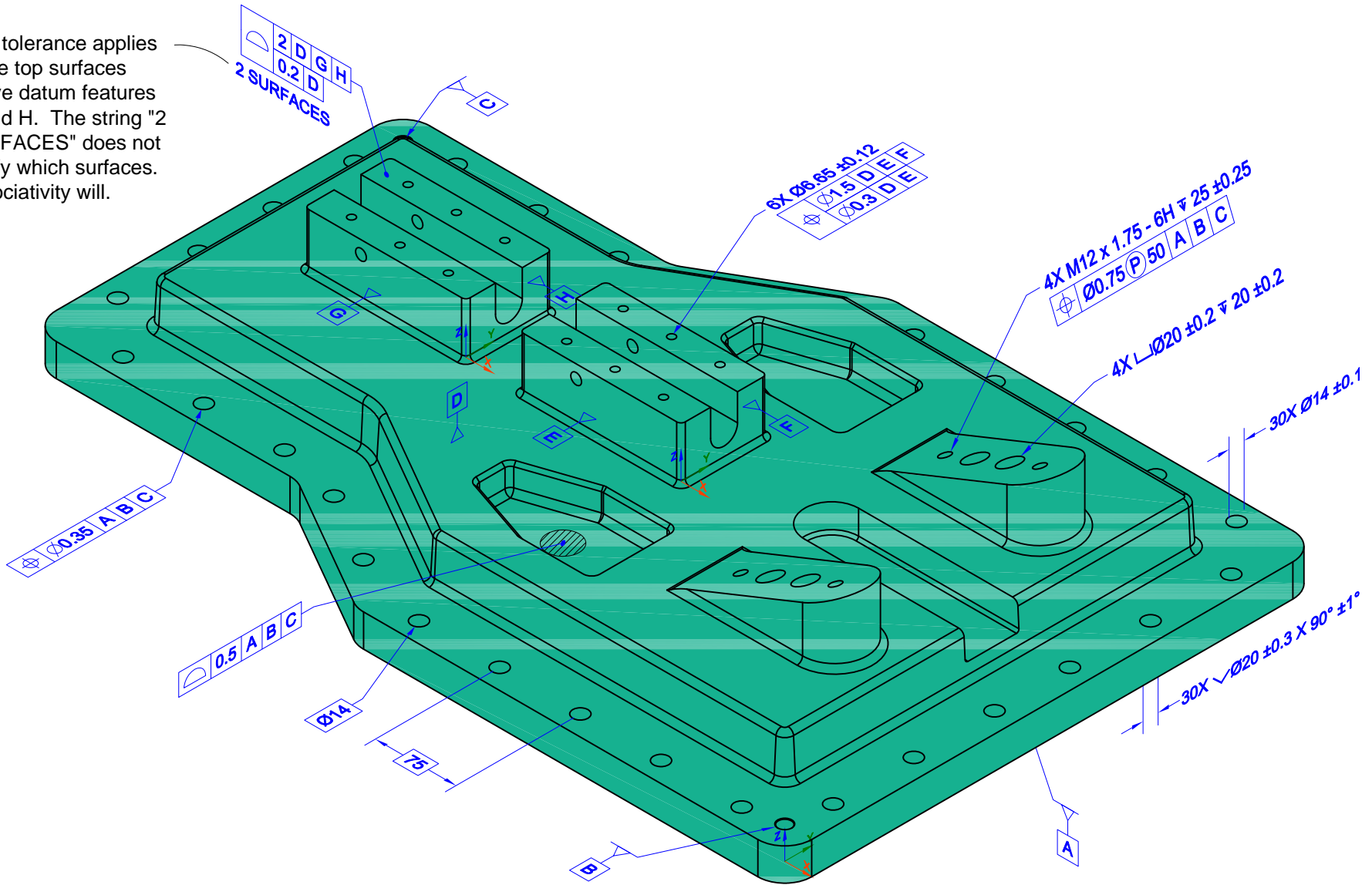
Measurand:
Size dimension with feature control
frame and string attached, applied nX.



Measurand:
Size dimension and tolerance with
feature control frame and datum
feature symbol attached. 3 examples,
datum features B, C, and F.

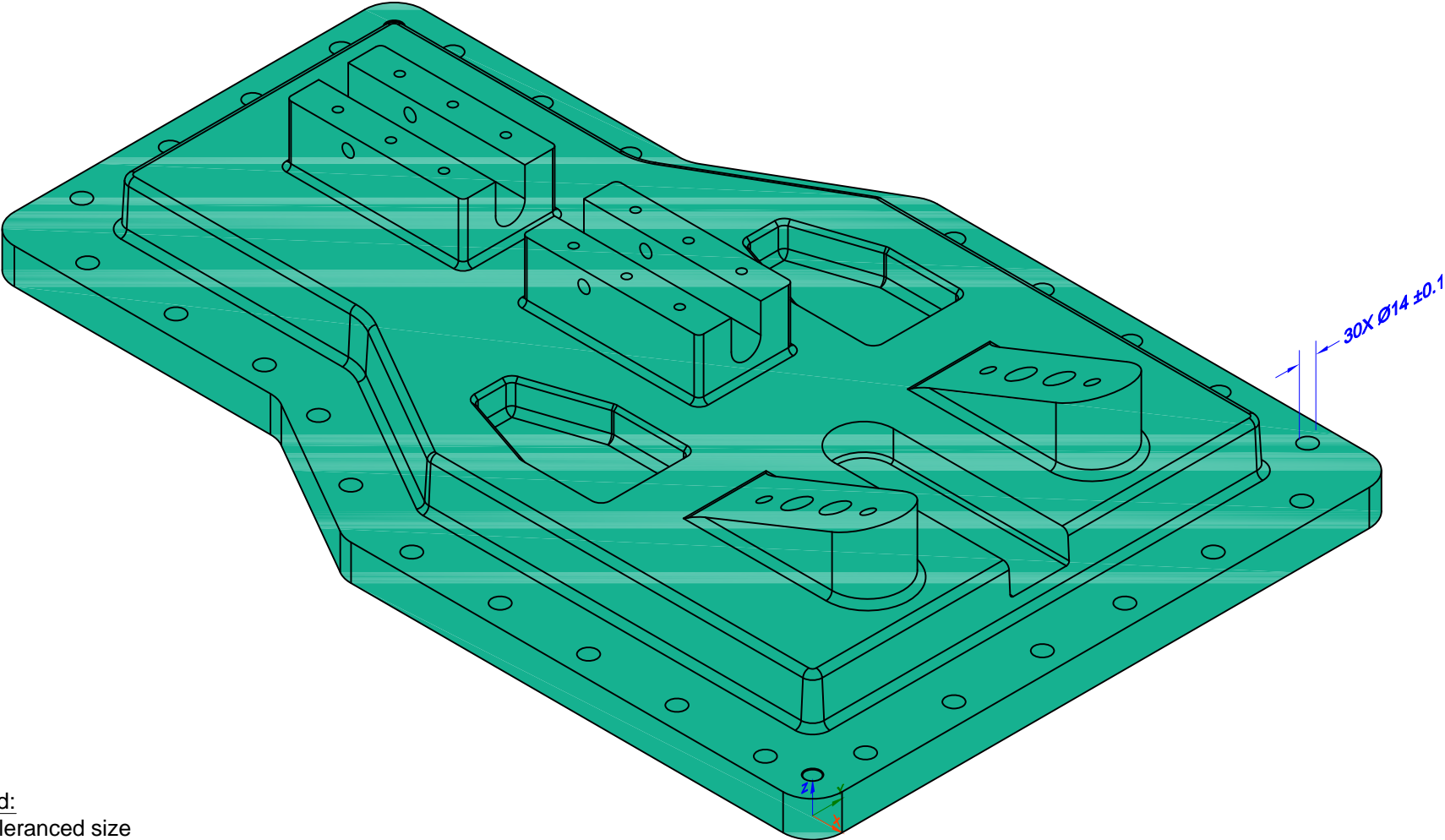
Test Model 4

This tolerance applies to the top surfaces above datum features G and H. The string "2 SURFACES" does not clarify which surfaces. Associativity will.

