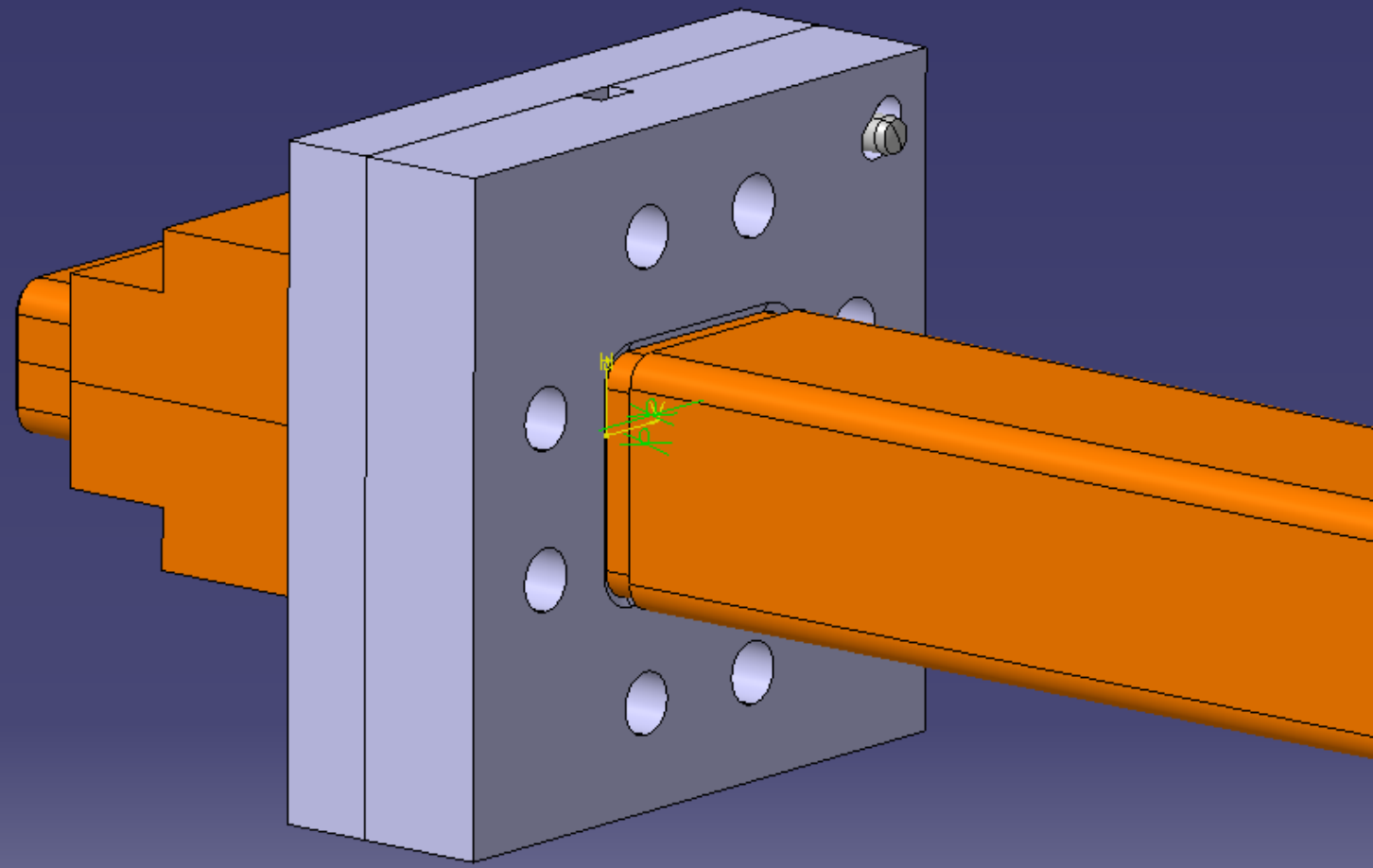
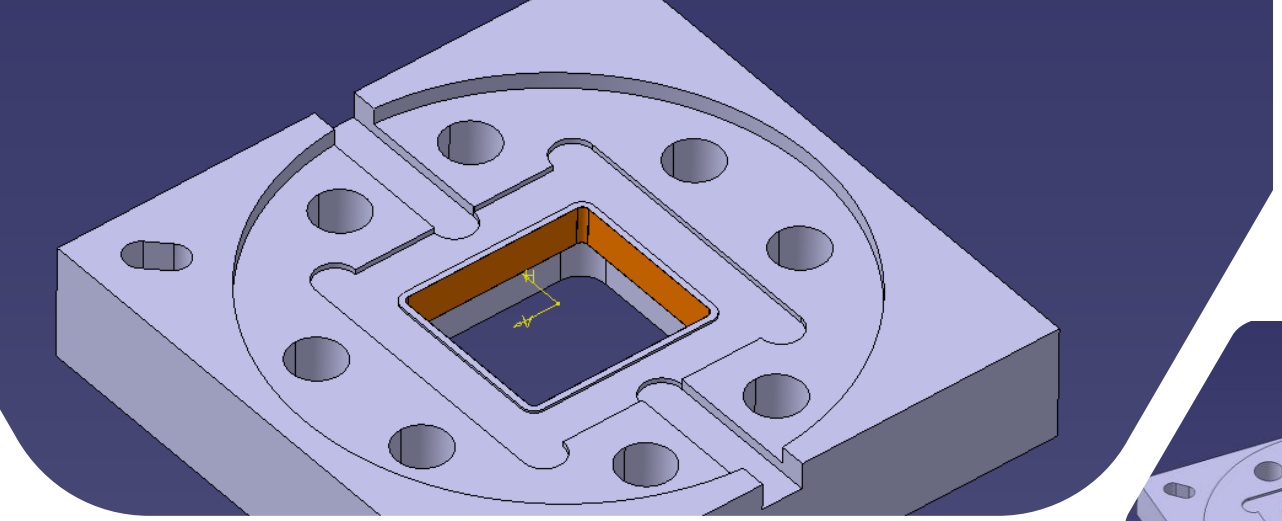
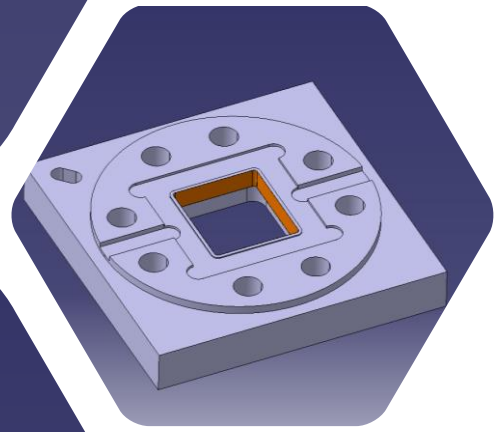
Methods in order to improve tolerance in double height waveguide taper attachment

