ELECTROIMPACT

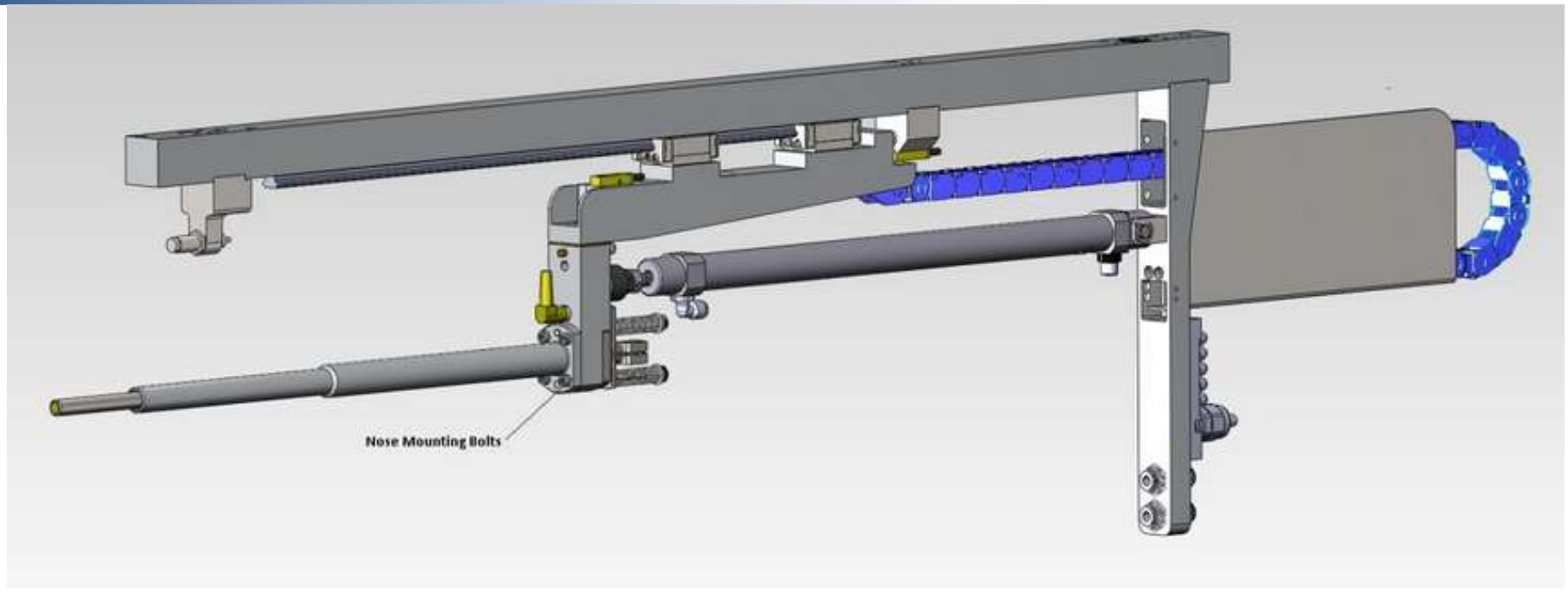
BUCA Method of Clampup

What is BUCA?

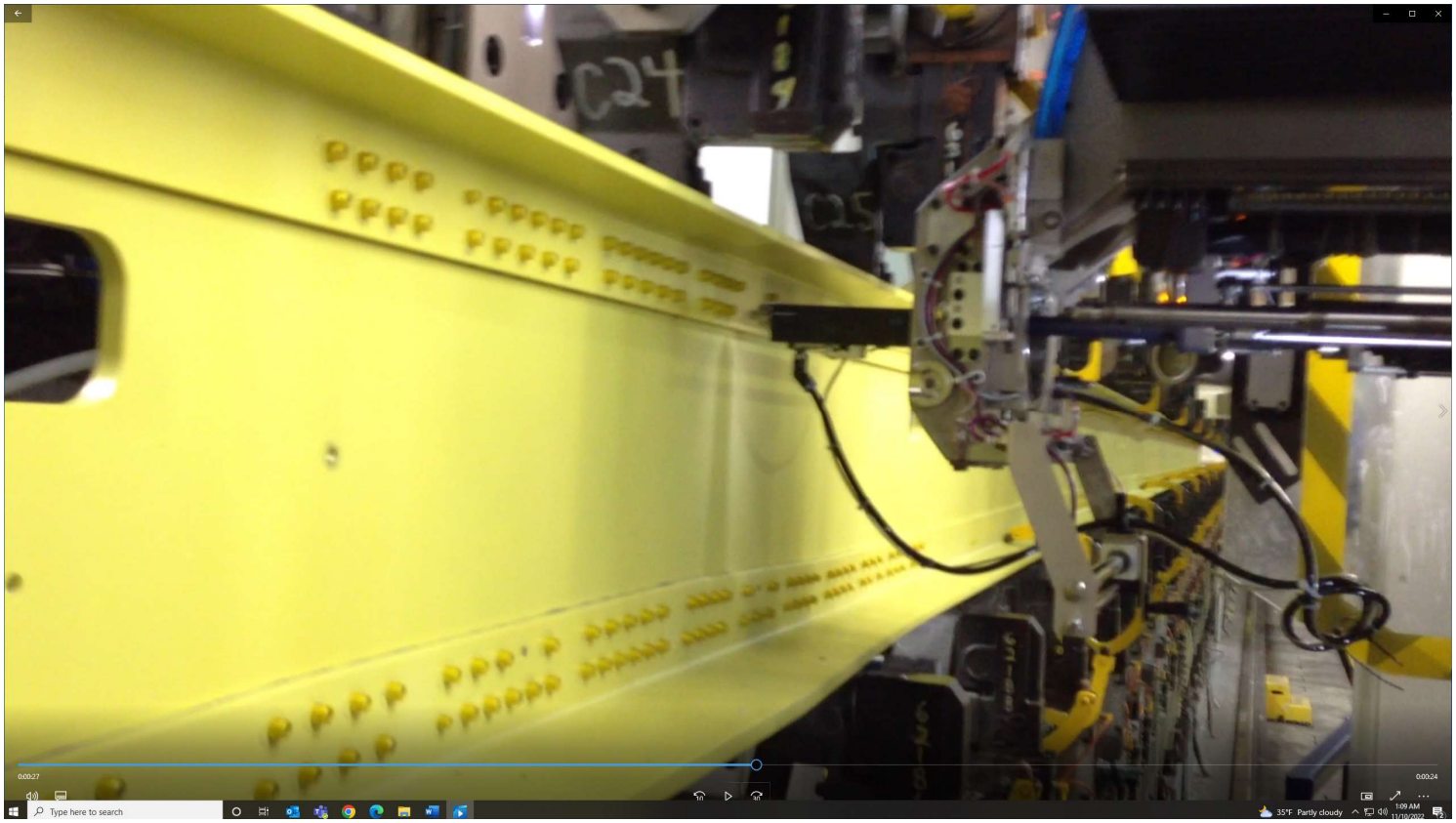
- Backup Carriage Advance Control
- A probe is advanced a precise distance out in front of the clamp surface “HOP” (about 10mm)
- When the probe senses the surface the work head moves forward HOP and stops
- Allows precise clampup on a flimsily held part