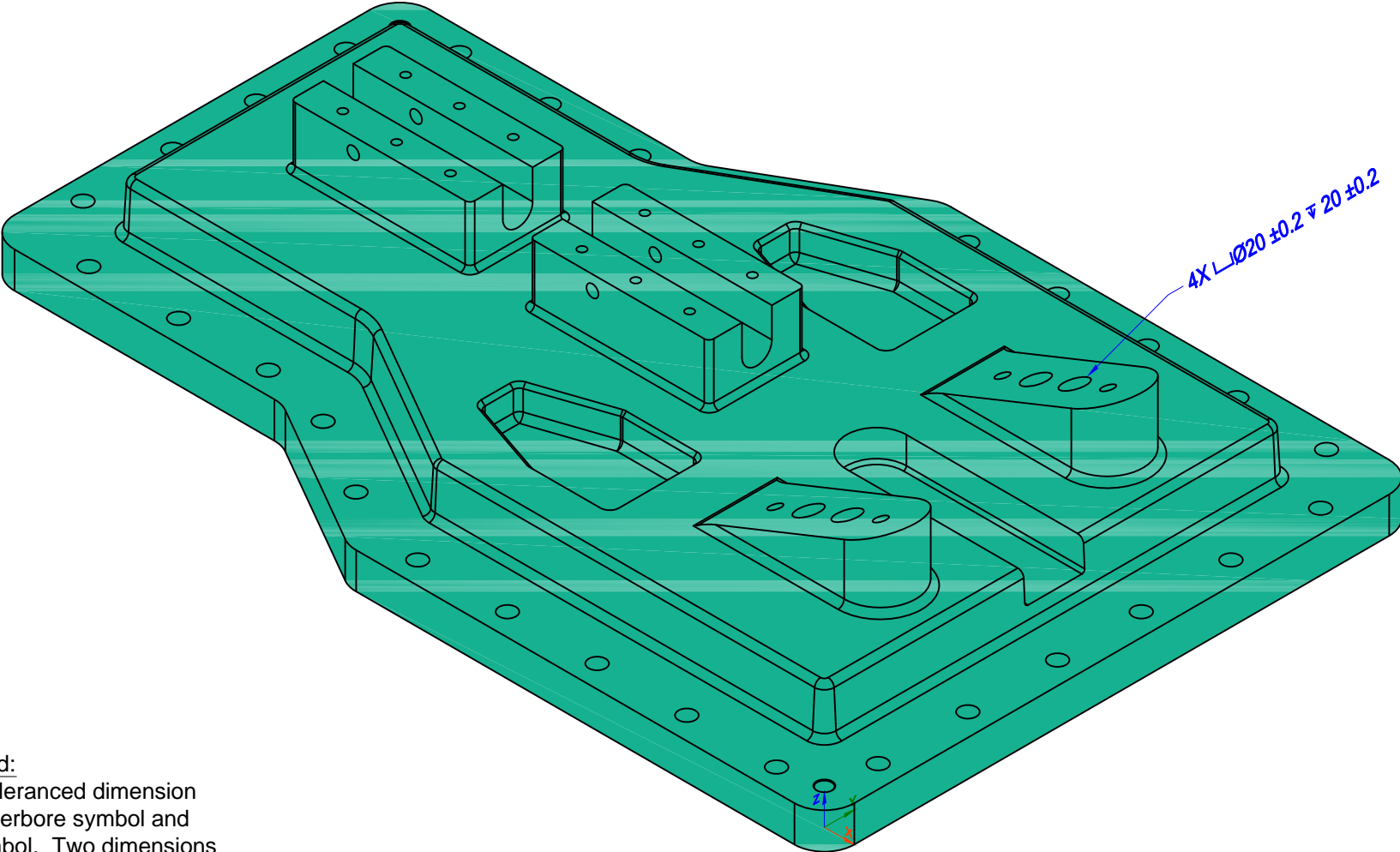


PMI Complex Test Case 4

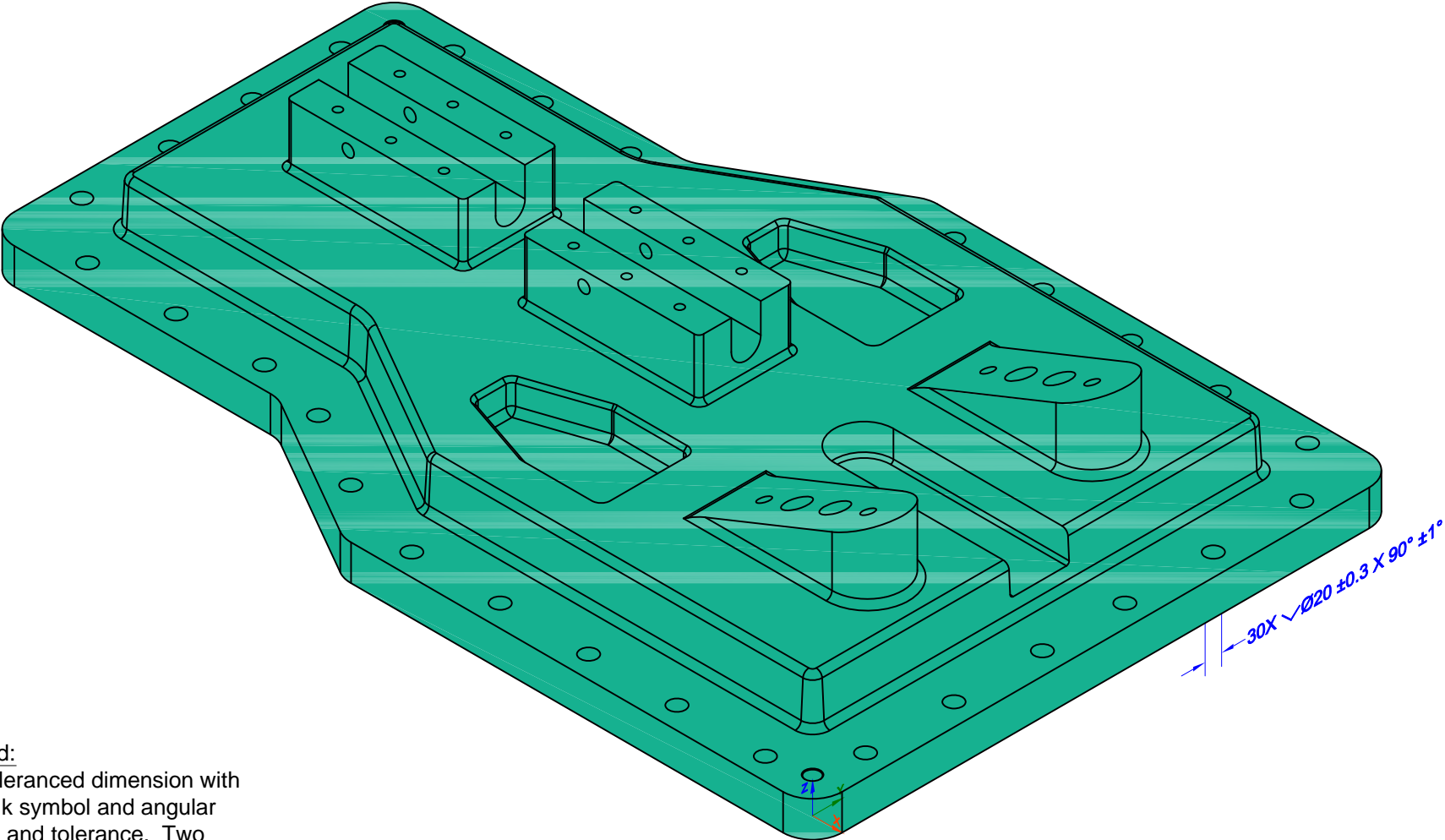
Includes Atomic Test Cases - 5, 9, 10, 12, 15, 16, 22, 30, 40, 49



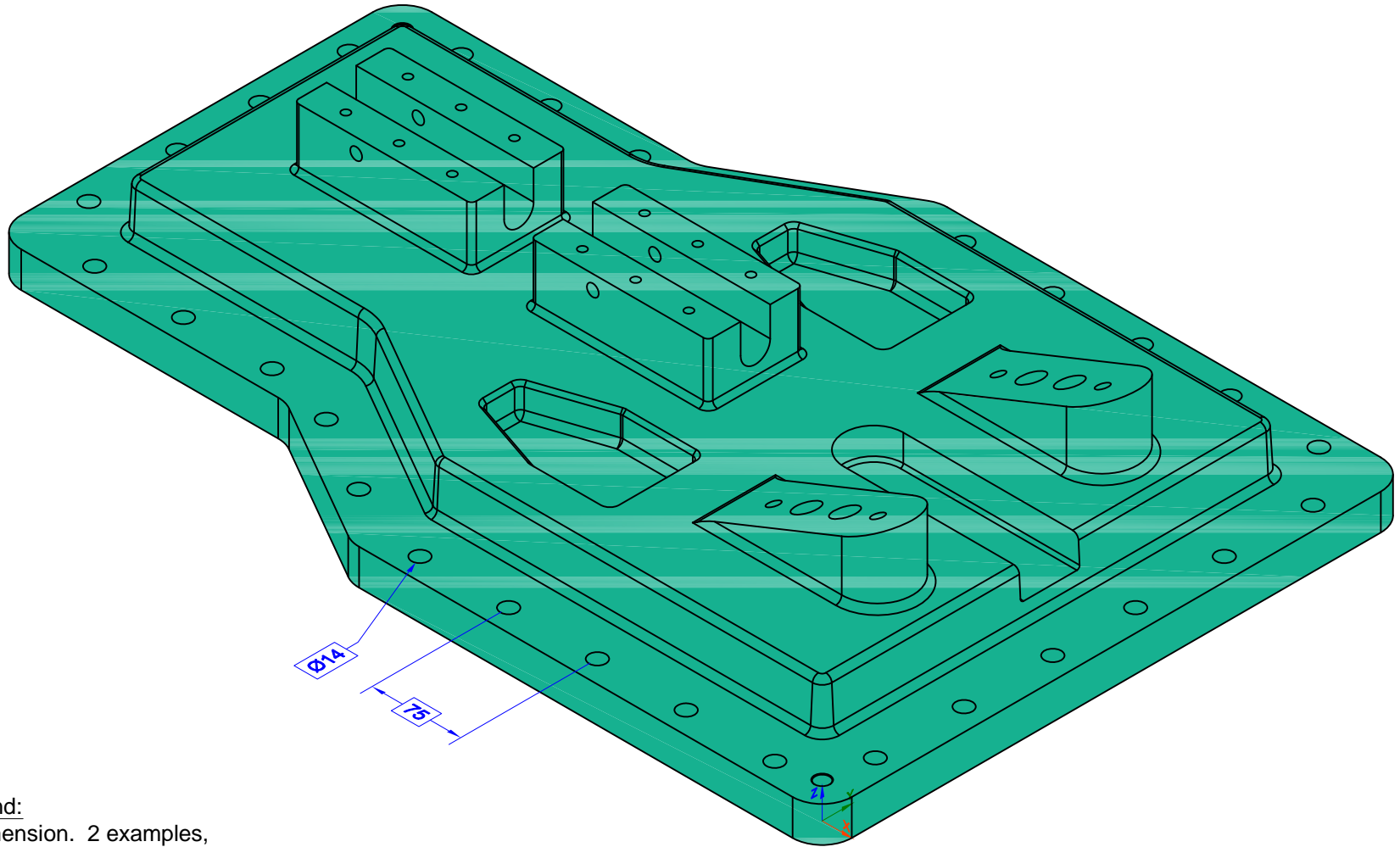
Measurand:
Directly-toleranced size
dimension with nX quantity.



Measurand:
Directly-toleranced dimension
with counterbore symbol and
depth symbol. Two dimensions
and two tolerances in one
specification.