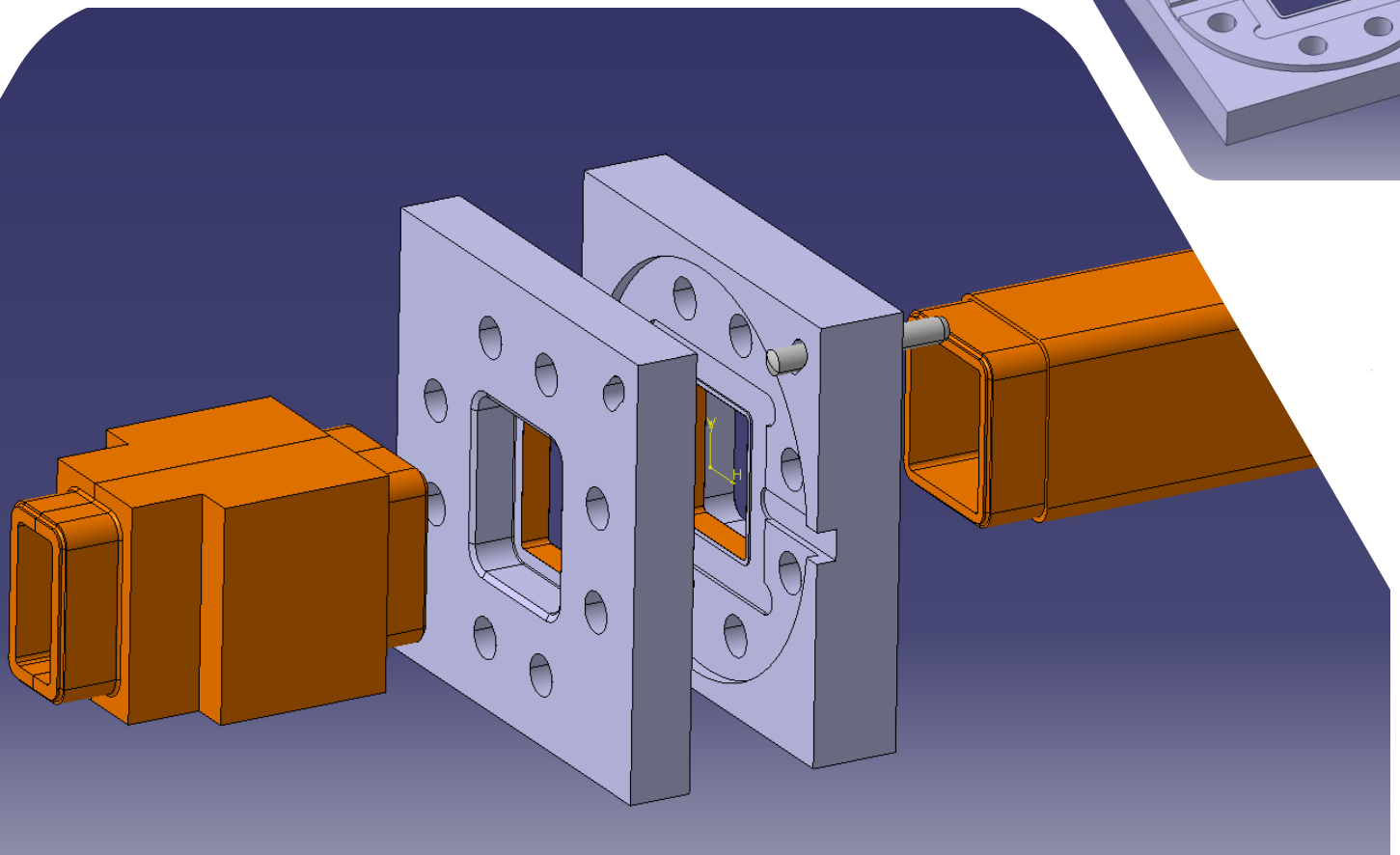
- Joshua Brown -

Male to Female Flange Adaptor



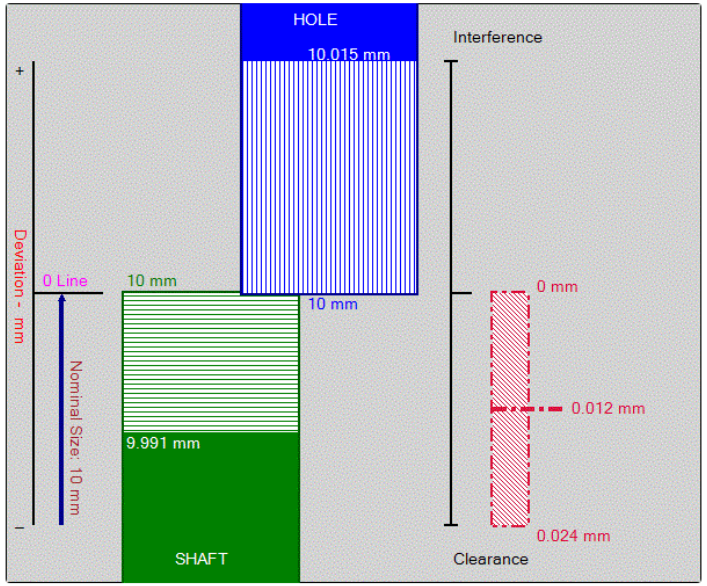






- Use of translational restrictive adaptor along with rotational restrictive dowel to constrain alignment in all degrees of freedom.