Application 1

- Precise clampup on flimsily held part
- Part should not move during the application of clampup (24)
- A rod protrudes through the center and sticks out in front of the clamp nosepiece



A prox switch in the end of the stick was added.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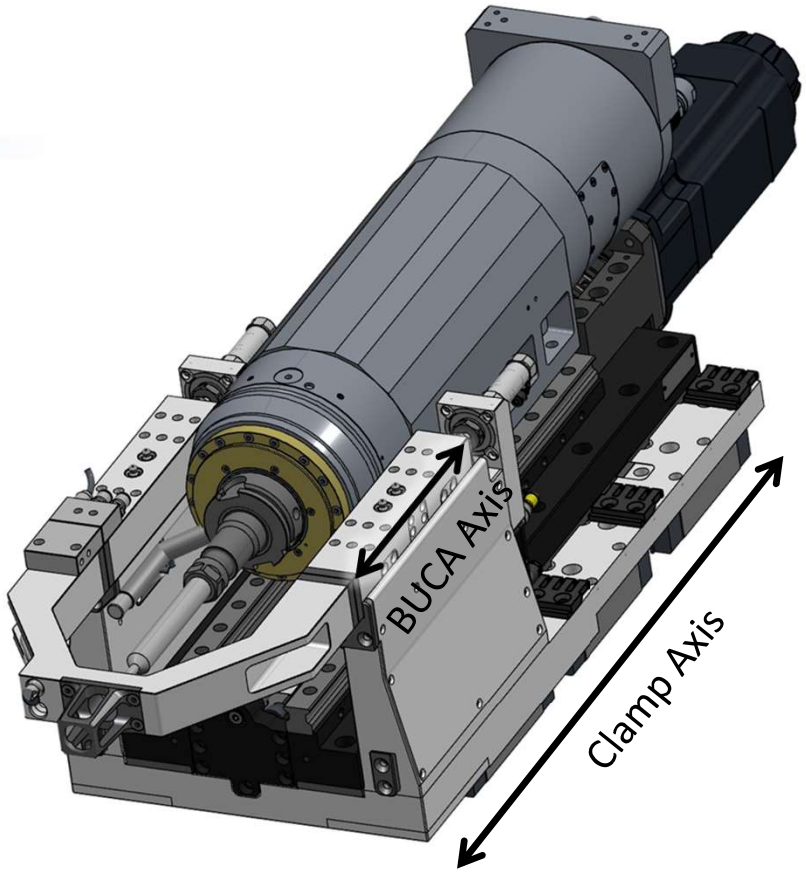
Application 2

- Wing panel dual sided (17) and LTD single sided (2)
- Safety that the machine will not drive through the part
- Lost motion is created by a custom air cylinder that is built into the headstone