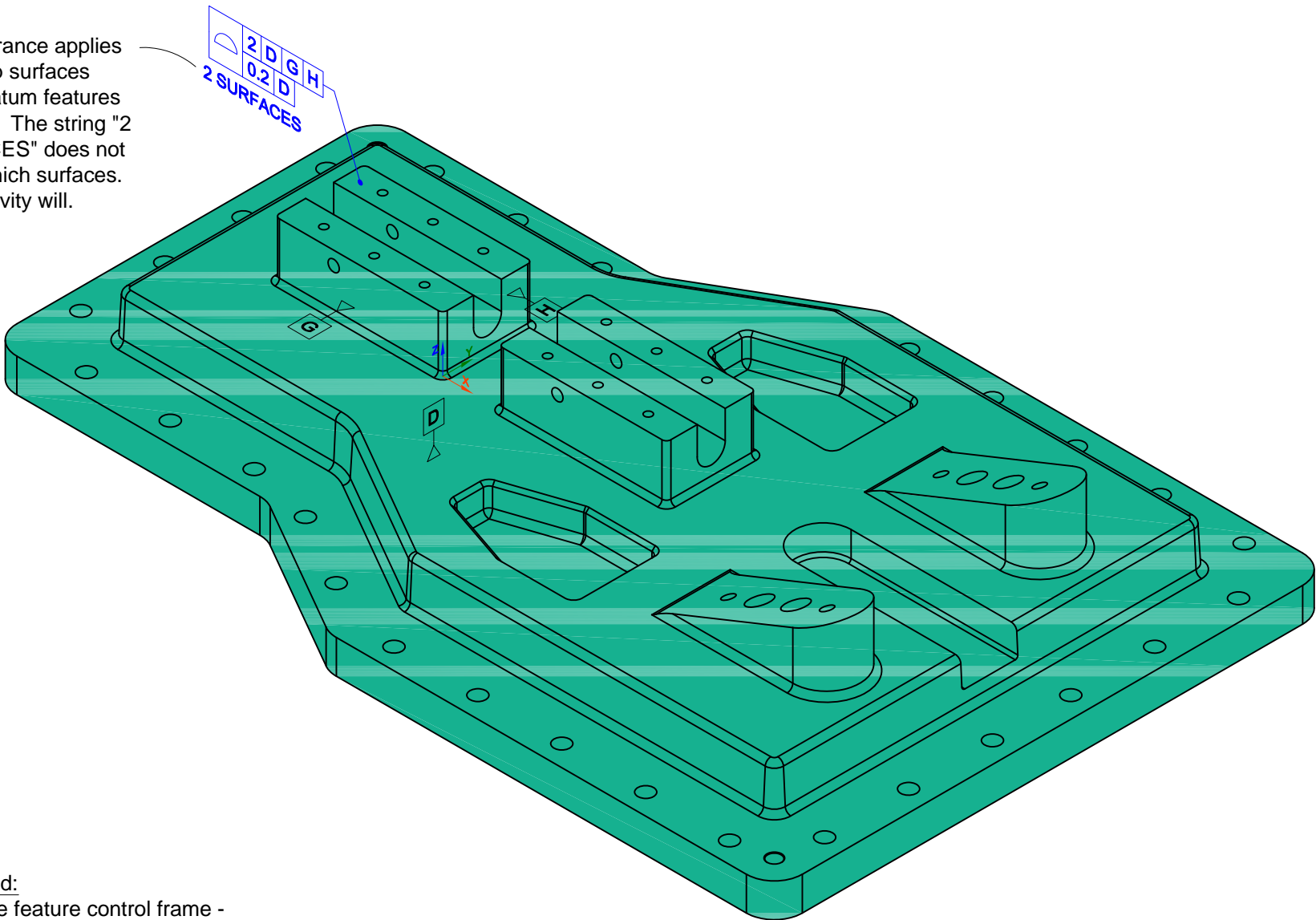
Measurand:
Directly-toleranced dimension with
countersink symbol and angular
dimension and tolerance. Two
dimensions and two tolerances in
one specification.



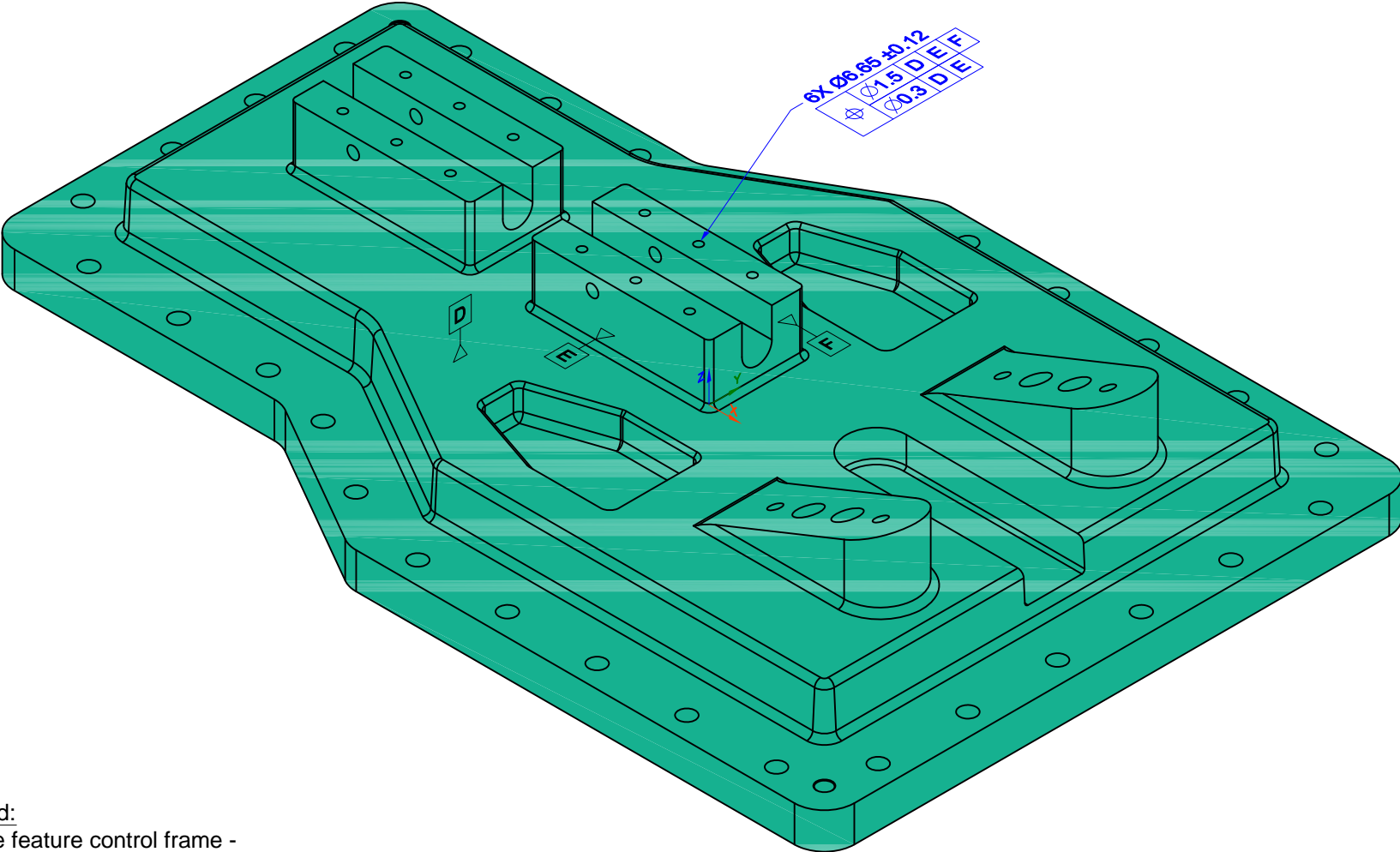
Measurand:
Basic dimension. 2 examples,
 $\varnothing 14$ and 75.

Test Model 4

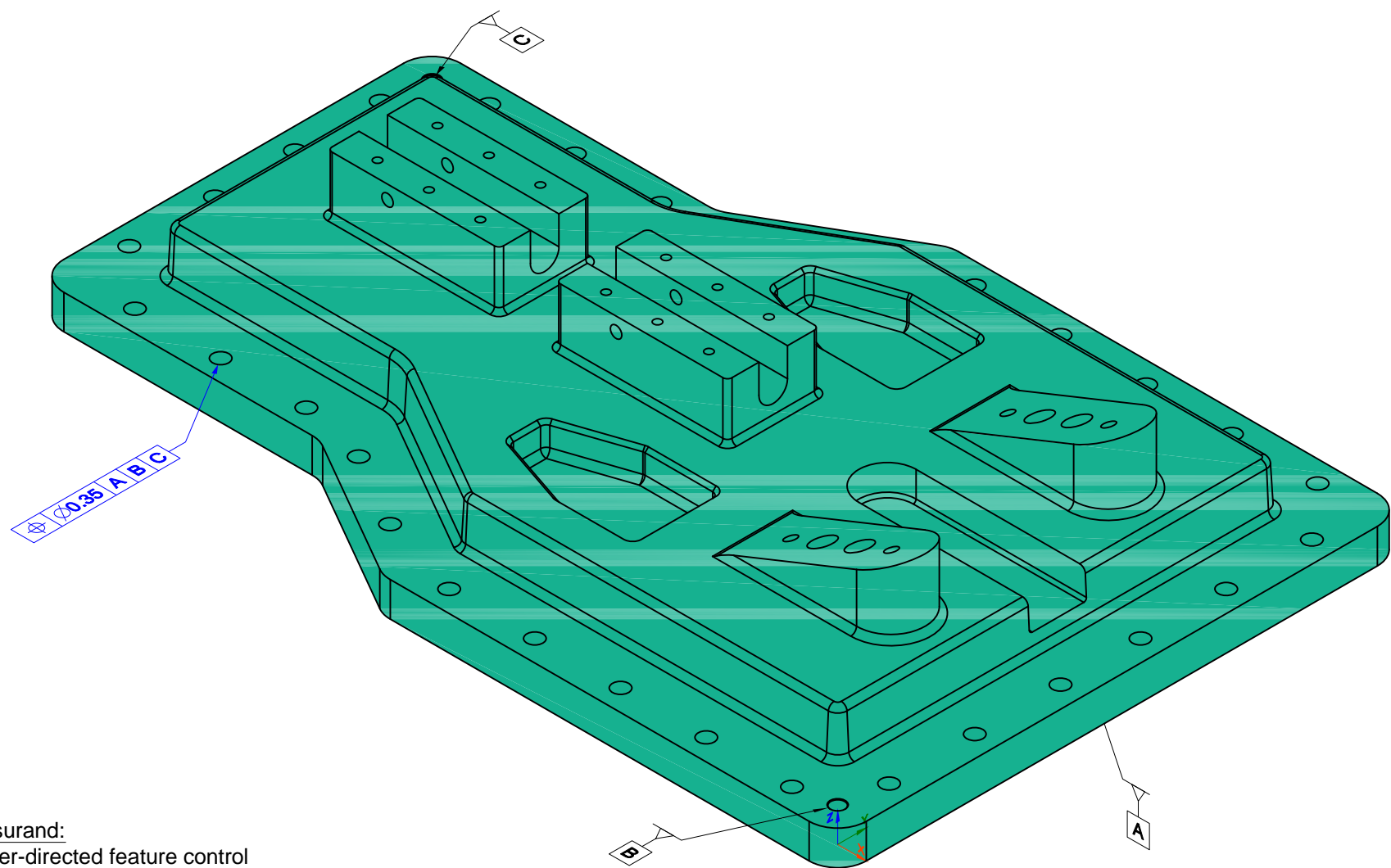
This tolerance applies to the top surfaces above datum features G and H. The string "2 SURFACES" does not clarify which surfaces. Associativity will.