- Ensures near-perfect alignment of internal geometries

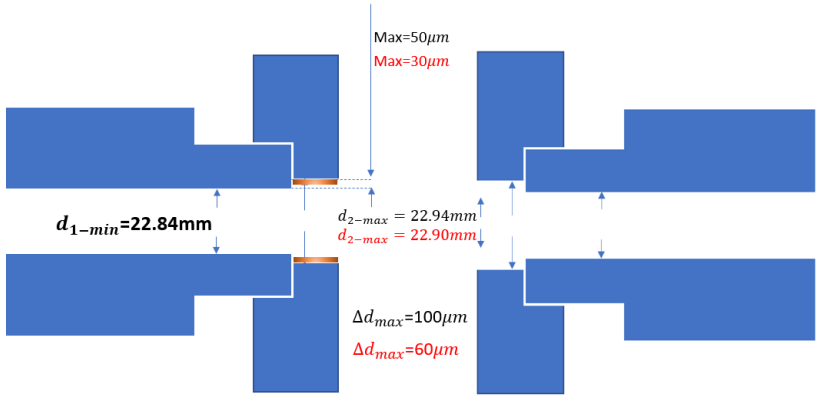


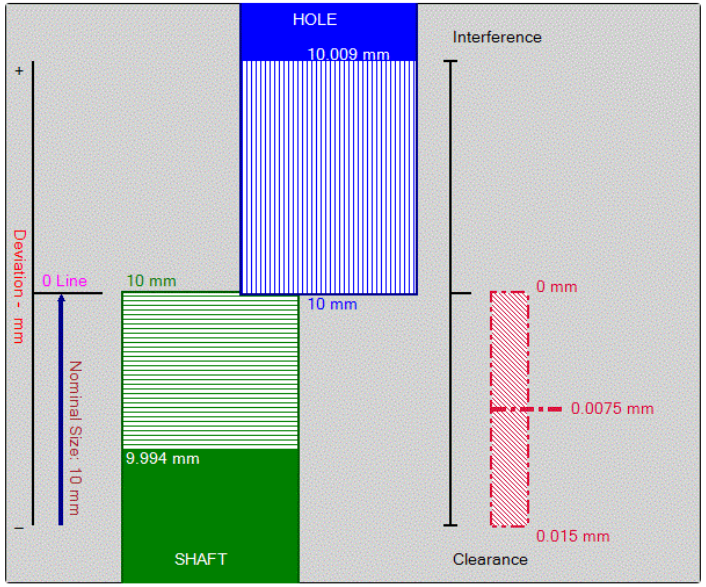
Schematic Representation Of Fit

H7-h6 Fit :

-Gives clearance fit of up to $24\mu m$

-Does not address clearance between flange and taper/waveguide (100/$60\mu m$)