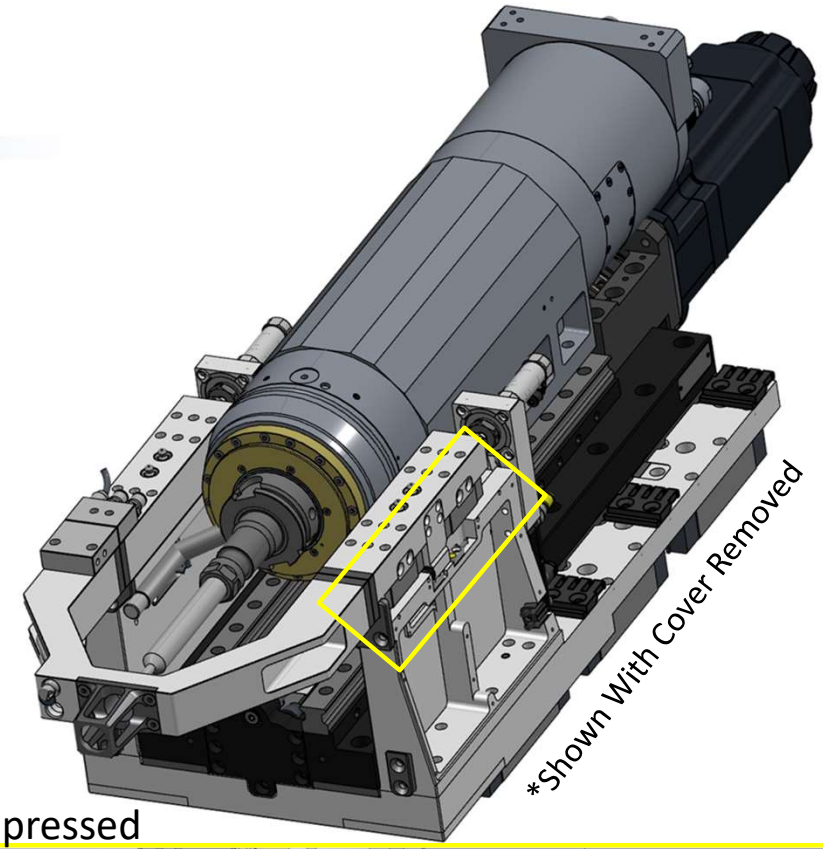
BUCA Overview

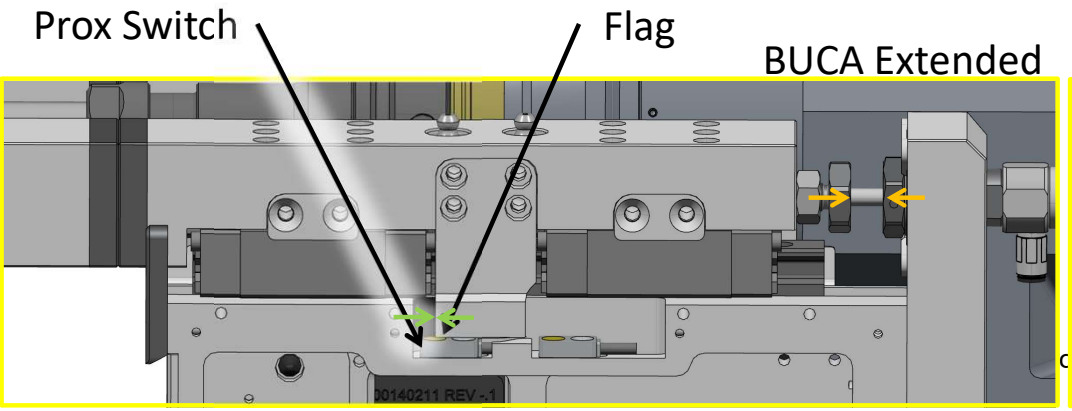
- The BUCA is used to reduce cycle time and eliminate clamp force overshoot
- The BUCA is a passive axis that is pneumatically extended.
- The Clamp Axis can be rapidly extended until the nosepiece contacts the part and movement of the BUCA is sensed. (The distance to fully compress the BUCA Axis onto the Load Cell is known)
- The Clamp Axis can then continue to rapidly extend until just before it contact the Load Cell.
- The Clamp Axis then slowly continues to extend onto the Load Cell until the commanded clamp force.

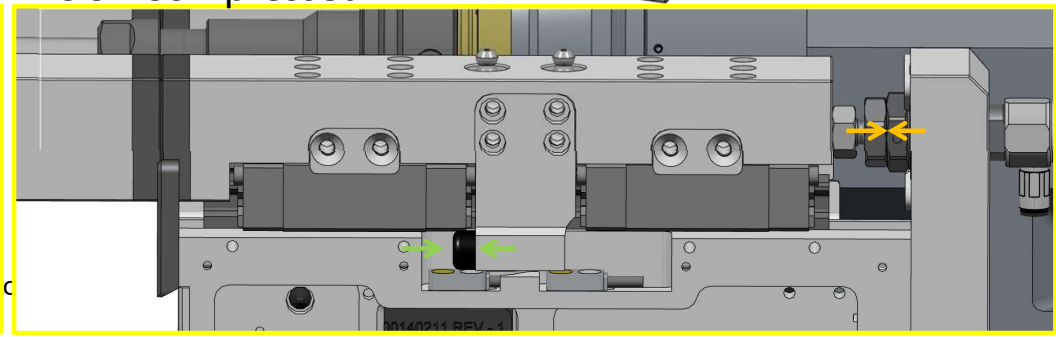


BUCA Overview

- An inductive Prox Switch senses a flag on the BUCA when it's fully extended.
- Just as the BUCA starts to compress, the Prox Switch senses the Flag move off the Switch and triggers the start of the BUCA Travel.
- The distance from when the Flag comes off the Prox Switch until the BUCA contacts the Load Cell is known and repeatable.

