

# Temporary Fastener Automated Install Tool



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## INTRODUCTION

Blue Origin is transitioning to autonomous drilling and fastener installation on their New Glenn rocket.

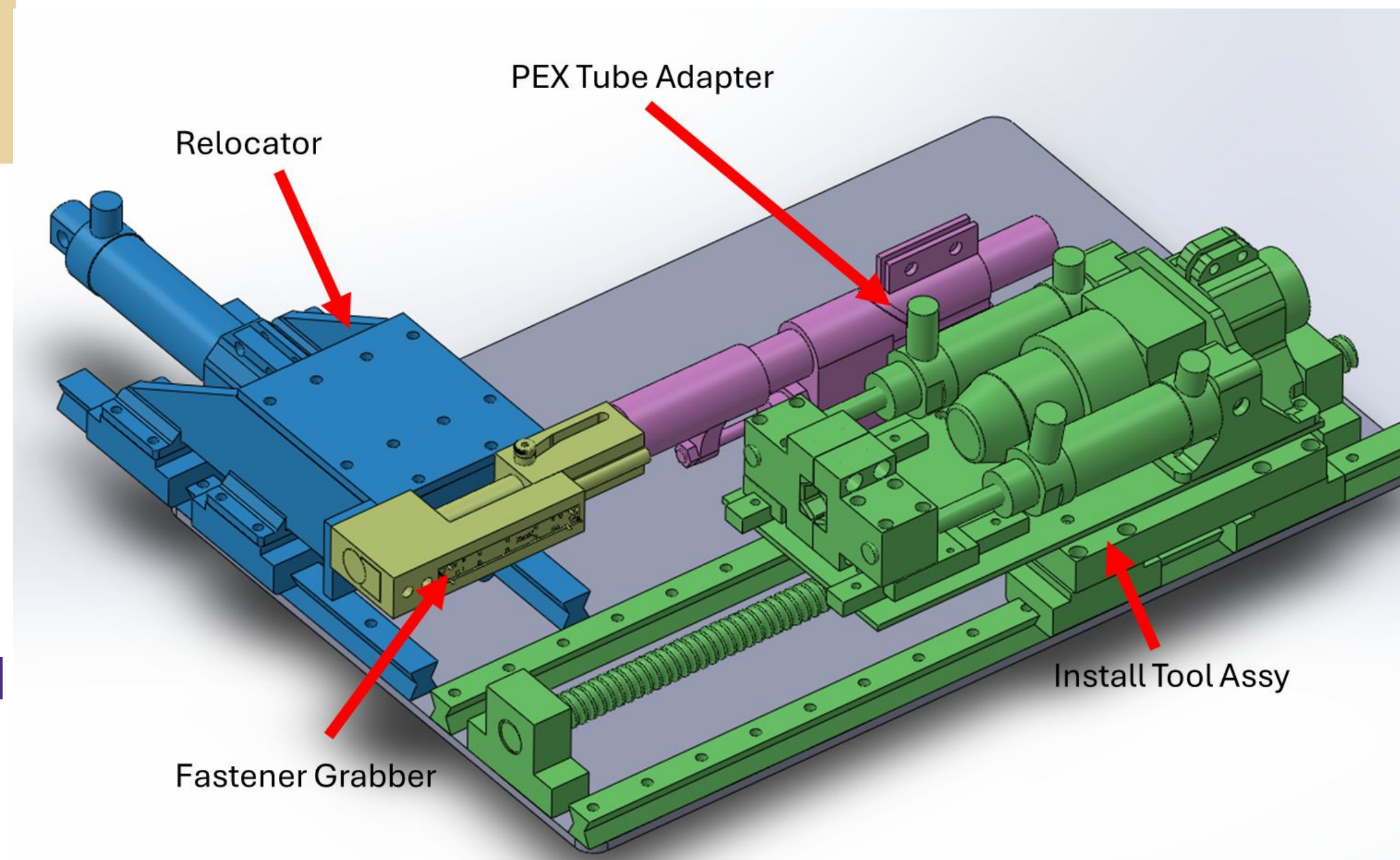
### Robot Design Requirements

- Receive fasteners
- Validate fastener length and diameter
- Install correct fasteners in pre-drilled holes
- Provide a low-cost test bed for automated fastener handling
- Design for mounting on robot arm for installation in all orientations

### Temporary Fastener

One-sided fasteners from Centrix Aerospace hold structural components in precise alignment before permanent riveting.

