

# Subsea XT Machining

Presented at the Home Metal Shop Club

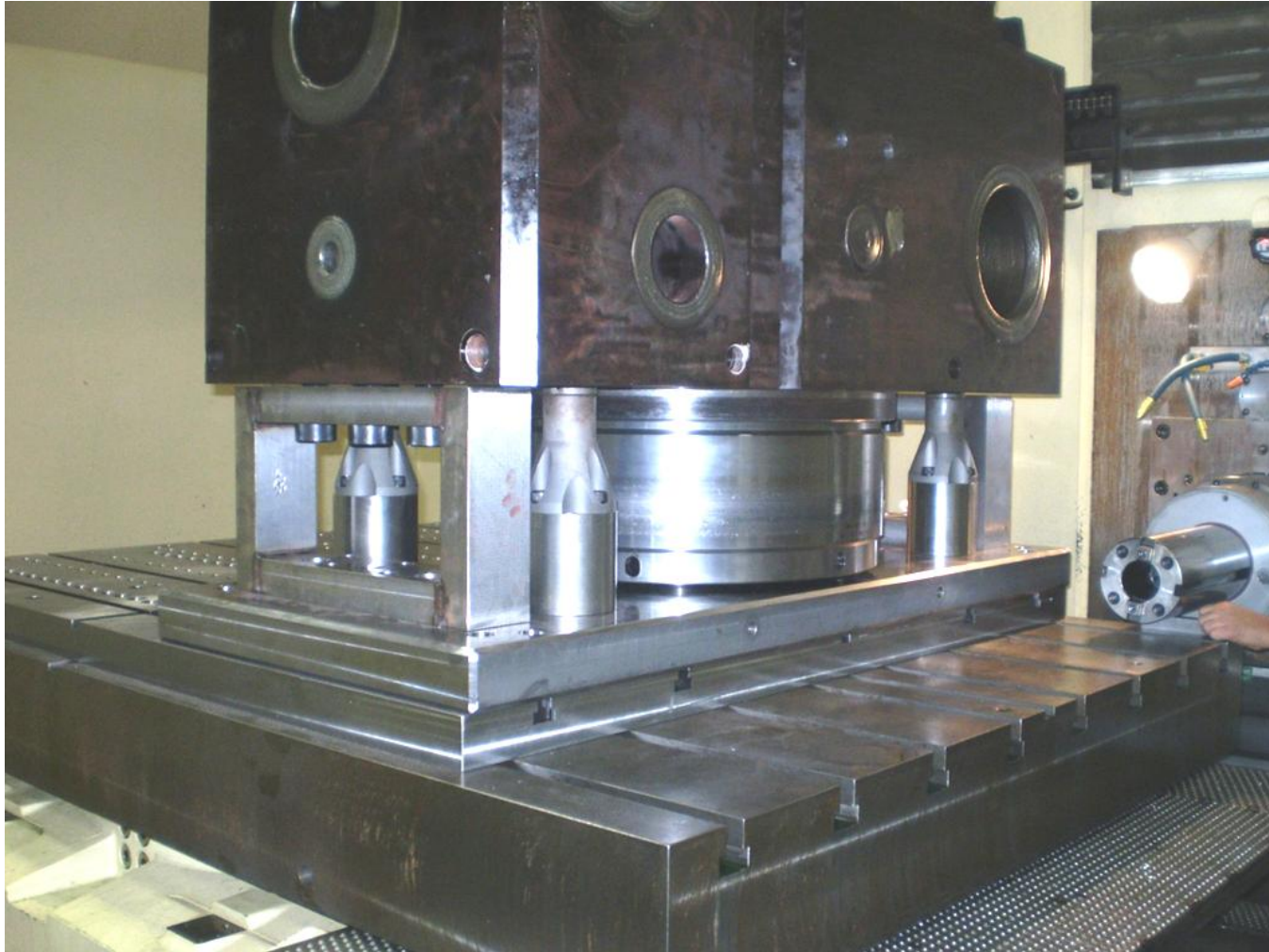
8/14/2010

By Bubba Vaughn

# Presentation Description

- Seat Pockets
- Ring Grooves
- Internal and External Slot Cutting
- Deep Hole Drilling

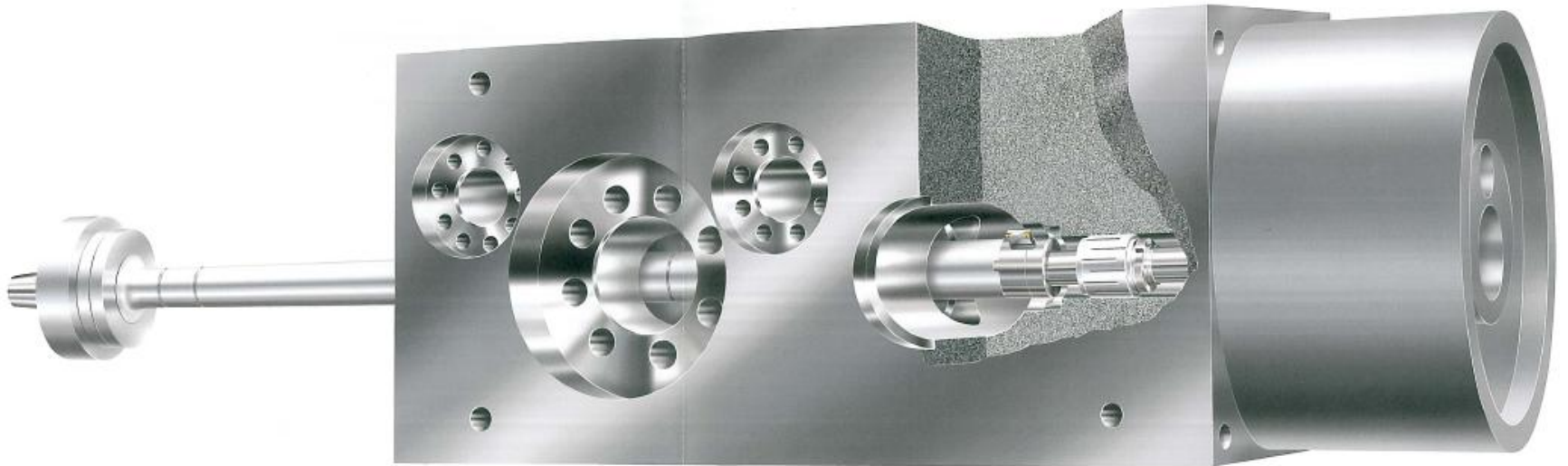
# EHXT Valve Block Body

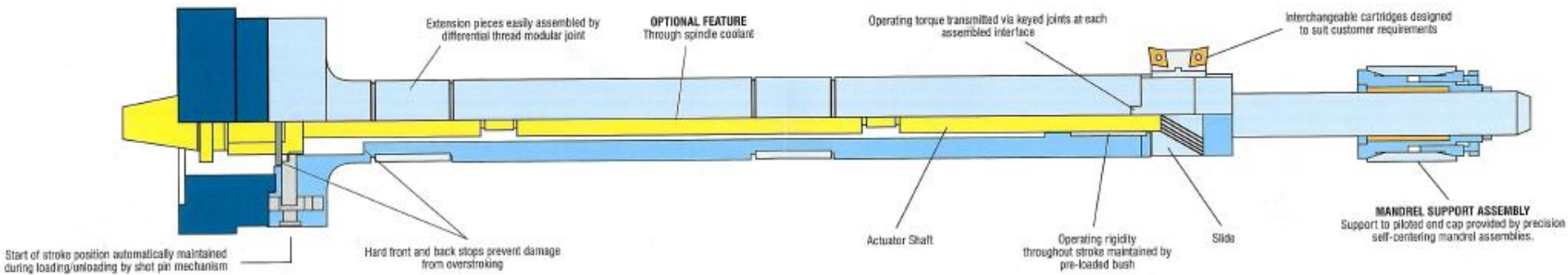


# Seat Pockets

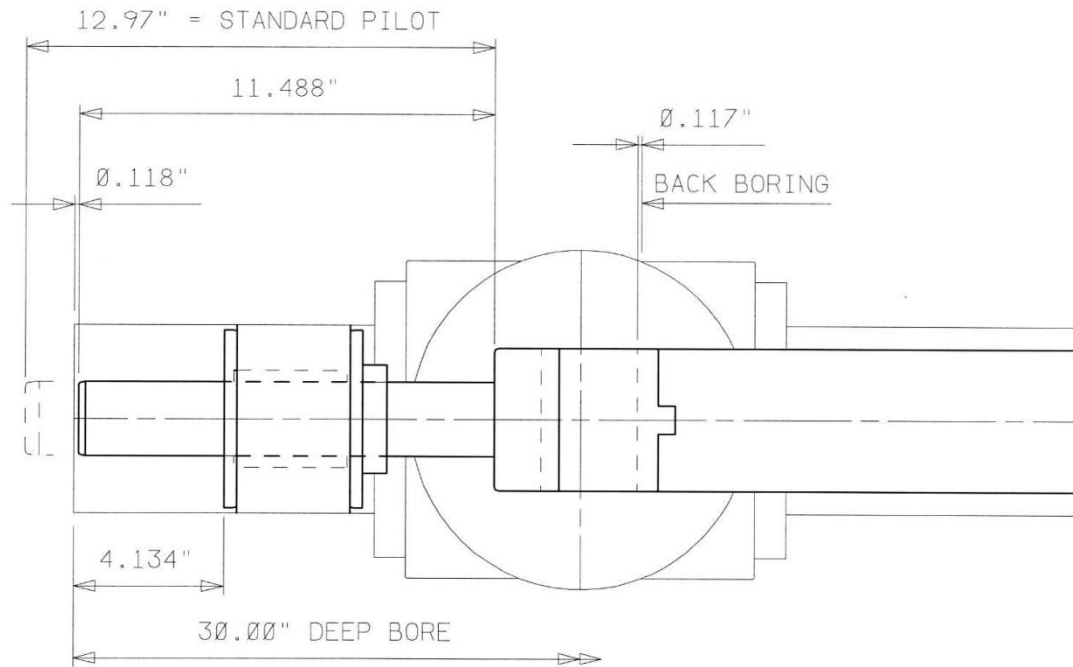
- Seat pockets typically present the most difficult machining challenge for the machine shop and supplier.
- Few small shops have the Innovative Tooling Solutions for machining seat pockets.
- Can be machined on Lathe or Mill.

