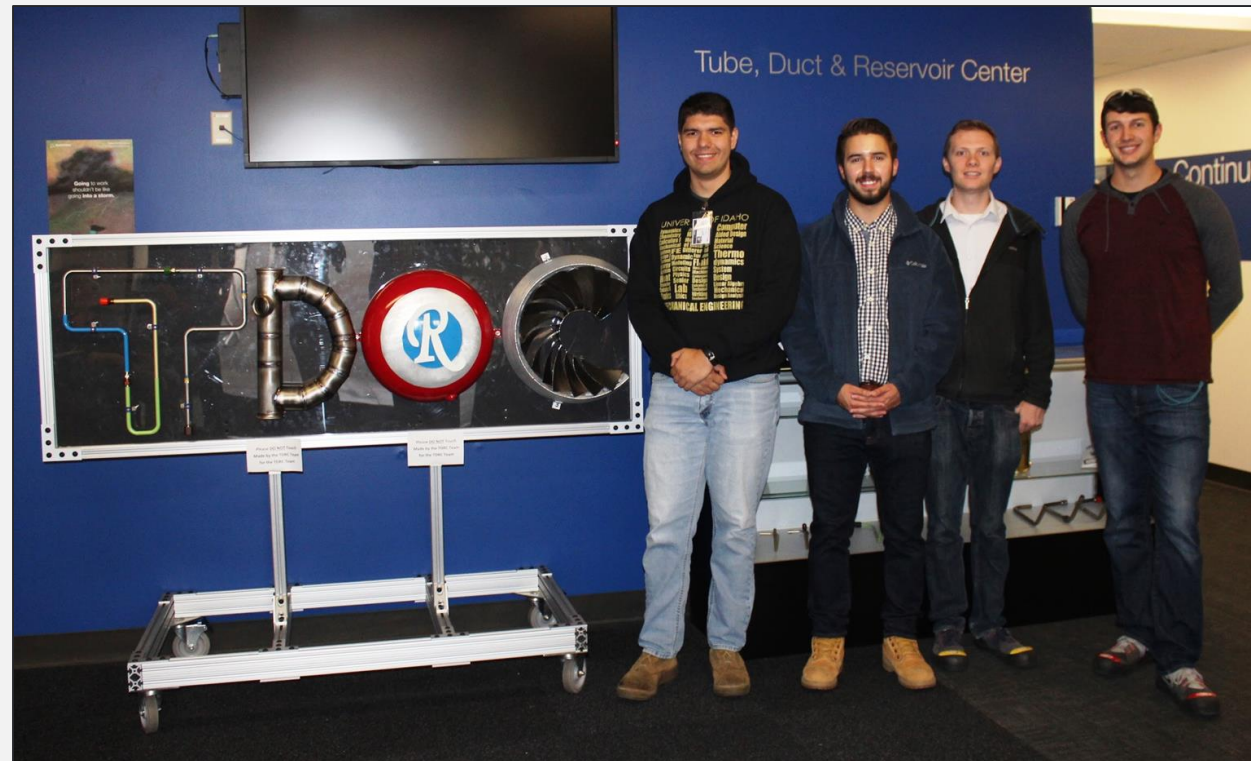


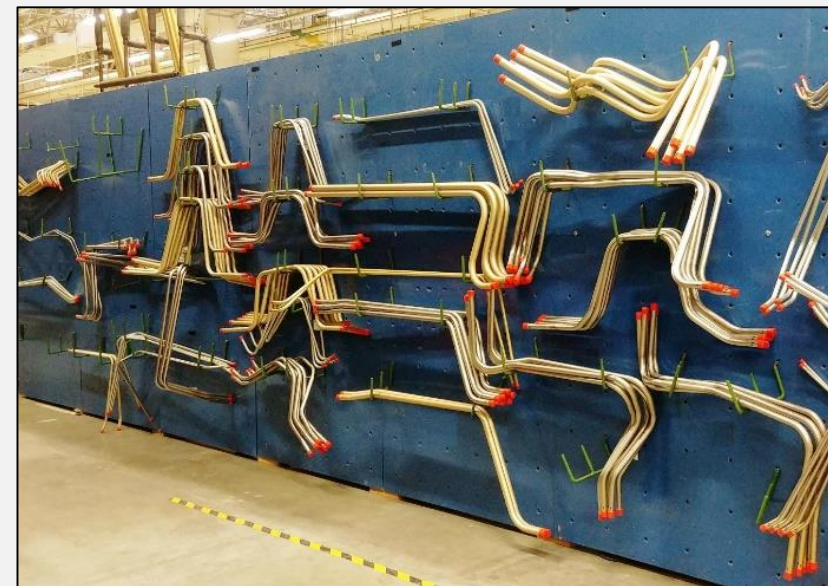
Boeing Tubing Insulation Installation

