

ePIC OUTER BARREL (OB) MODULE TOOLING DEVELOPMENT

Ken Davies

Mechanical Design Engineer

PME Group, Technology Department

STFC Daresbury Laboratory

16th October 2024

Brief update:

The following images have been taken from the Alpidе Jig Assembly for the R3B-TRT project where the surface mounting is flat. The CAD models have been imported into the groups CAD management system 'Windchill' and have been given valid project model numbers to allow re-work and modification as required to suit ePIC requirements.

The aim of the ePIC jig is to provide a curved surface for the construction of the FPC for the Module OB. It is intended to base the design of the ePIC jig on the Alpidе design to help speed up the process of development.

Comment from Georg Viehhauser (Project Lead):

'The curvature issue will require a bit more thinking, in particular as we just have started the bonding discussion. The next is that we get a good understanding of how many bonds we are talking, and what the size required for the bond areas will be. And how this affects the geometry of the bridge FPC, and the impact on the bonding if we do the curved surface.

As you know Adam has made a first go at tooling for ePIC, and I think it would be sensible to have a good look at that and, together with him, consider what should go into the final tooling. Also, note that we have a prototype of this tooling and it will be interesting to learn what we can on handling this ultra-thin sensors from this tooling, also if we choose a different design in the end.

The hold-up currently is that we need to get the silicon off its backing foil, but we are slowly making progress on that.

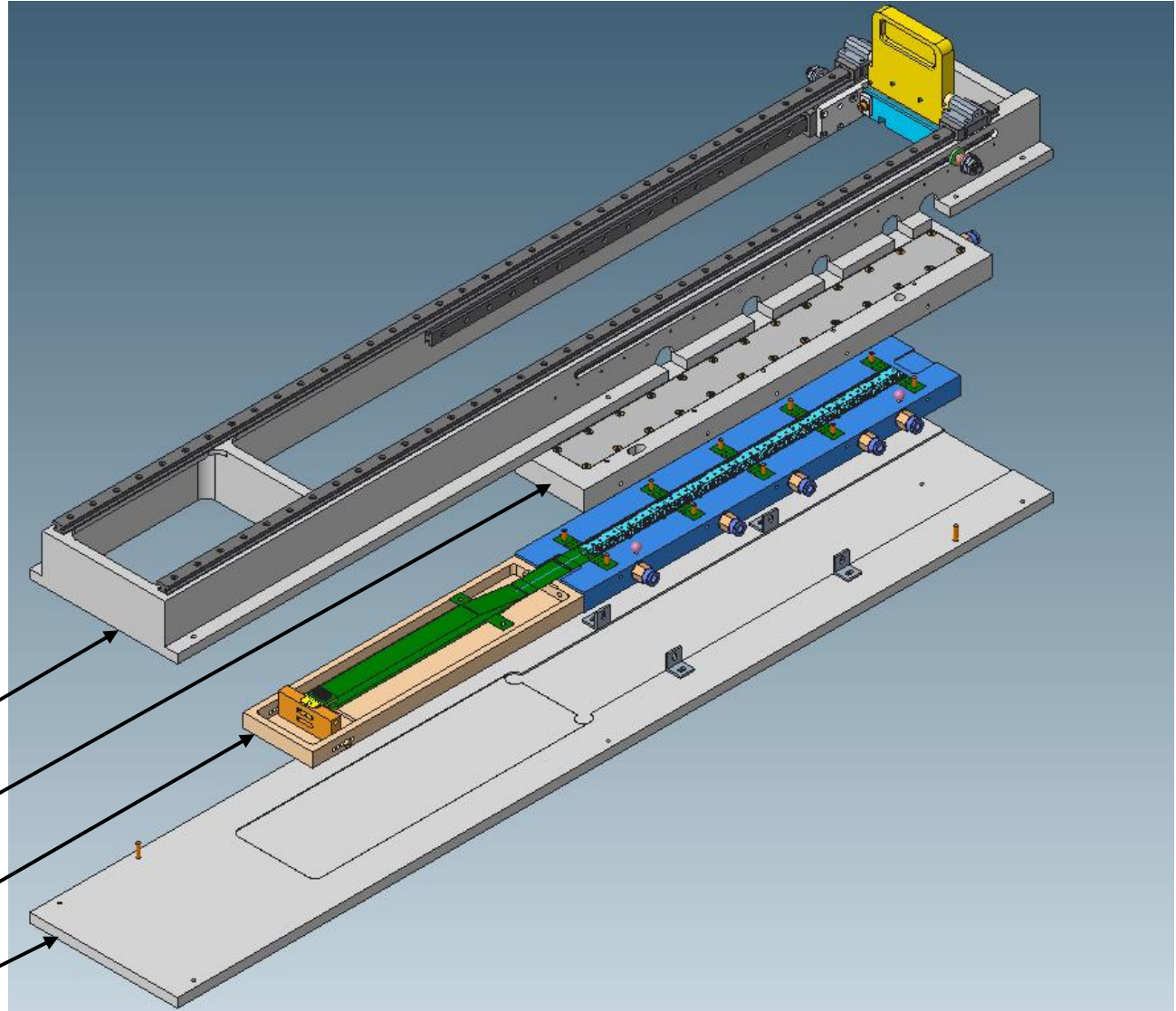
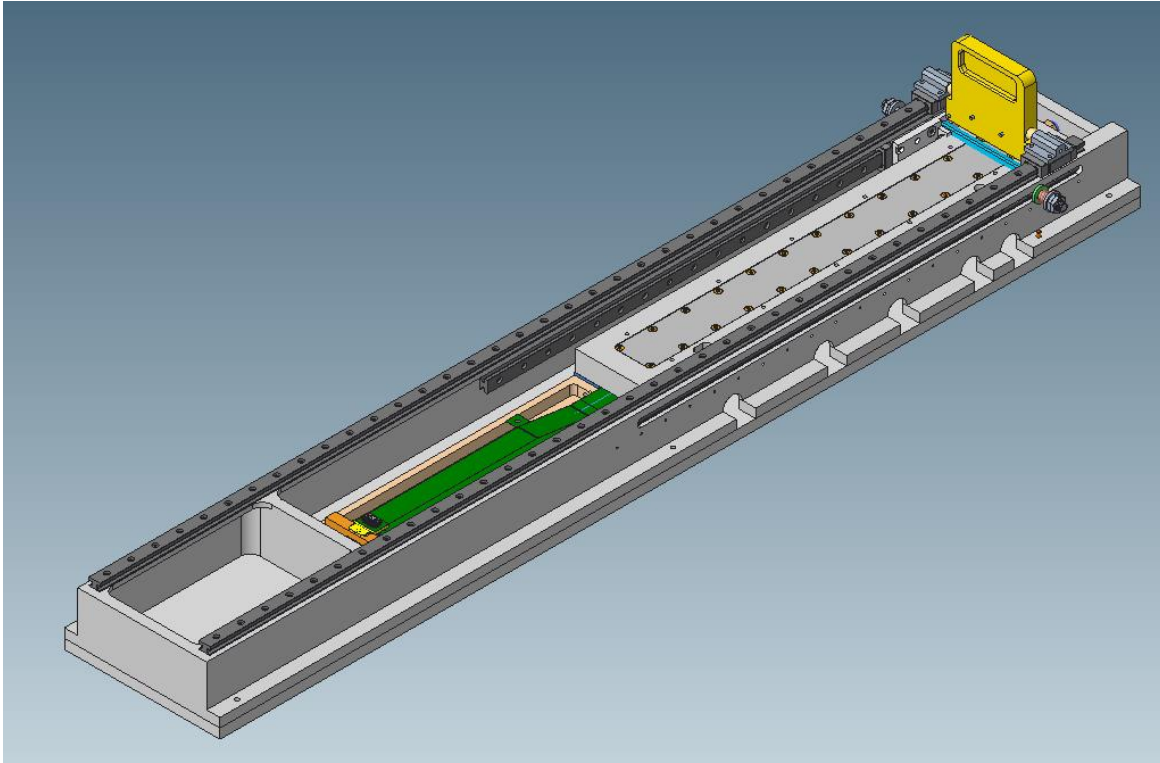
If you think this would be useful, maybe Adam and I could come to DL and bring the tooling with us, and then we can see what features of the two different approaches we should merge.'

THE FOLLOWING FOUR SLIDES SHOW THE MAIN
COMPONENTS OF THE ALPIDE JIG AND TOOLING DESIGN

MODEL No. 318-10059

PEELING MECHANISM TOP LEVEL ASSEMBLY

(ALPIDE REF. NP93-01-120)



