



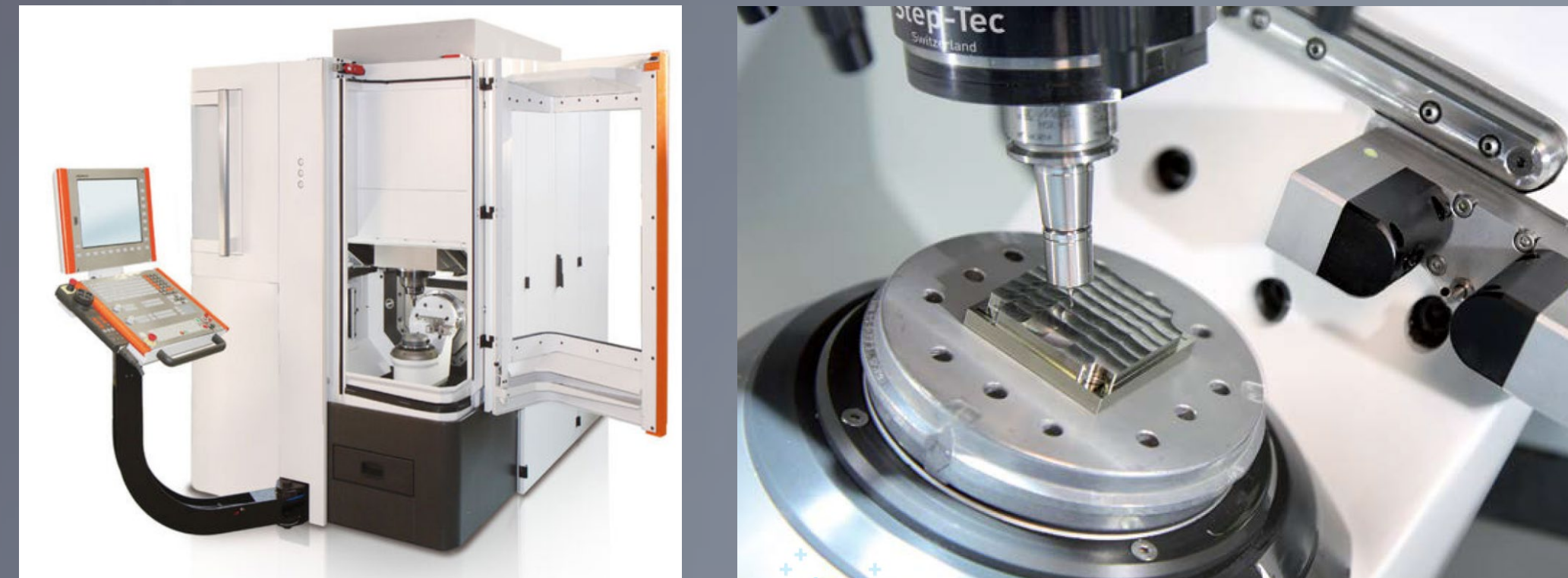
4-Axis Milling of Planer Targets For Dynamic Materials Properties Experiments*