Michael Odell, Richard Baptista, Isaac Fisher, Kaleb Halen



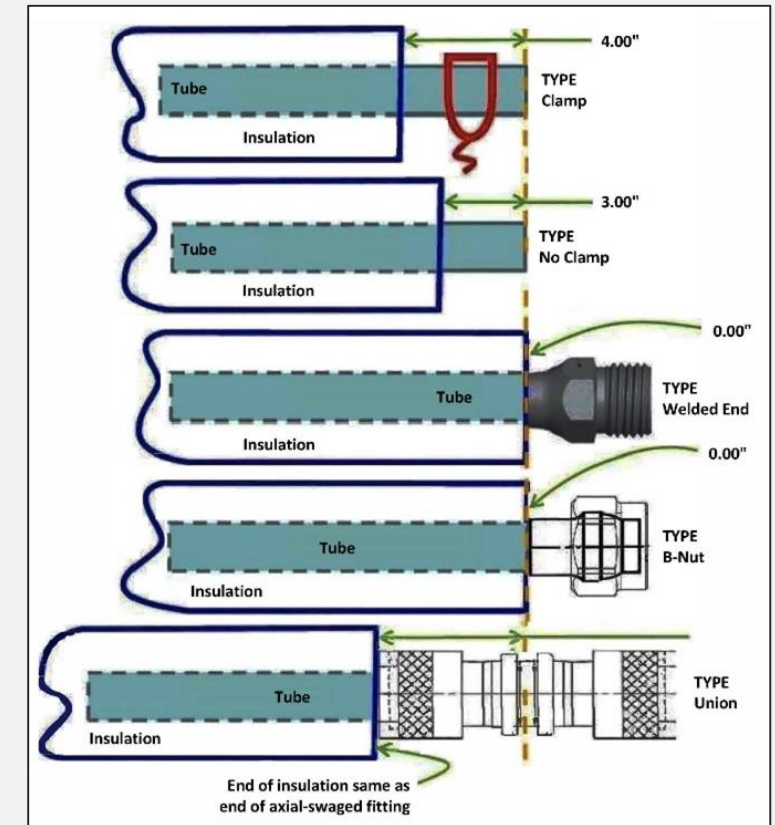
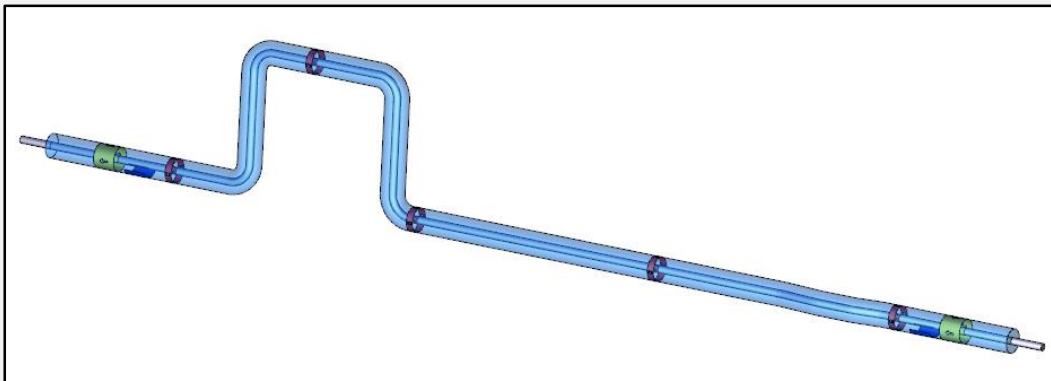
Project Overview