# ITS Tooling

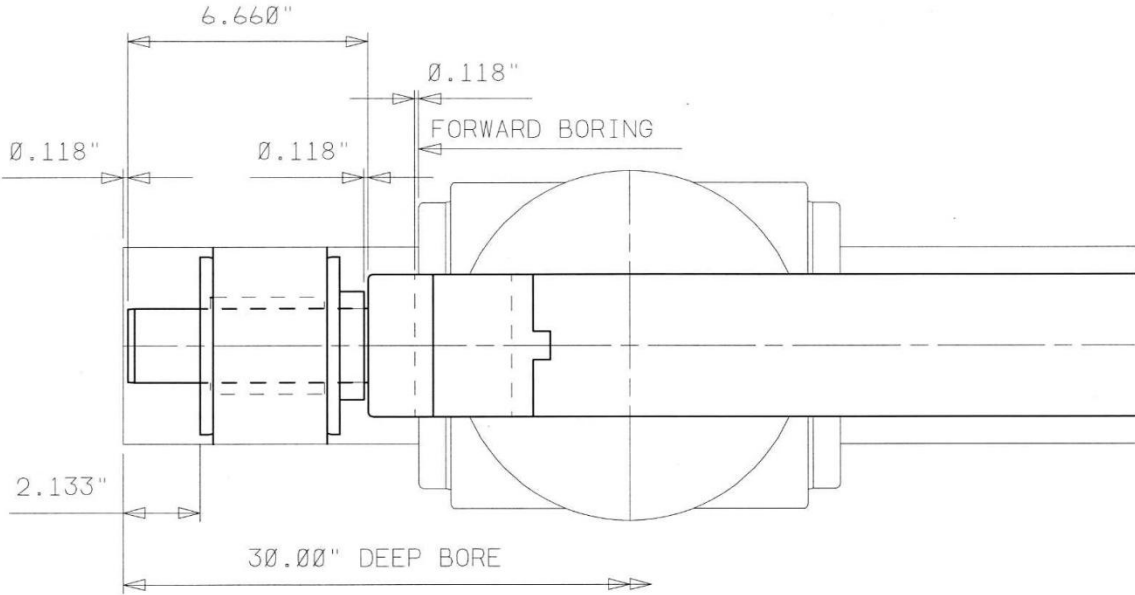




# ITS ES50 Back Boring

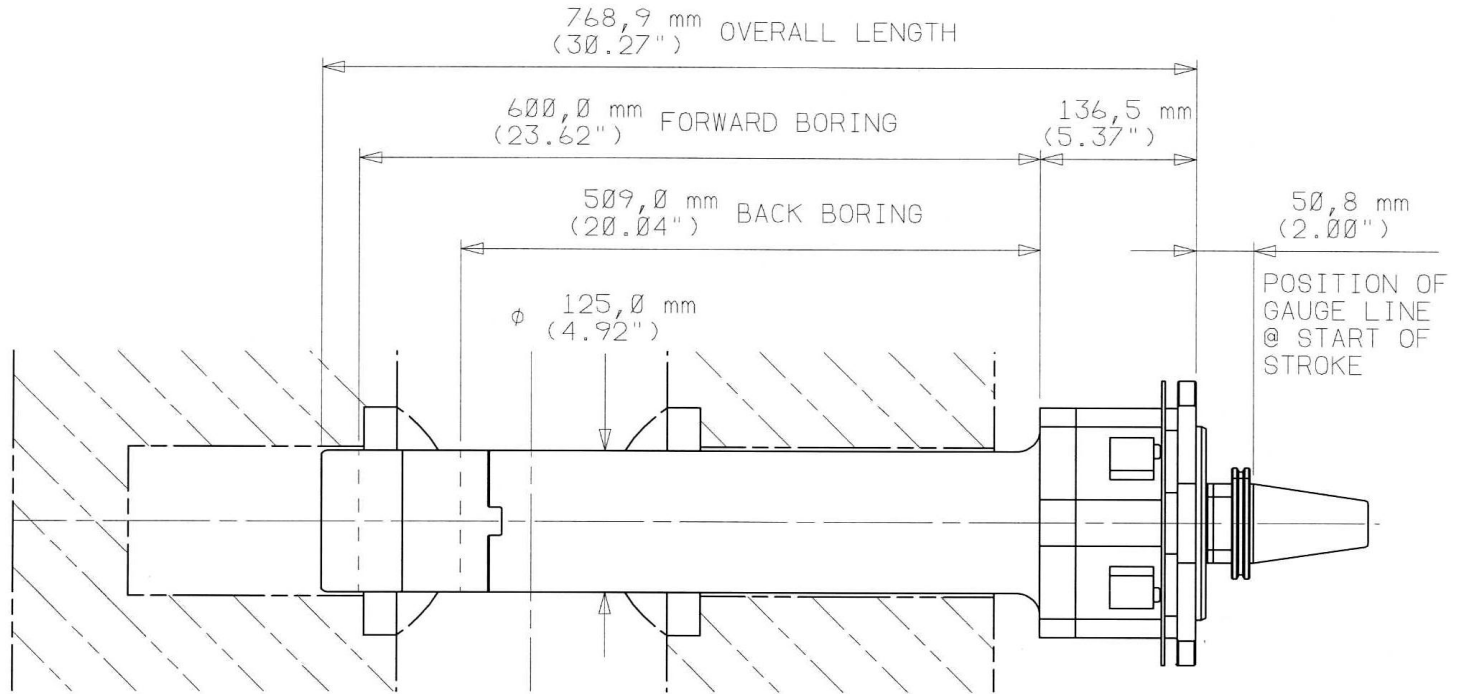


# ITS ES50 Forward Boring





# ITS S50 Boring Bar



# Seat Pocket and Internal Contouring

Below are examples of an extended ES Contouring bar on the left and a fixed length S Contouring Bar on the right. The bar on the left, being modular, will accommodate deeper features; the bar on the right will not.