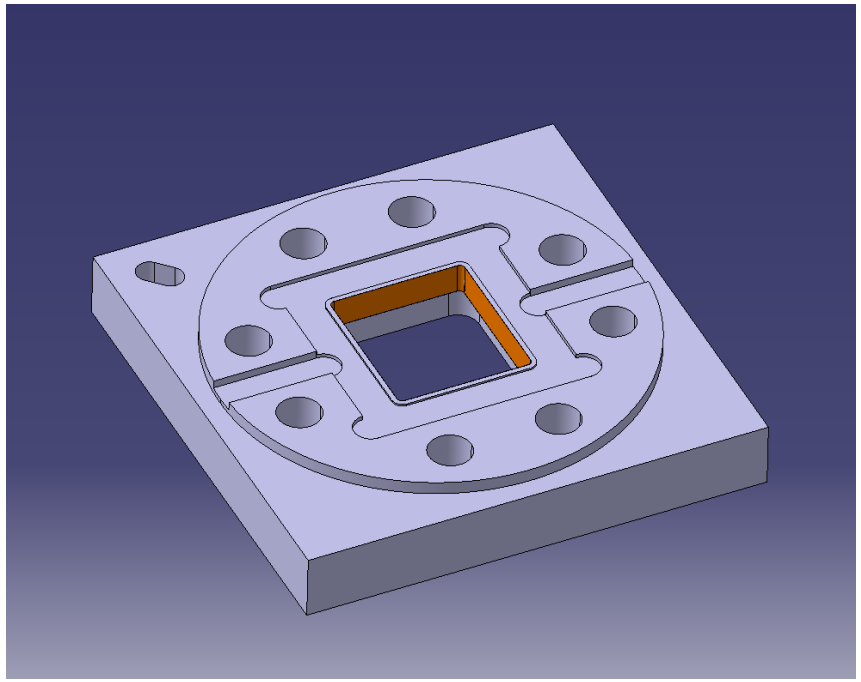


Schematic Representation Of Fit

H6-h5 Fit :