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THE MIKRON MILLING MACHINE

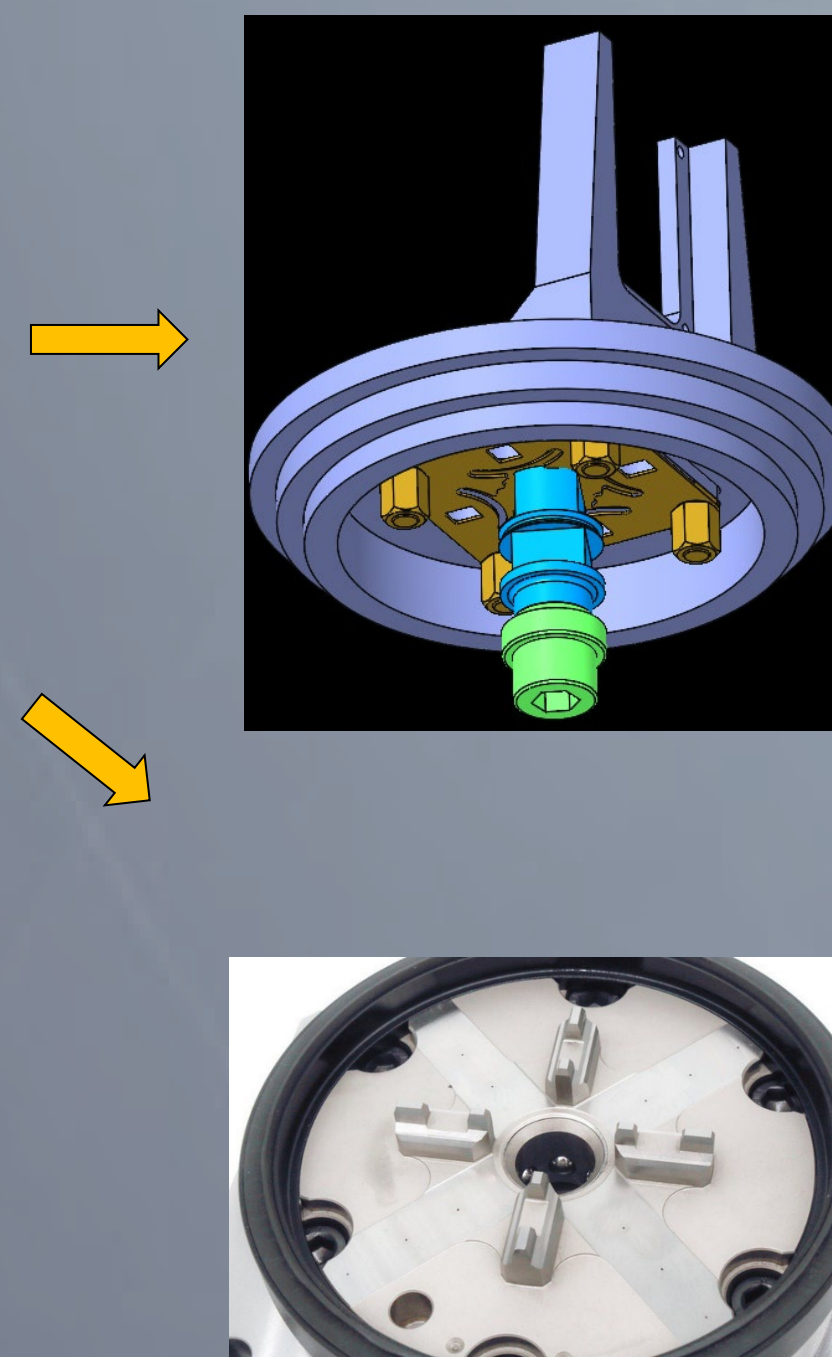
OVERVIEW OF FEATURES



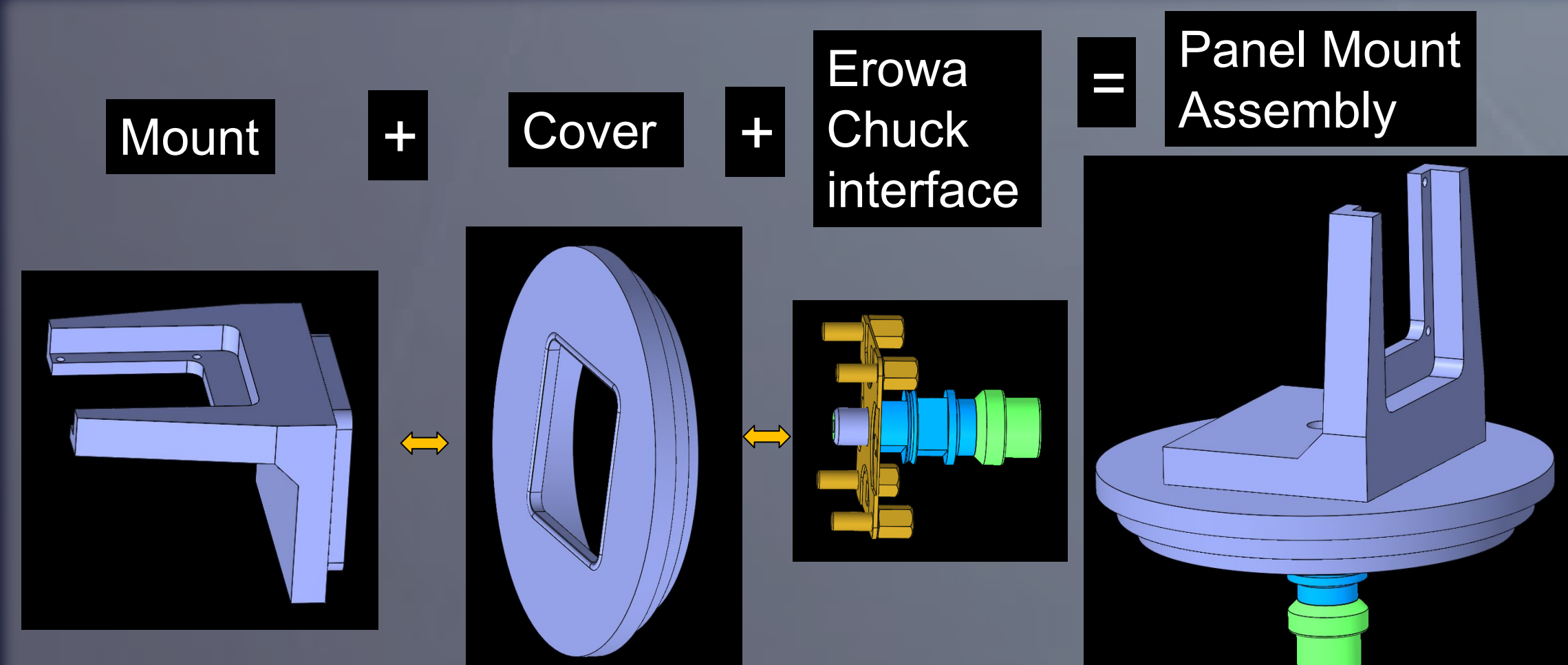
- Made in Switzerland
- Full 5-axis
- 50K RPM spindle
- \$500,000 capital investment by SNL