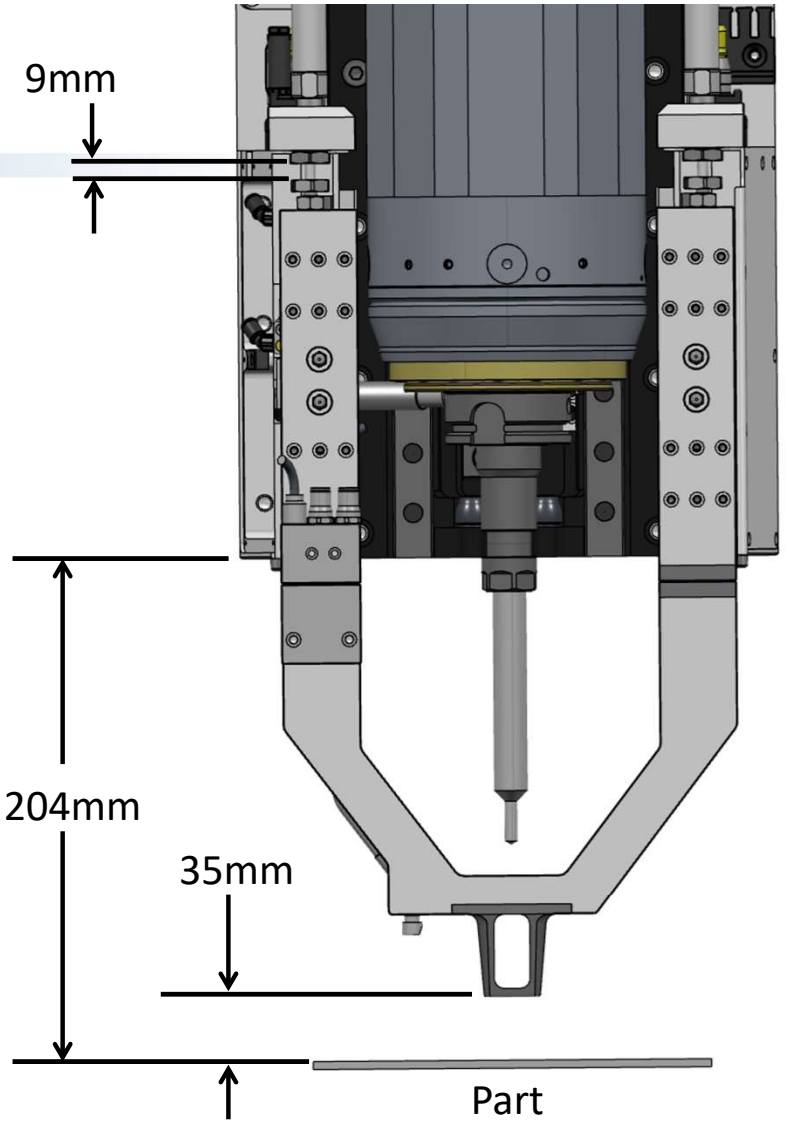






BUCA Clamping Sequence

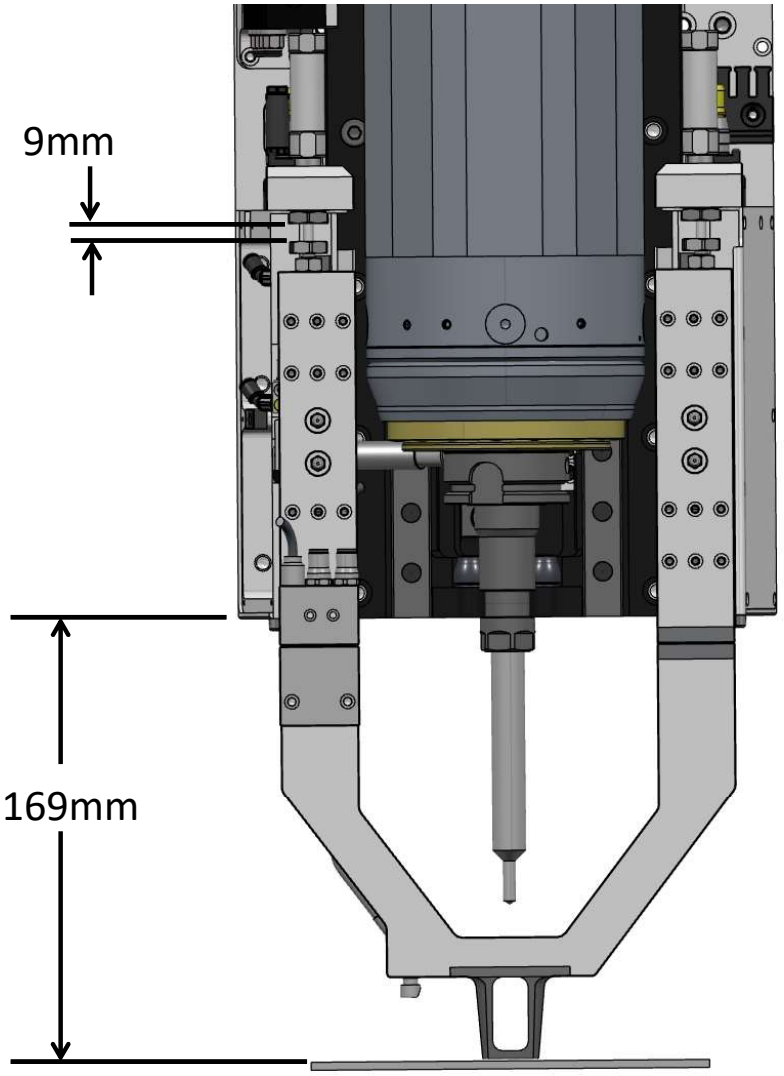
- The BUCA is pneumatically extended.
- The Clamp Axis is retracted from the part surface with adequate fly height to clear temporary fasteners and other obstructions, in this case 35mm.