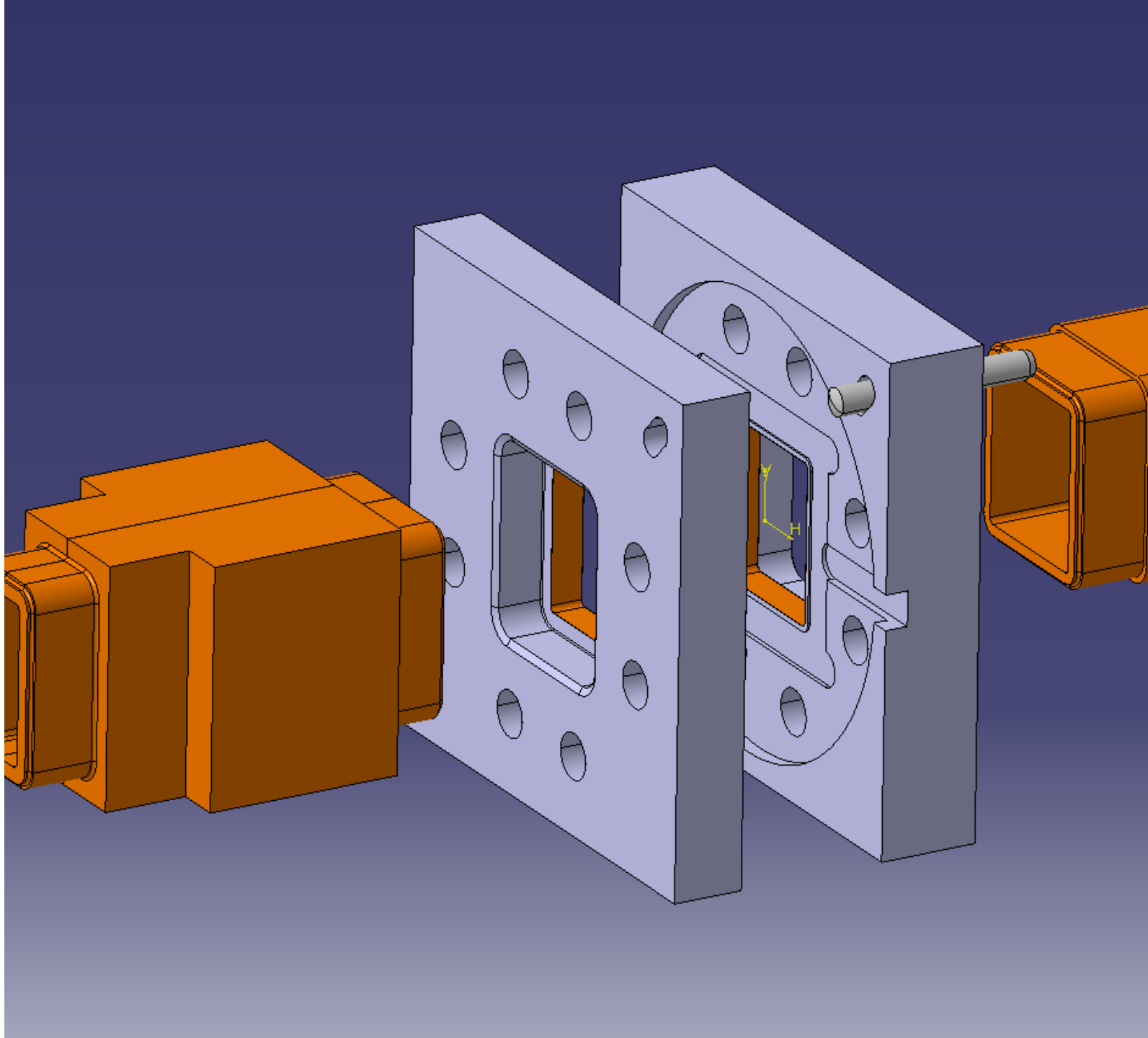
-Gives clearance fit of up to $15\mu m$

-Unknown, if possible, subject to manufacturing method e.g., turning?



- Worth considering a transitional fit for