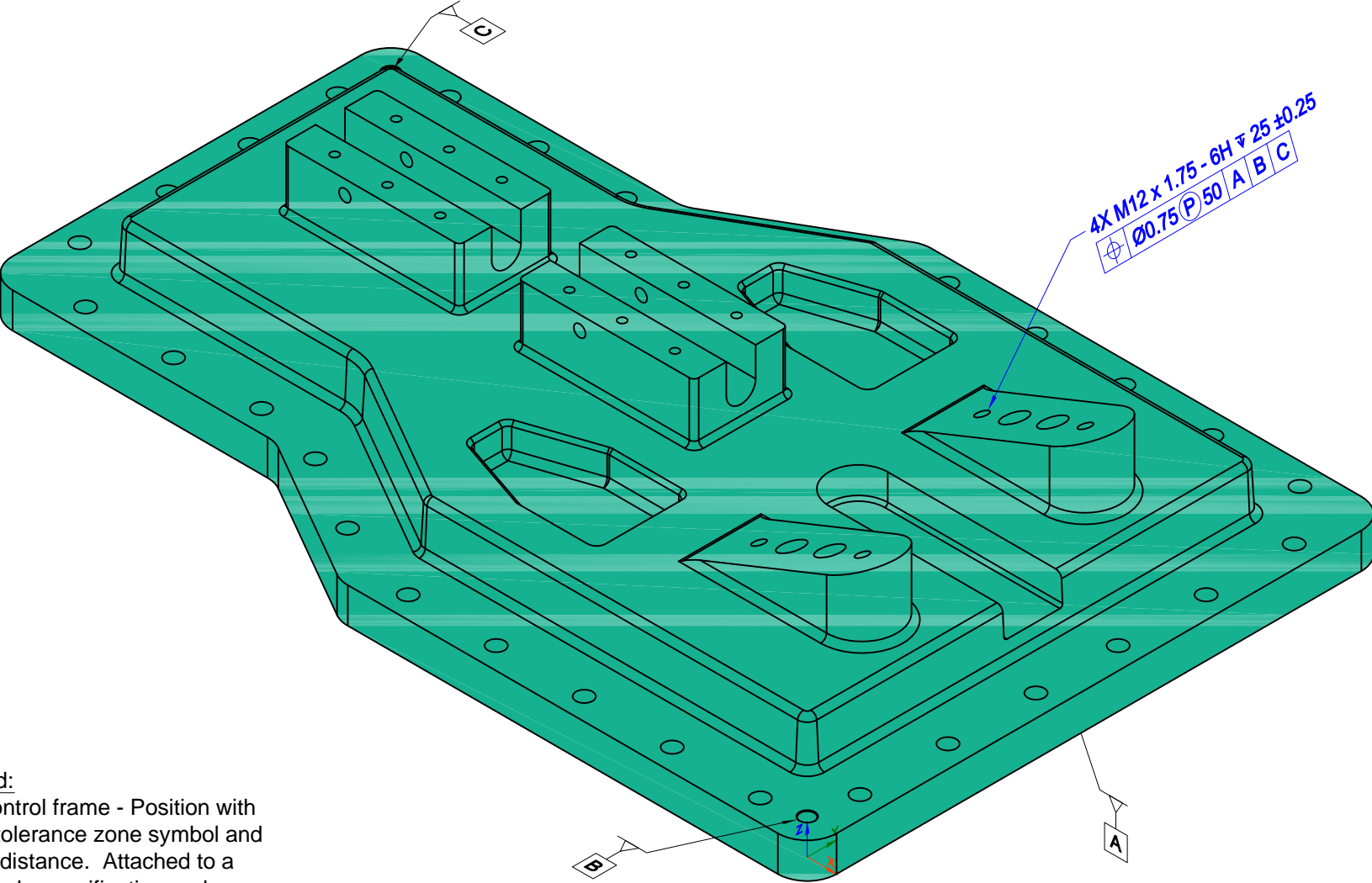
Measurand:
Composite feature control frame -
Profile of a surface, With string
grouping mechanism.



Measurand:
Composite feature control frame -
Position with 2 segments. Attached to
a directly-toleranced dimension.



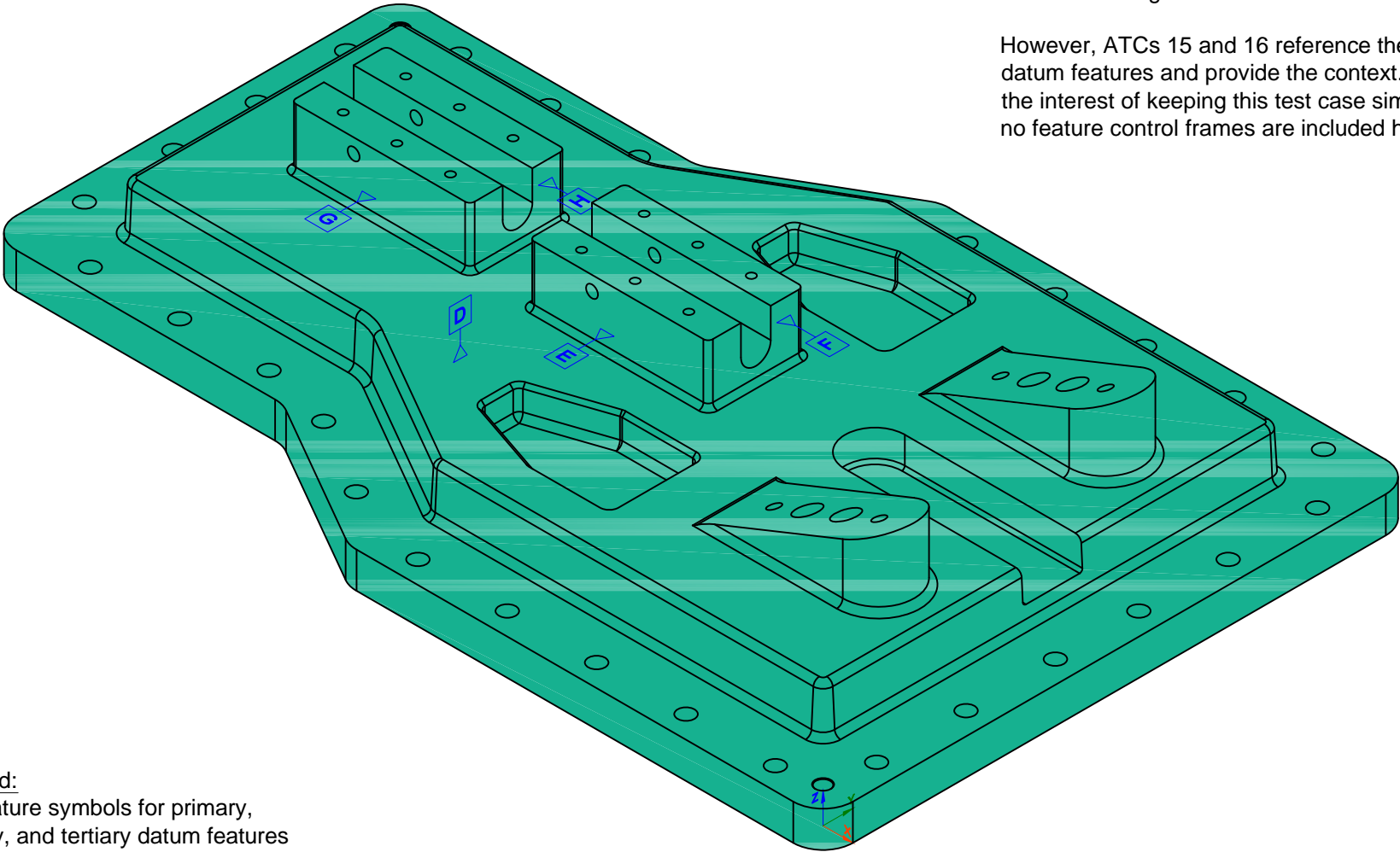
Measurand:
Leader-directed feature control
frame - Position. Not attached
to a dimension.



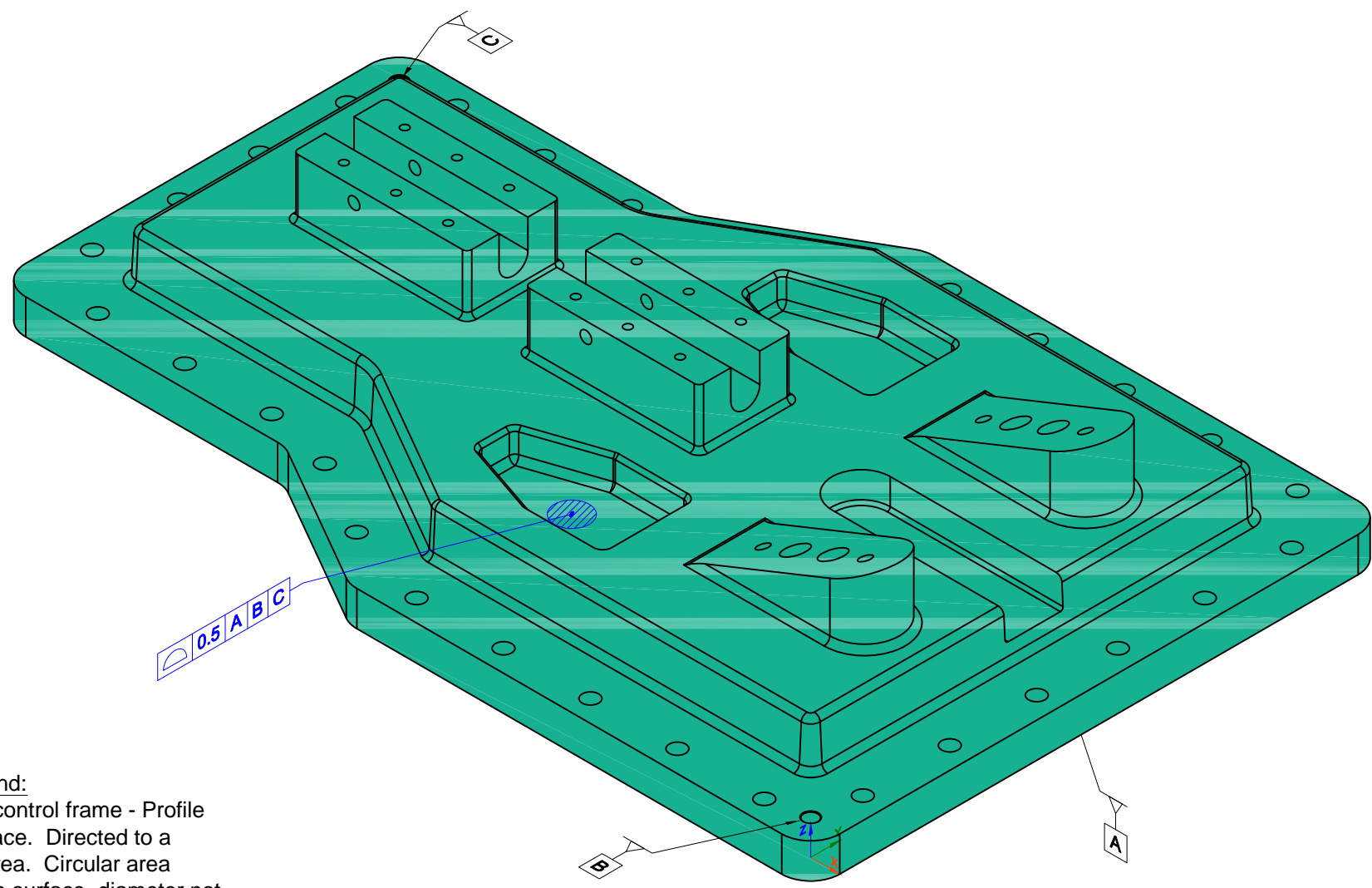
Measurand:
Feature control frame - Position with projected tolerance zone symbol and projection distance. Attached to a threaded hole specification and depth dimension and tolerance.