BUCA Clamping Sequence

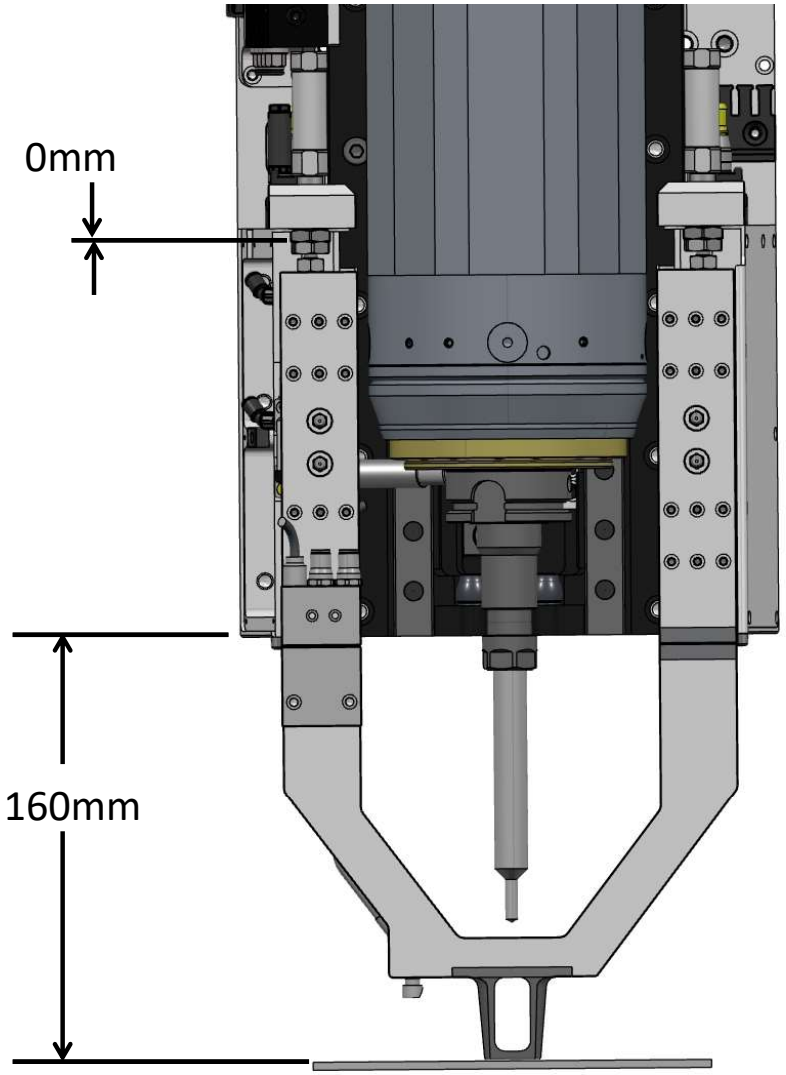
- The Clamp Axis is rapidly extended to close the distance to the part surface.
- As the Clamp Axis continues forward movement of the BUCA with respect to the Clamp Axis is sensed.

- Note: As the Clamp Axis continues to extend toward the part the BUCA is now stationary with respect to the part.



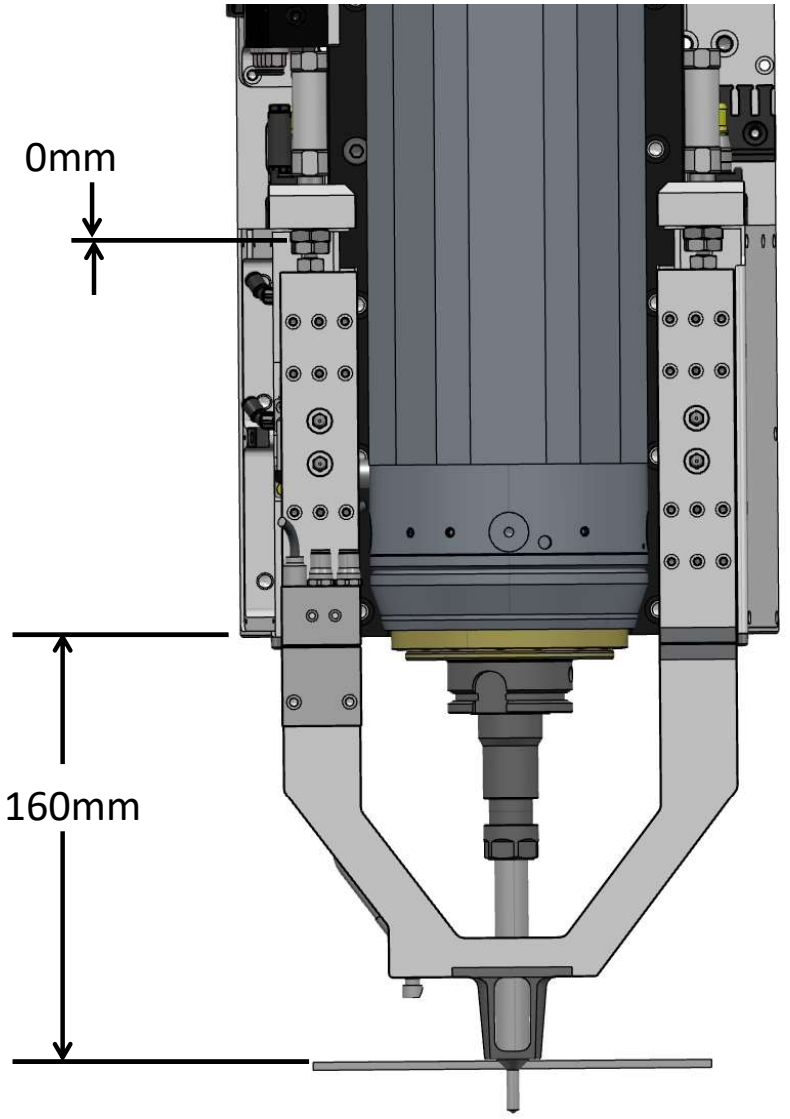
BUCA Clamping Sequence

- The Clamp Axis continues to rapidly extend until just before the 9mm of BUCA travel is compressed.
- The Clamp axis then slowly extends onto the Load Cells and continues to the commanded clamp force.



