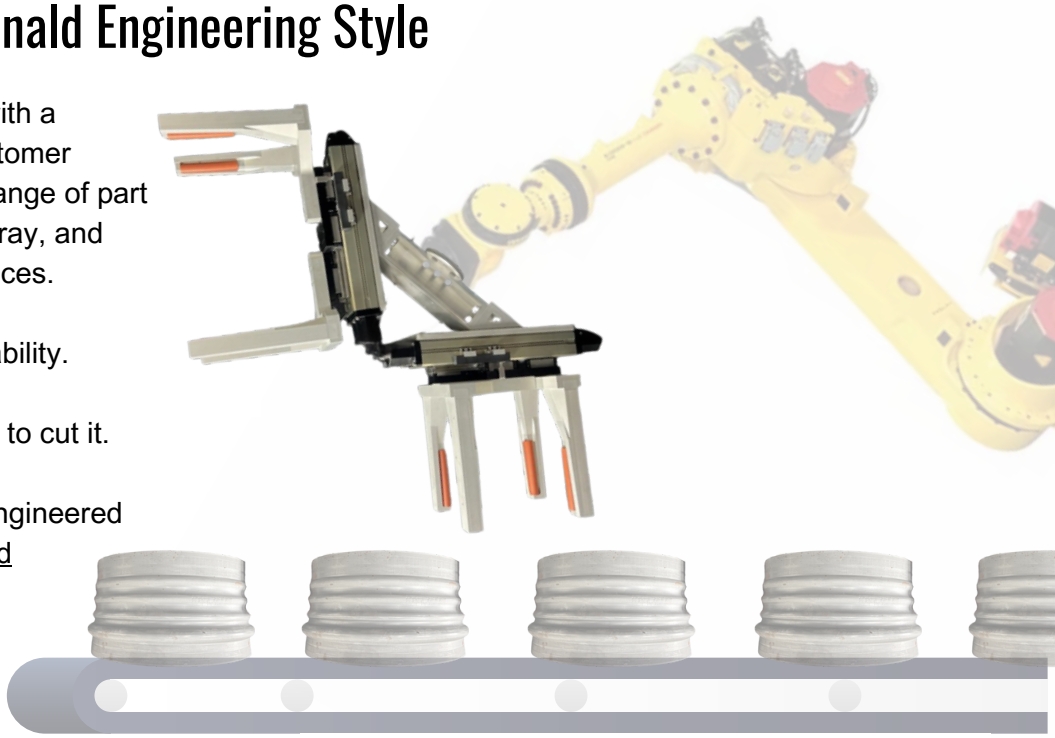
Custom EOAT Design, Donald Engineering Style



Every automation challenge starts with a problem to solve. In this case, a customer needed an EOAT that could grip a range of part sizes, withstand potential coolant spray, and operate inside tight machine clearances.

All while maintaining safety and reliability.

An off-the-shelf gripper wasn't going to cut it.

This called for a complete custom-engineered solution, and that's where the Donald Engineering team stepped in.

Designing The Solution

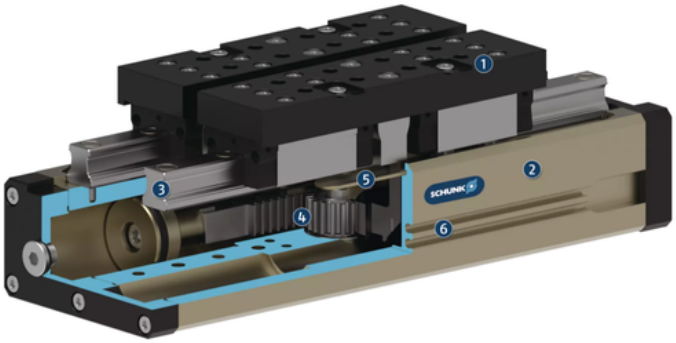
We began with what matters most: **listening**.

By sitting down with the customer, we defined every parameter: **weights, dimensions, cycle speed, orientation, environmental factors, and clearance requirements**. With that information, the design path became clear.

1. **The Core Gripper:** We selected the **SCHUNK PHL**, the heart of the solution, for its strong grip force, long stroke, and ability to handle extended fingers. To withstand potential coolant spray, we specified a custom version with **viton seals**.