rotational constraining dowel to improve functionality.

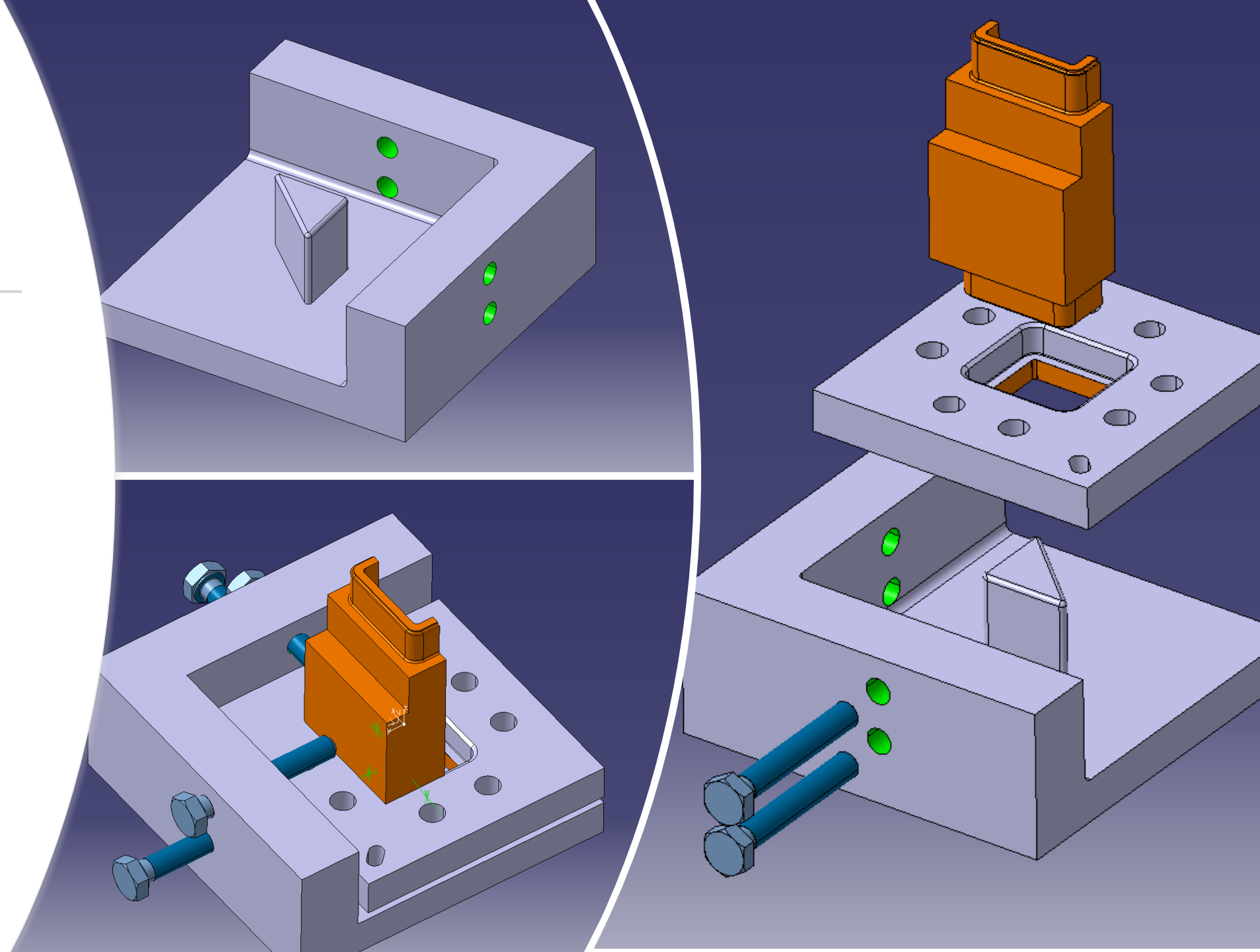
- Transitional fit = Where the material has the possibility of intersecting within its clearances