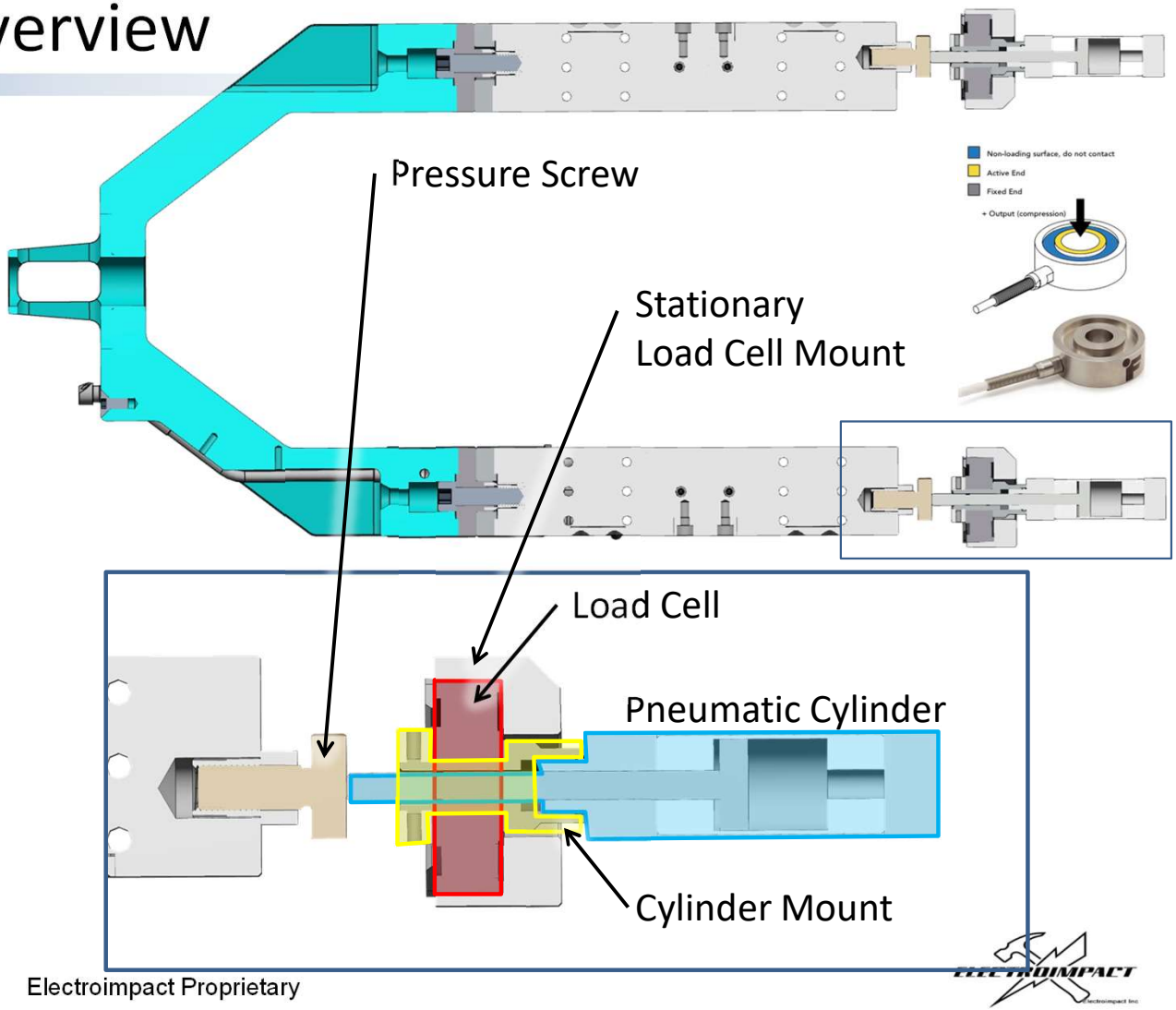
BUCA Clamping Sequence

- The Machine is now clamped at the desired force and the drill/countersink operation started.