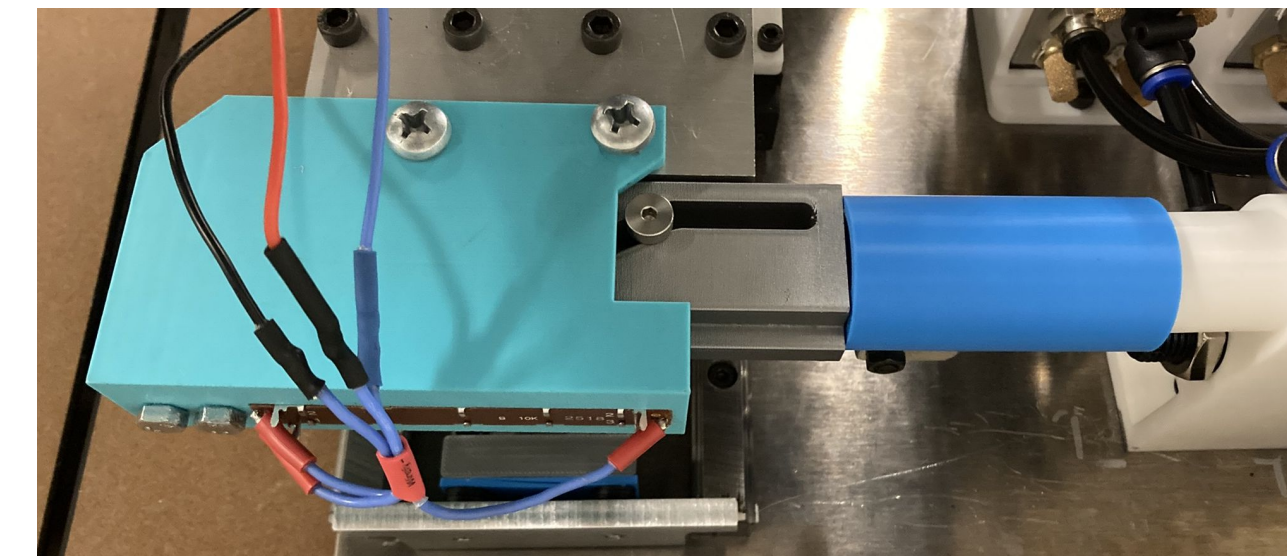
## FINAL DESIGN



## SUBSYSTEMS

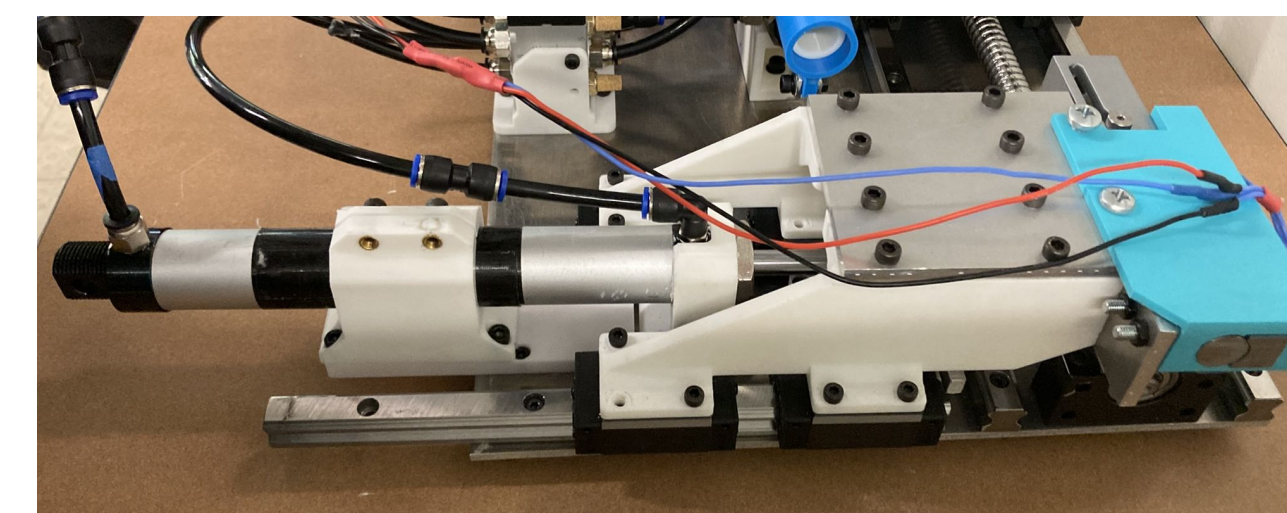
### Feed Interface

- Receive fastener from feed tube
- Measure diameter
- Secure fastener for relocation



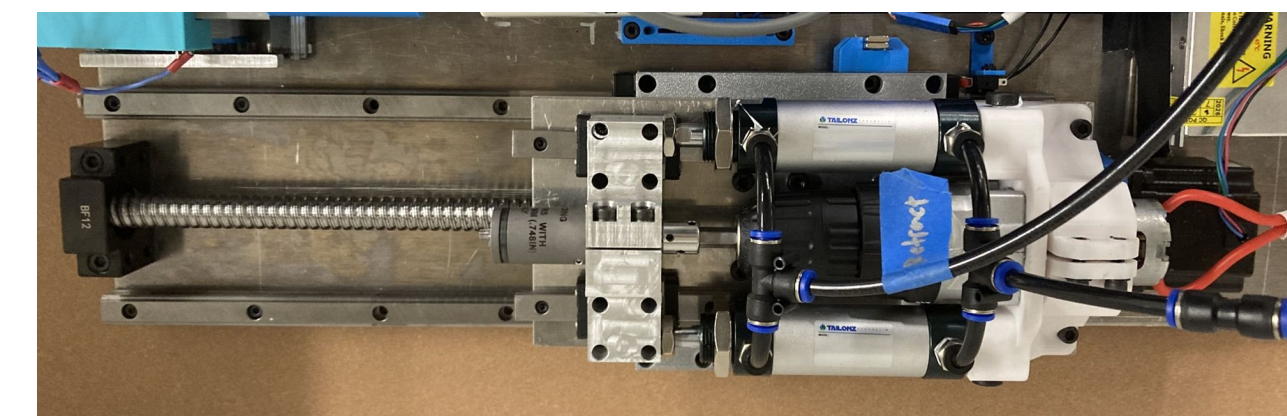
### Relocation Slide

- Translate fastener from feed tube to installation assembly
- Align fasteners between subsystems



### Install Assembly

- Grab and eject
- Torque fastener
- Measure length
- Move installation tool



### Automated Control

- Fault detection
- Automatic processing
- System monitoring

CASE A Everything Correct	CASE B Wrong Fastener	CASE C Machine Failure
correct fastener →	Bad Diameter or Bad Length	hard stop,
full install cycle →	→	all actuators stop,
re-home	INSTALL skips to EJECT	power cycle required