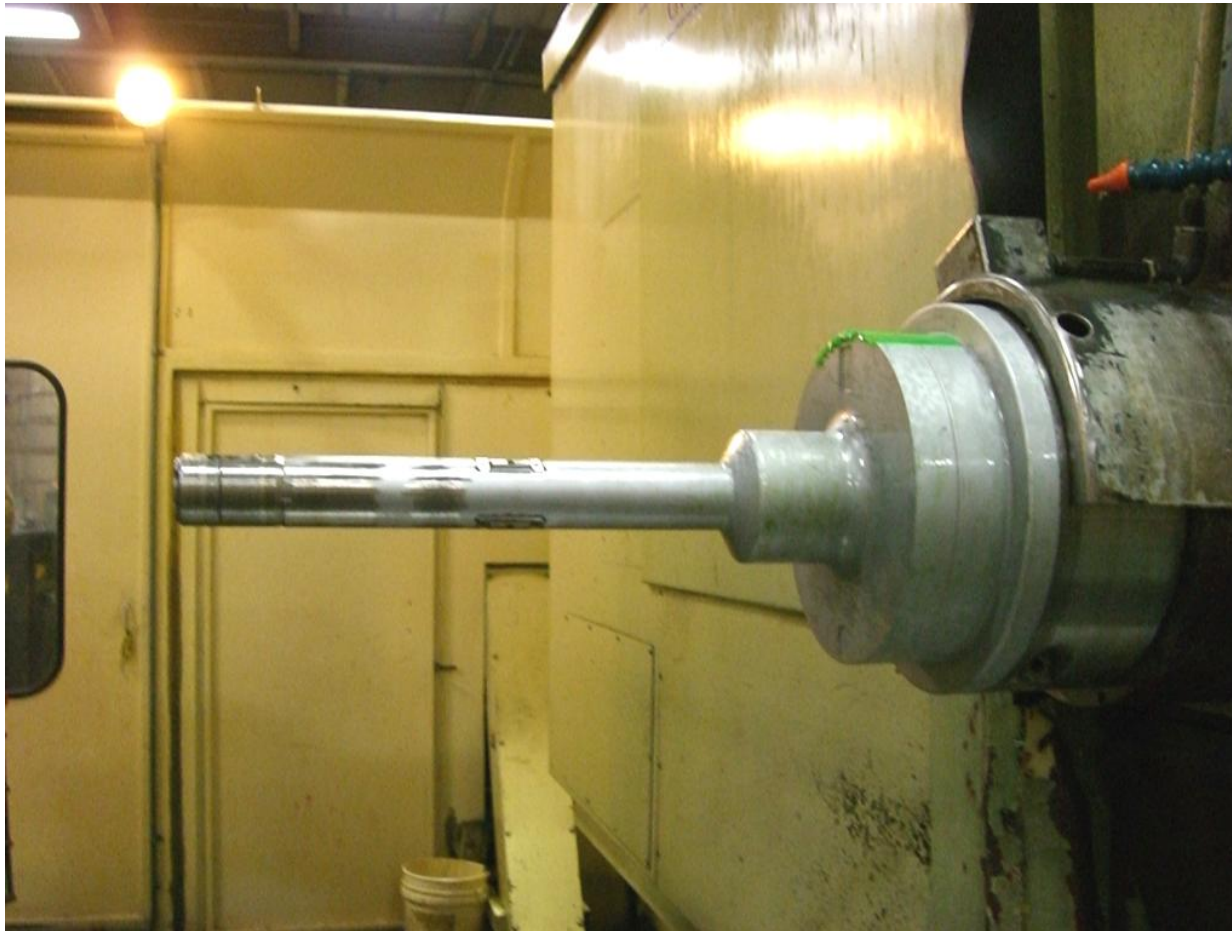


# Finish Machine Seat Pocket





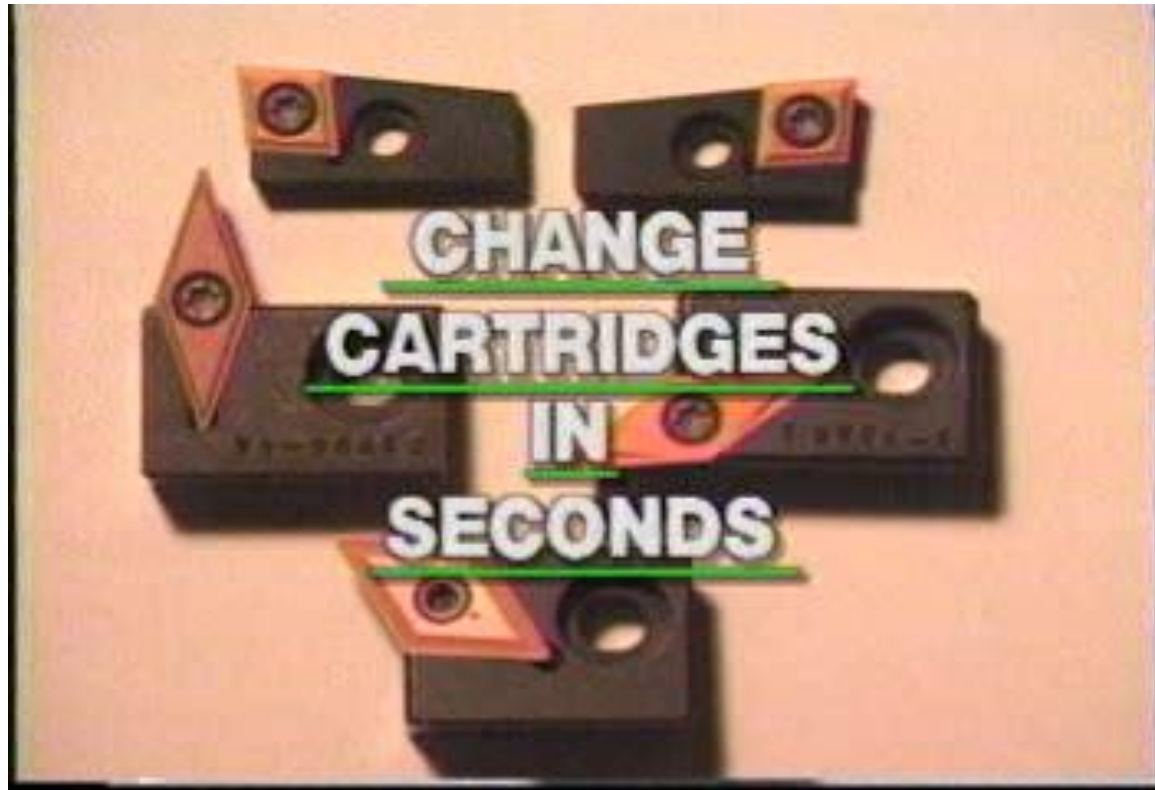
# ITS S20 Boring Bar, Closed



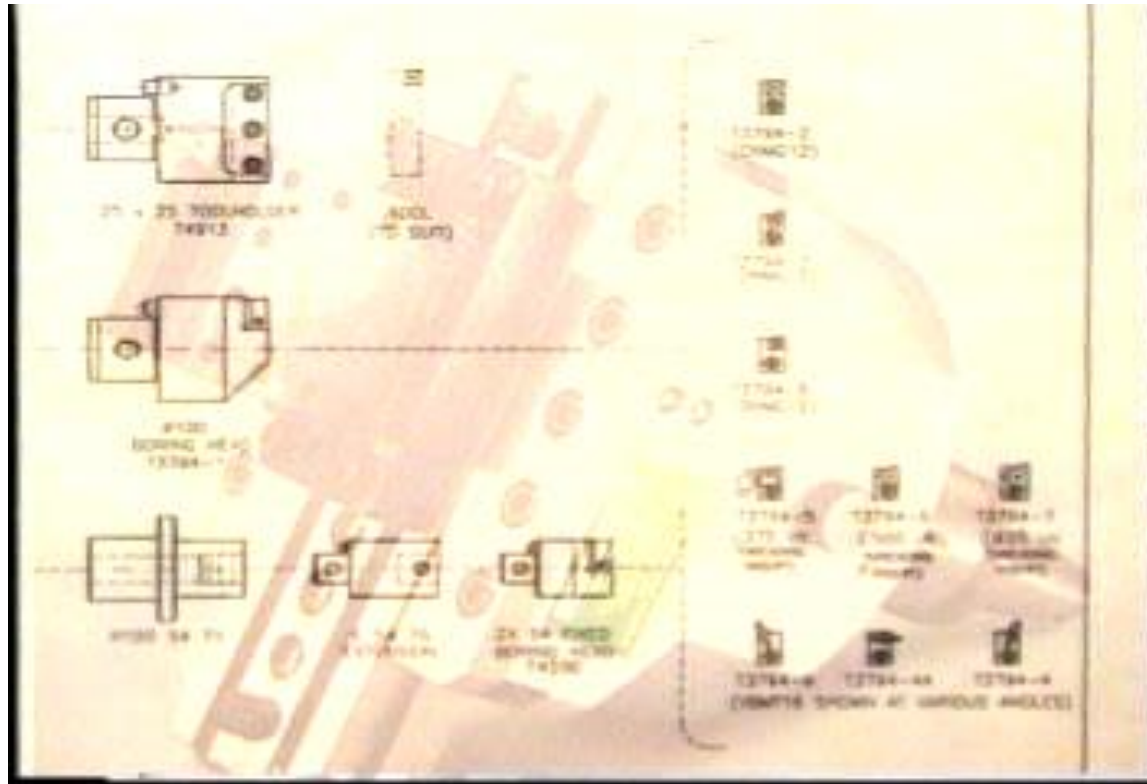
# ITS S20 Boring Bar, Opened



# Seat Pocket Bar Cartridges

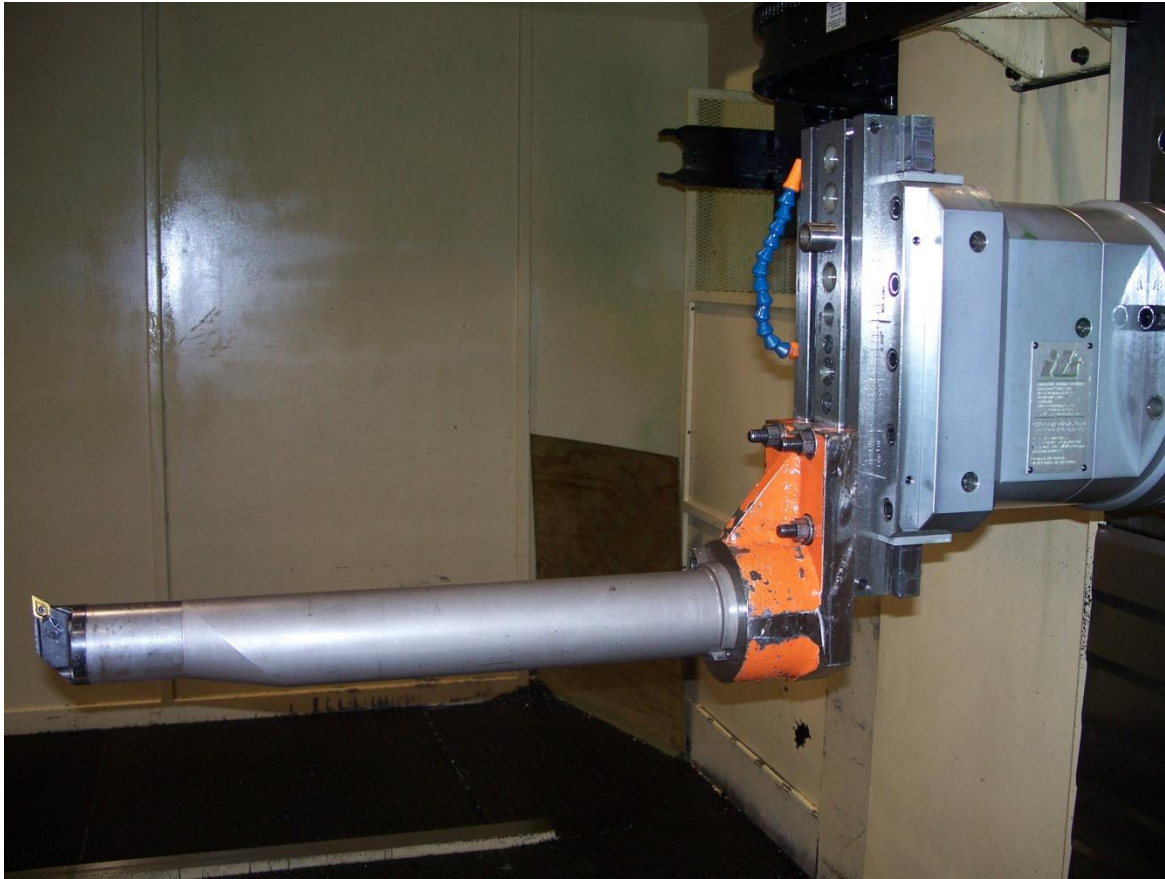


# Animation





# Contouring Head Set-up





# Outer Diameter



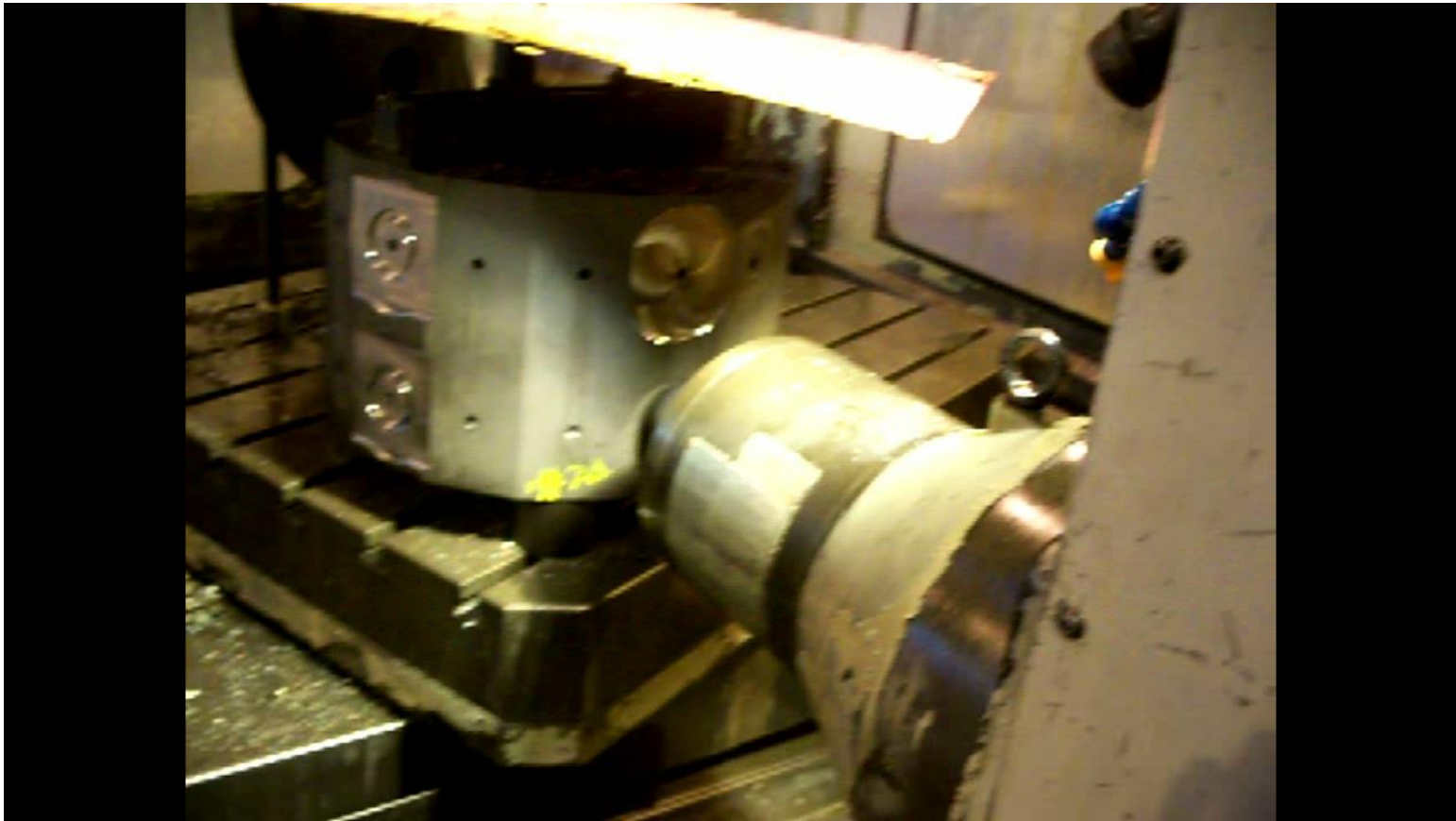