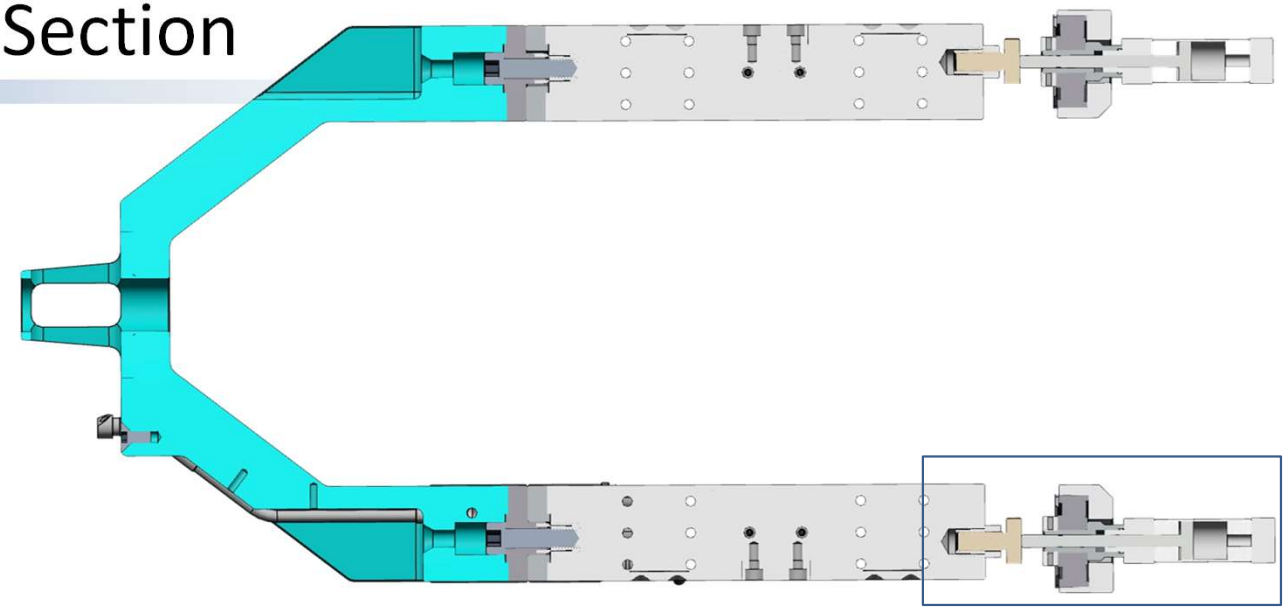
BUCA Cross Section Overview

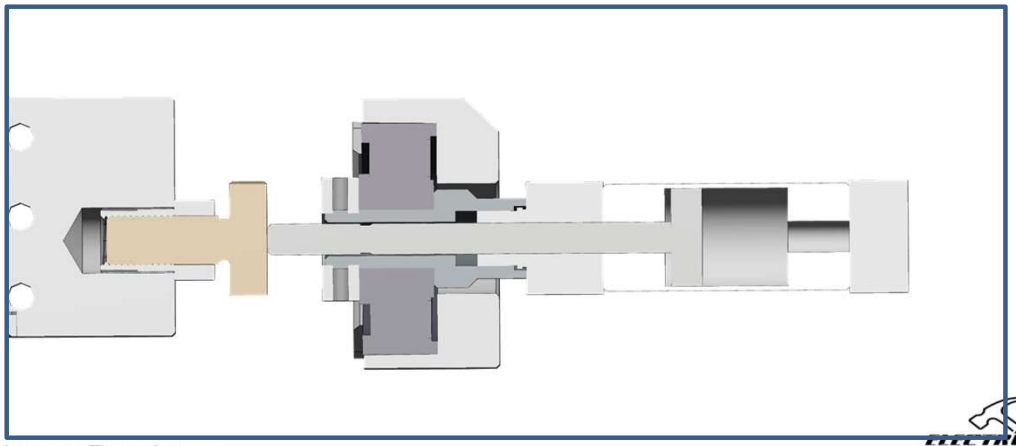
- The outer side of the Load Cell is mounted to the Clamp Axis and stationery relative to the BUCA.
- The Pneumatic Cylinder is mounted to the inner portion of the Load Cell (active end) via the Cylinder Mount.
- The Pressure Screw can be adjusted to balance the load between the two Load Cells.
- When compressed, the Pressure Screw pushes on the Cylinder Mount that acts on the Load cell.



BUCA Extended Cross Section

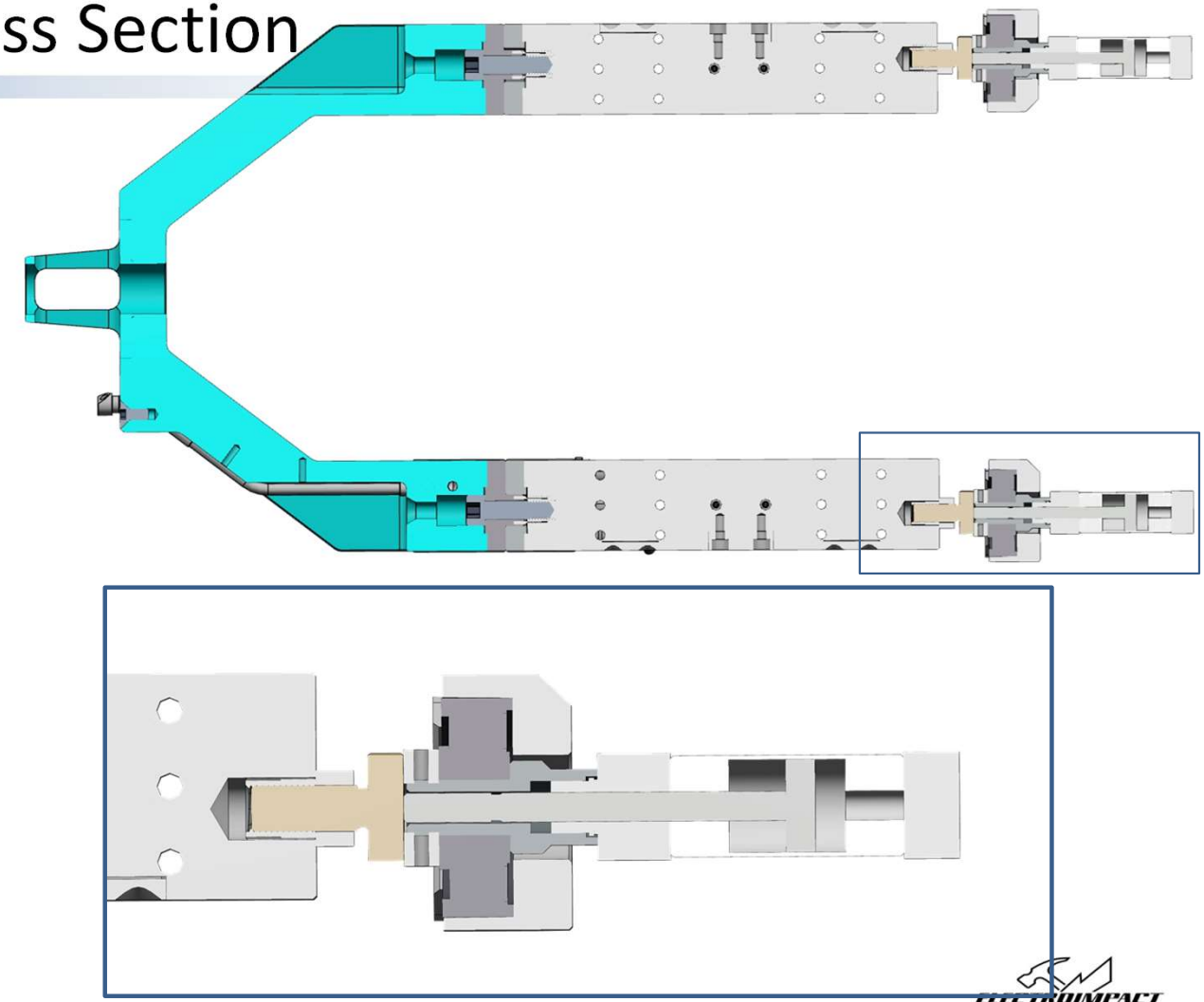
- The Pneumatic Cylinder rod extends the BUCA forward with light pressure.