Note:
To say that these datum feature symbols represent primary, secondary, or tertiary datum features is meaningless without a feature control frame to define their contextual usage.

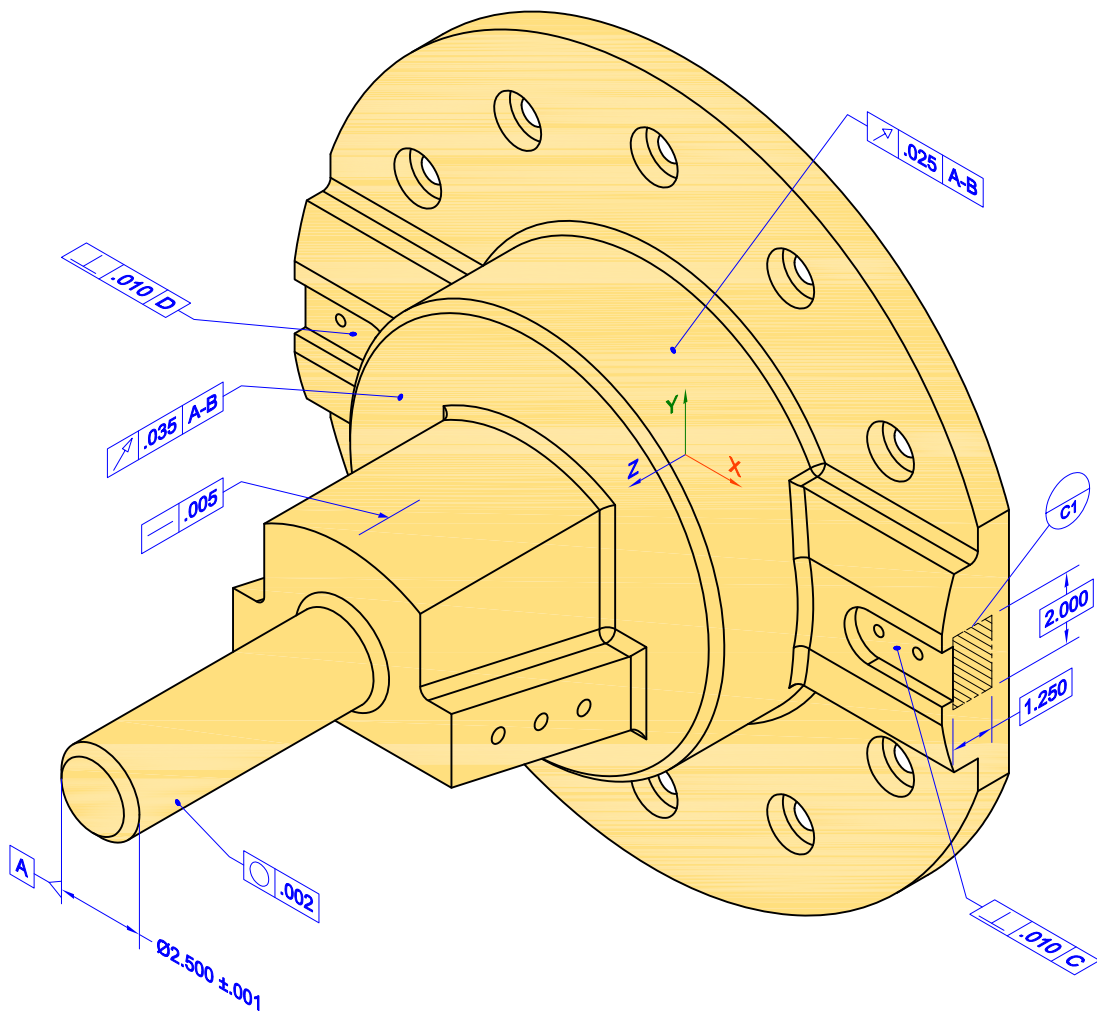
However, ATCs 15 and 16 reference these datum features and provide the context. In the interest of keeping this test case simple, no feature control frames are included here.



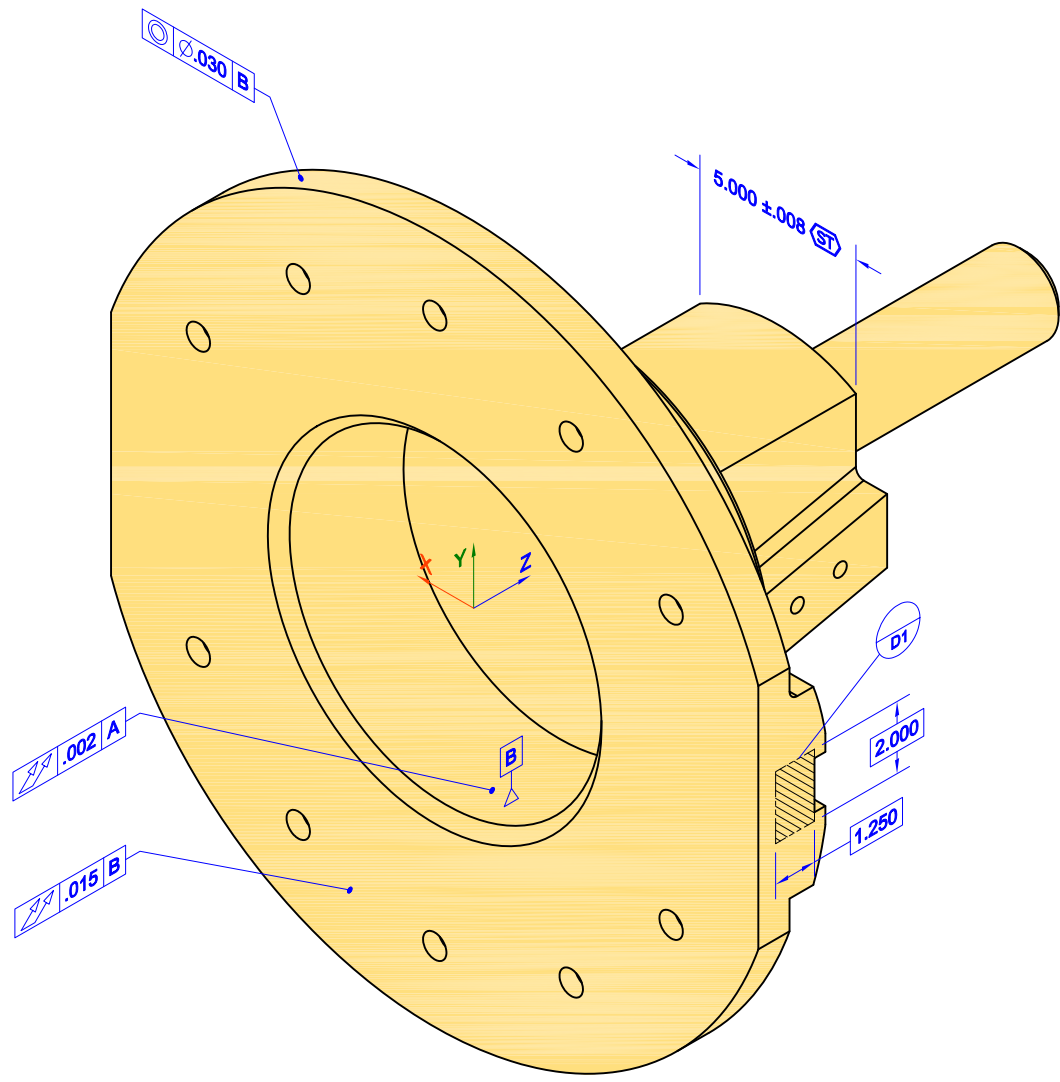
Measurand:
Datum feature symbols for primary, secondary, and tertiary datum features attached directly to surfaces. 5 examples, datum features D, E, F, G and H



Measurand:
Feature control frame - Profile
of a surface. Directed to a
limited area. Circular area
shown on surface, diameter not
explicitly dimensioned.

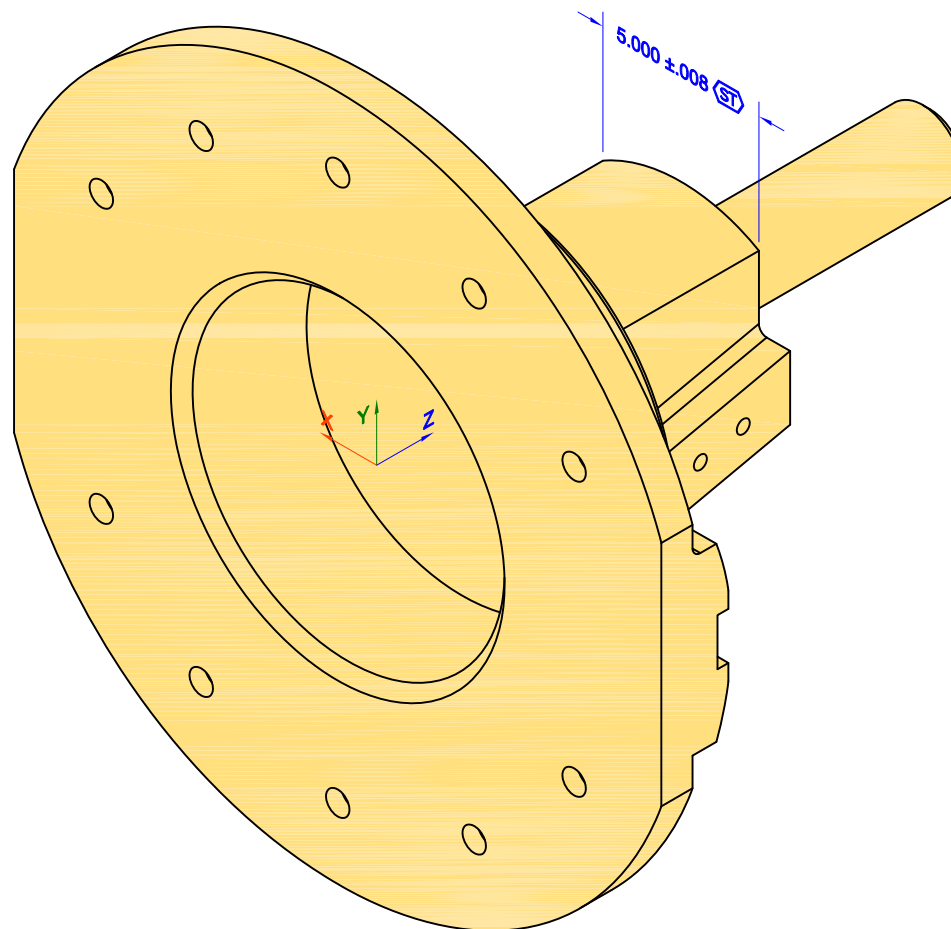


Notes
Datum feature B and
Datum target D1 defined
in View 2 (of 2).