# Video



# Ceramic Facing

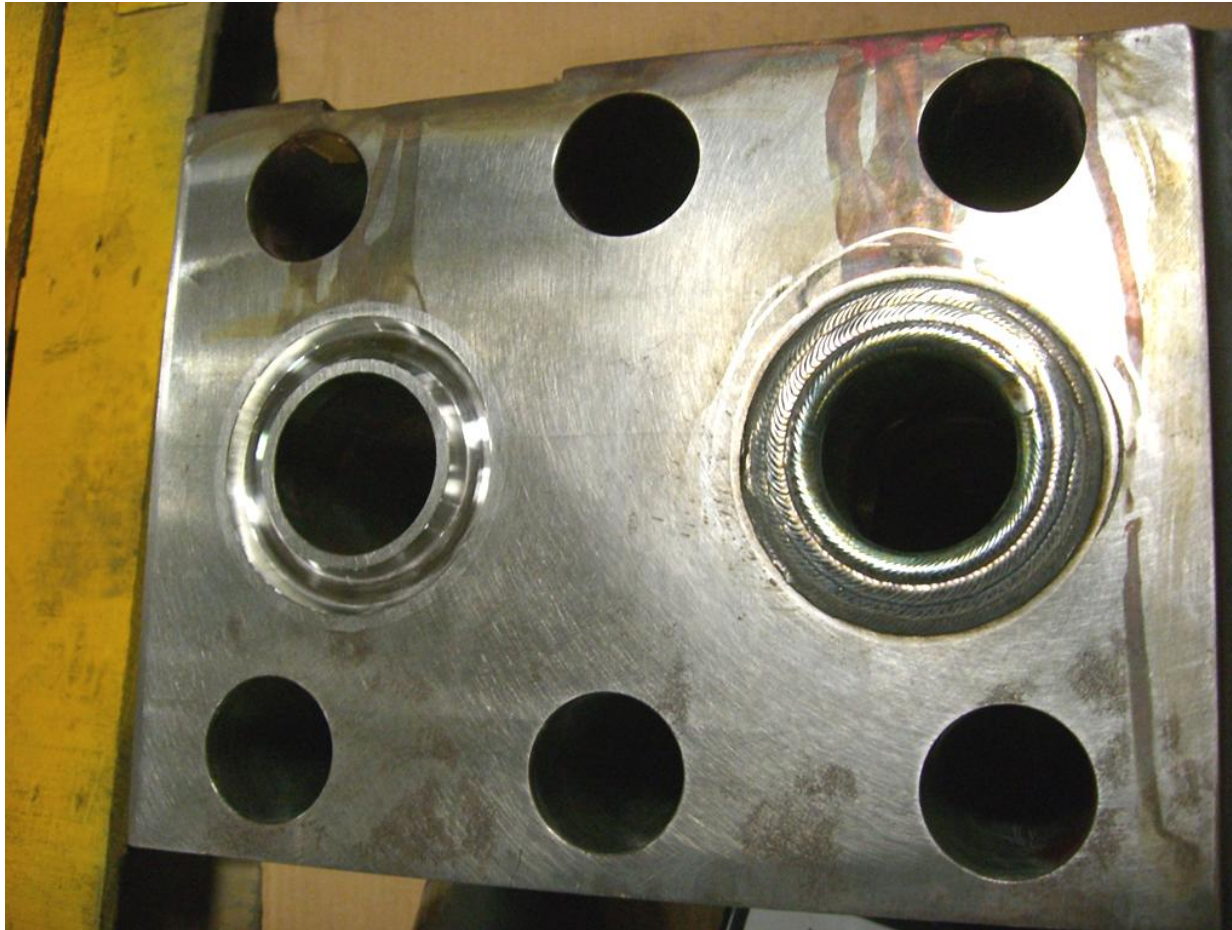


# Ceramic Milling Inconel Inlaid Area





# Ring Grooves – one finish, one welded



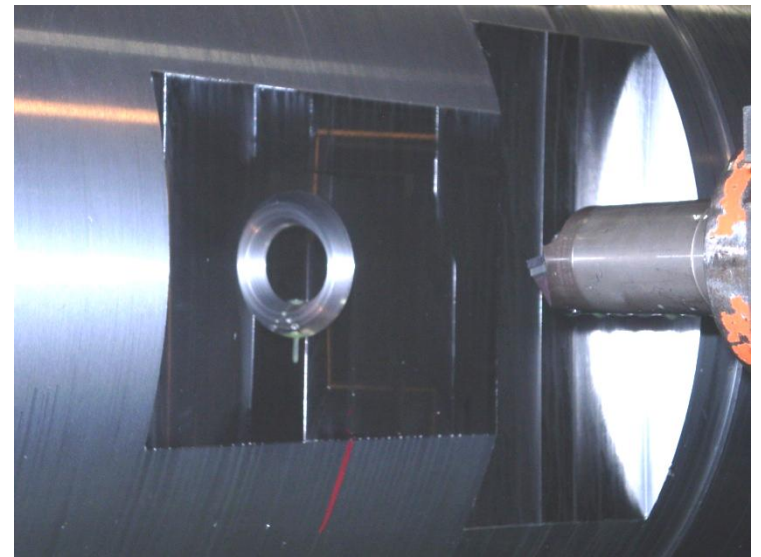
# Ring Groove Cutting

Ring Grooves are one of the more common features that a majority of our components have. This once again is accomplished on CNC HBM and in some instances on turning equipment as well. Below are a couple of examples.