SCHUNK PHL

SCHUNK PHL-W

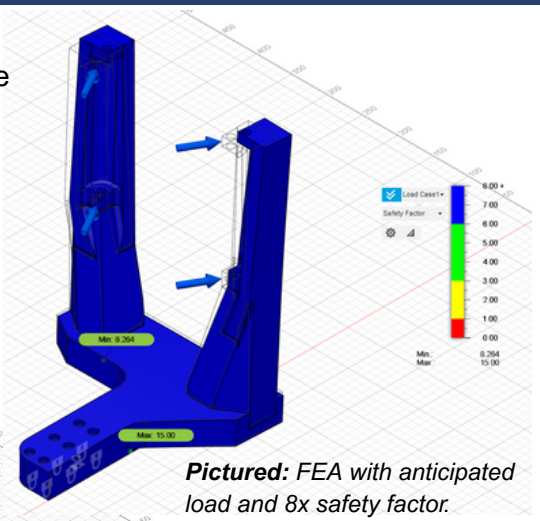


By pressure actuation of the opposing piston, the base jaws are guided by a carrier on the piston, and are set in motion. The synchronization of the jaw stroke is done with a rack and pinion principle.

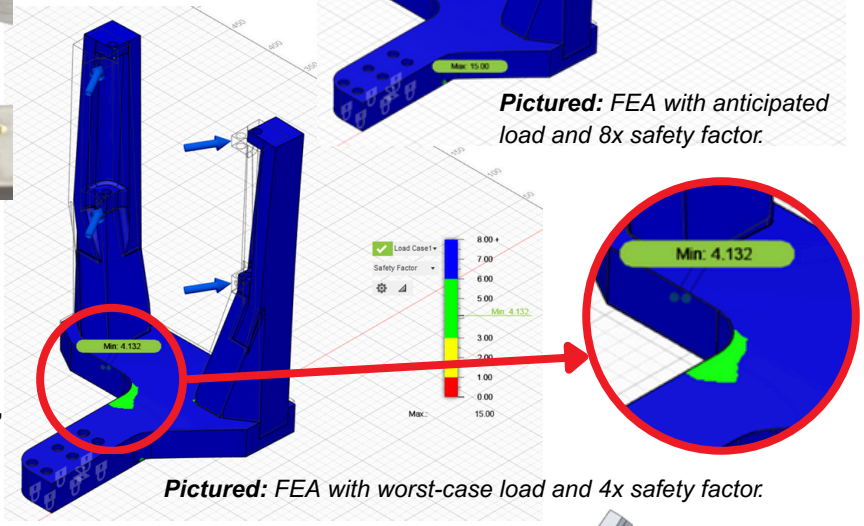
1. **Base jaw**
   for the connection of workpiece-specific gripper fingers
2. **Housing**
   is weight-optimized due to the use of high-strength aluminum alloy
3. **Roller guide**
   highly loadable, nearly backlash-free base jaw guidance for long finger lenghts
4. **Kinematics**
   pinion and rack principle for centric clamping, even at large strokes
5. **Dust cover**
   along the whole guidance length against coarse dirt
6. **Sensor system**
   Brackets for proximity switches and adjustable control cams in the housing

2 **Custom Finger Design:** Long fingers were required to clear machine components, but they had to remain strong. Using Finite Element Analysis (FEA), we optimized the design for both stiffness and load capacity. To grip tapered, uneven, and hot parts, we lined the fingers with silicone rubber inserts. Making it flexible enough to conform, tough enough to handle heat.

Pictured: *Close-up of silicone rubber inserts on the gripper fingers.*



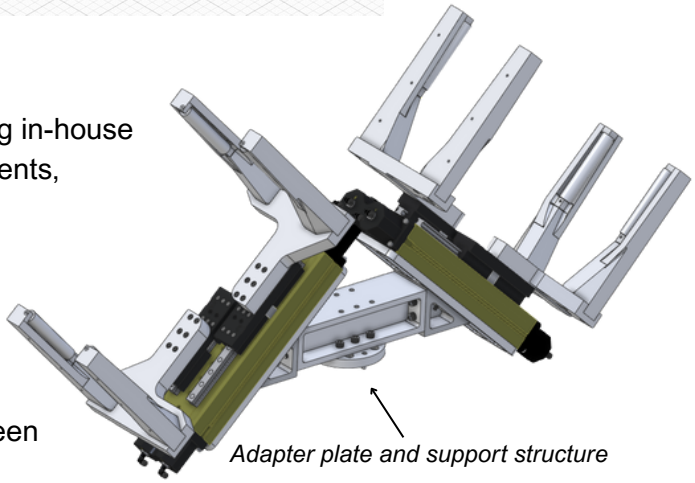
Pictured: *FEA with anticipated load and 8x safety factor.*



Pictured: *FEA with worst-case load and 4x safety factor.*

3 **Seamless Integration:** We engineered a custom adapter plate and support structure, so the EOAT mounted cleanly to the robot. Multiple design reviews with the customer confirmed that the design fit not only the mechanics but also the process requirements

Once the final design was approved, the Donald Engineering in-house engineering team manufactured and assembled all components, delivering a complete, ready-to-run EOAT.