- Aircraft tubing needs to be insulated
- Currently assembles components by hand
- Goal: Design novel tooling for installing insulation

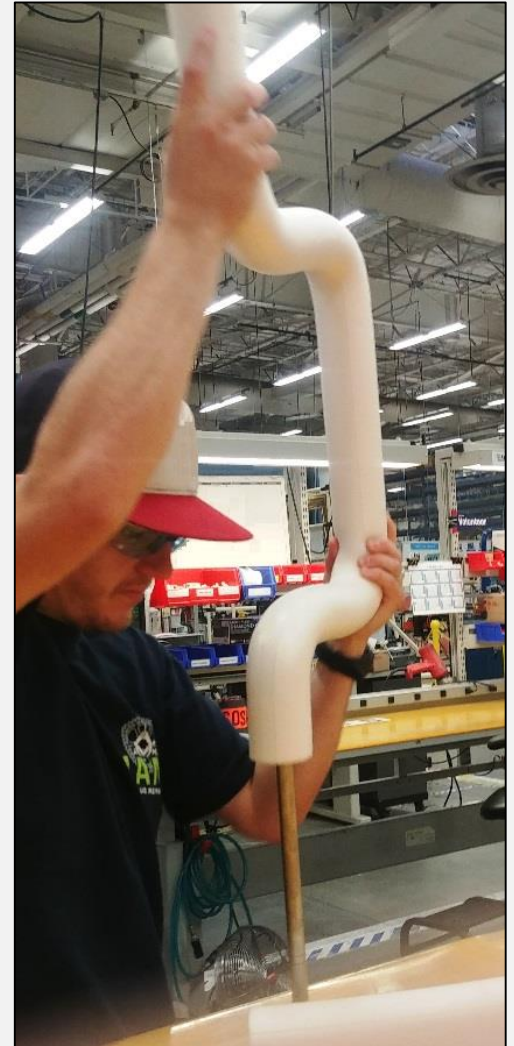
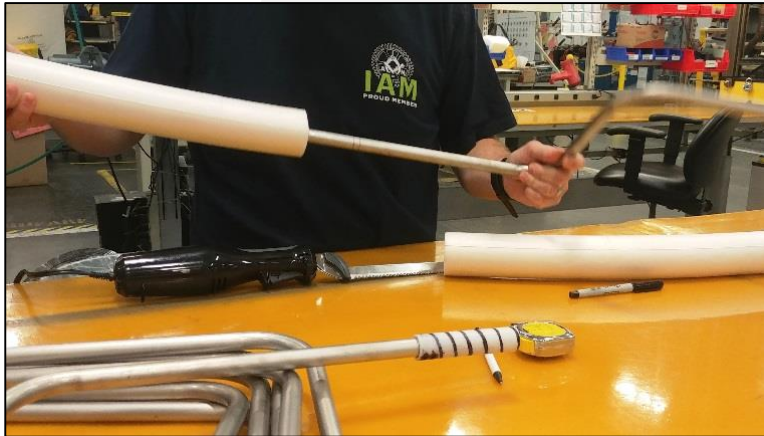


Product Requirements

- Multipurpose for various tubing geometries
- Produce defect-free and consistent results
- User-friendly and ergonomic for operators
- Reduce current manufacturing times