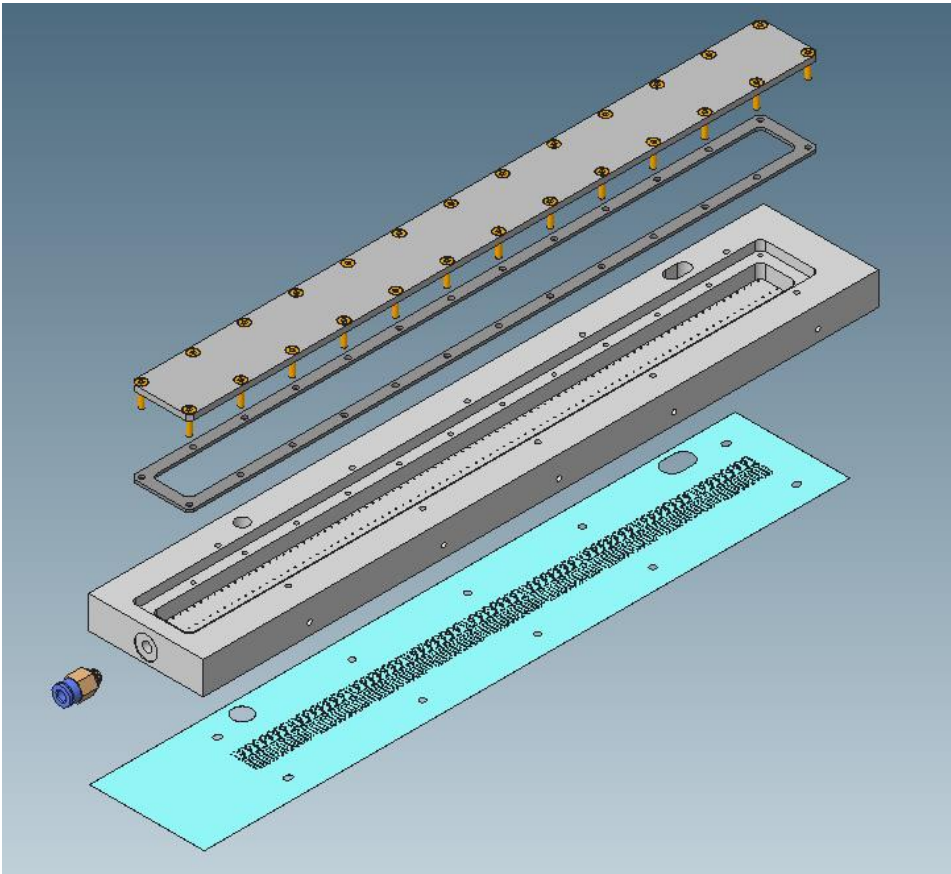
PEELING MECHANISM

GLUE MASK JIG ASSEMBLY

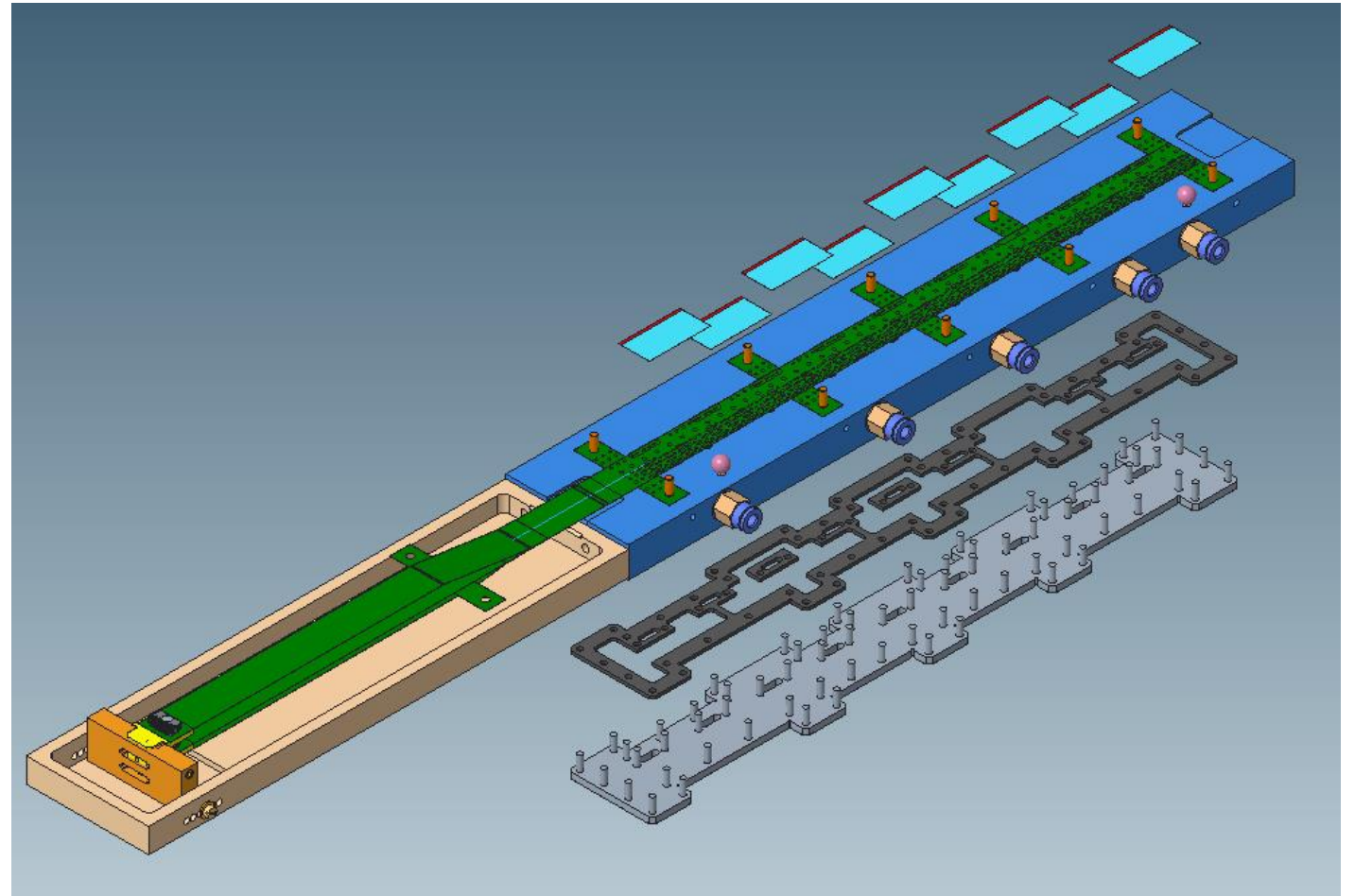
HIC FPC GRIPPER ASSEMBLY

BASE PLATE

MODEL No. 318-10045
GLUE MASK JIG ASSEMBLY
(ALPIDE REF. NP93-01-147)

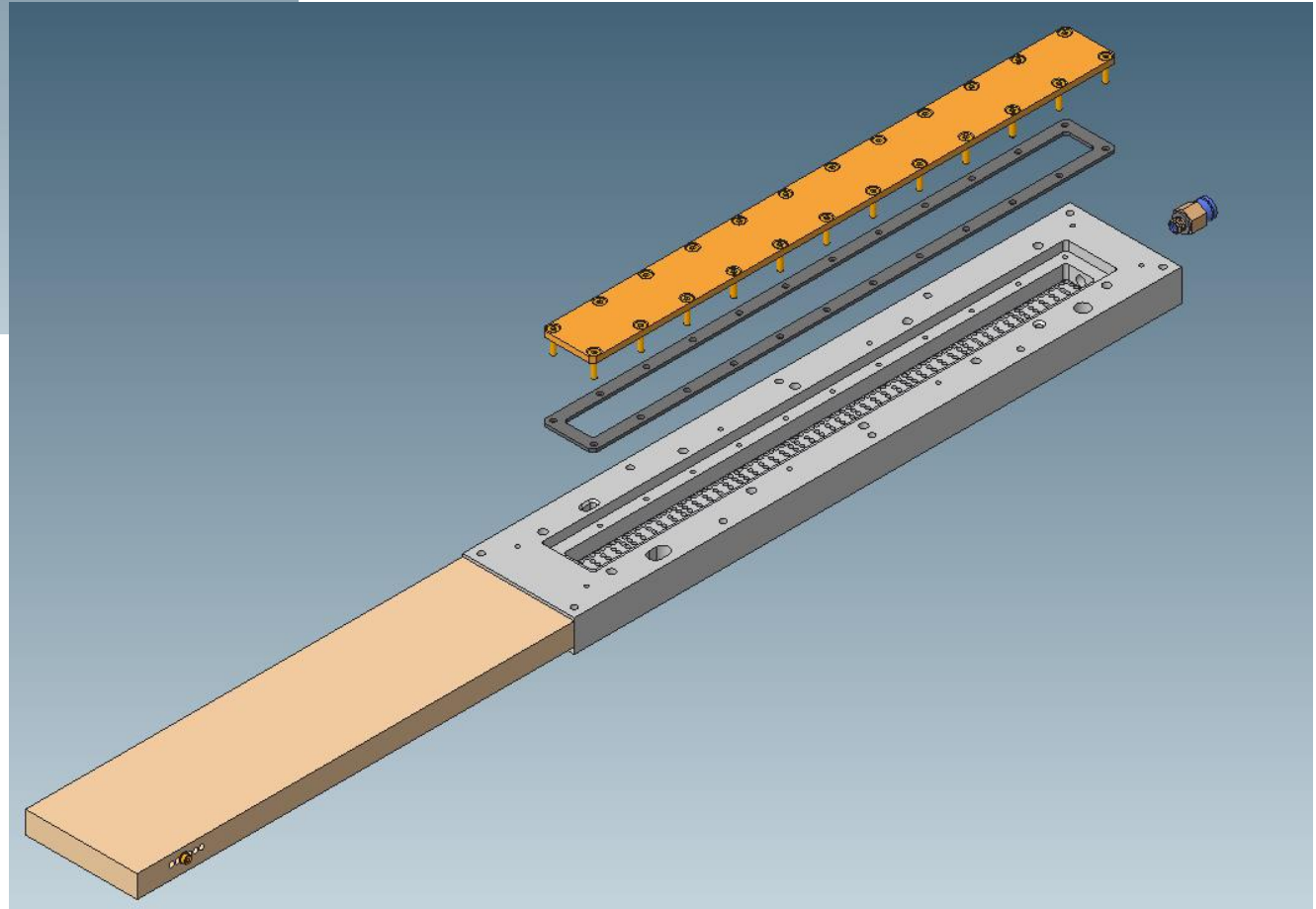
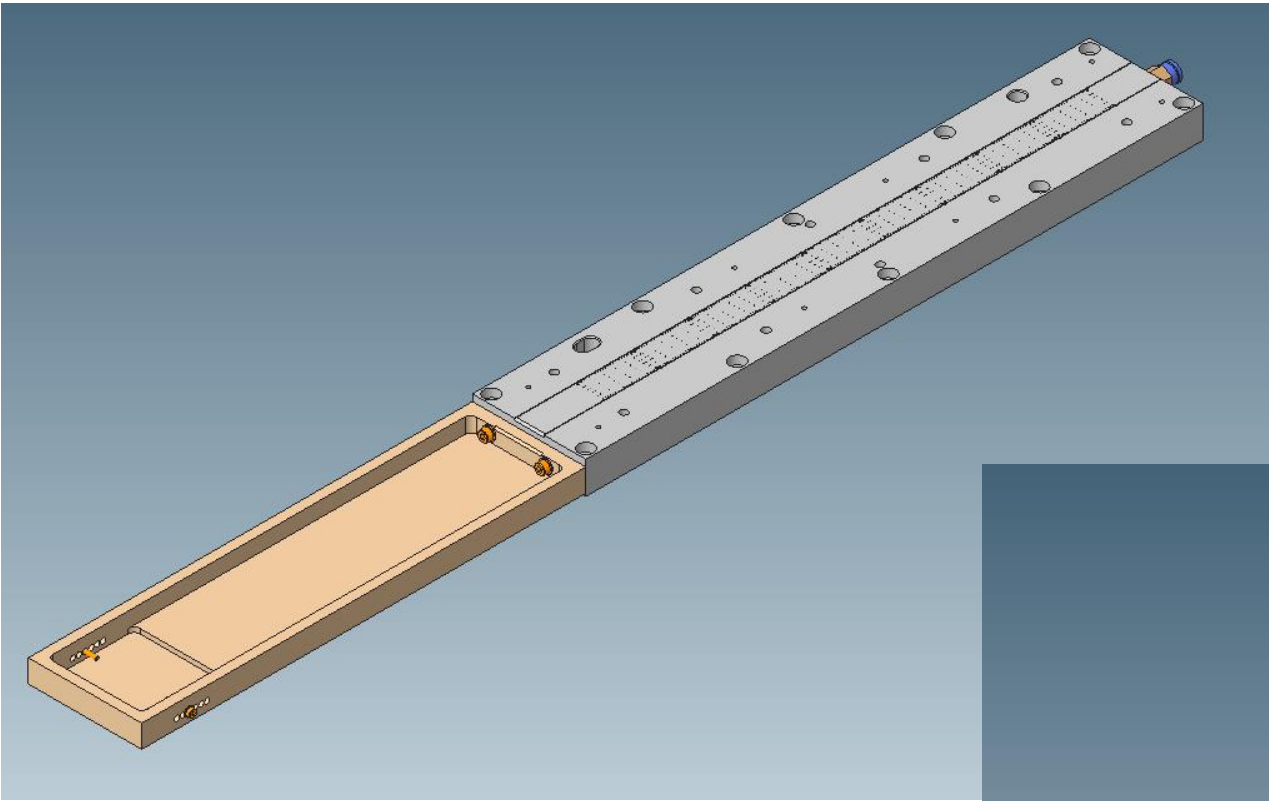