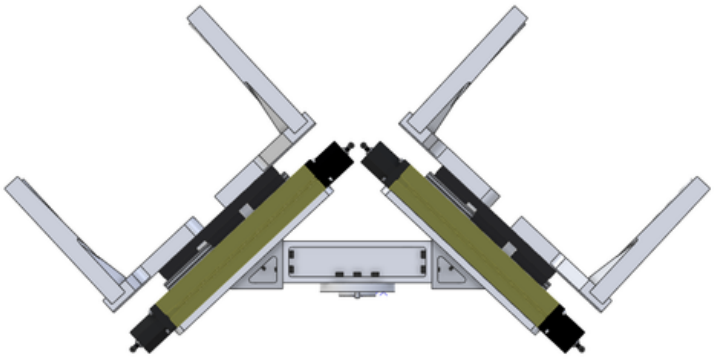


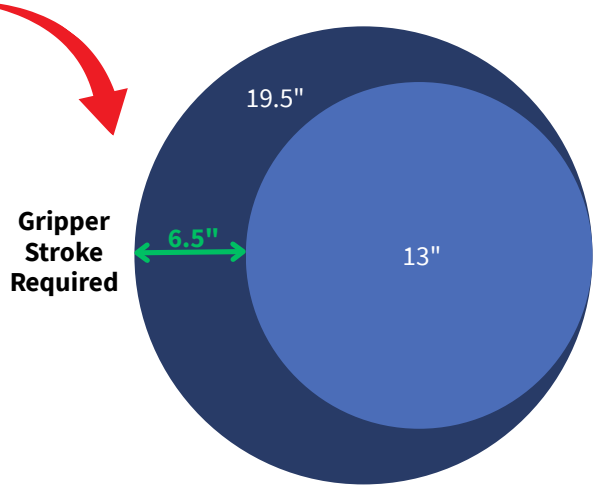
Adapter plate and support structure

Process Driven Engineering

At Donald Engineering, we design for the entire process. For this project, that meant accounting for:

- The wide range of part profiles and sizes, ranging between 13” and 19.5”, with enough grip force to handle .5g of acceleration in all directions.
- The speed and throughput of the application.
- The gripping challenges posed by hot, uneven surfaces.



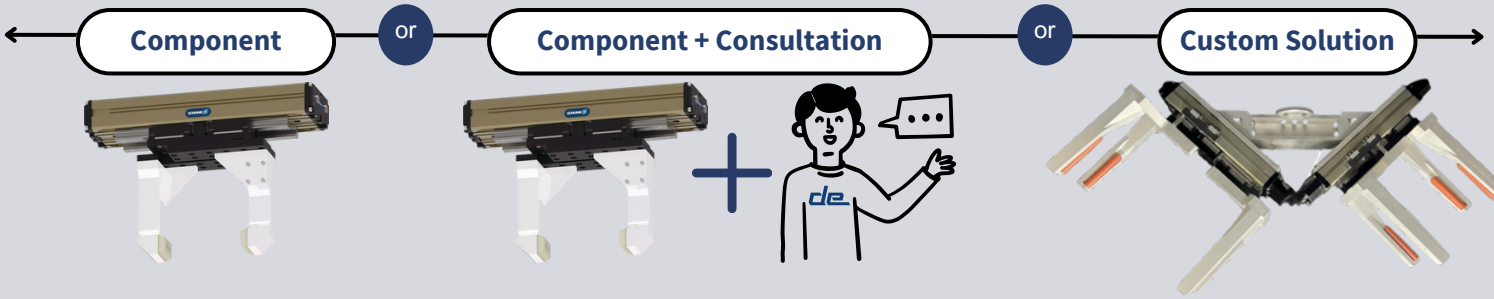


Optimized for User Experience

For this EOAT, we attacked it from all angles:

- **Spring-close gripping:** If air pressure is lost, the gripper remains closed, keeping parts secure and preventing accidents.
- **Analog sensing:** Instead of simple “open/close” feedback, analog monitoring provides real-time jaw position data, so we know which parts we are holding.
- **Minimize maintenance:** Off-the-shelf silicone finger components can be switched out as they wear. Minimizing maintenance and upgrading the seal to keep contaminants out.

The Donald Engineering Difference



This project highlights what sets Donald Engineering apart: We bring together component expertise, design consulting, and fully integrated custom solutions to help our customers succeed. Whether it’s selecting the right gripper, optimizing finger geometry with FEA, or building in the right safety measures, our role is to make sure the solution is reliable and ready for the application.

At Donald Engineering, you’re not just sourcing components; you’re gaining a **partner** who works alongside you to design, refine, and deliver solutions that fit seamlessly into your process from day one.

Ready to Tackle Your Next Challenge?

If your project calls for more than an off-the-shelf answer, Donald Engineering is here to help. We specialize in custom EOAT and automation solutions built for real-world performance, safety, and reliability.

Please reach out to us today to start the conversation.

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