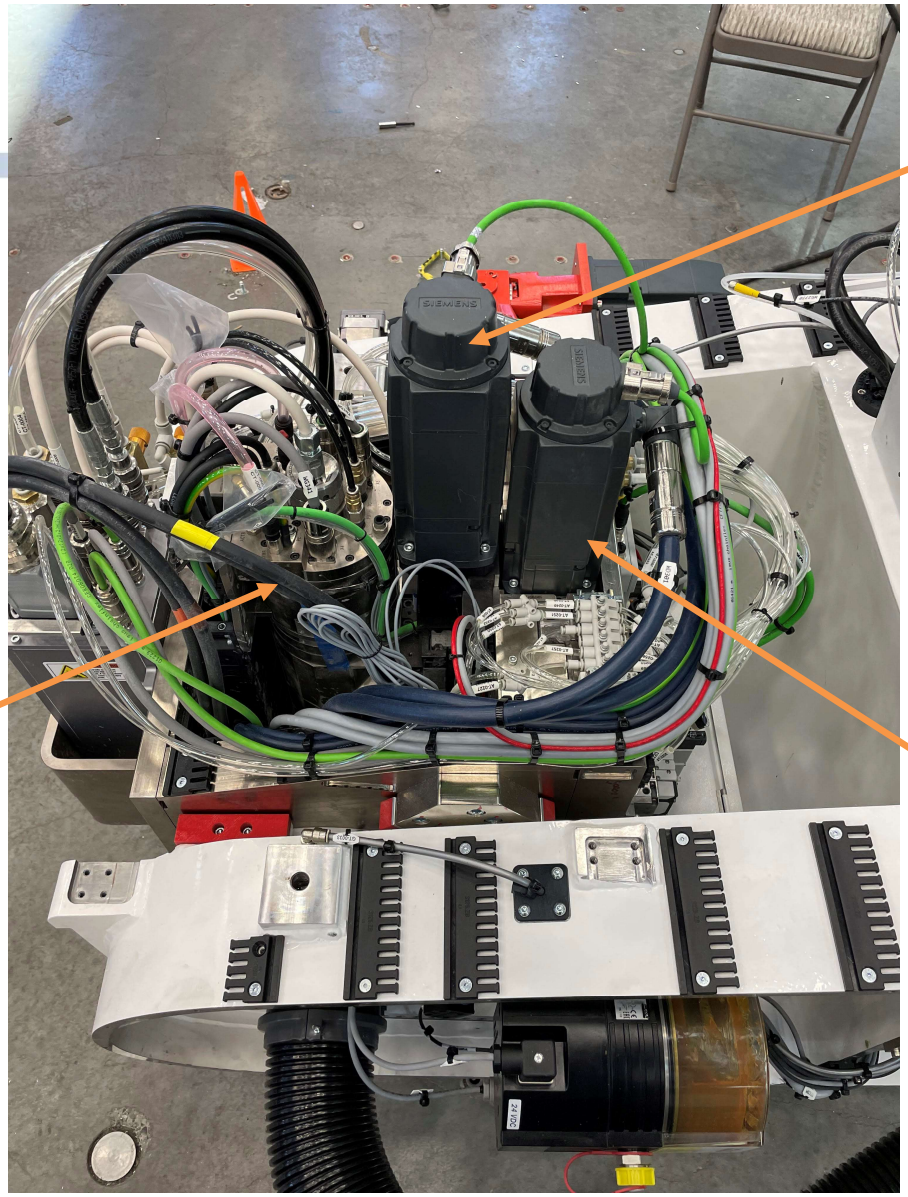


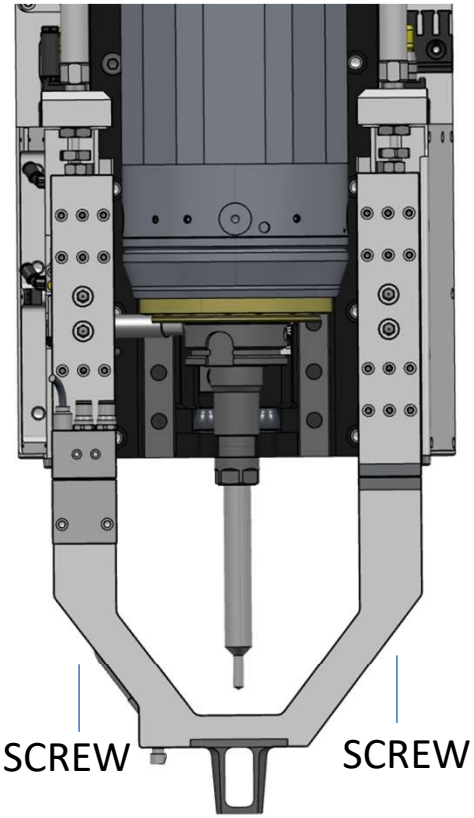
BUCA Compressed Cross Section

- Because the Pneumatic Cylinder is mounted to the Load Cell all the forces to extend the BUCA and clamp are measured directly by the Load Cell.
- With the BUCA compressed the BUCA acts directly on the Load Cell through the Cylinder Mount.



Dual W(quill) drive. One drive for the clampup and the second to drive the spindle and perform precision drill-countersink operations.

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