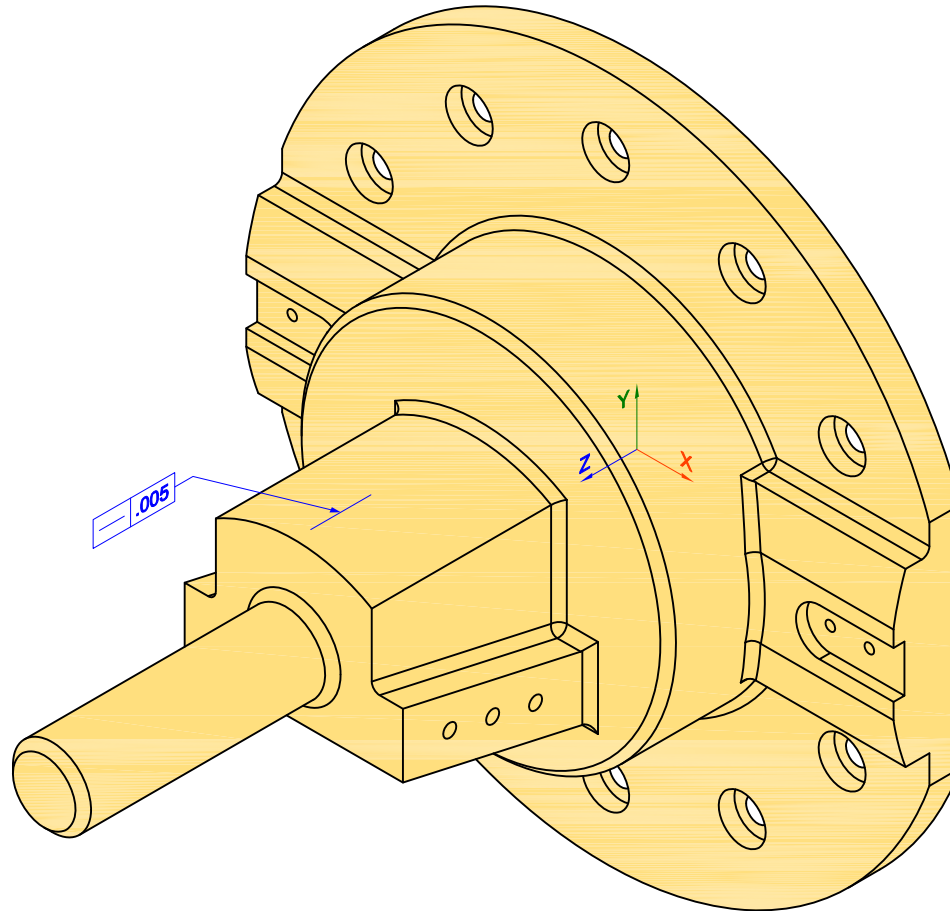


Notes
Datum feature A defined in
View 1 (of 2).

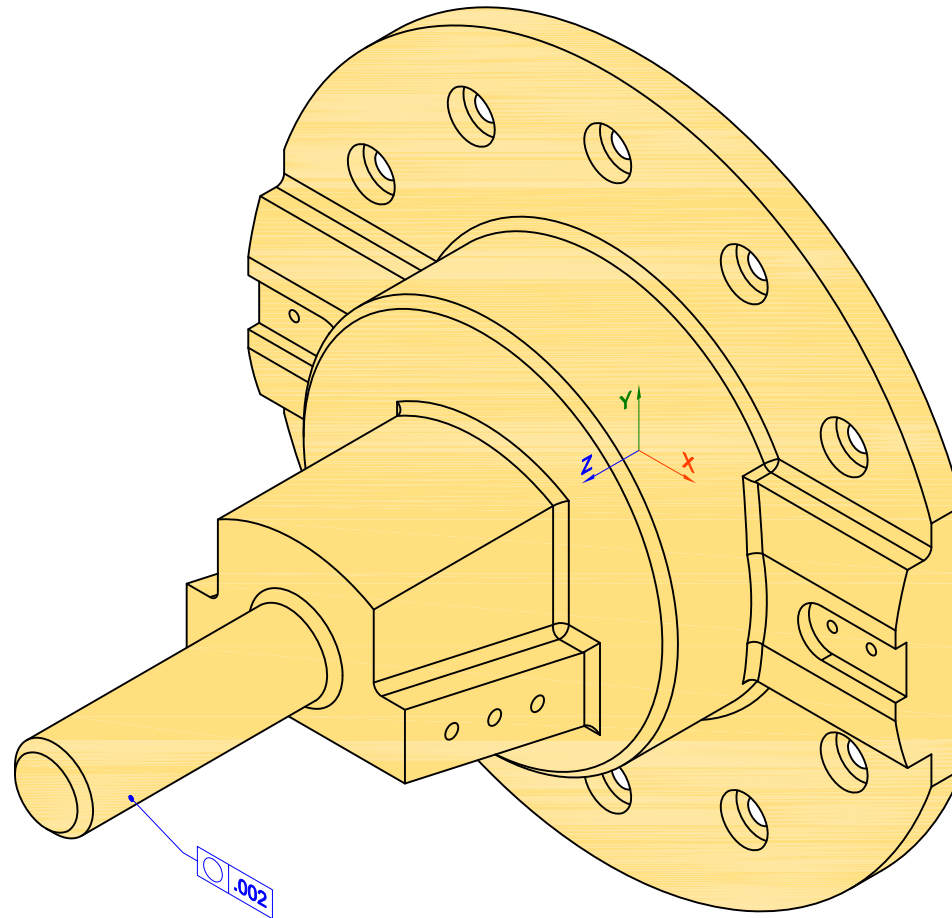
Datum target D1 referenced
in View 1 (of 2).



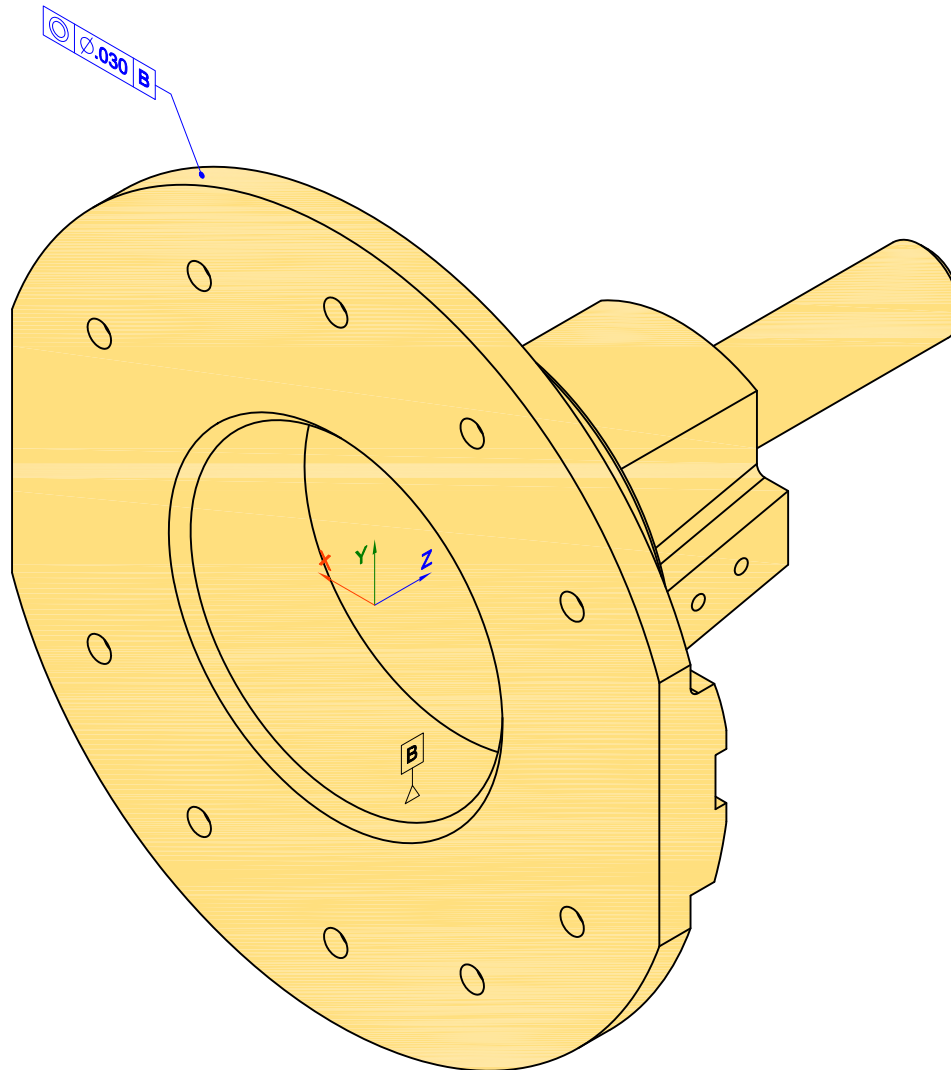
Measurand:
Directly-toleranced dimension
with statistical tolerancing
symbol.