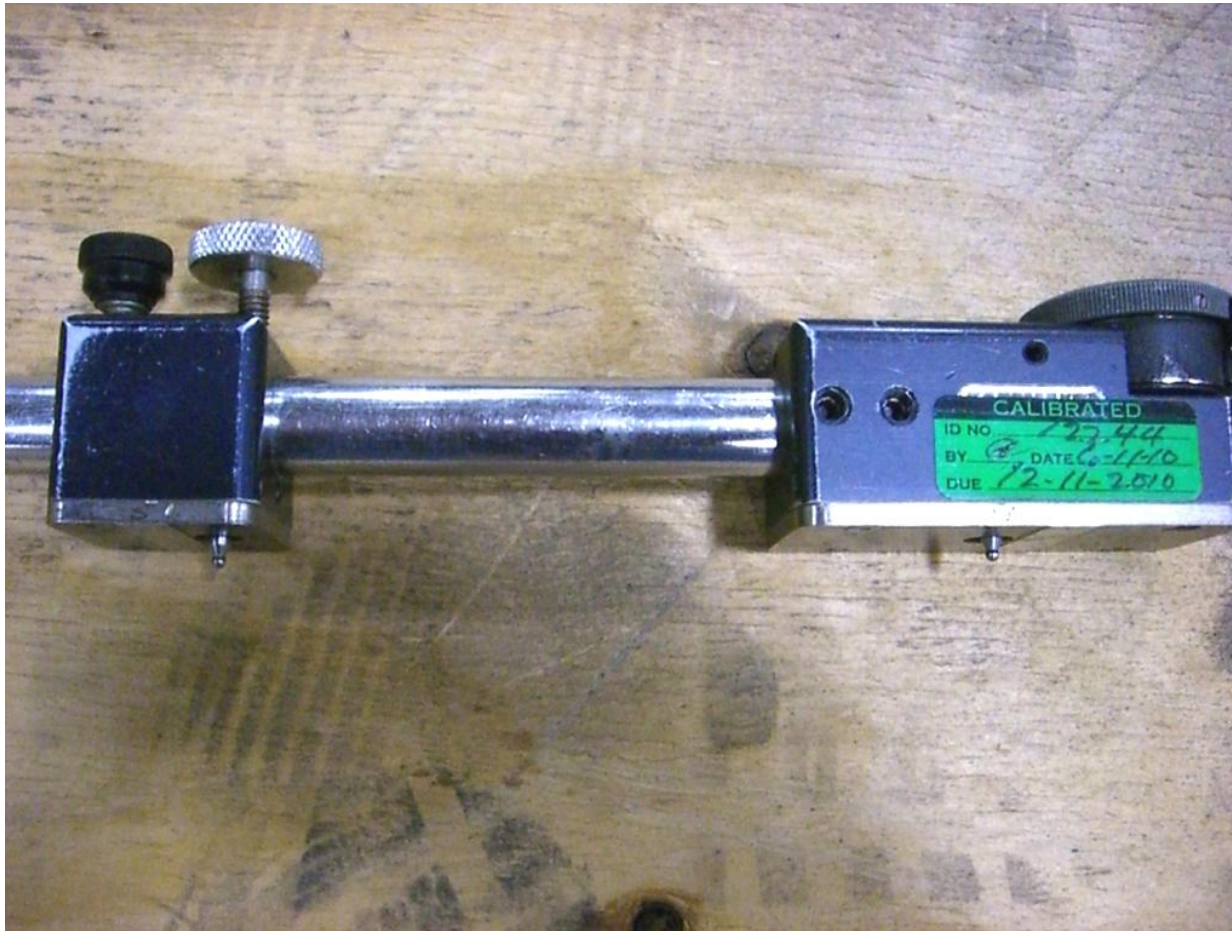
Ring Groove Prep Cutting



Finished Ring Groove Prep



# Ring Groove Gauge





# Ceramic Ring Groove Plunge Cutter

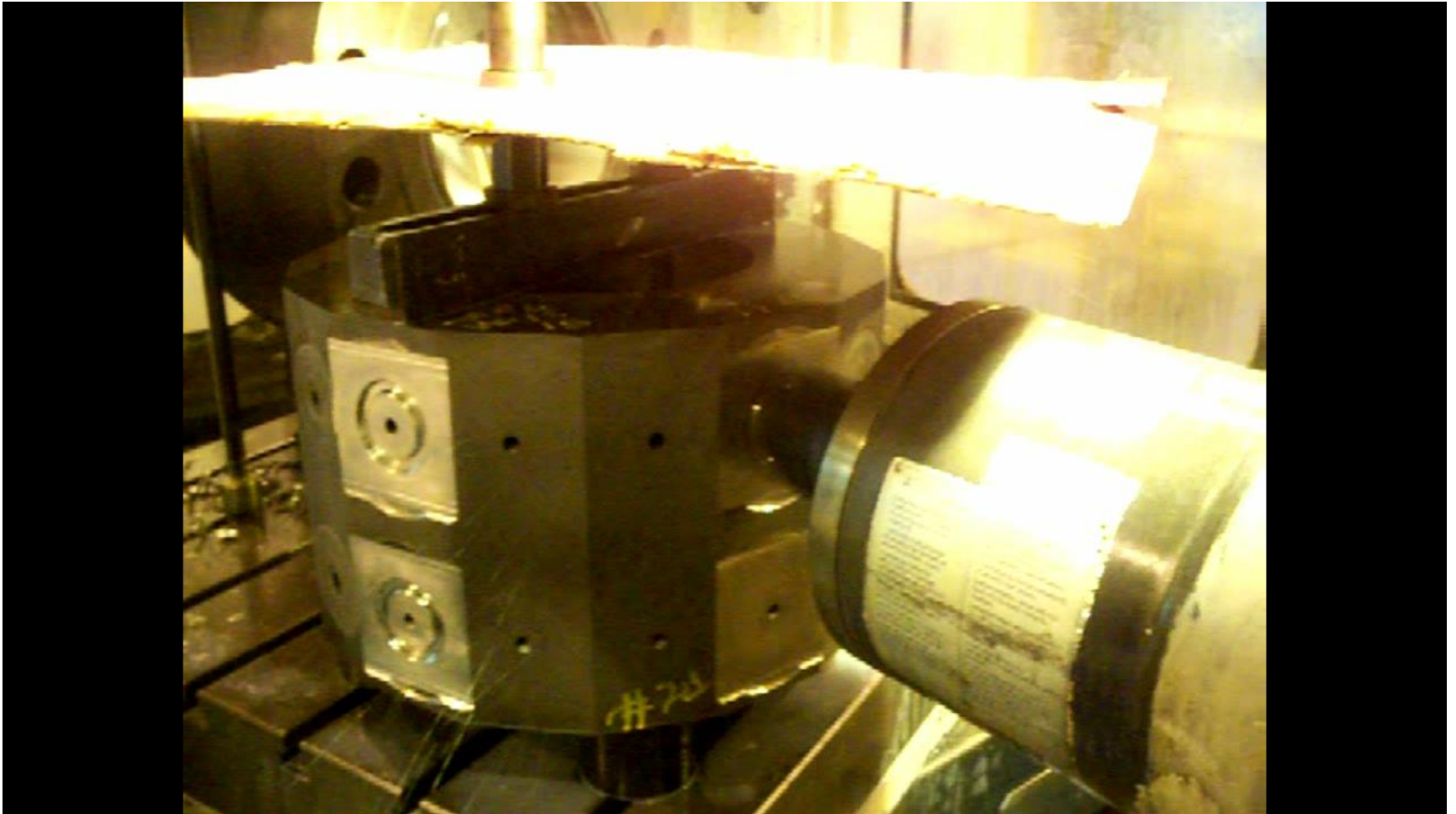




# Ceramic Ring Groove Roughing



# Ceramic Ring Groove Finishing



## Slot and Groove Cutting

- The majority of our Composite Valve Blocks as well as other parts have in them several groove and or slot requirements.
- This feature is performed on any HBM's and in some cases large CNC lathes with live tooling.
- The tooling varies with the particular requirement and the machine the work is performed on.

# External Slot Cutting

Some of our parts namely Wellheads have a series of external slots required to be cut on the O.D. This feat is accomplished on Horizontal Machining Centers. In some cases this is accomplished on a large CNC lathe with live tooling.

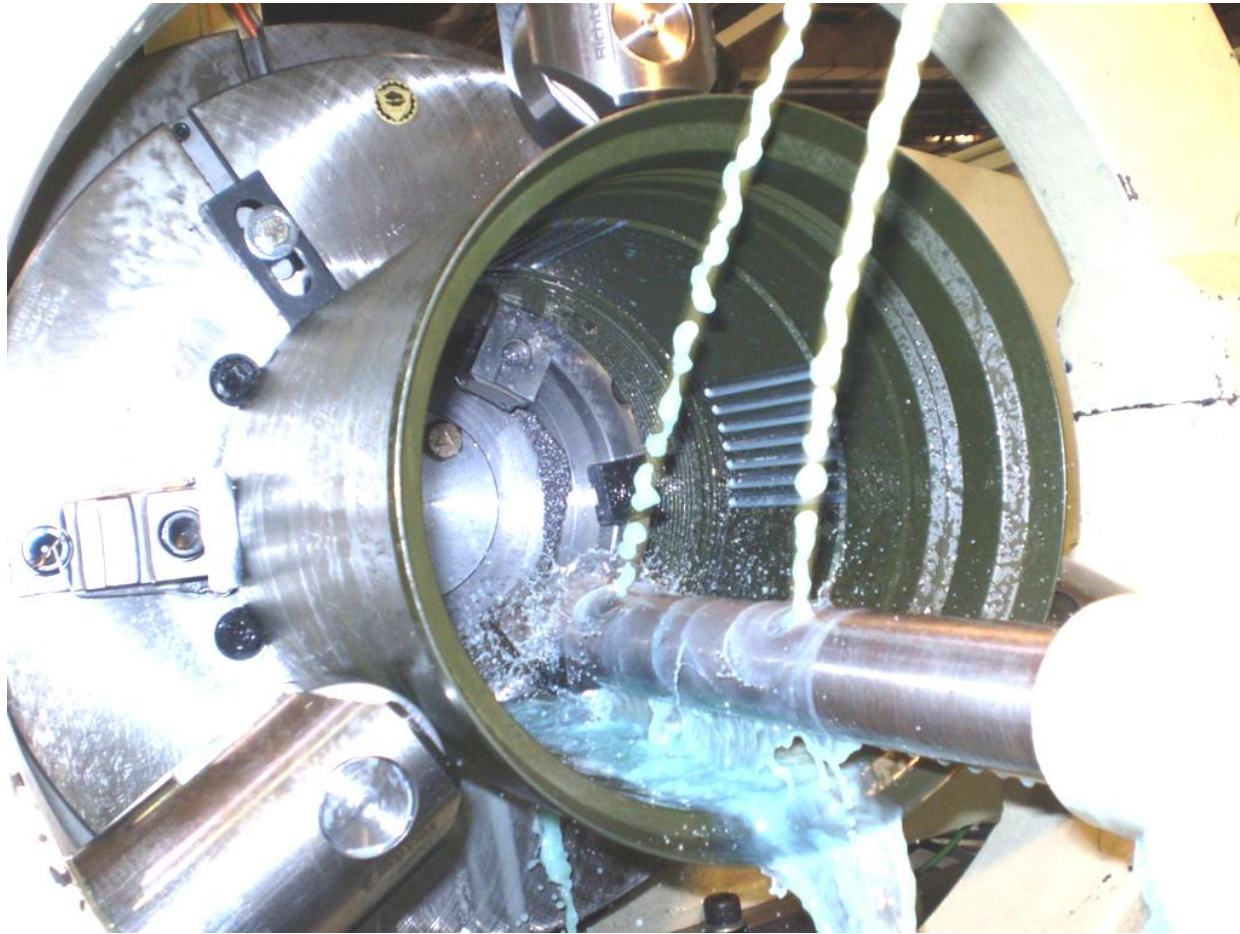
External Slots

Inserted Milling Cutter



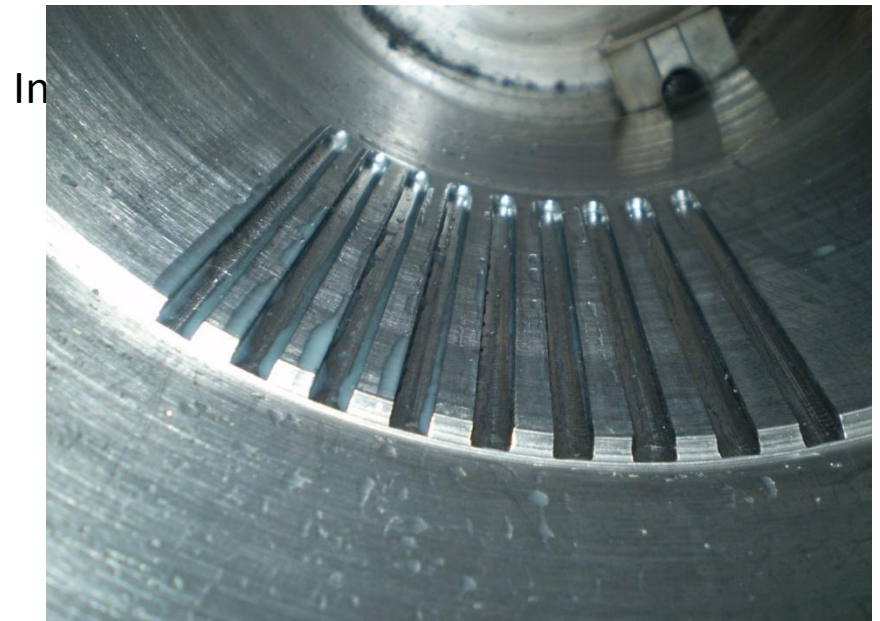
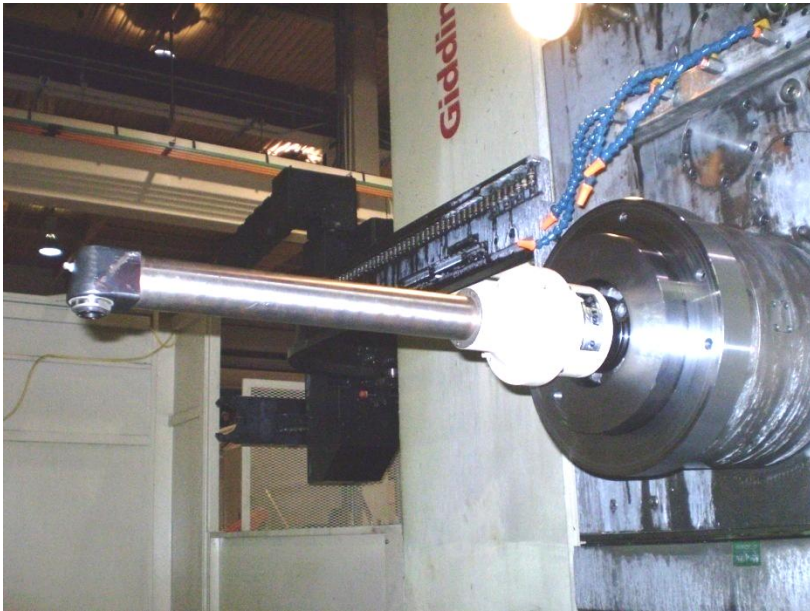