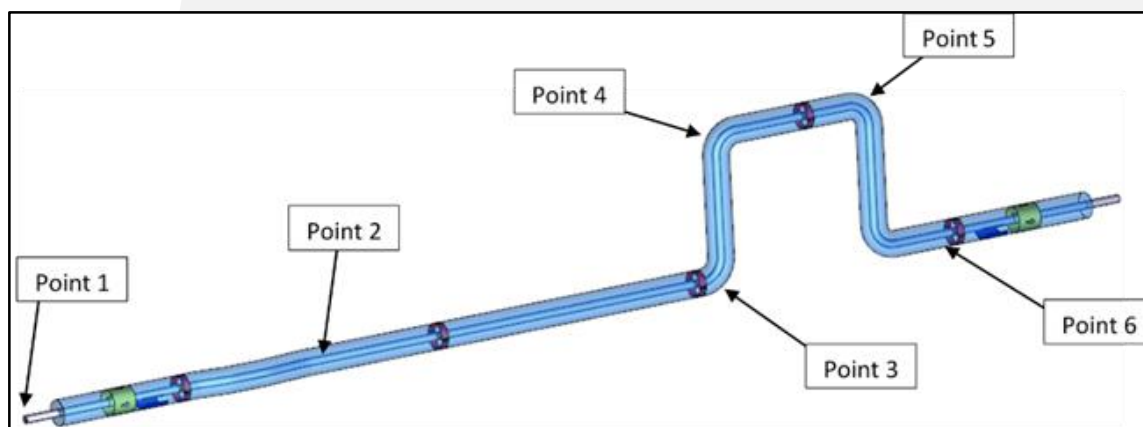
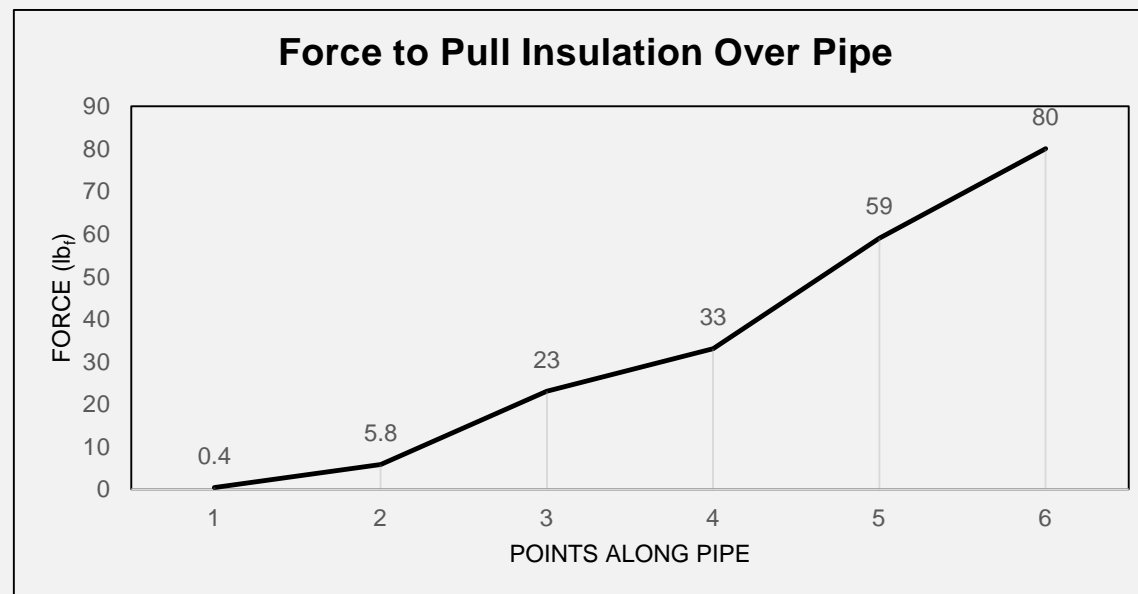