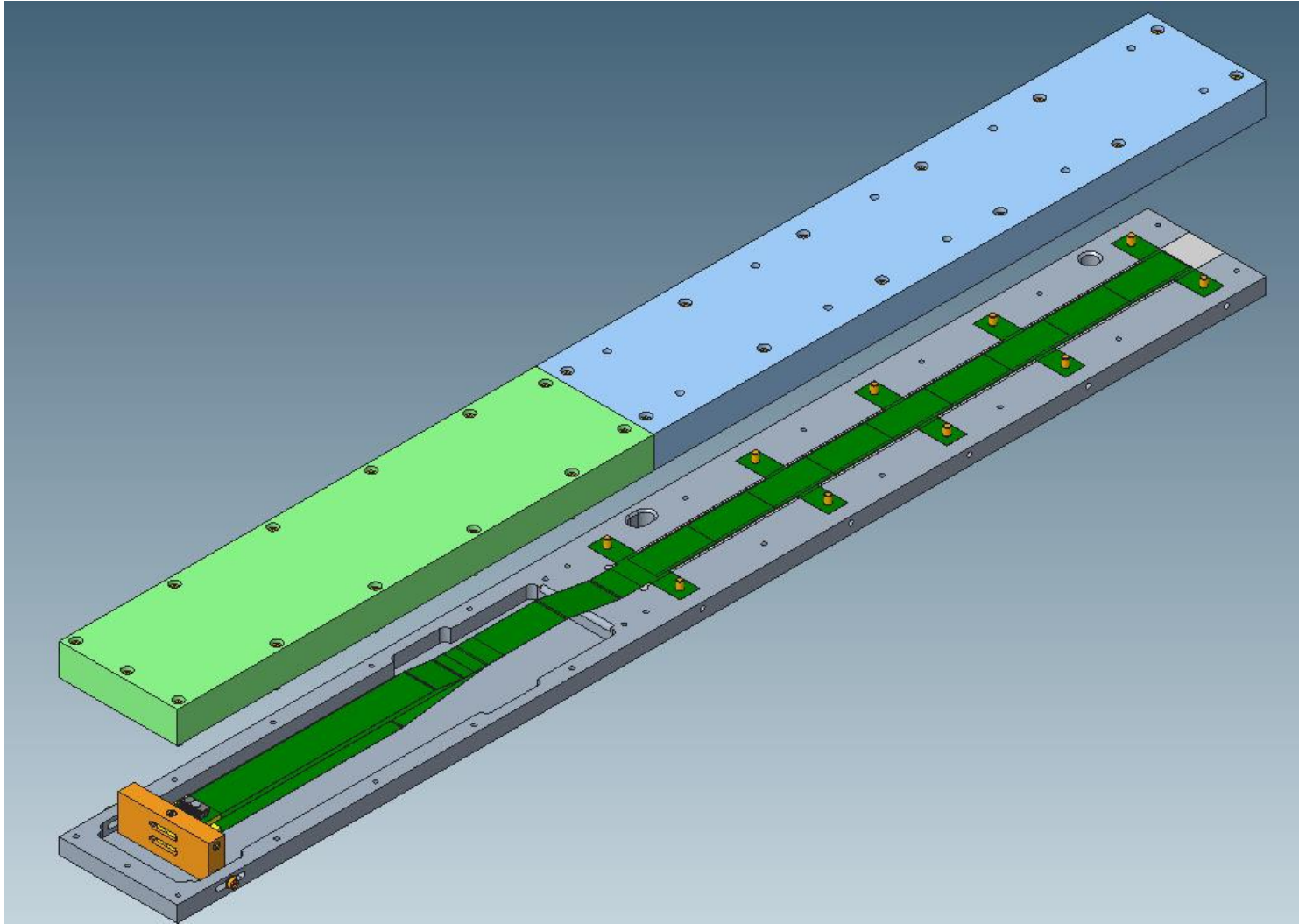
MODEL No. 318-10050
HIC FPC GRIPPER ASSEMBLY
(ALPIDE REF. NP93-01-160)



MODEL No. 318-10069
WIRE BONDING JIG
(ALPIDE REF. NP93-01-152)

EXPLODED VIEW FROM
UNDERSIDE

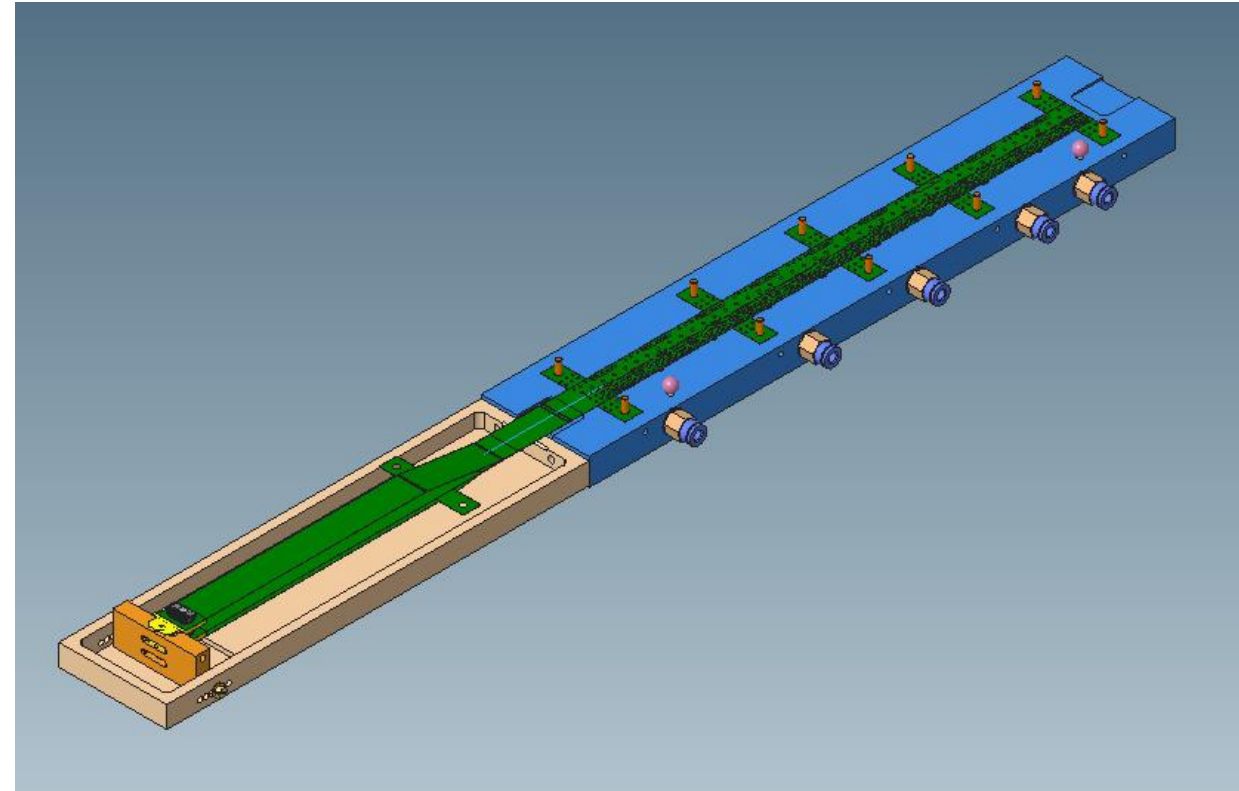
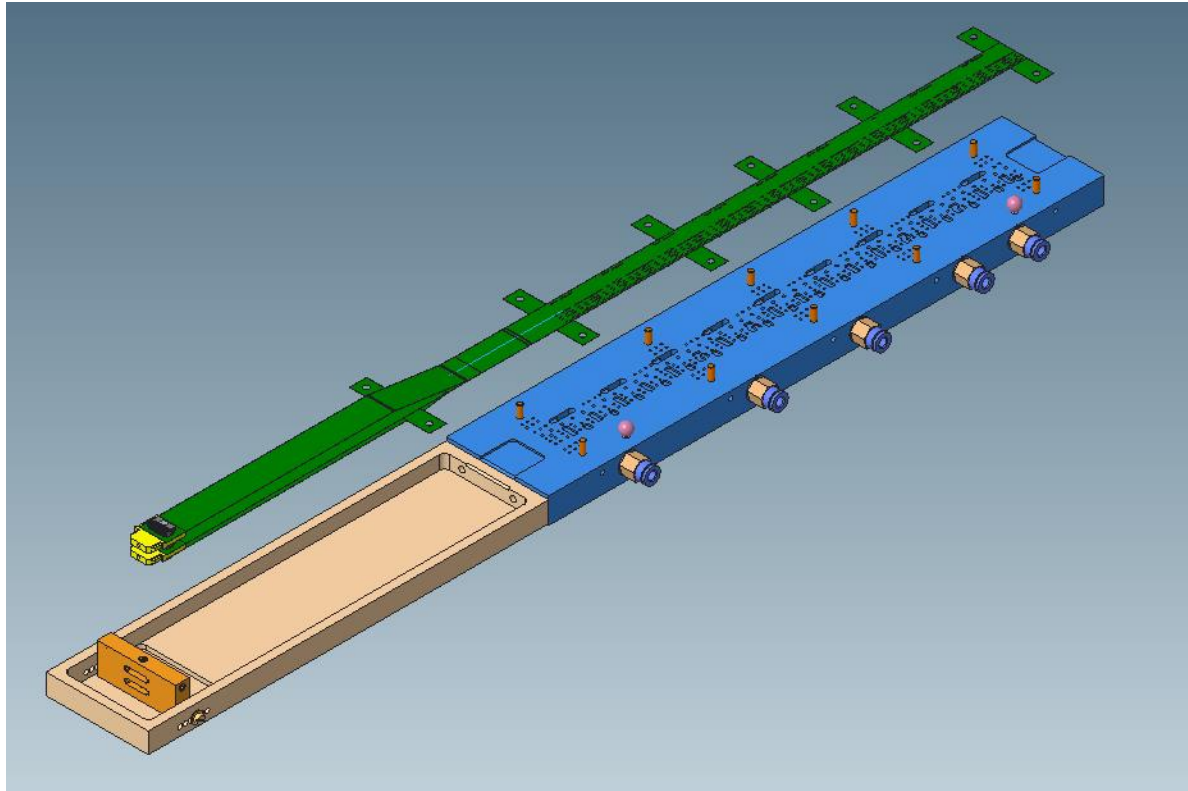


