**Pseudocode for Validity Checks**

BEGIN

PRINT "Enter the internal layer details: coordinates (X₁, Y₁), width (W₁), height (H₁), thickness (t₁):"

READ InternalX, InternalY, InternalWidth, InternalHeight, InternalThickness

PRINT "Enter the external layer details: coordinates (X₂, Y₂), width (W₂), height (H₂), thickness (t₂):"

READ ExternalX, ExternalY, ExternalWidth, ExternalHeight, ExternalThickness

PRINT "Enter the thickness of the insulation layer (t ₃):"

READ InsulationThickness

PRINT "Enter the hole specifications: coordinates (X ₄, Y ₄), width (W ₄), height (H ₄):"

READ HoleX, HoleY, HoleWidth, HoleHeight

IF

X₁+ W₁>= W ₂/ 2+ X ₂

OR

W ₂/ 2  >=  | X ₂| + | X₁|  ( | X₁| , | X ₂| = Absolute value  )

AND

Y₁+ H₁>= H ₂/ 2+ Y ₂

OR

H ₂/ 2  >=  | Y ₂| + | Y₁ |    ( | Y₁ | , | Y ₂| = Absolute value  )

PRINT `OK`

ELSE:

PRINT `Centre of gravity outside of internal layer!`

#CommonSurface (Internal layer, External layer):

    x1\_1 = Internal.bottom\_left\_x

    y1\_1 = Internal.bottom\_left\_y

    x2\_1 = Internal.top\_right\_x

    y2\_1 = Internal.top\_right\_y

    x1\_2 = External.bottom\_left\_x

    y1\_2 = External.bottom\_left\_y

    x2\_2 = External.top\_right\_x

    y2\_2 = External.top\_right\_y

     overlap\_x1 = max(x1\_1, x1\_2)

    overlap\_x2 = min(x2\_1, x2\_2)

    overlap\_y1 = max(y1\_1, y1\_2)

    overlap\_y2 = min(y2\_1, y2\_2)

    IF overlap\_x1 < overlap\_x2 AND overlap\_y1 < overlap\_y2:

        Insulation \_width = overlap\_x2 - overlap\_x1

        Insulation \_height = overlap\_y2 - overlap\_y1

    ELSE:

        PRINT `Centre of gravity outside of internal layer!`

function checkHolePlacement(internal, external, hole):

    internal\_x1 = internal.bottom\_left\_x

    internal\_y1 = internal.bottom\_left\_y

    internal\_x2 = internal.top\_right\_x

    internal\_y2 = internal.top\_right\_y

    external\_x1 = external.bottom\_left\_x

    external\_y1 = external.bottom\_left\_y

    external\_x2 = external.top\_right\_x

    external\_y2 = external.top\_right\_y

    hole\_x1 = hole.bottom\_left\_x

    hole\_y1 = hole.bottom\_left\_y

    hole\_x2 = hole.top\_right\_x

    hole\_y2 = hole.top\_right\_y

IF

(hole\_x1 >= internal\_x1 AND hole\_y1 >= internal\_y1)

AND

(hole\_x2 <= internal\_x2 AND hole\_y2 <= internal\_y2)

 PRINT “ Hole is in Internal layer”

  IF

 (hole\_x1 >= external\_x1 AND hole\_y1 >= external\_y1)

AND

(hole\_x2 <= external\_x2 AND hole\_y2 <= external\_y2)

 PRINT “ Hole is in External layer”

 ELSE:

        return "Error: Hole is outside both the internal and external rectangles."