Current Process



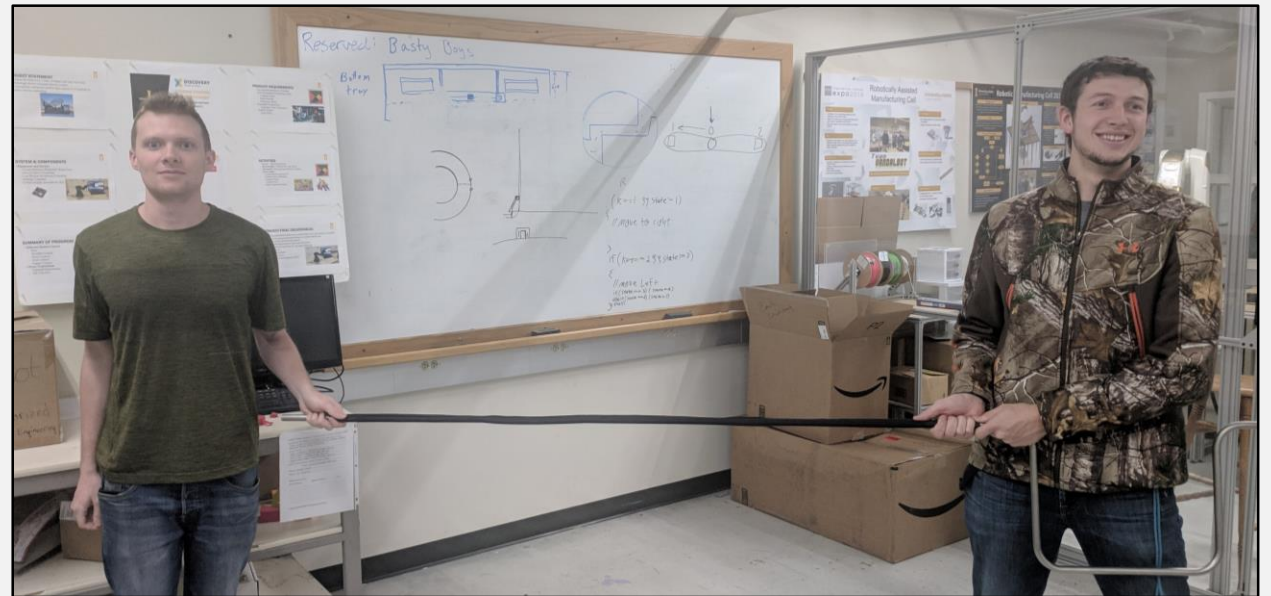
Testing

Point	Force (lb _F)
1	.4
2	5.8
3	23
4	33
5	59
6	>80



Concepts Considered

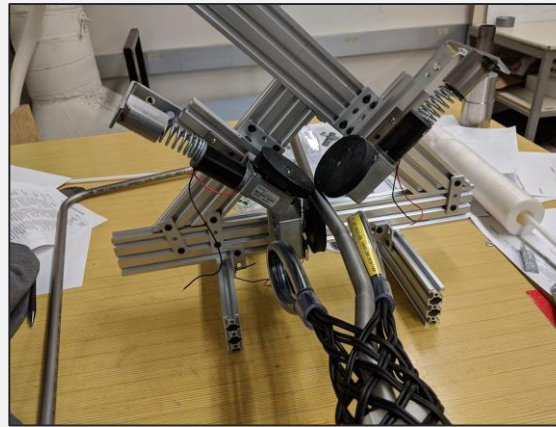
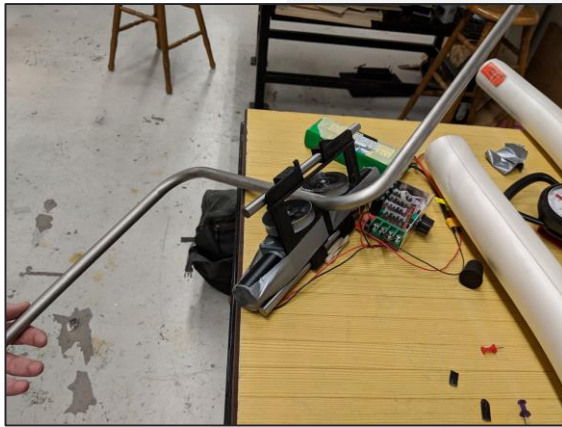
- Compressed air
- Pressure differential
- Friction reducing sleeve
- Motorized pulling device
- Motorized pushing device



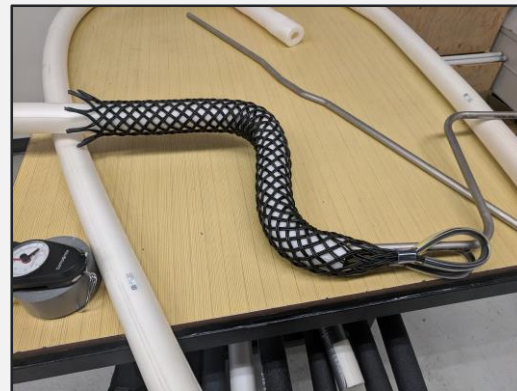
Friction reducing sleeve

Puller – Prototypes

Evolution of Design:



Attachment Devices:



Finger trap

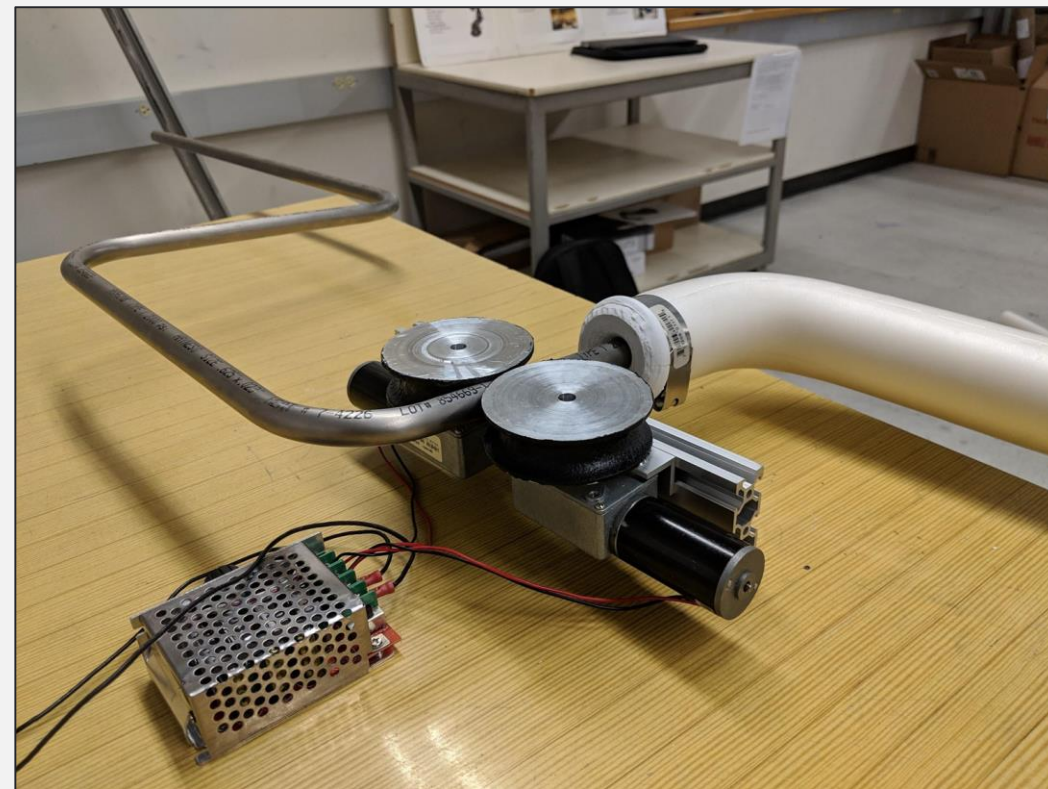
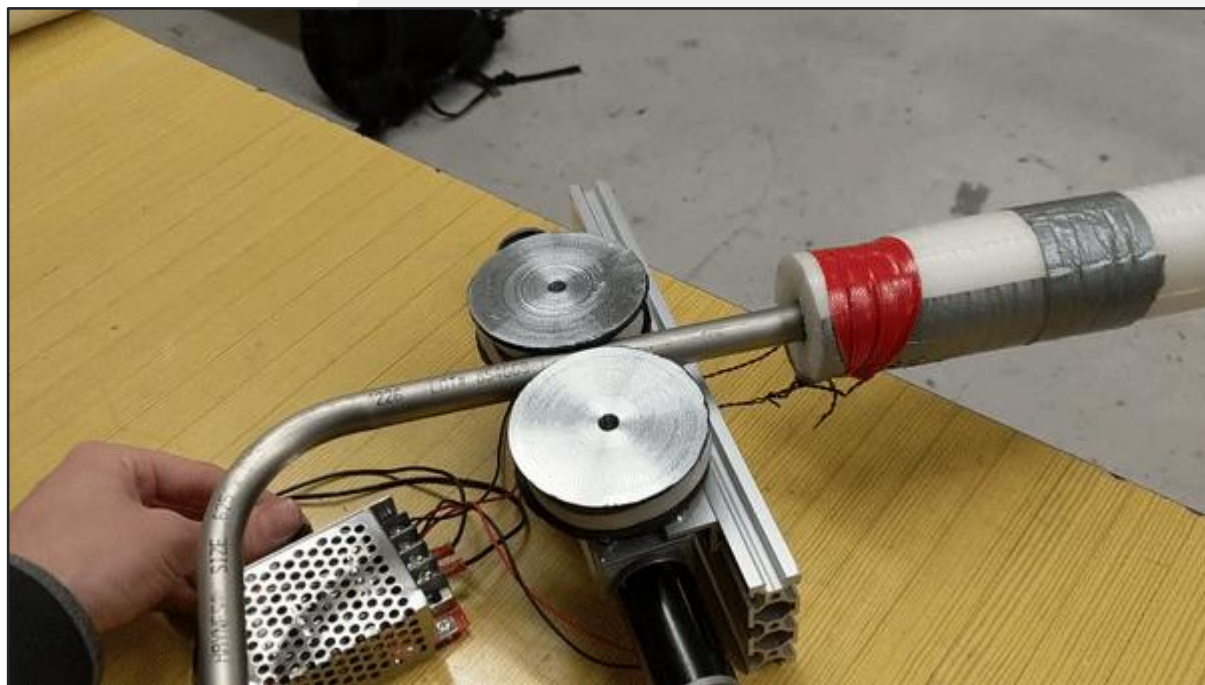