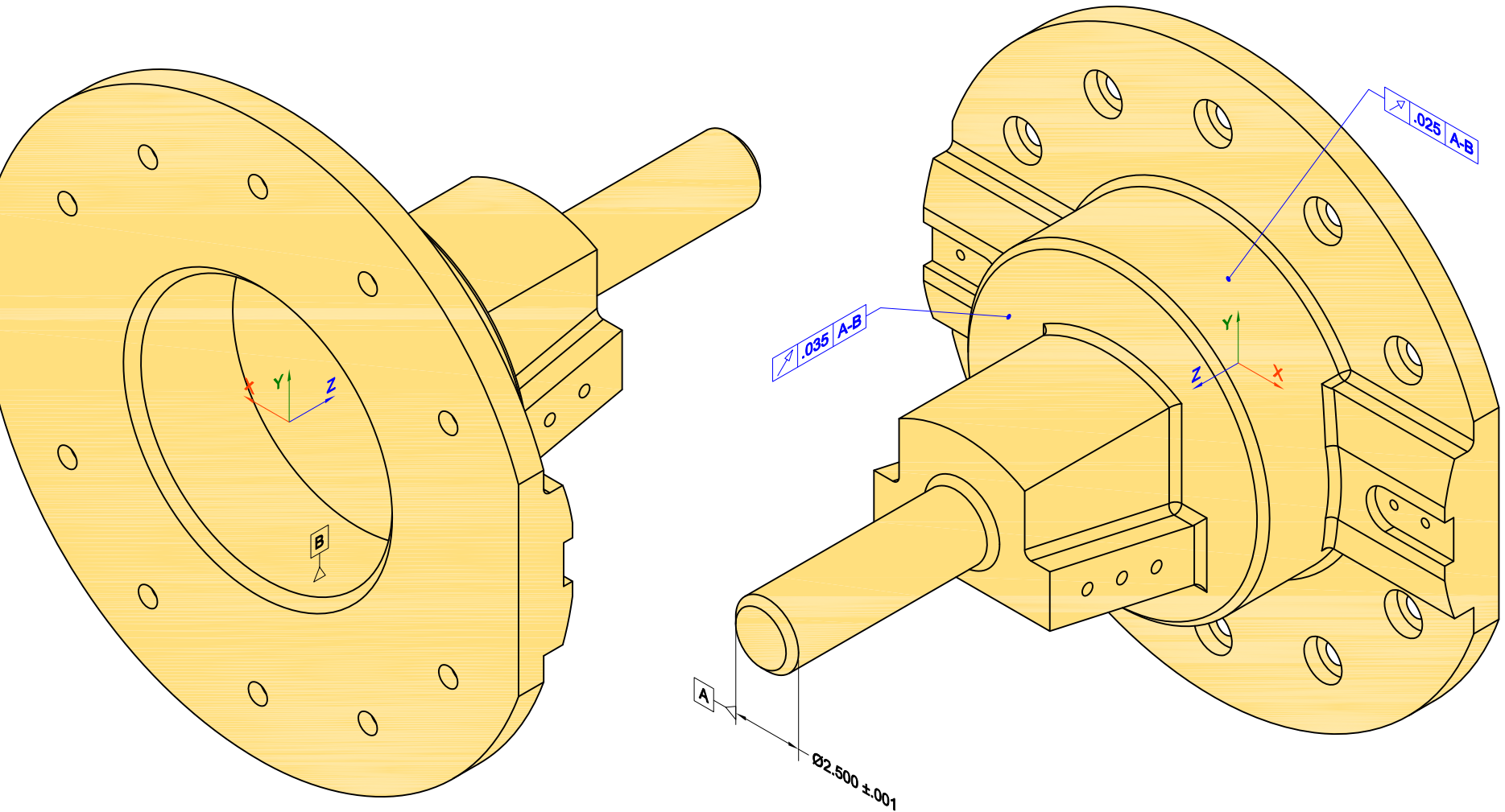
Measurand:
Leader-directed feature control frame -
Straightness. Directed to supplemental
geometry (represented line element).



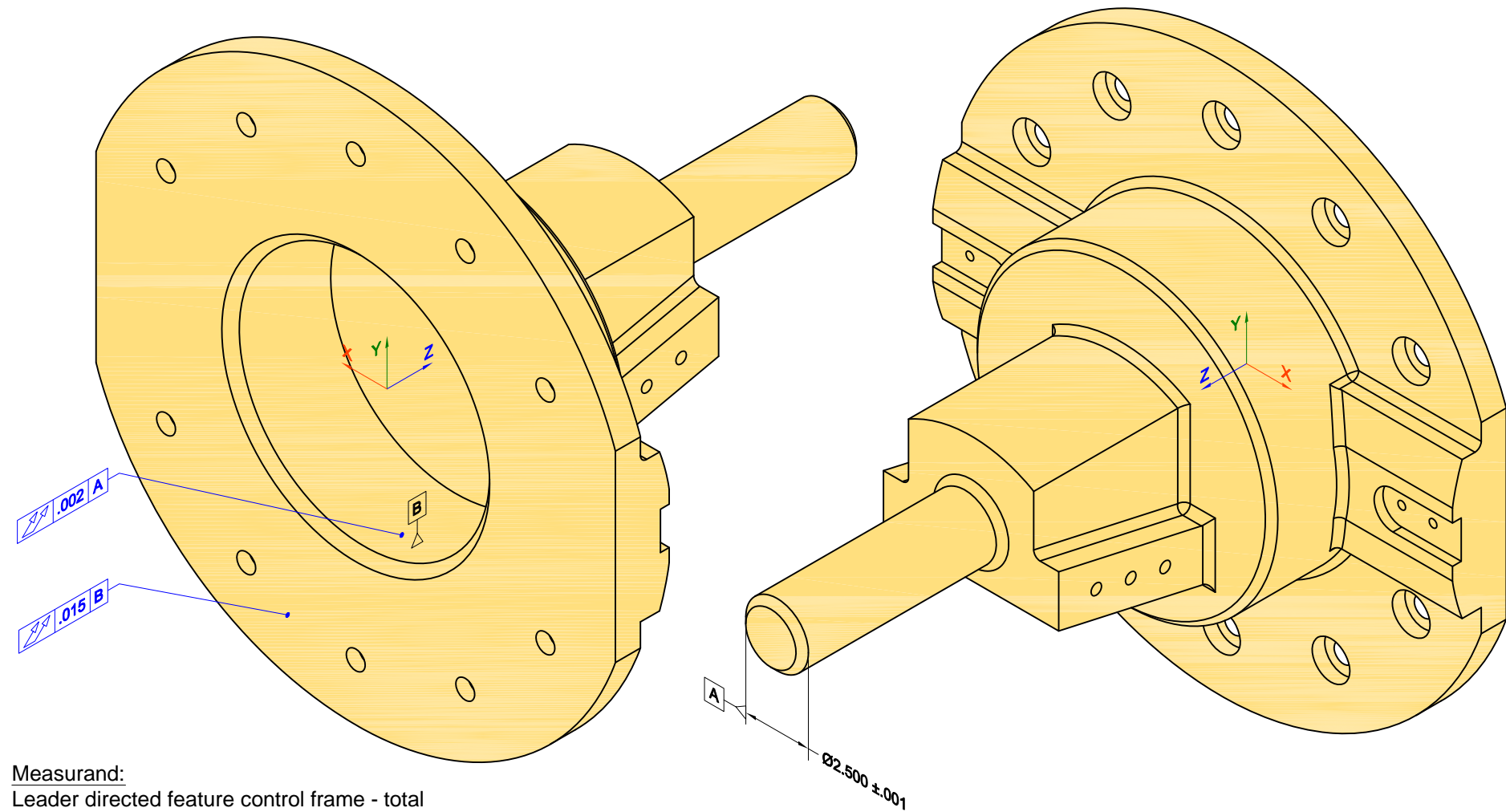
Measurand:
Leader-directed feature control
frame - Circularity.



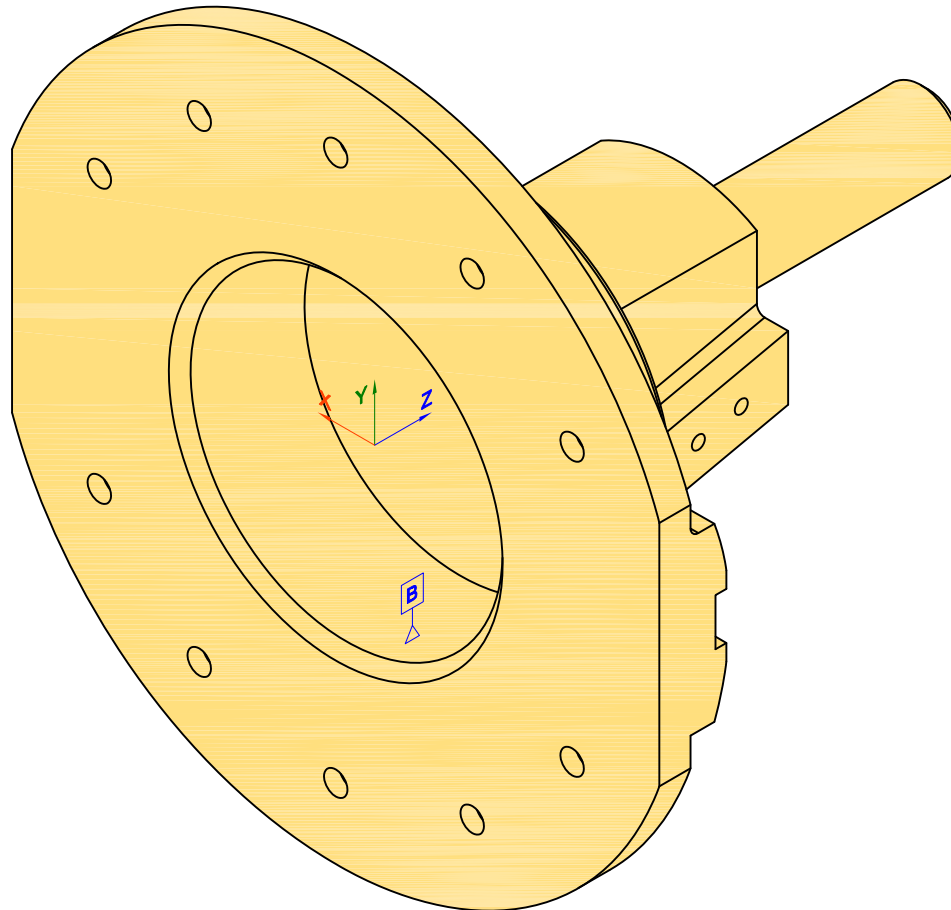
Measurand:
Leader-directed feature control
frame - Concentricity.