THE BUILT - IN EROWA CHUCK INTERFACE

- Erowa is a Swiss company specializing in high precision tooling.
- The Erowa interface components connect the panel mount to Erowa chuck.
- The Erowa chuck is built into the Mikron machine.
- Enables removal/replacement of the panel/mount assembly with ~1µm repeatability.
- Allows removal of panel for inspection with no loss of accuracy.



THE PANEL MOUNT ASSEMBLY



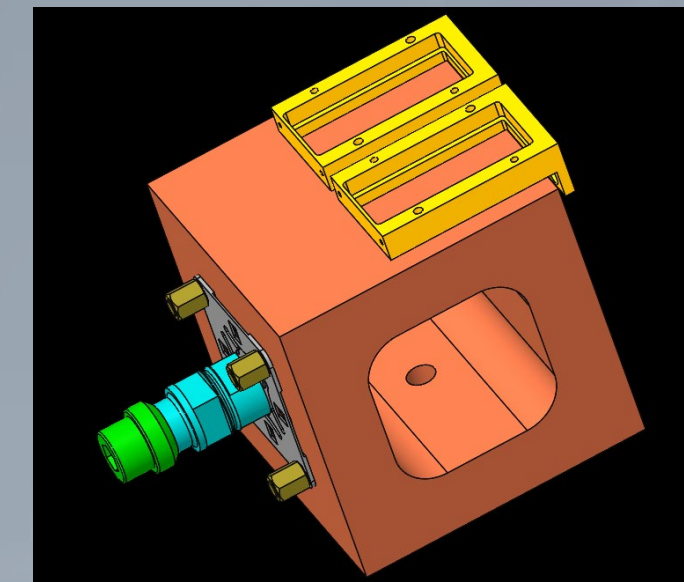
OLD MACHINING PROCESS

DISADVANTAGES

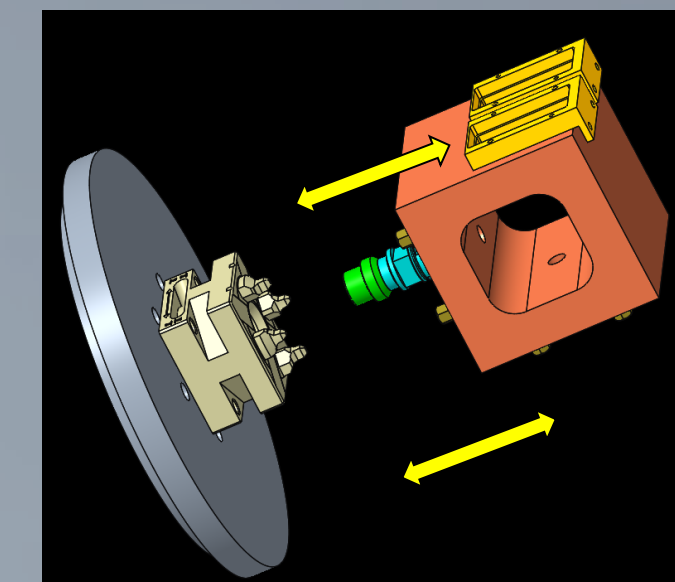
- 2 different machines, ¼ mile apart cost time traveling
- 2 glue/unglue cycles waste time waiting
- Slow spindle speed: 800 rpm turning – 3000 rpm milling
- No tool changer so milling is limited to 1 finishing tool