## RESULTS

### Reliability Testing

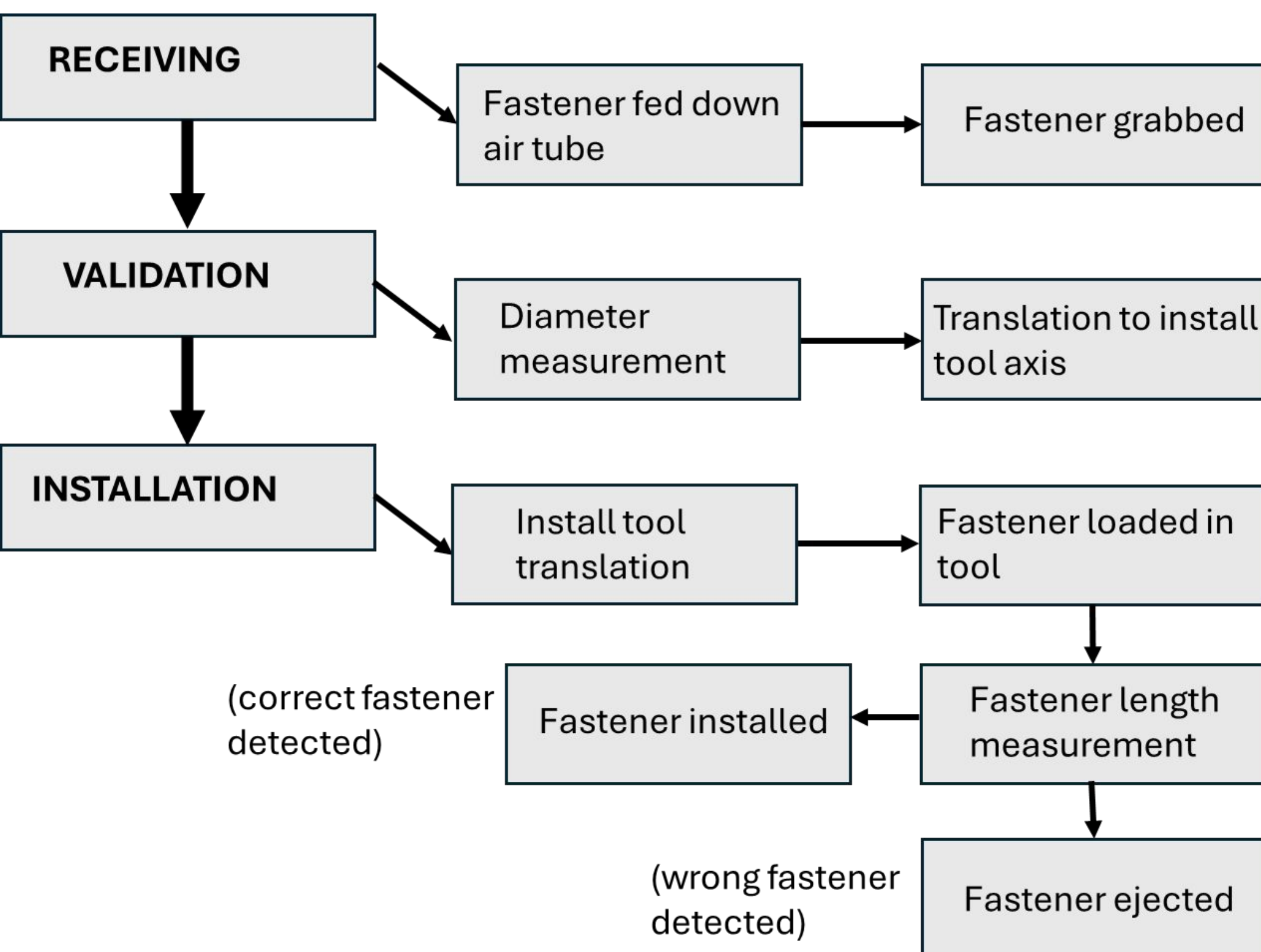
- **Criteria:** Achieve a 10/10 consecutive pass threshold across all critical states
- **Dimensional Verification:** 100% success rate on diameter and length measuring
- **Fault Handling:** Successfully executed incorrect fastener ejection and machine failure state protocols without error

## FUTURE IMPROVEMENTS

- Integrated torque feedback
- Improved layout compactness
- Industry standard materials and electronics
- Integration with hole drilling system

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Function Diagram