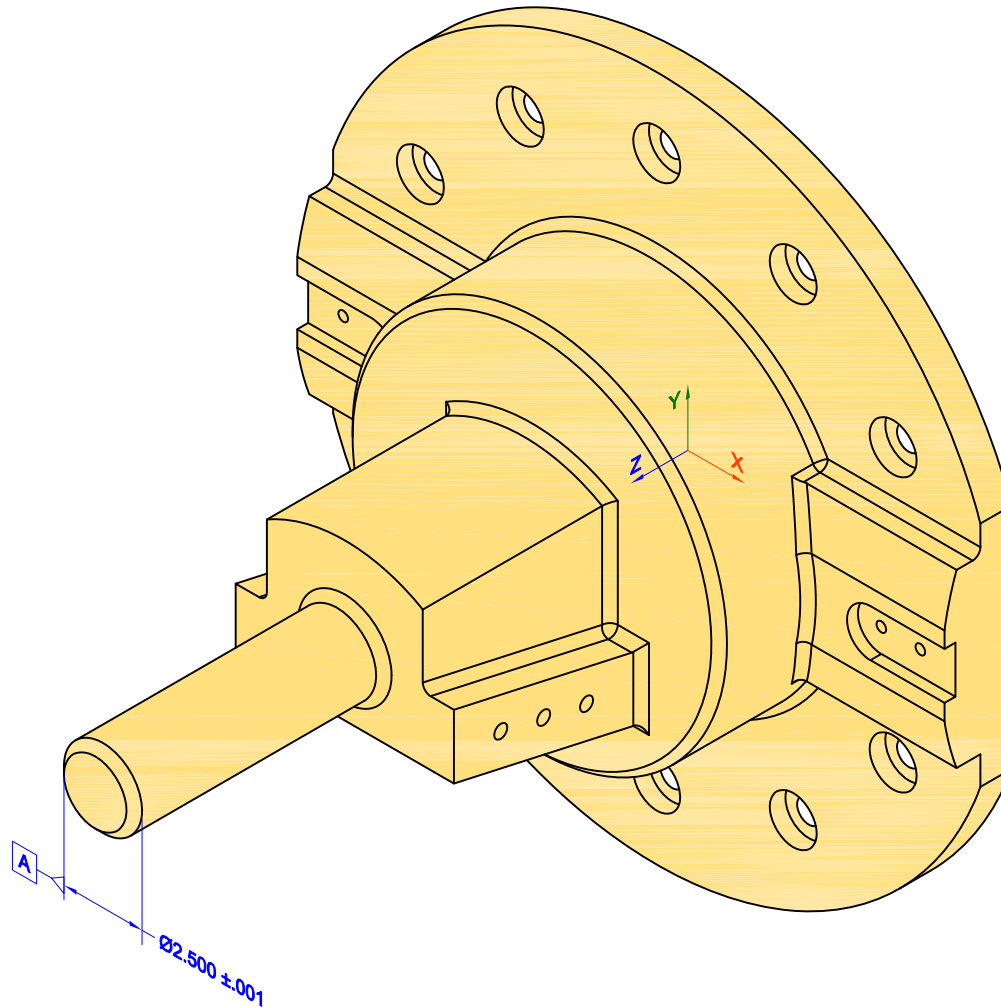
Measurand:
Leader directed feature control frame -
circular runout. 2 examples, 1 directed to
flat surface, 1 directed to cylindrical surface.



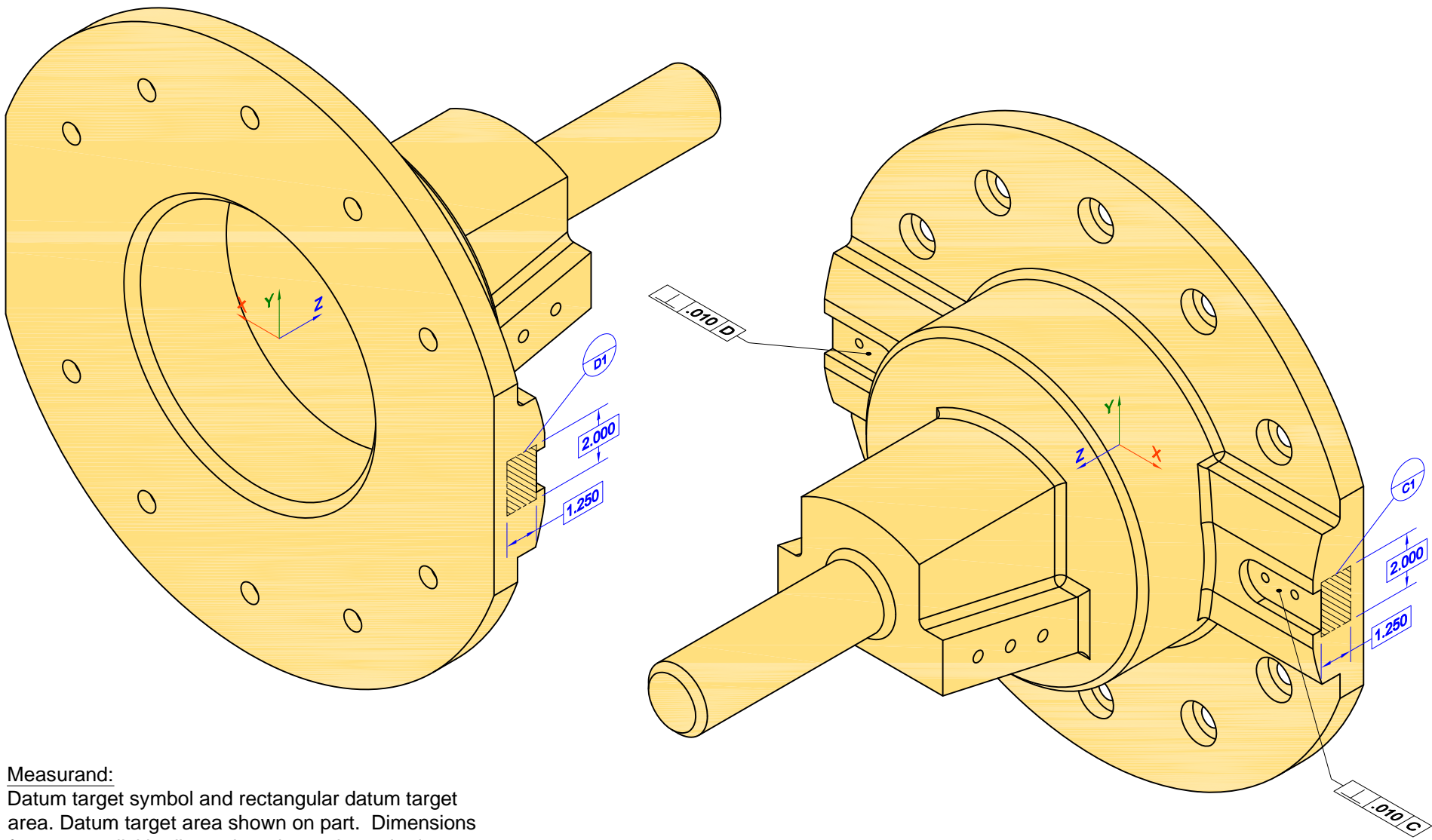
Measurand:
 Leader directed feature control frame - total
 runout. 2 examples, 1 directed to flat
 surface, 1 directed to cylindrical surface.



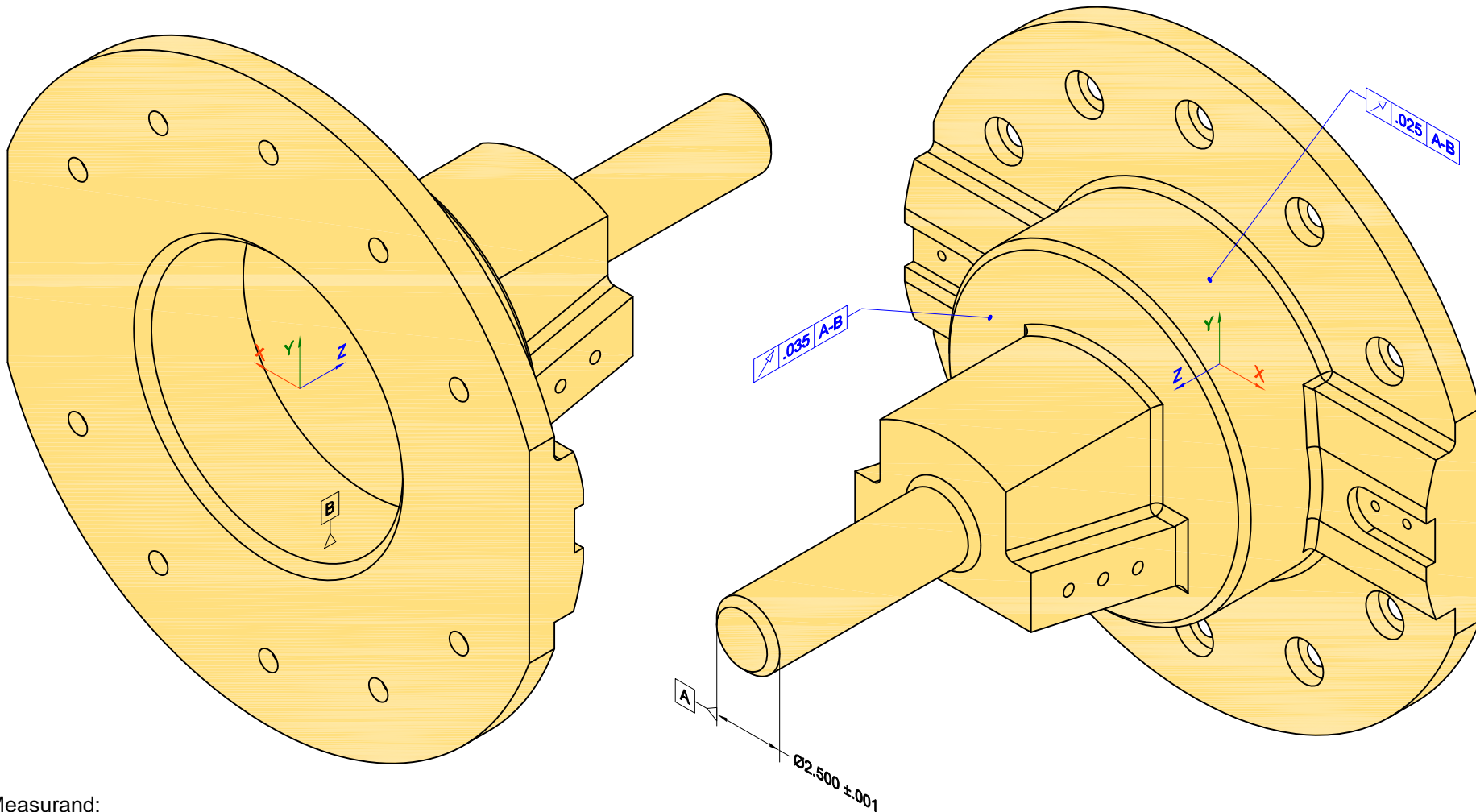
Measurand:
Datum feature symbol attached
to surface of feature of size.



Measurand:
Datum feature symbol attached
to a size dimension.



Measurand:
Datum target symbol and rectangular datum target area. Datum target area shown on part. Dimensions for area explicitly-dimensioned, not shown in datum target symbol. 2 examples, datum targets C1 and D1.



Measurand:
 Multiple datum feature - referenced in a feature control frame. 2 examples, circular runout applied to a flat surface, and applied to a cylindrical surface - both reference A-B. This is essentially the same as ATC 24, which tested circular runout.