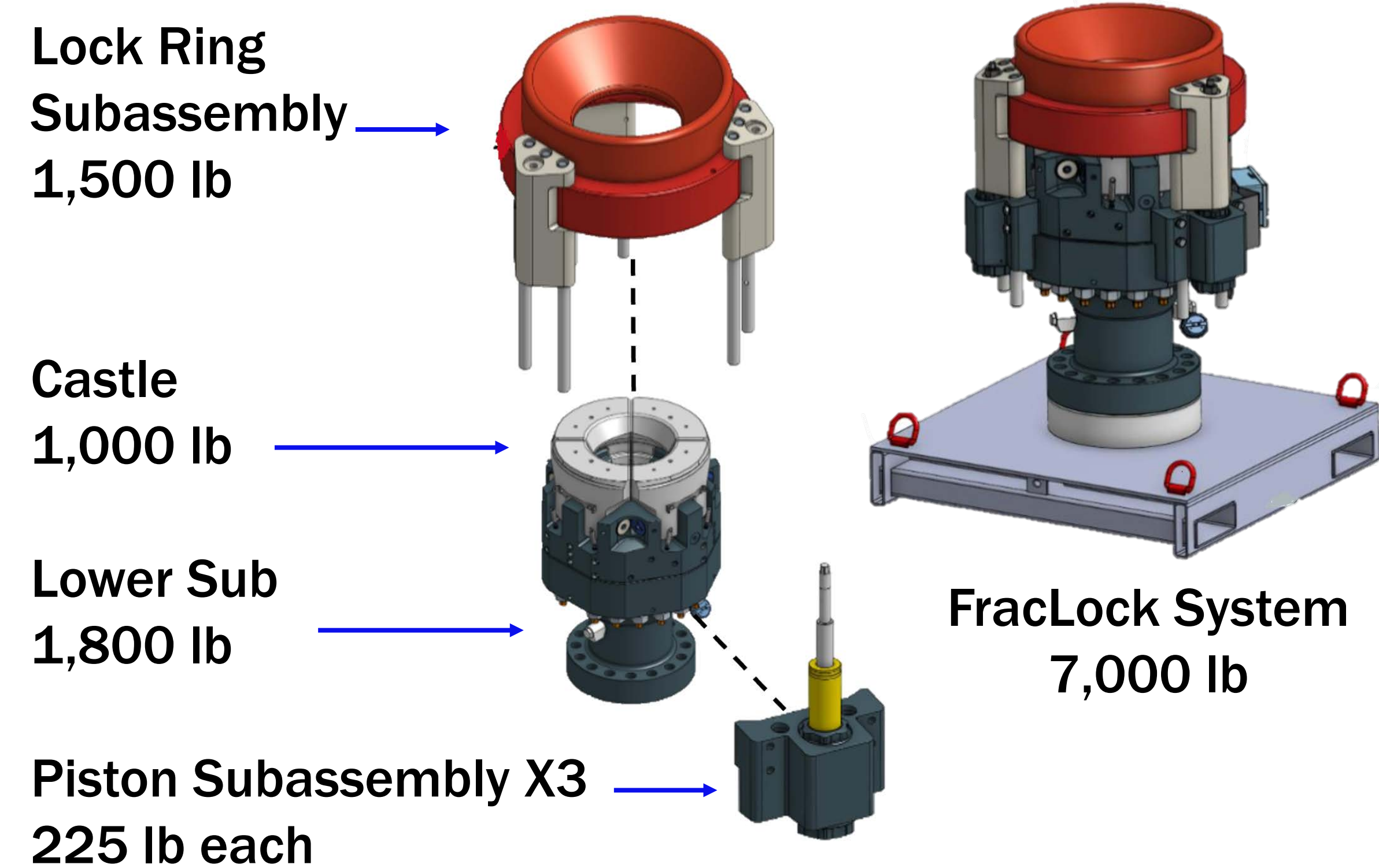


FracLock Assembly System

Team: Cody Hedrick¹, Project Engineer & Finance Manager.
Jackson Shaw², Manufacture Engineer Lead & CAD Director.
Jeremy Seeyave², Test & System Engineer
Sponsor: FHE LLC