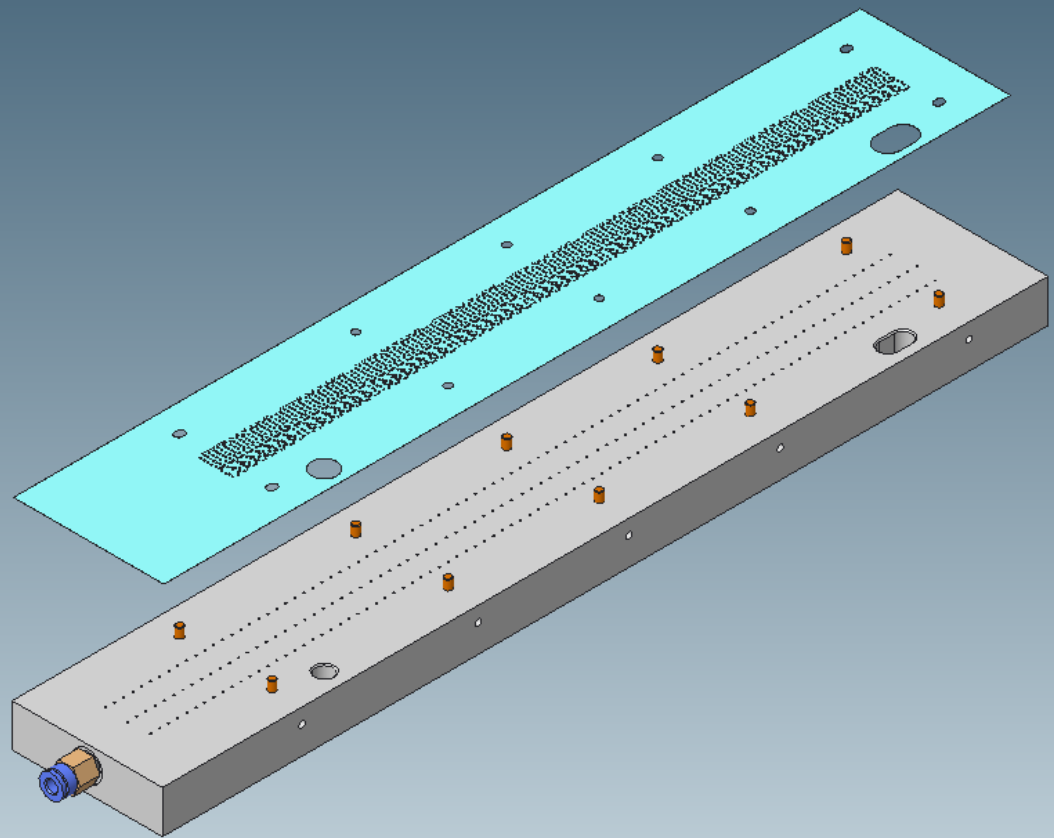


MODEL No. 318-10064
TRANSPORT PLATE ASSEMBLY
(ALPIDE REF. NP93-01-189)

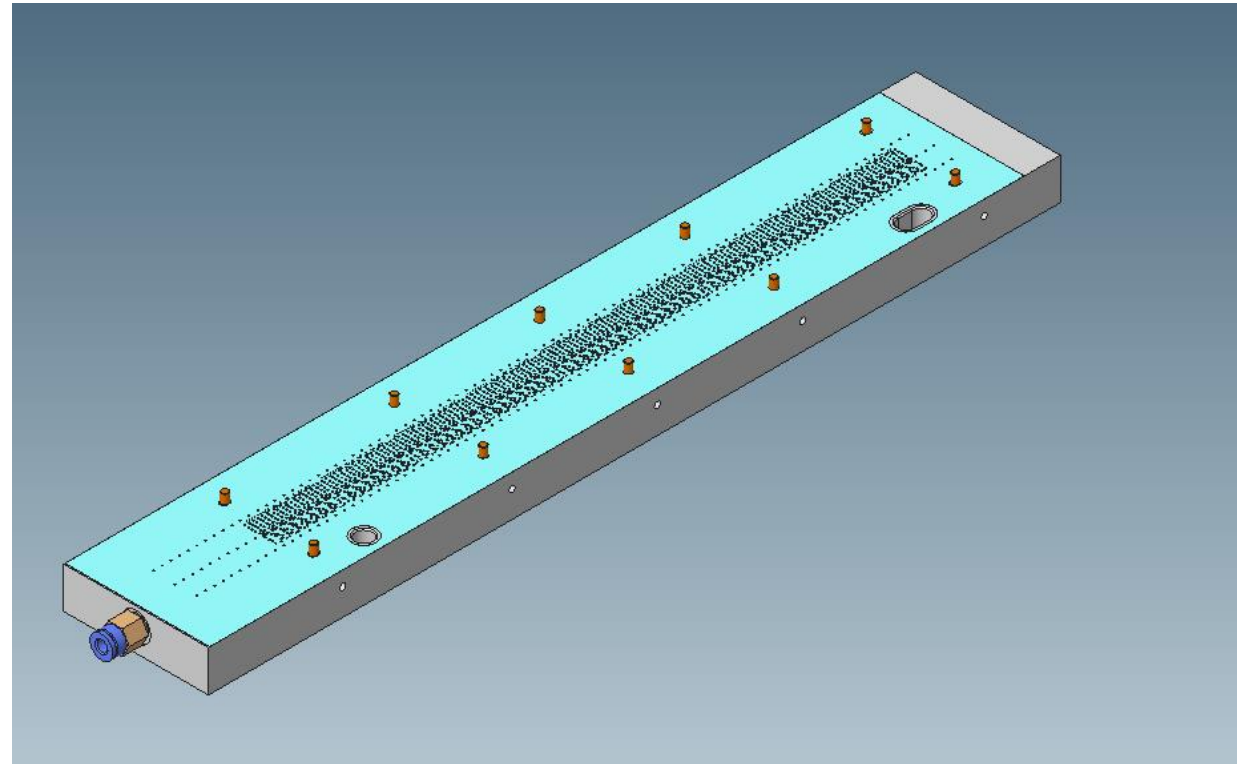
PROCEDURE OF OPERATION

PLACE THE FPC ONTO THE FPC GRIPPER

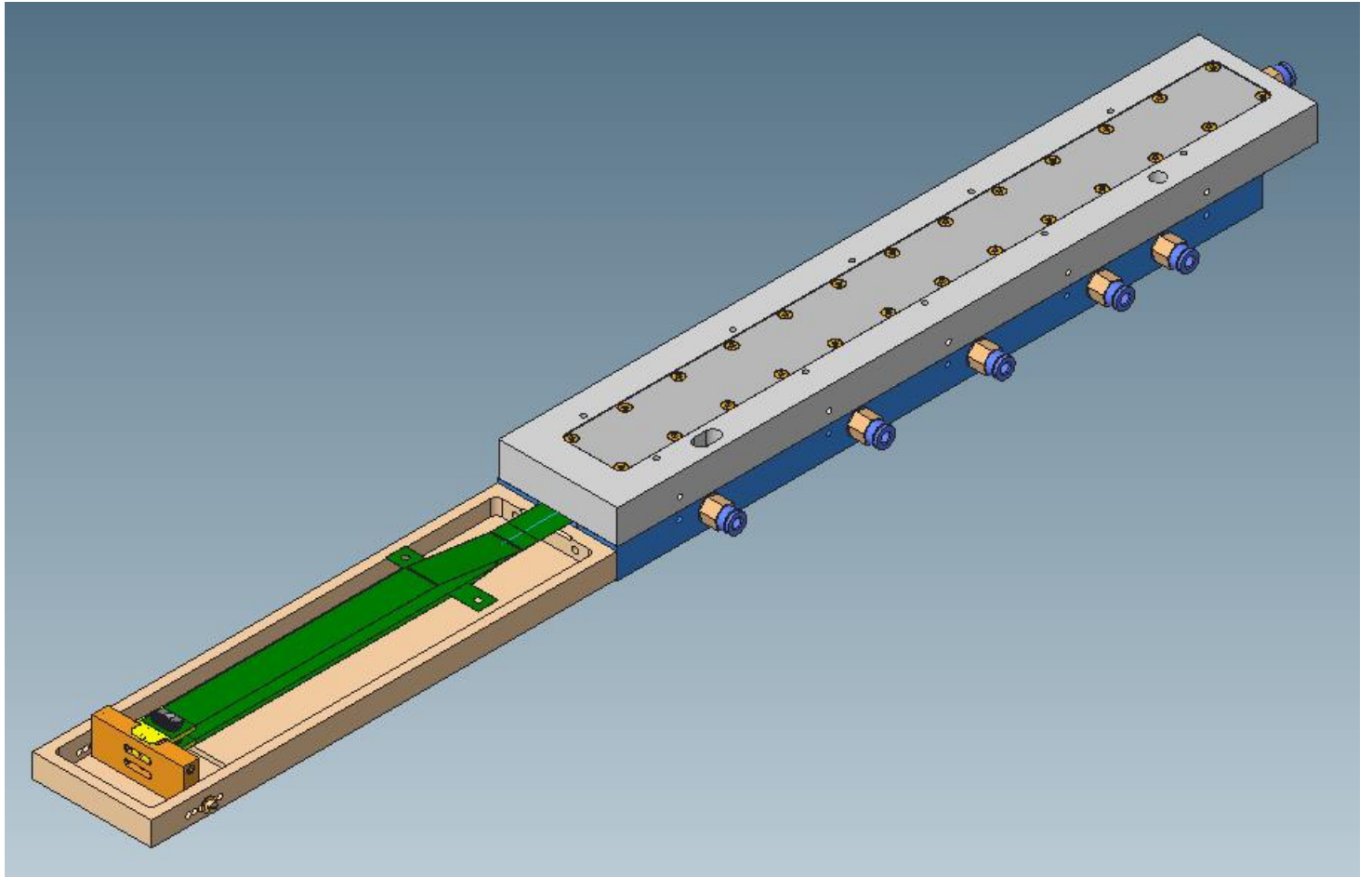
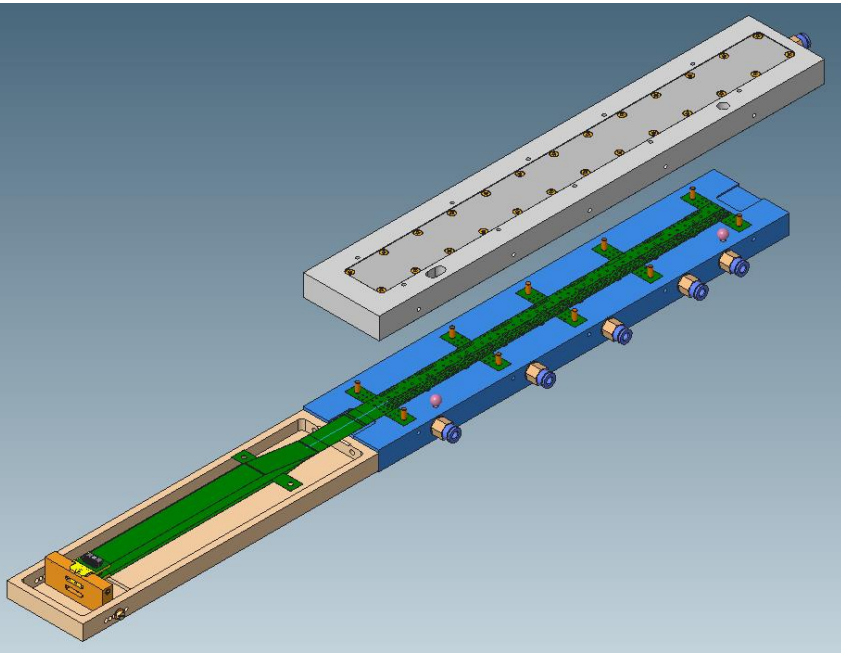
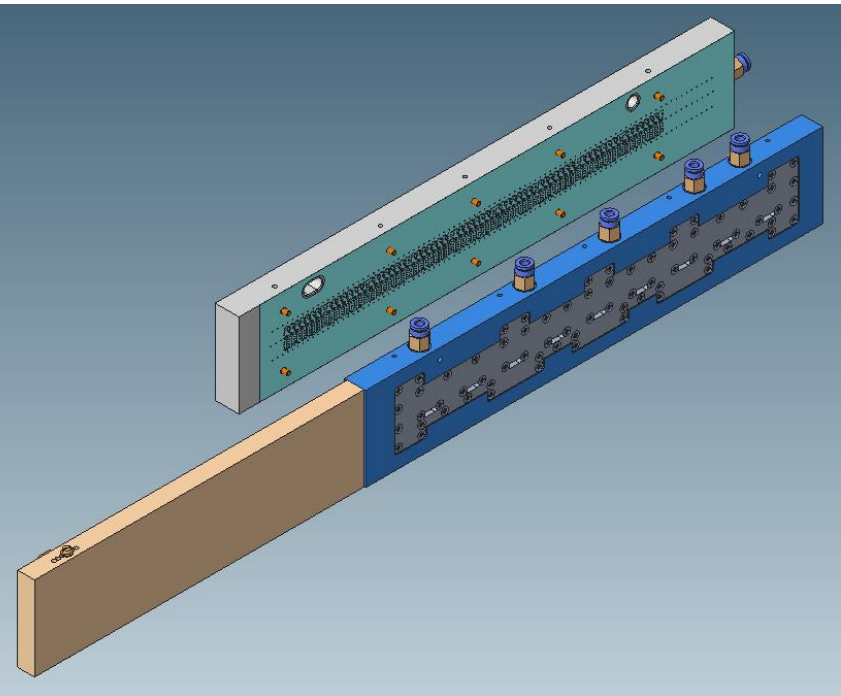