Precitech 2-axis Diamond Lathe

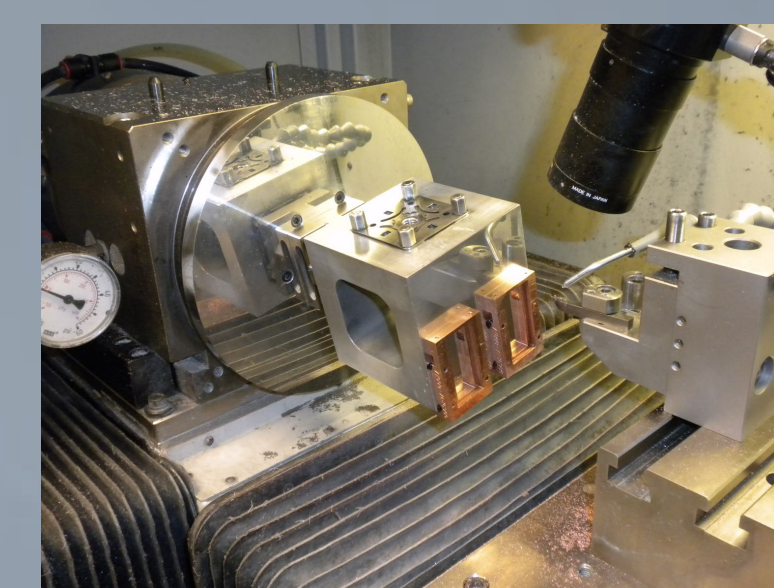
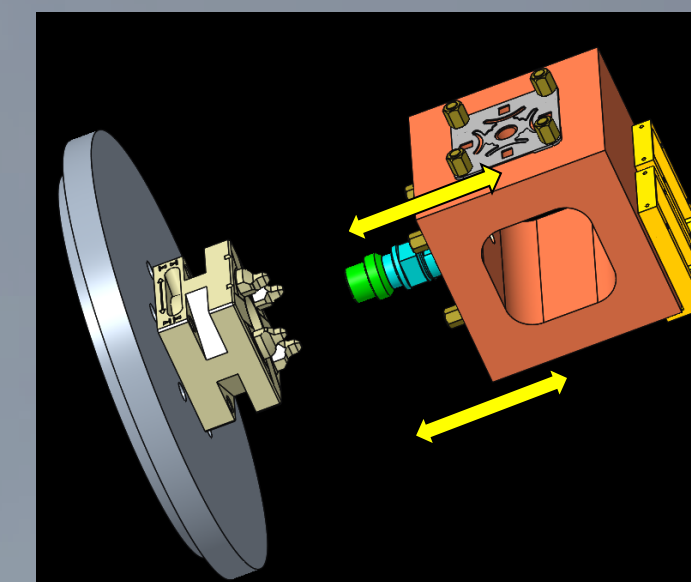
Glue Panels To Squaring Block



Mount Erowa To Lathe For Facing Panel "Foot"

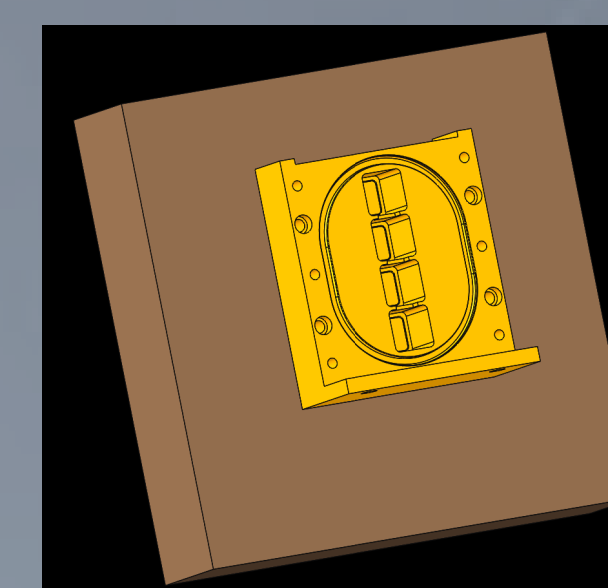


Swap Erowa Position For Facing Panel "Back"