Background



Single Overhead Crane for Three Departments

Fabrication & Fluid Power Departments

FracLock Assembly Area



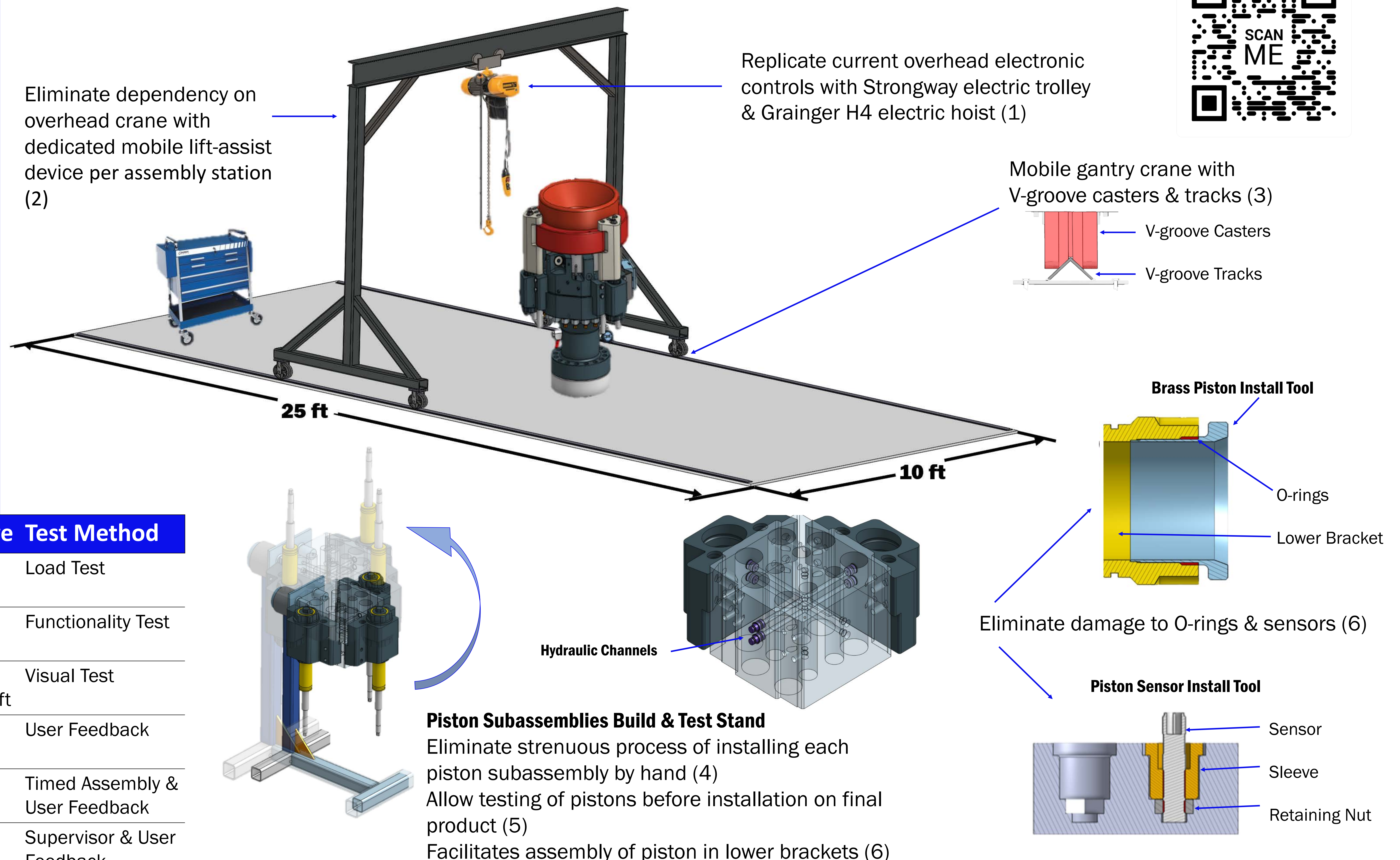
Requirements

1. Eliminate dependency on overhead crane & workers inactivity
2. Lifting system rated to 2000 lb with a minimum safety factor of 2 for OSHA
3. Move parts over an area of 150 ft², cross dimensions 15 ft x 10 ft
4. Perform 90% assembly via a single operator safety
5. Improve assembly time by 30%
6. Eliminated damage to piston coating, sensors, and O-rings in assembly process