# Internal Slot Pattern Cutting



## Internal Slot Cutting

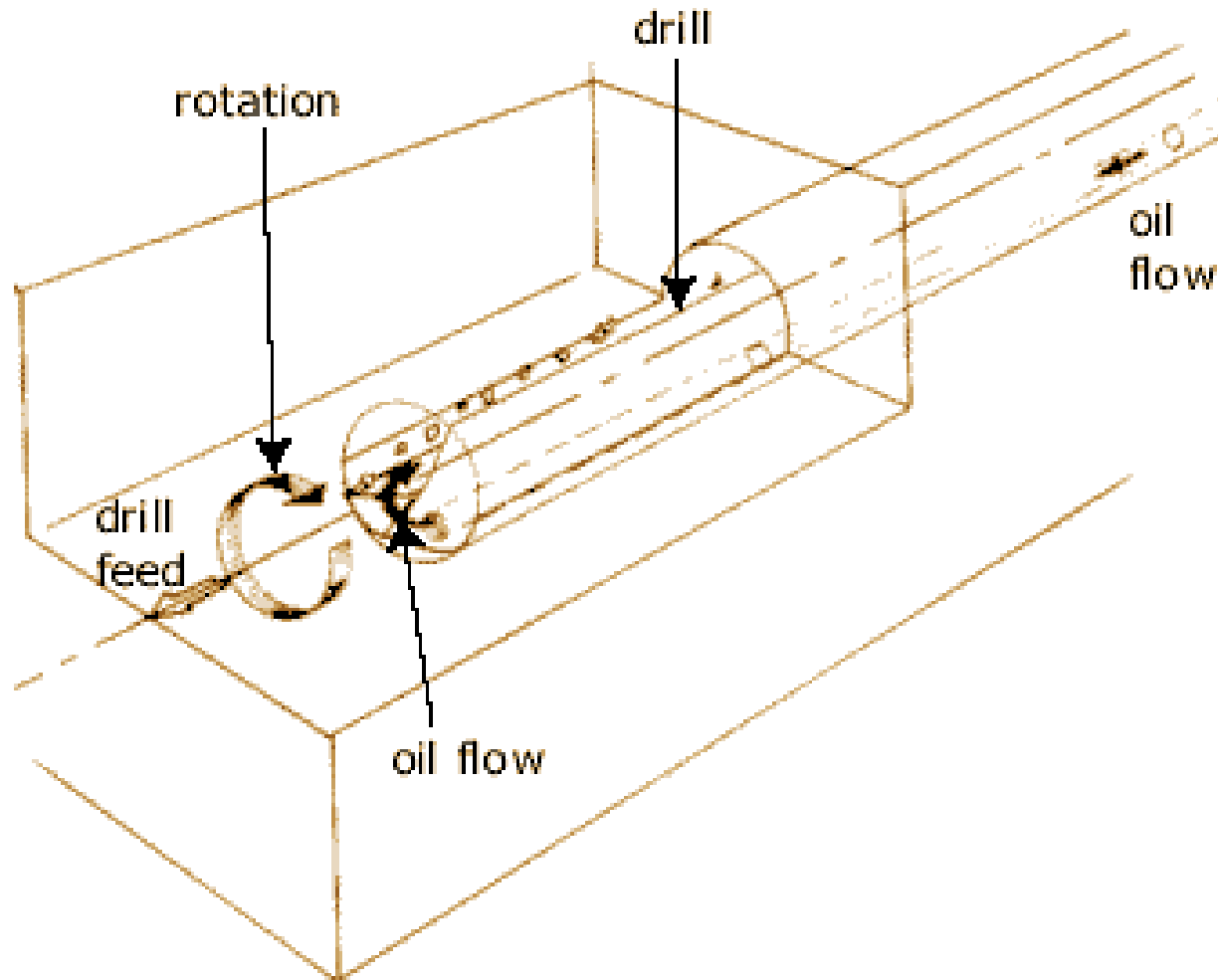
Internal slot cutting is accomplished on a CNC HBM with a live “A” axis using various types of right angled heads and also lathes with special attachments.



# Gun Drill Capabilities

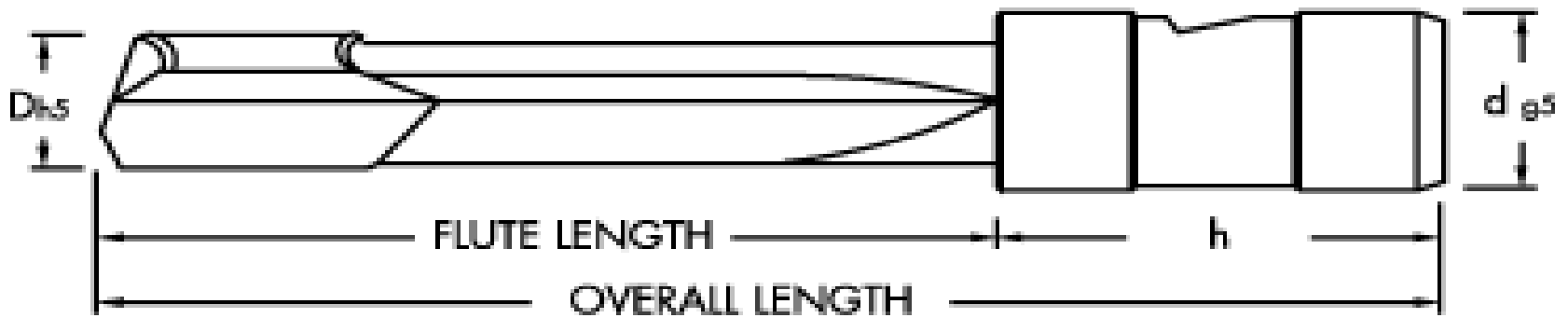
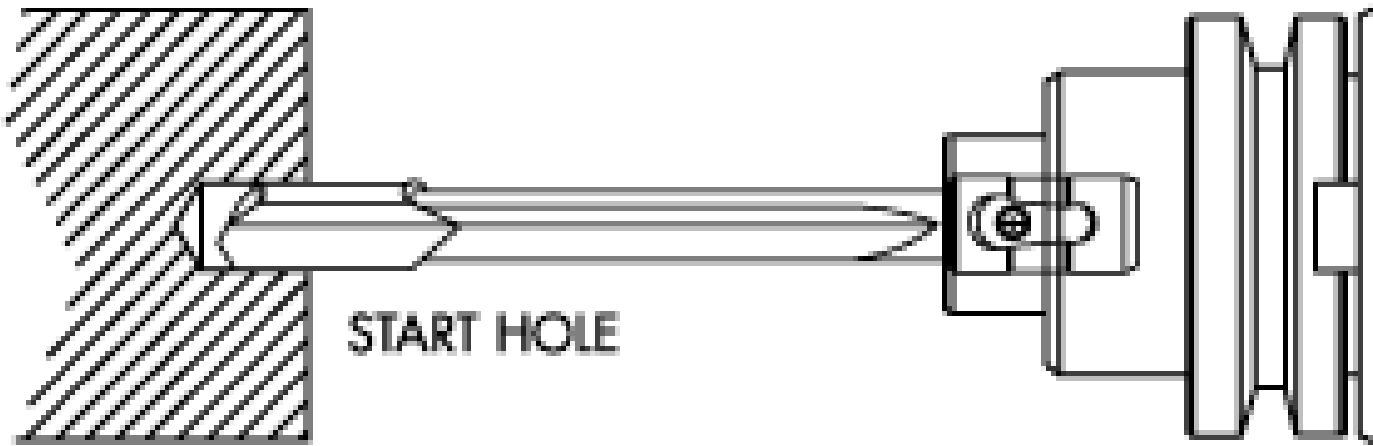
- Gun drills will typically obtain hole sizes within .001", run-out requirements of .001" per inch and finishes of 63rms.
- Though gun drills typically run-out or "drift" .001" per inch, gun drilling vendors will only guarantee .002" per inch which should be used for design purposes.