Bullnose and hose clamp



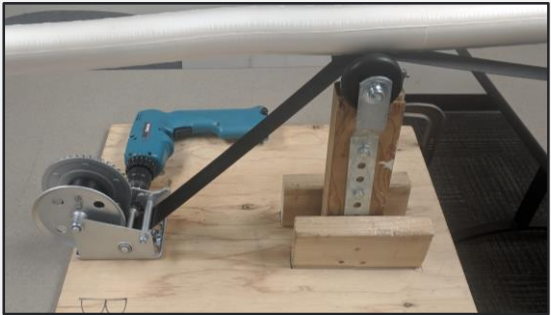
Bullnose w/ flared insert

Final Puller Prototype

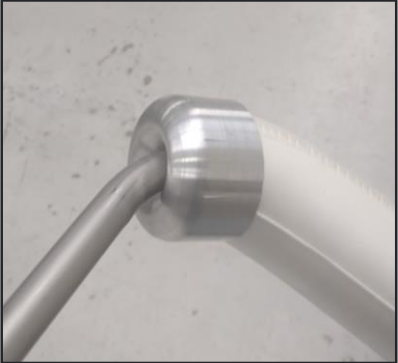


Pusher – Prototypes

Boat plug



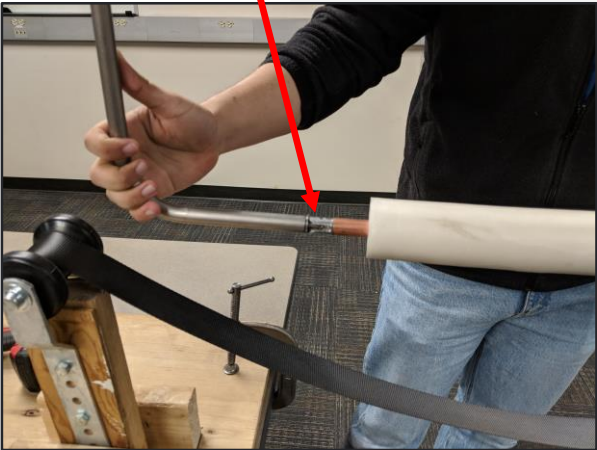
Winch and drill providing power and torque