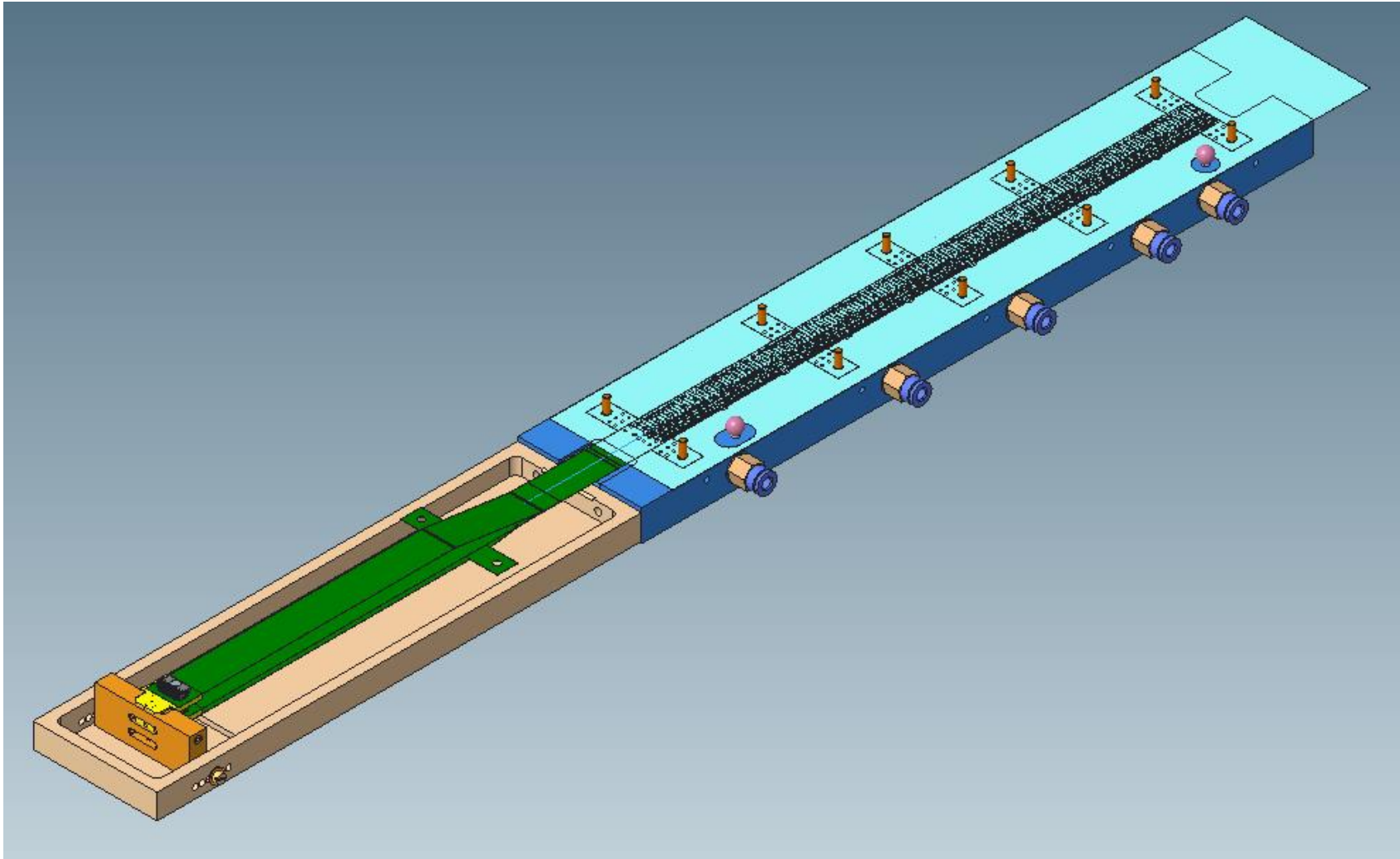


PLACE THE GLUE MASK ONTO THE GLUE MASK JIG.
NOTE THE GLUE MASK IS ADHESIVE AND DISPOSABLE
AND IS 80 MICRONS THICK.
THE HOLES RANGE FROM 300 TO 700 MICRON IN
DIAMETER WITH A 25 MICRON TOLERANCE ON SIZE
AND POSITION



PLACE THE GLUE MASK JIG ONTO THE FPC GRIPPER

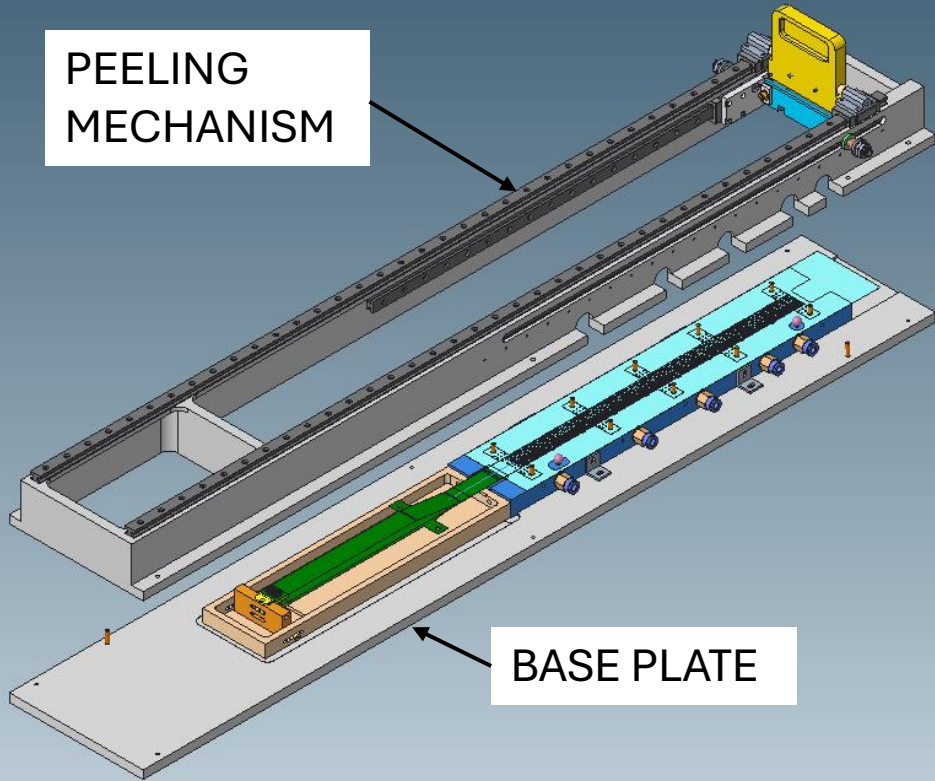




REMOVE THE GLUE MASK JIG
LEAVING THE GLUE MASK
ADHERED ONTO THE FPC
GRIPPER.

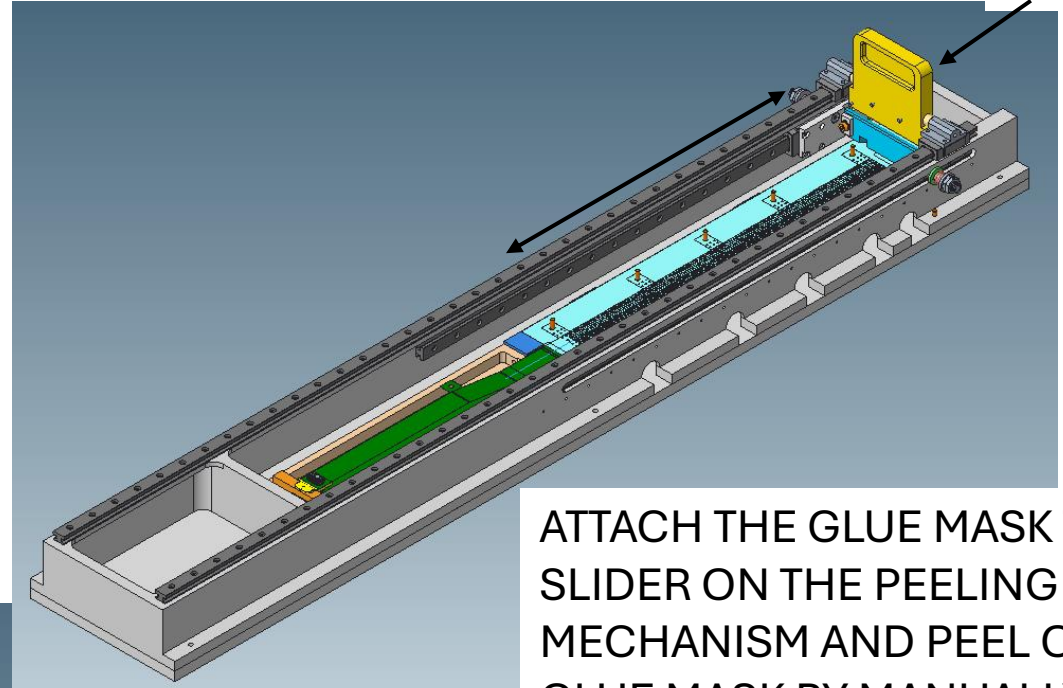
THE GLUE IS MANUALLY APPLIED
ONTO THE GLUE MASK TO
DEPOSIT THE GLUE DOT PATTERN
ONTO THE FPC