# Gun Drilling

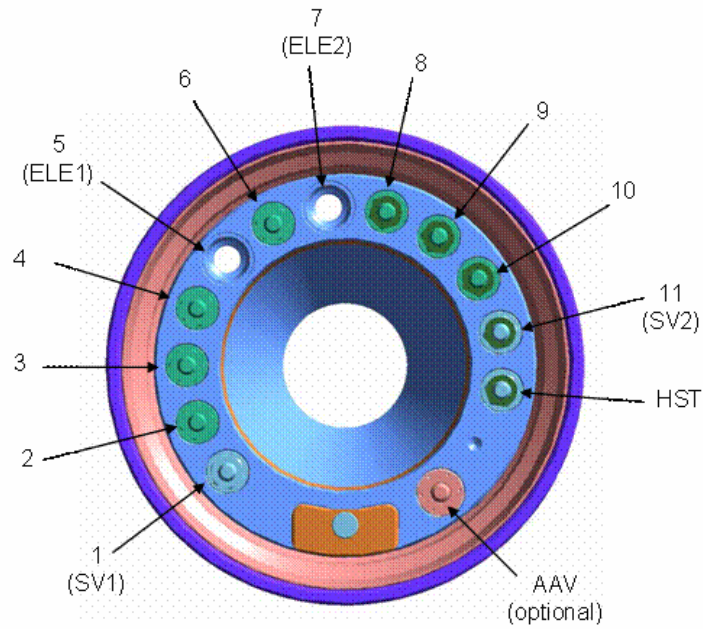


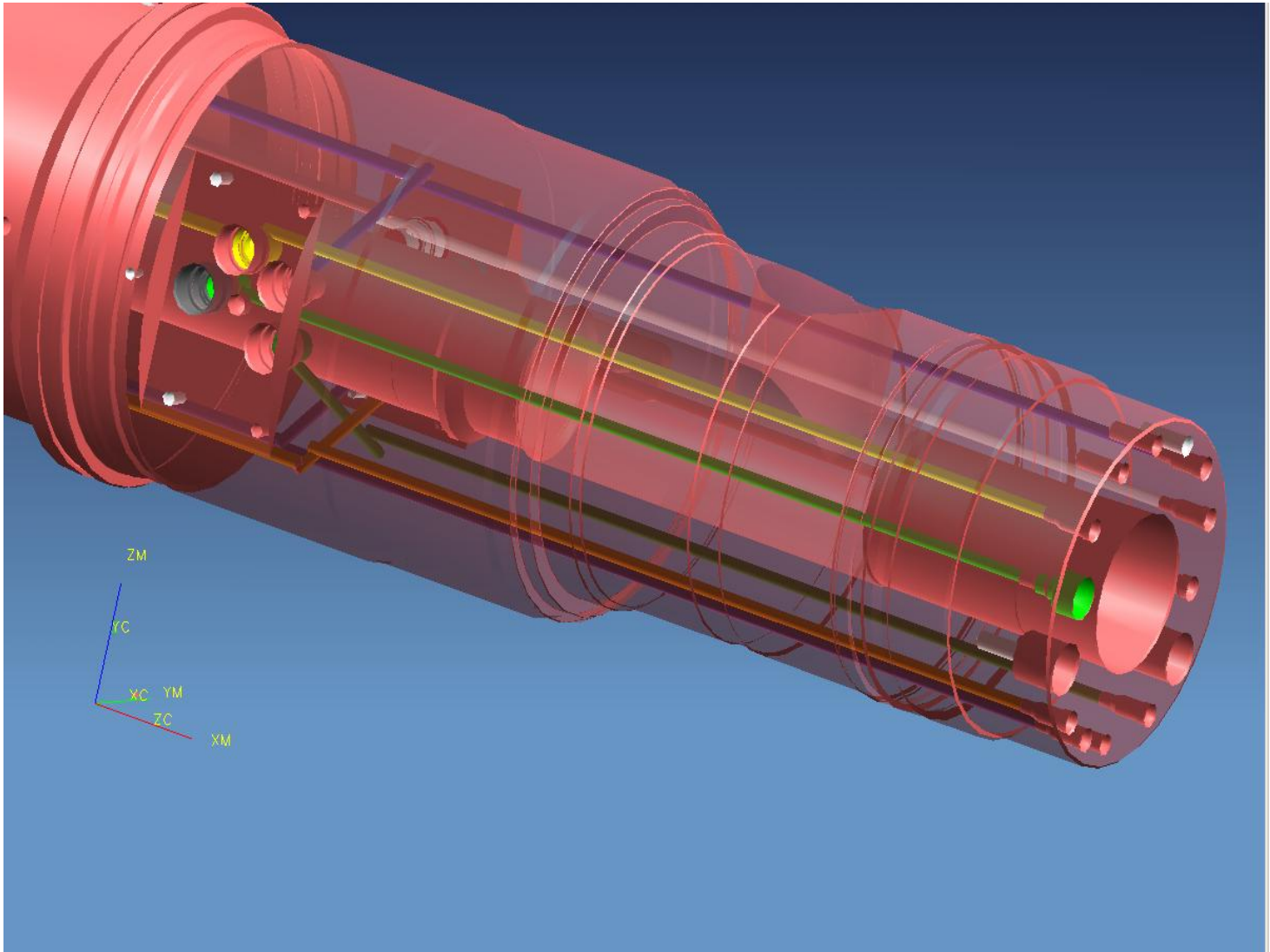


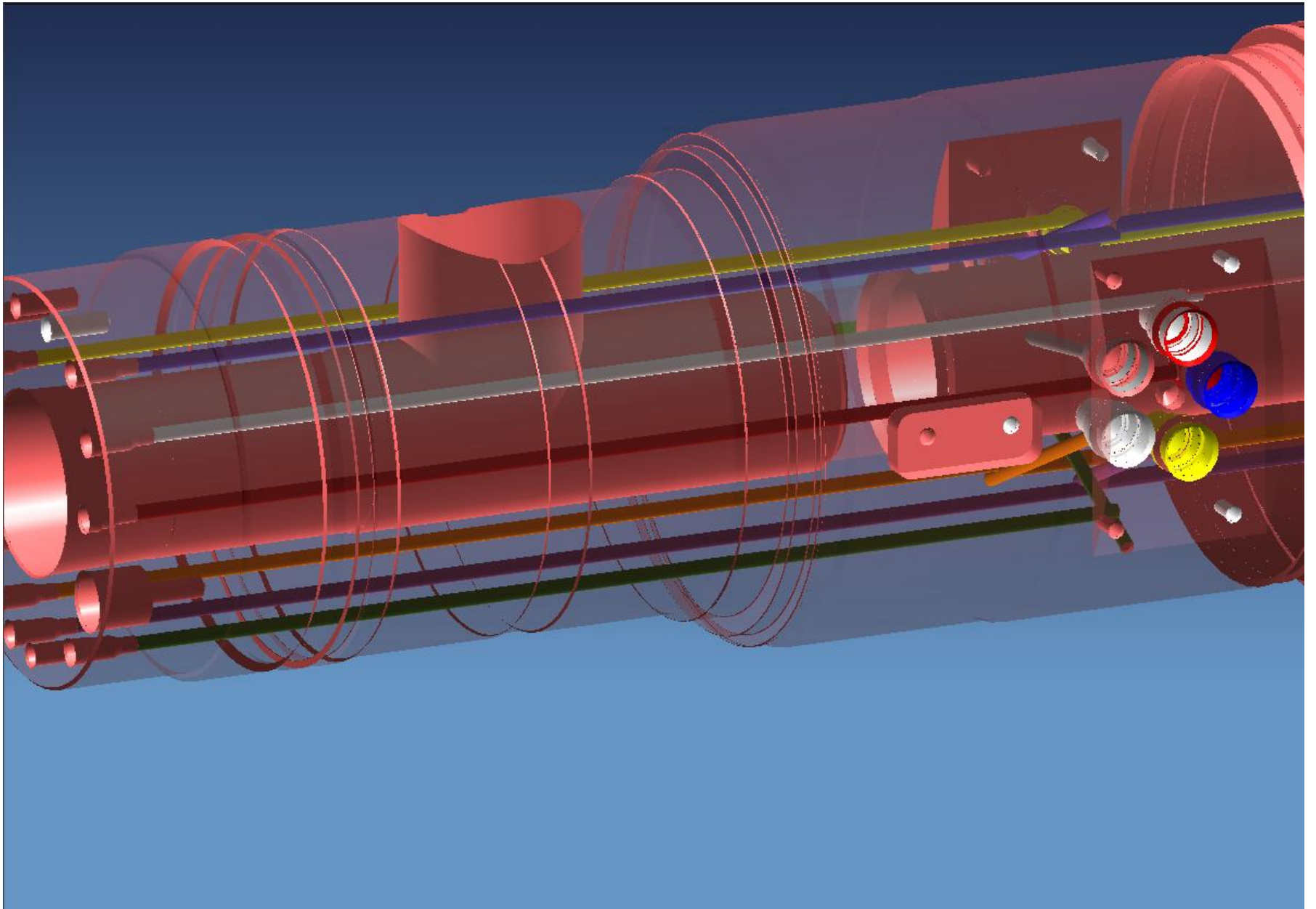
# Gun Drill Illustration

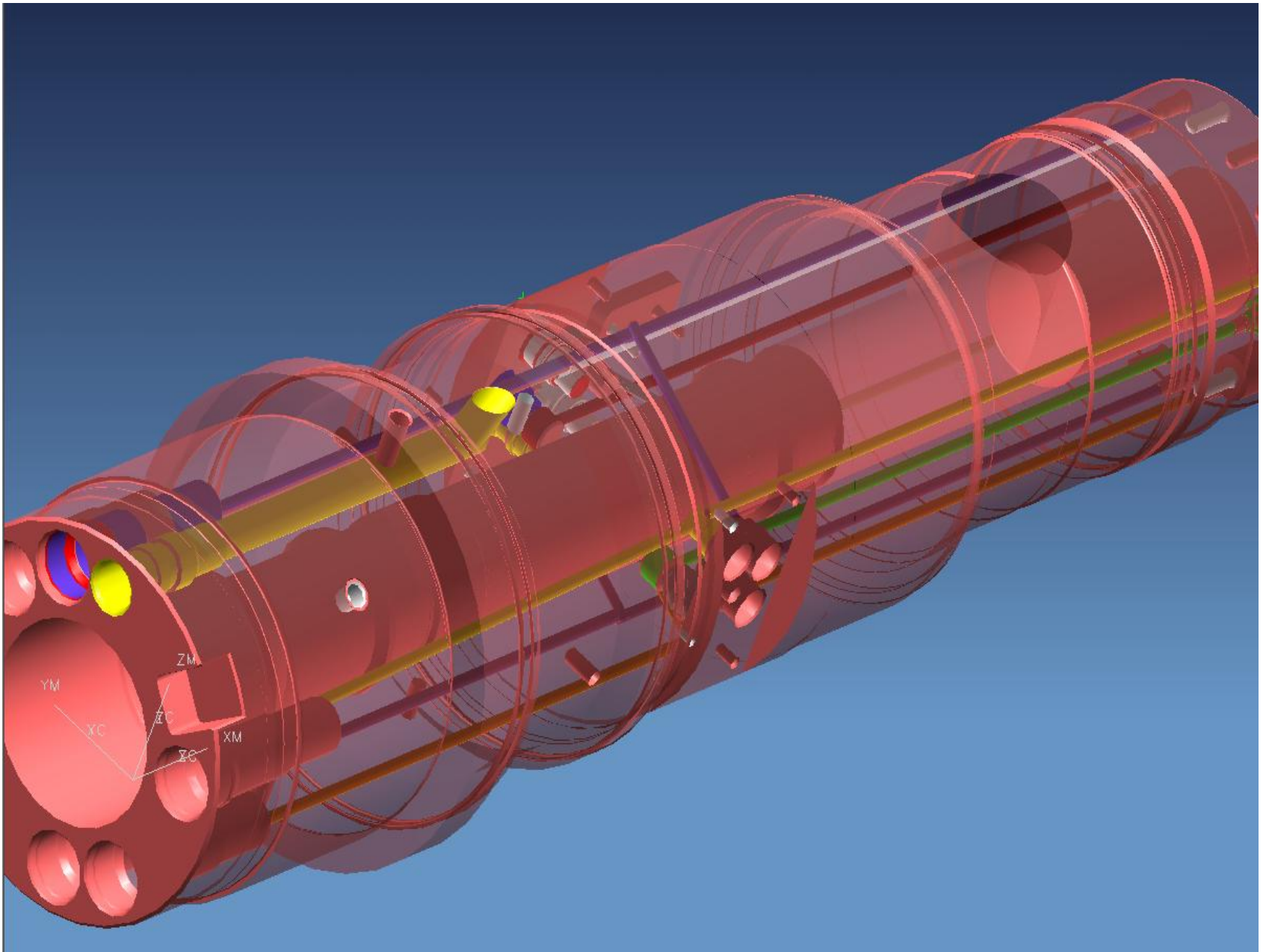


# Tubing Hanger Down Hole







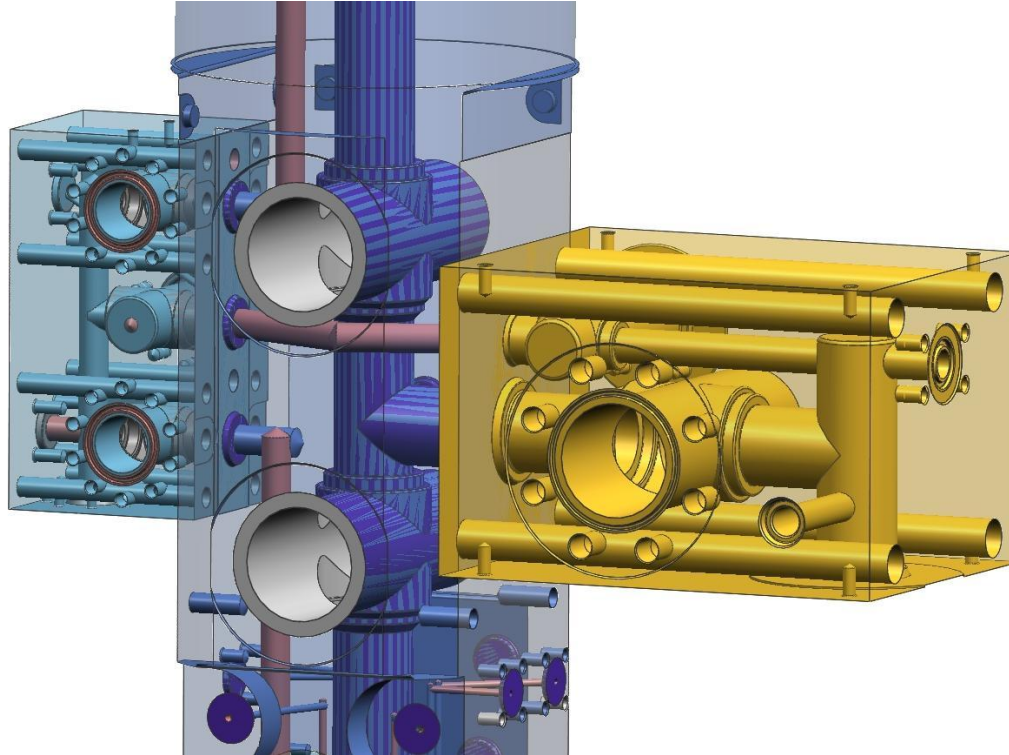