Original bullnose



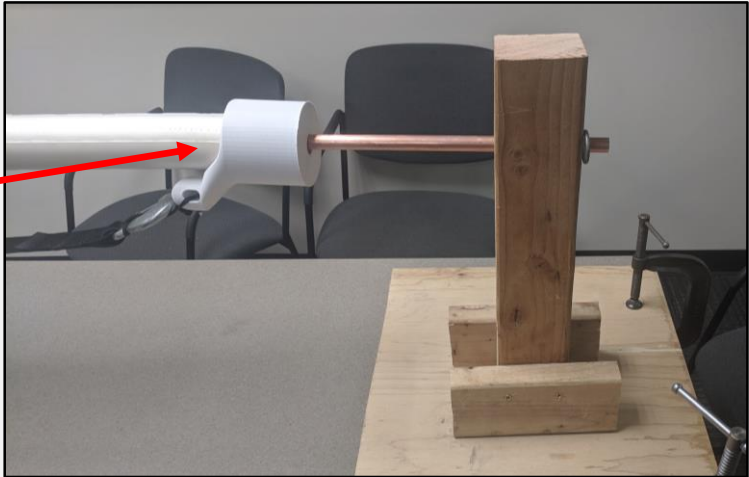
New bullnose (for pusher)



Boat plug connecting guide to tube



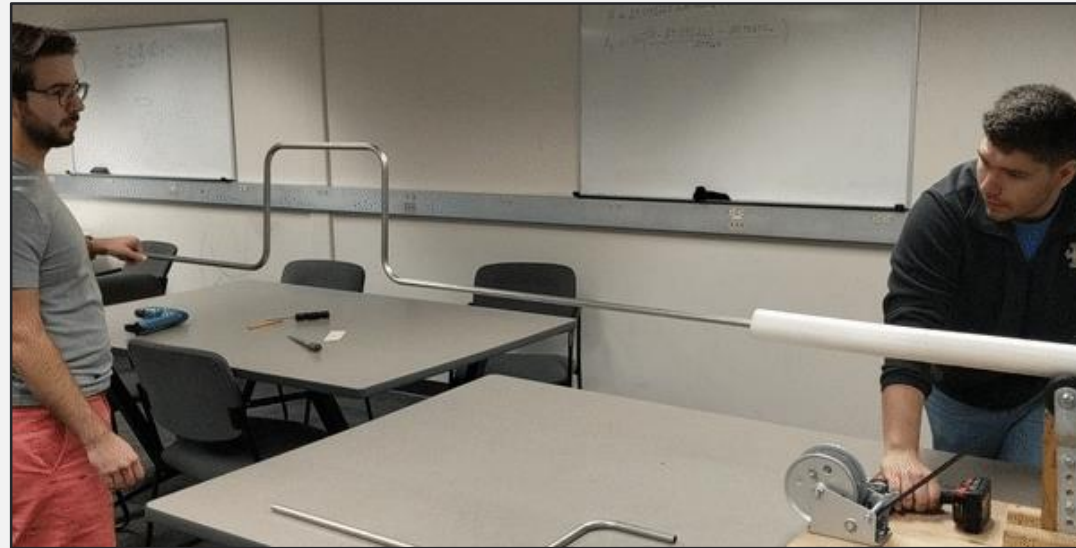
Pusher cup



Cup on guide



Final Pusher Prototype



Set-up Process:

1



2



3



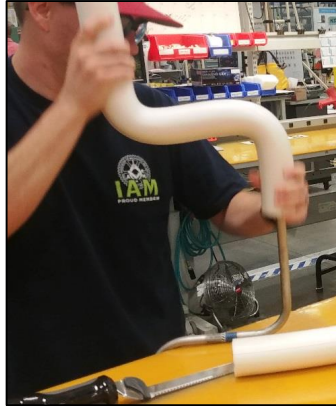
4



5



Conclusion



	Manual	Puller	Pusher
Set-up Time	0	37 sec	21 sec
Installation Time	1 min 20 sec	46 sec	18 sec
Effort (Out of 10)	10	5	4

Questions