PEELING
MECHANISM



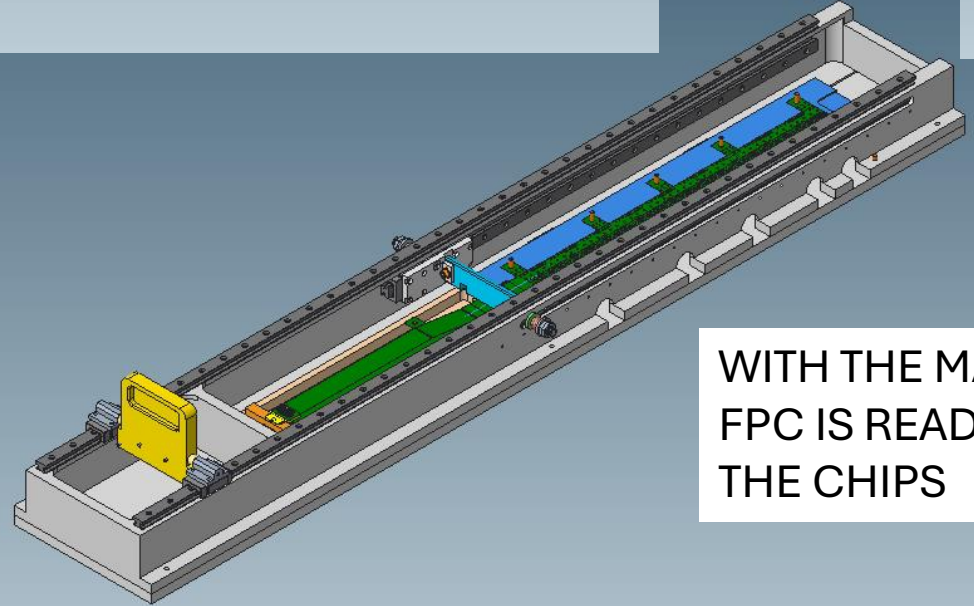
BASE PLATE

ASSEMBLE PEELING MECHANISM TO FPC
GRIPPER SUB-ASSEMBLY WITH BASE PLATE

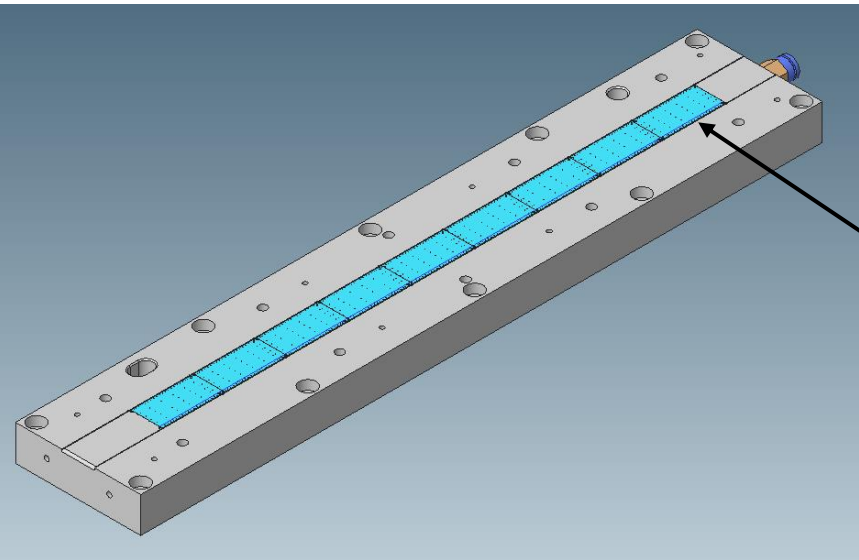


SLIDER

ATTACH THE GLUE MASK TO THE
SLIDER ON THE PEELING
MECHANISM AND PEEL OFF THE
GLUE MASK BY MANUALLY
MOVING THE SLIDER ALONG
THE SLIDE RAILS