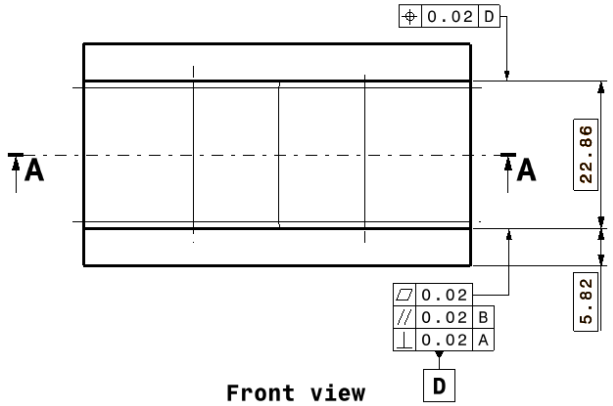


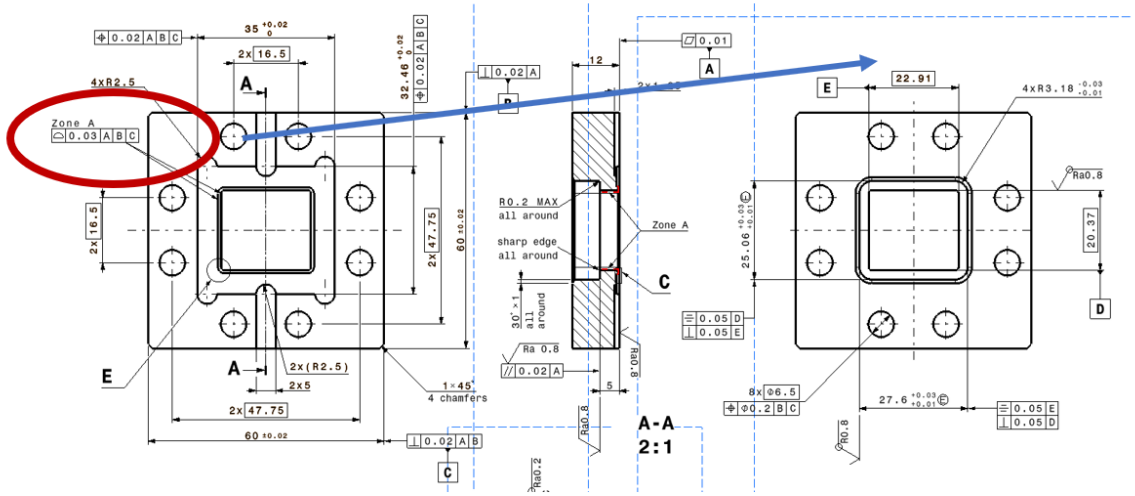
- **Brazing alignment Jig**

- Jig to be machined from single piece low thermal expansion ceramic-based material

- Theoretically reduces alignment offsets between taper and flange from 70$\boldsymbol{\mu m}$ to close to zero







- Refining internal surface tolerances are the only way to ensure internal geometries line up with no step.

- Changing positional tolerance to 10$\boldsymbol{\mu m}$ on the internal taper/flange surface could reduce clearance tolerance to as low as **40/20 $\boldsymbol{\mu m}$**.

- In conjunction with the dowel mechanism and brazing jig a tolerance of 35-44 $\boldsymbol{\mu m}$ is possible (**with H6-h5 fit**) but tolerances are getting closer to that of the structure disks=high cost