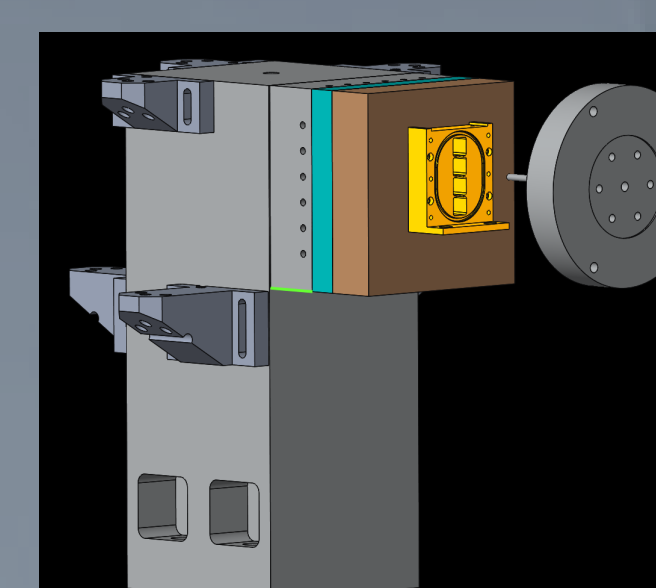


Precitech 5-axis Diamond Lathe

Glue Panel To Precision Block



Mill Panel "Pockets"



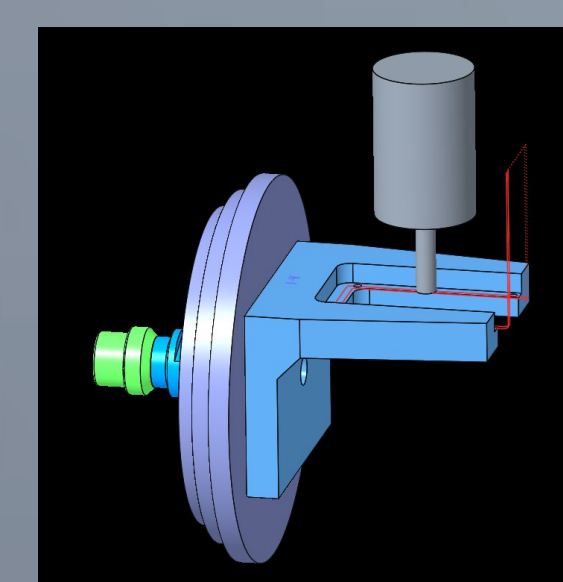
NEW MACHINING PROCESS

ADVANTAGES

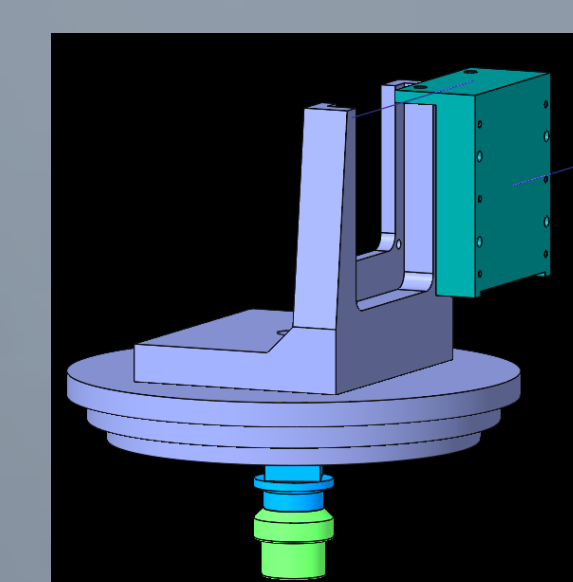
- 1 machine adjacent to related equipment saves time
- NO glue/unglue cycles saves time
- Faster spindle speed (3500 rpm flycutting; 20,000 rpm milling) cuts processing time and thermal effects
- Tool changer with 30 tool magazine enables separate roughing/finishing tools to save time and improve quality