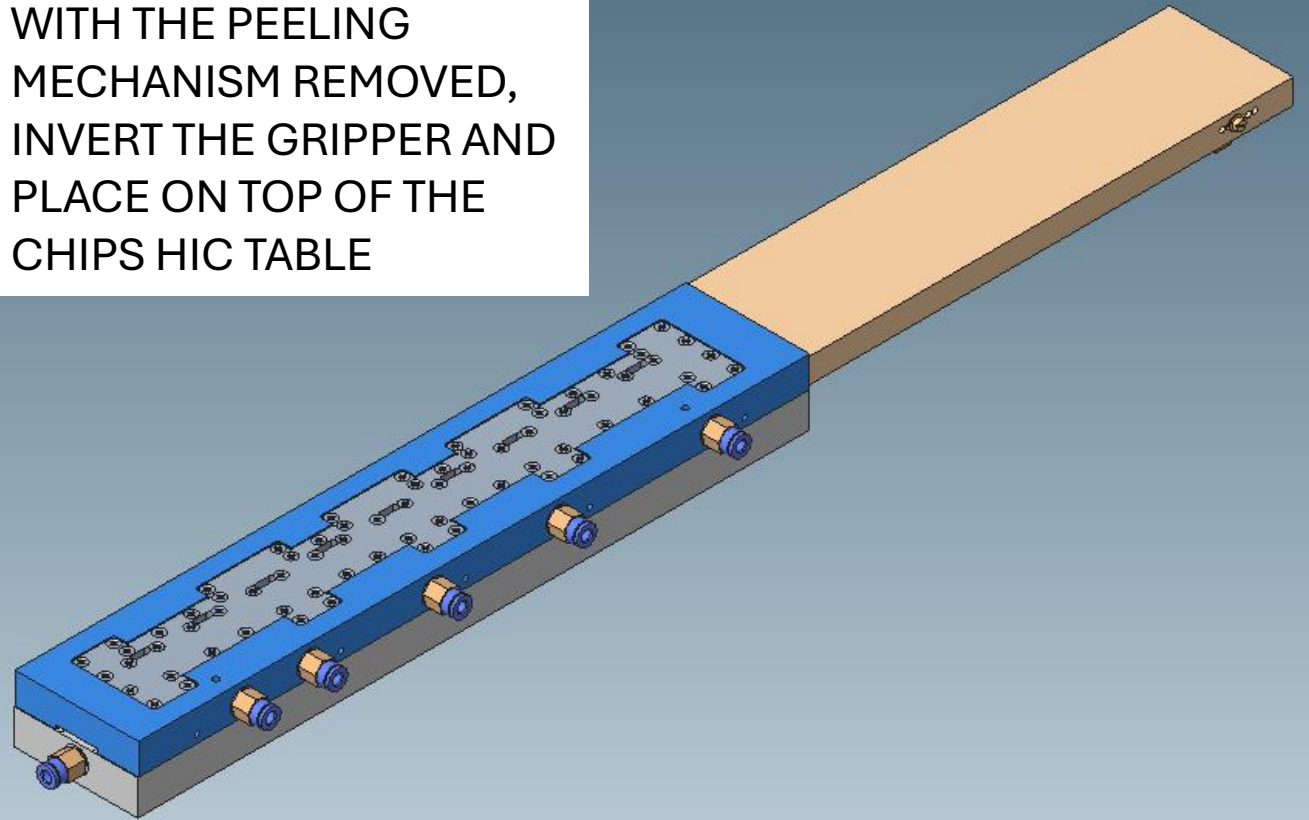


WITH THE MASK REMOVED THE
FPC IS READY TO BE GLUED TO
THE CHIPS



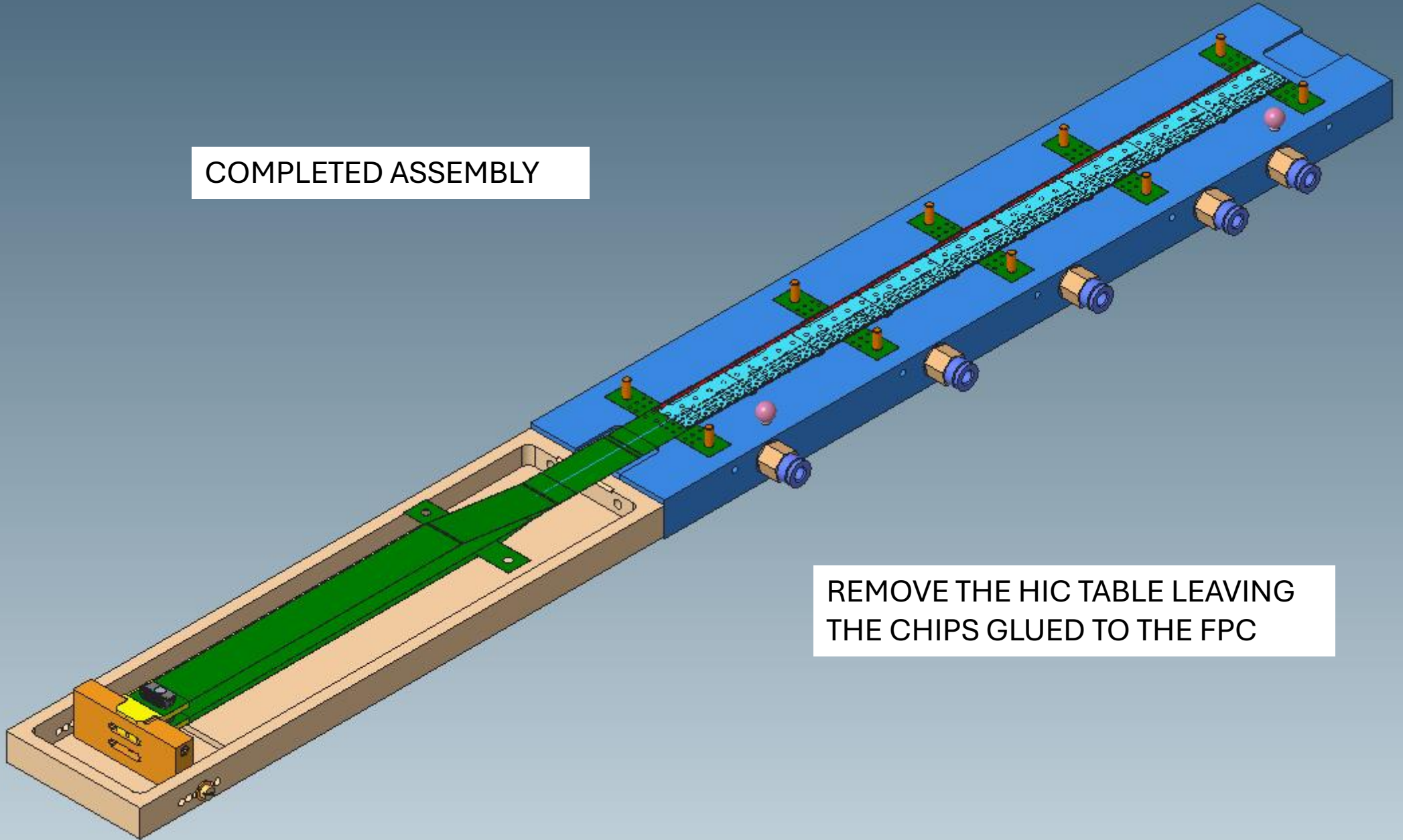
CHIPS MOUNTED ON
HIC TABLE

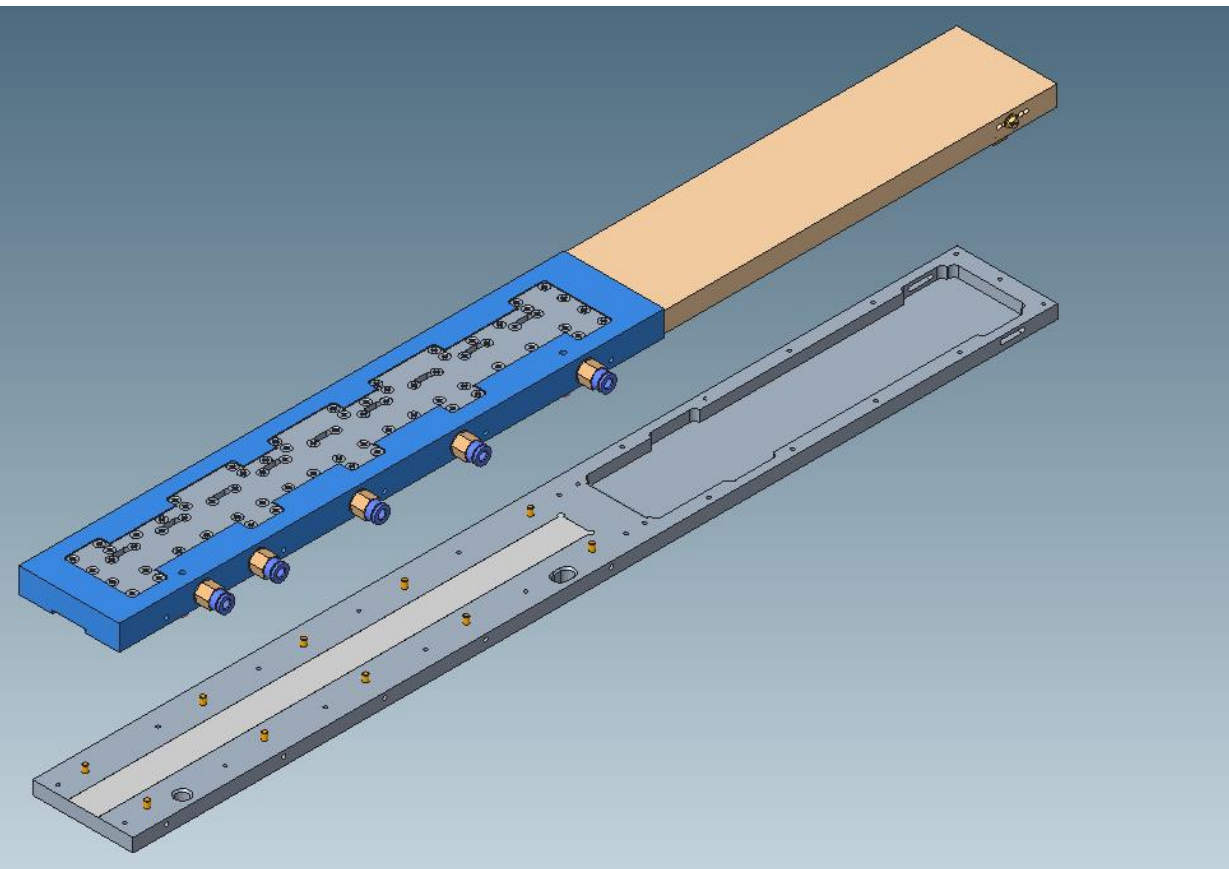
WITH THE PEELING
MECHANISM REMOVED,
INVERT THE GRIPPER AND
PLACE ON TOP OF THE
CHIPS HIC TABLE



COMPLETED ASSEMBLY

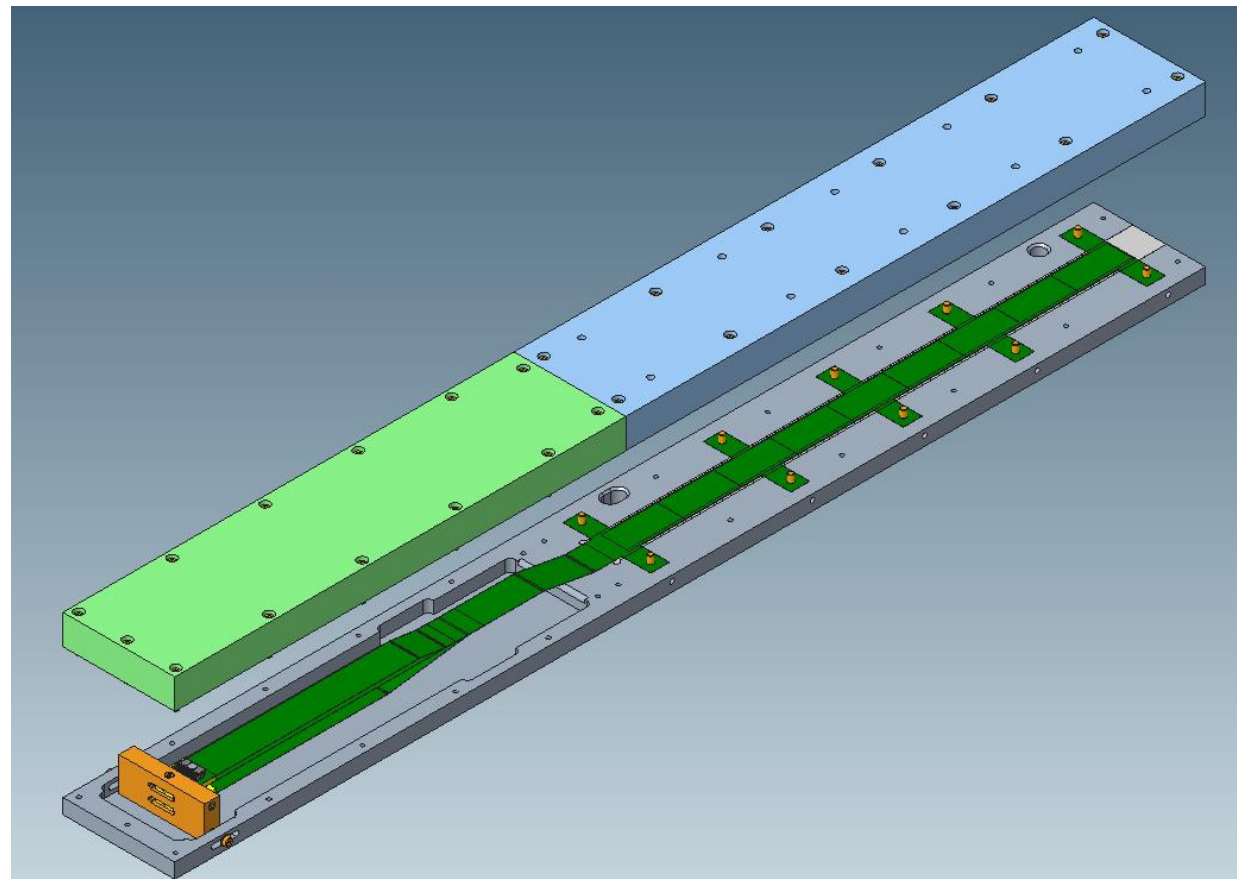
REMOVE THE HIC TABLE LEAVING
THE CHIPS GLUED TO THE FPC

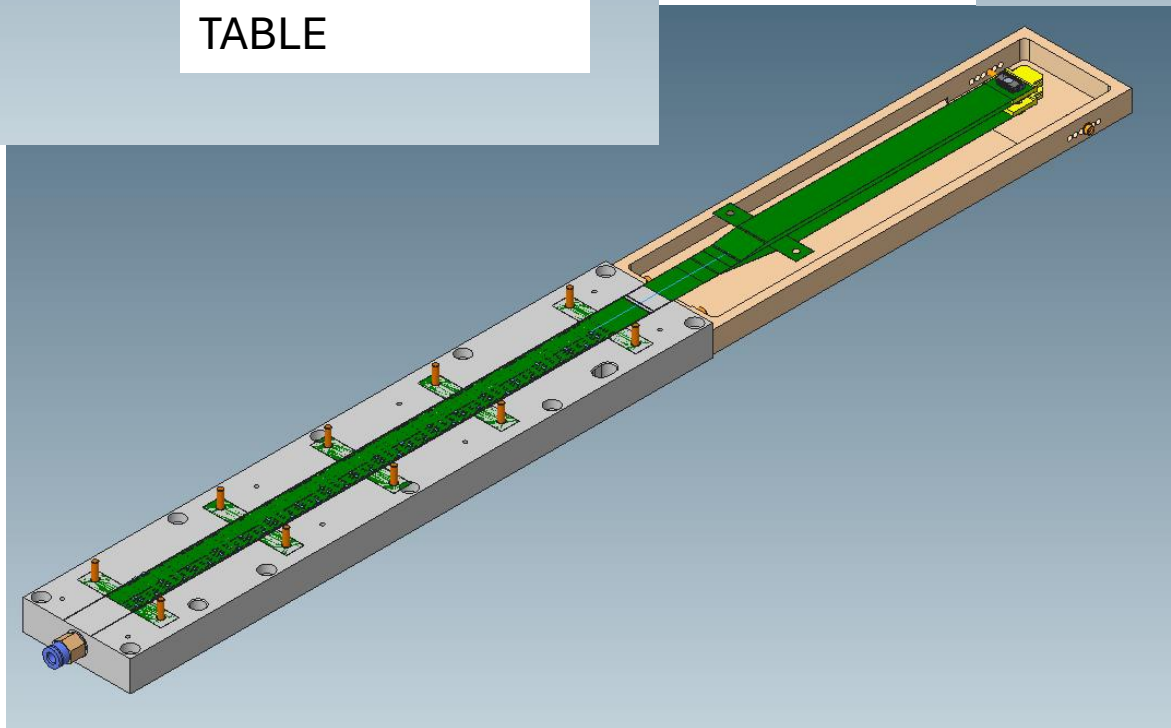
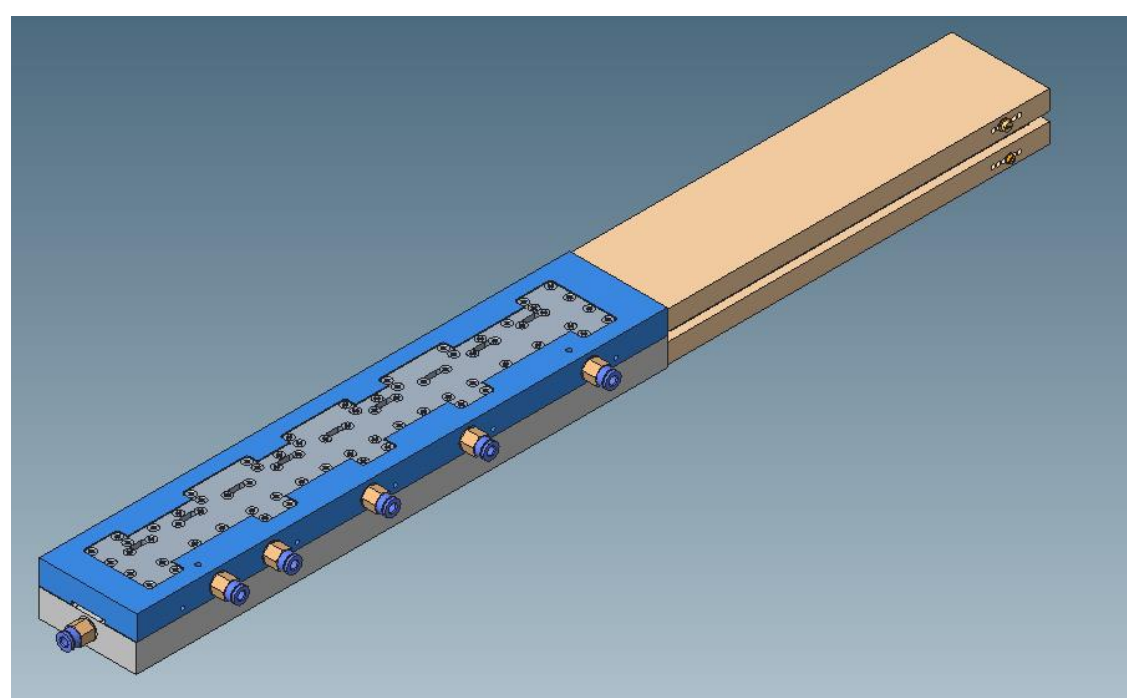
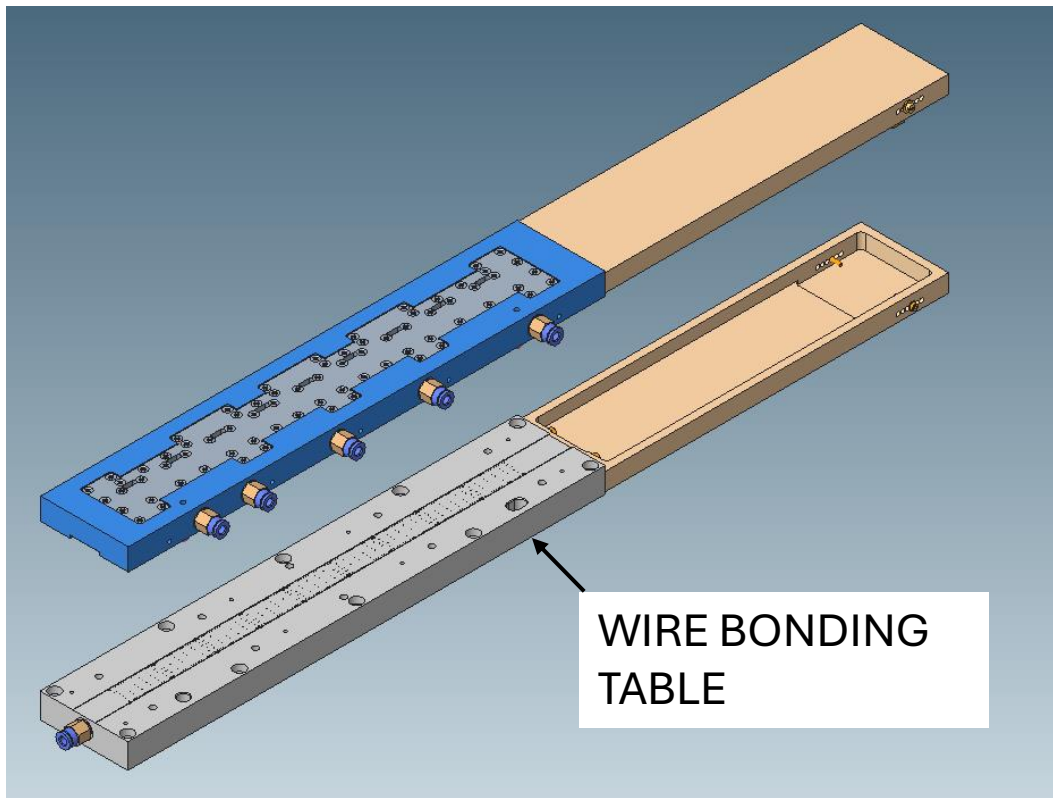