# Ejector Drilling

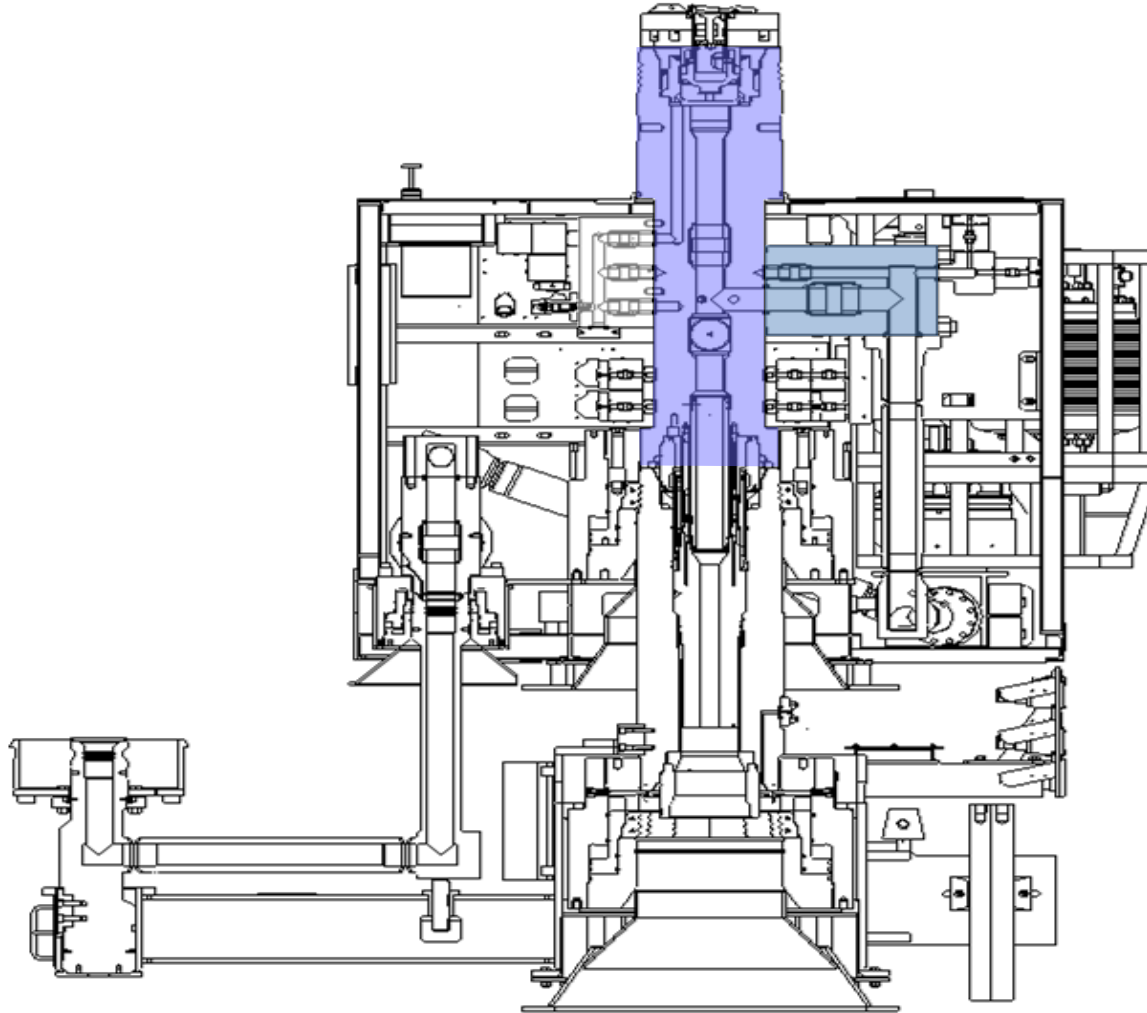


# Valve Block Porting



CVB and Wing Blocks

# Tree Assembly





# Back Side Tree Assembly

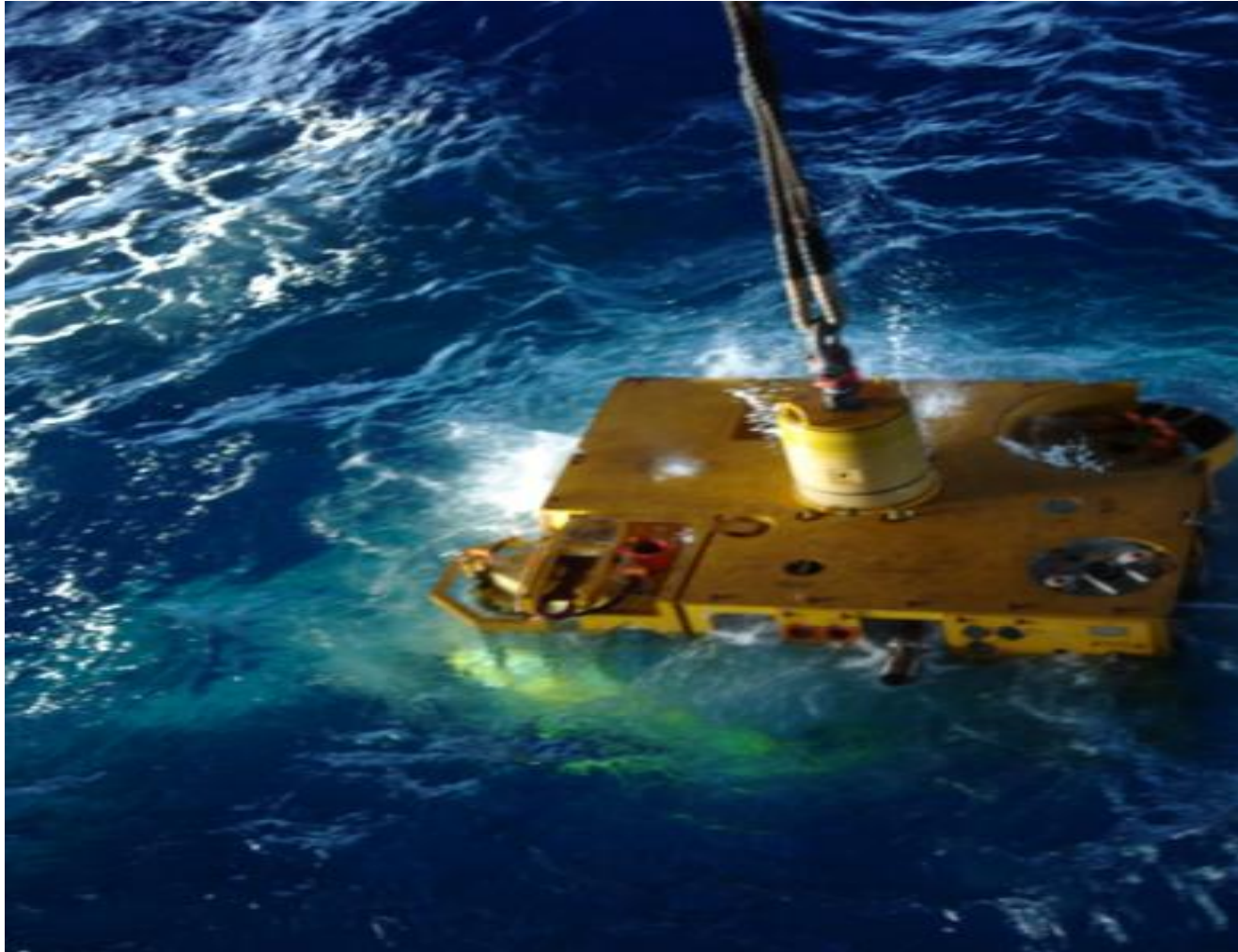


# Front Side Tree Assembly





# Installing Final Product



Thank You!