Mikron 5-axis Mill

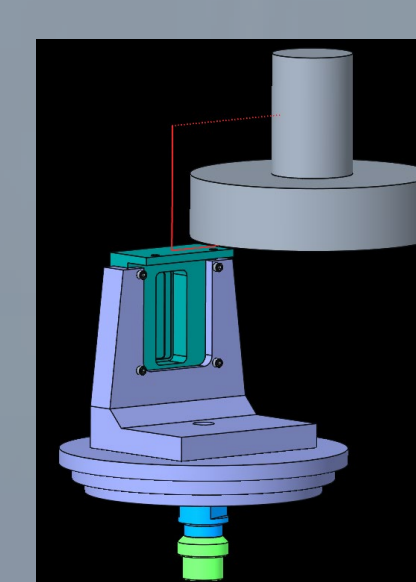
Prepare Panel Mount



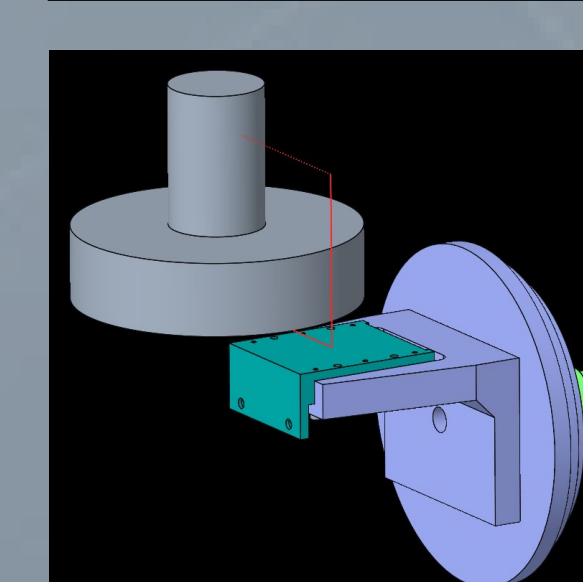
Screw Panel To Mount



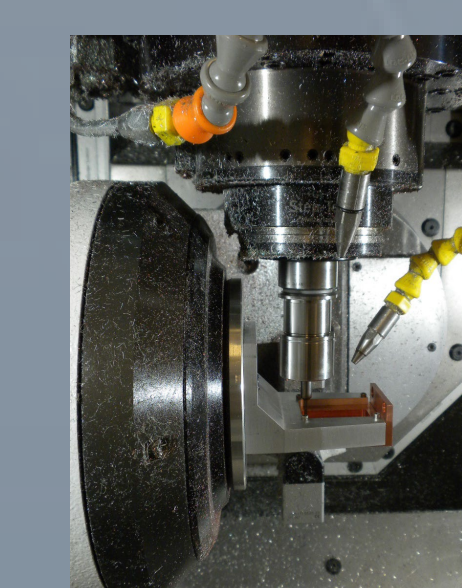
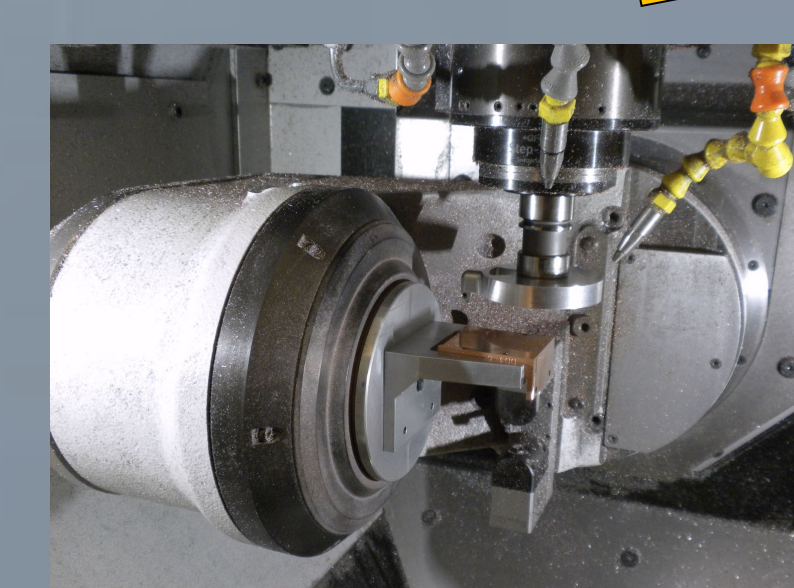
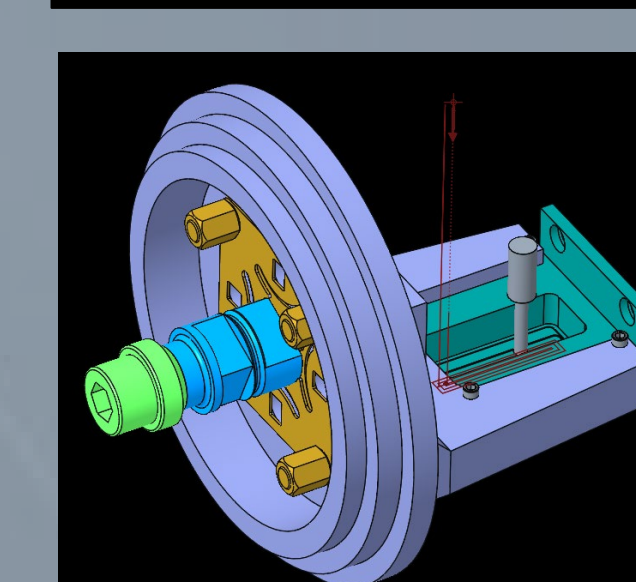
Flycut "Foot"