TRANSFER HIC ONTO THE
TRANSPORT PLATE

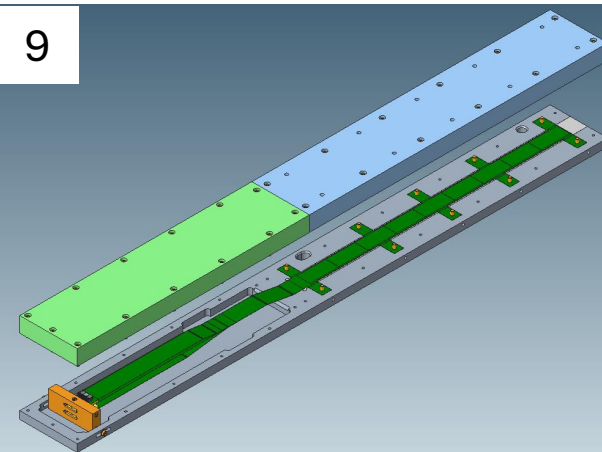
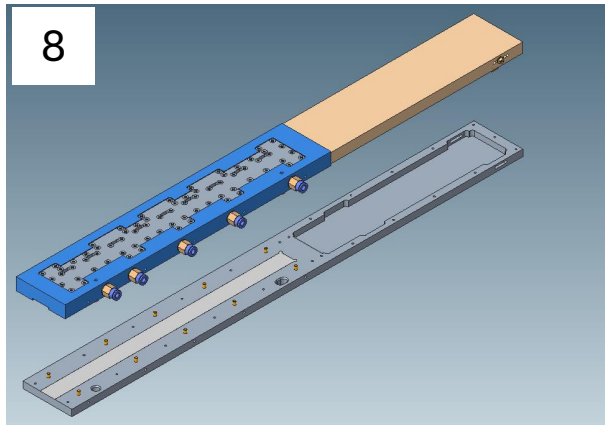
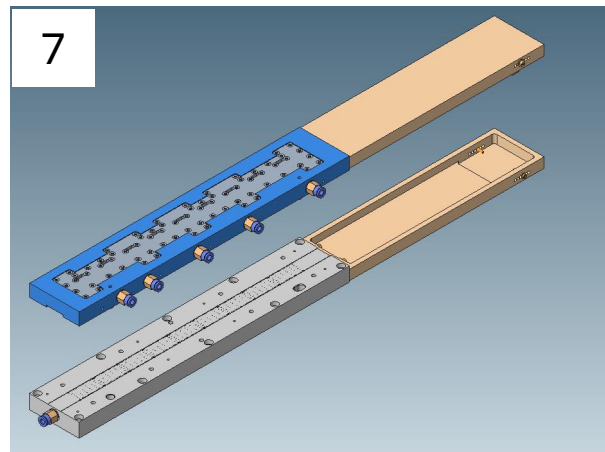
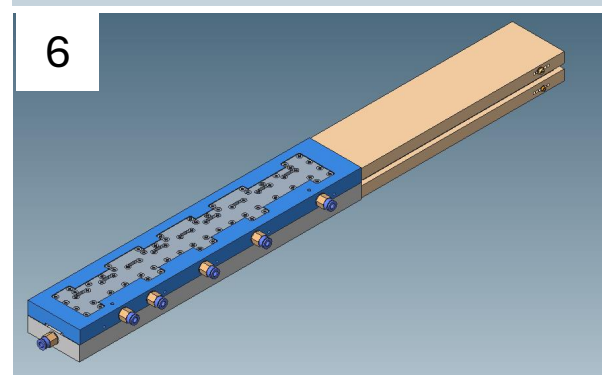
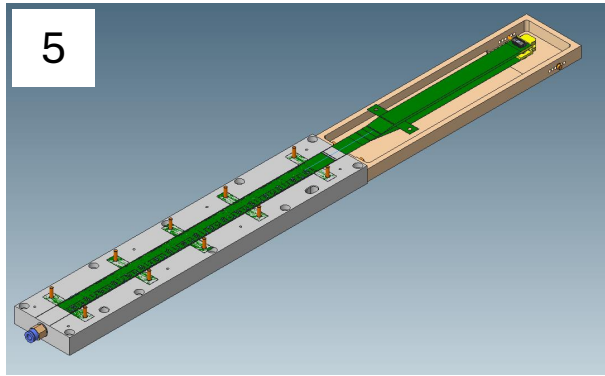
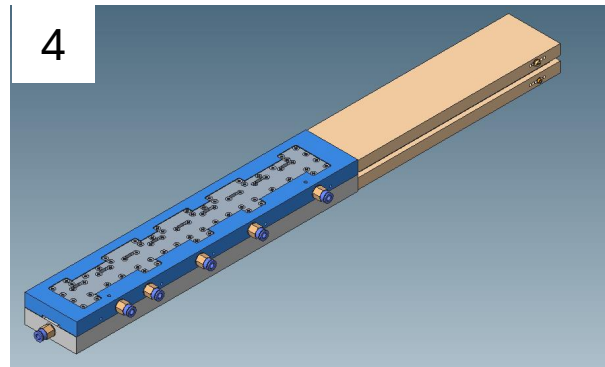
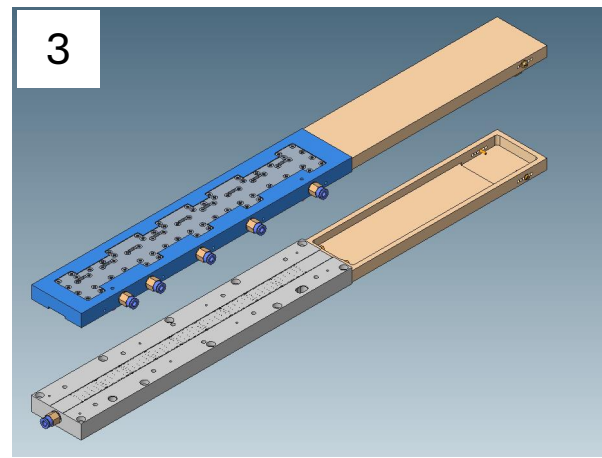
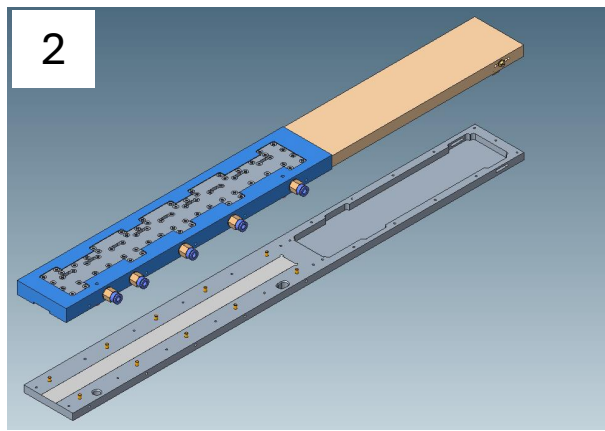
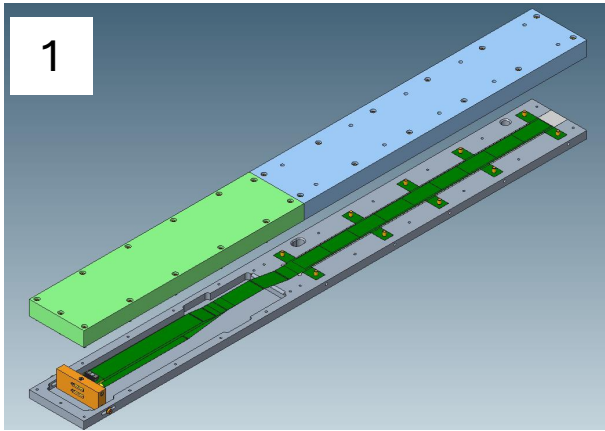
PLACE THE COVER ONTO
TRANSPORT PLATE TO PROTECT THE
HIC (MODULE)





THE HIC IS TRANSFERRED TO THE WIRE BONDING TABLE.

AFTER WIRE BONDING THE HIC IS PLACED BACK ONTO THE TRANSPORT PLATE



WIRE BONDING
SEQUENCE
REF. PREVIOUS
SLIDE