Flycut "Back"



Mill "Pockets"

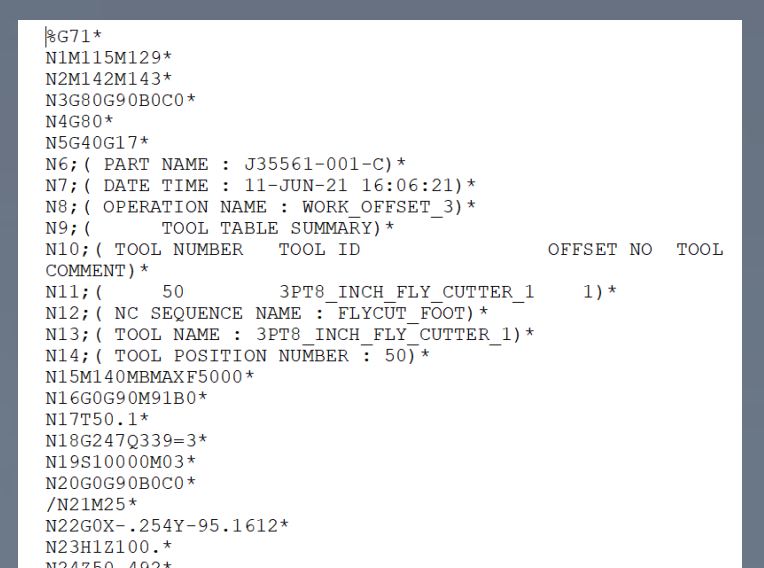
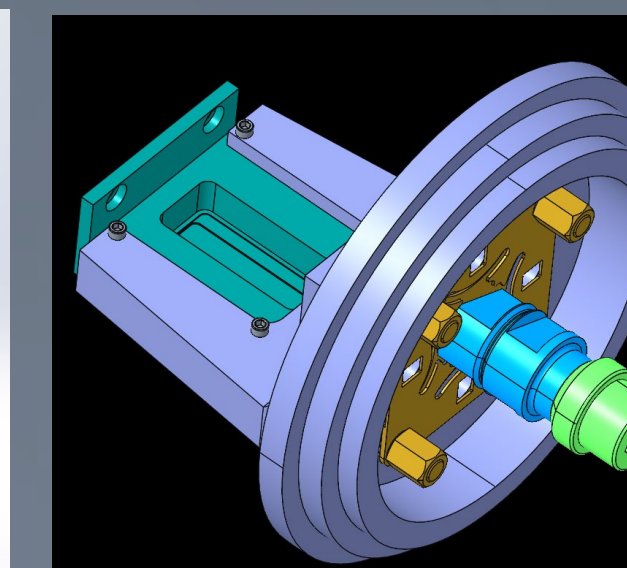
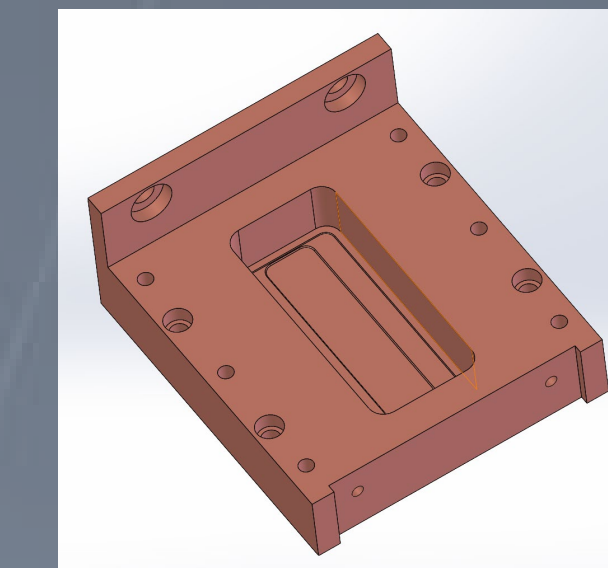


A FULLY "MODEL BASED" PROCESS

Solidworks "CAD" File

Creo "CAM" File

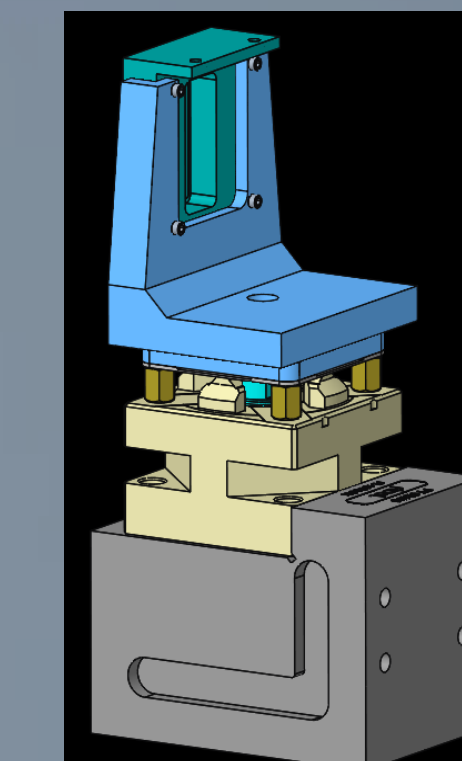
Mikron "G-Code" NC Program



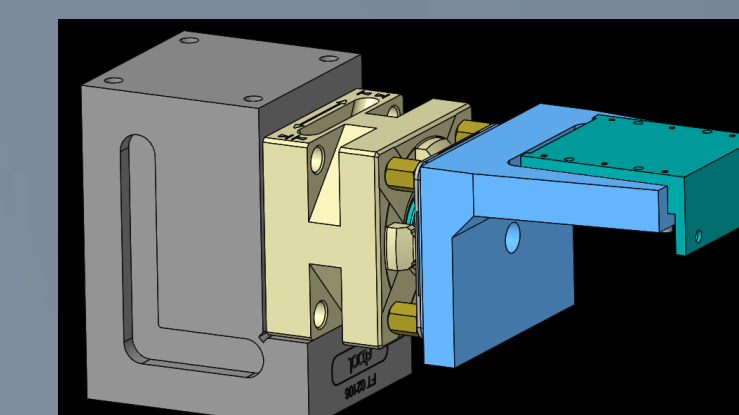
INSPECTION ADVANTAGES

- Erowa interface allows for in-process measurements of all features to enable fine tuning of mill calibration

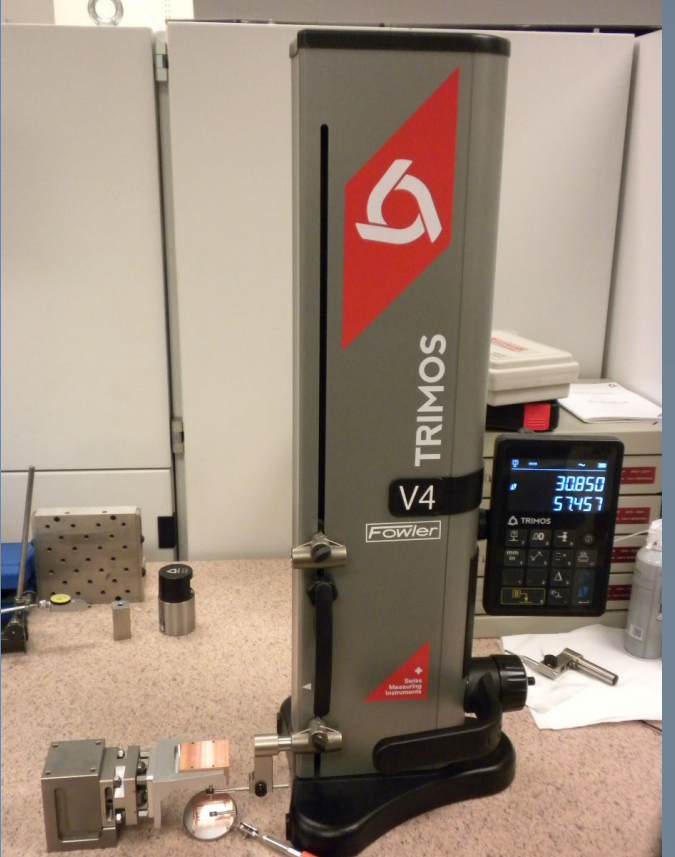
Check "Foot" Height



Check "Back" Height and Floor Thickness



Trimos Electronic Height Gage



TIME SAVED

- 3.4 hrs./panel
- 400 man-hrs. annually