Objective Test Method

100%	Load Test
Pass	Functionality Test
200 ft ² 20 ft x 10 ft	Visual Test
95%	User Feedback
50%	Timed Assembly & User Feedback
100%	Supervisor & User Feedback

Reduced Assembly Time by 50% Boasts \$150,000 in Revenue Yearly

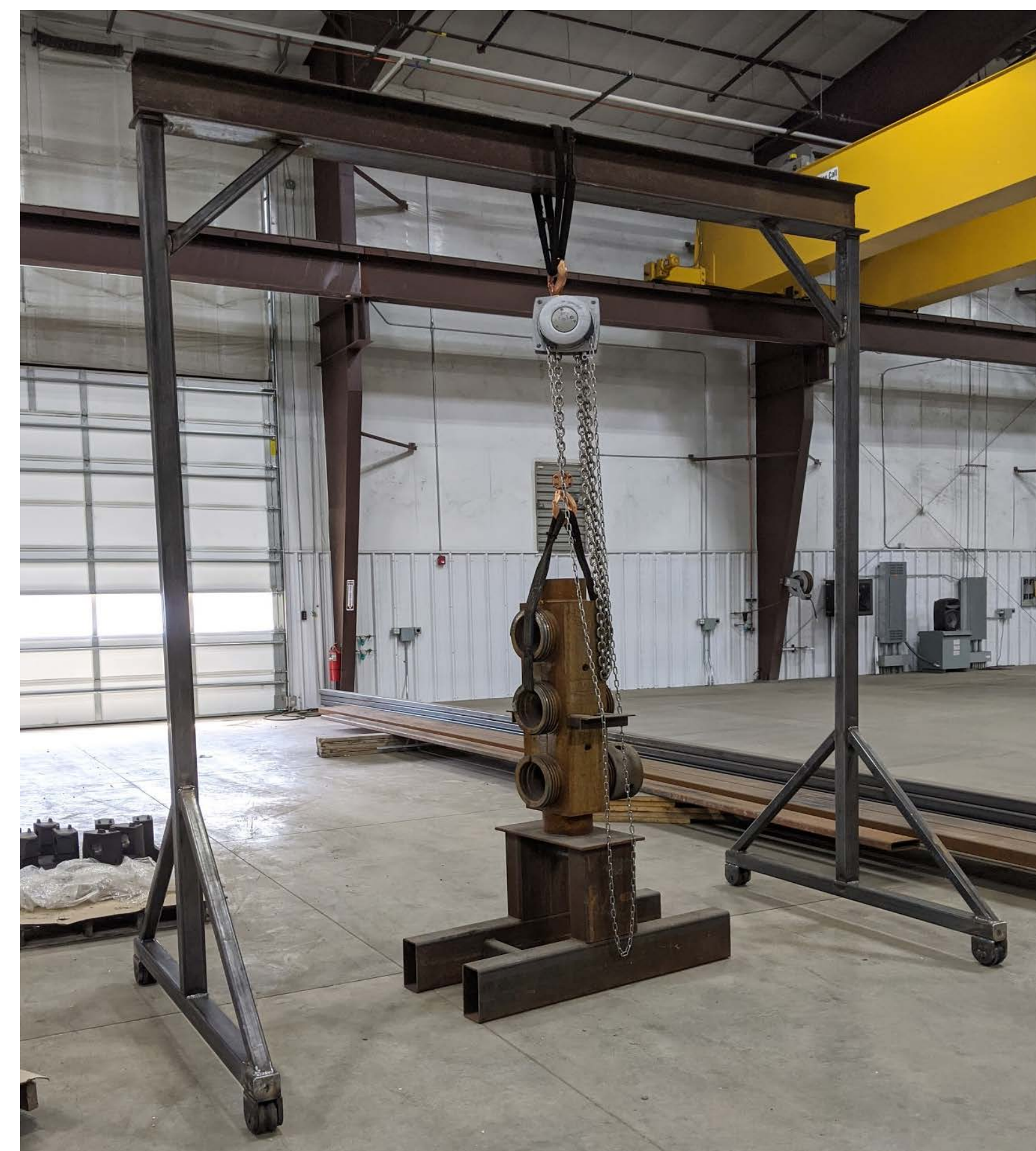


FracLock In Action

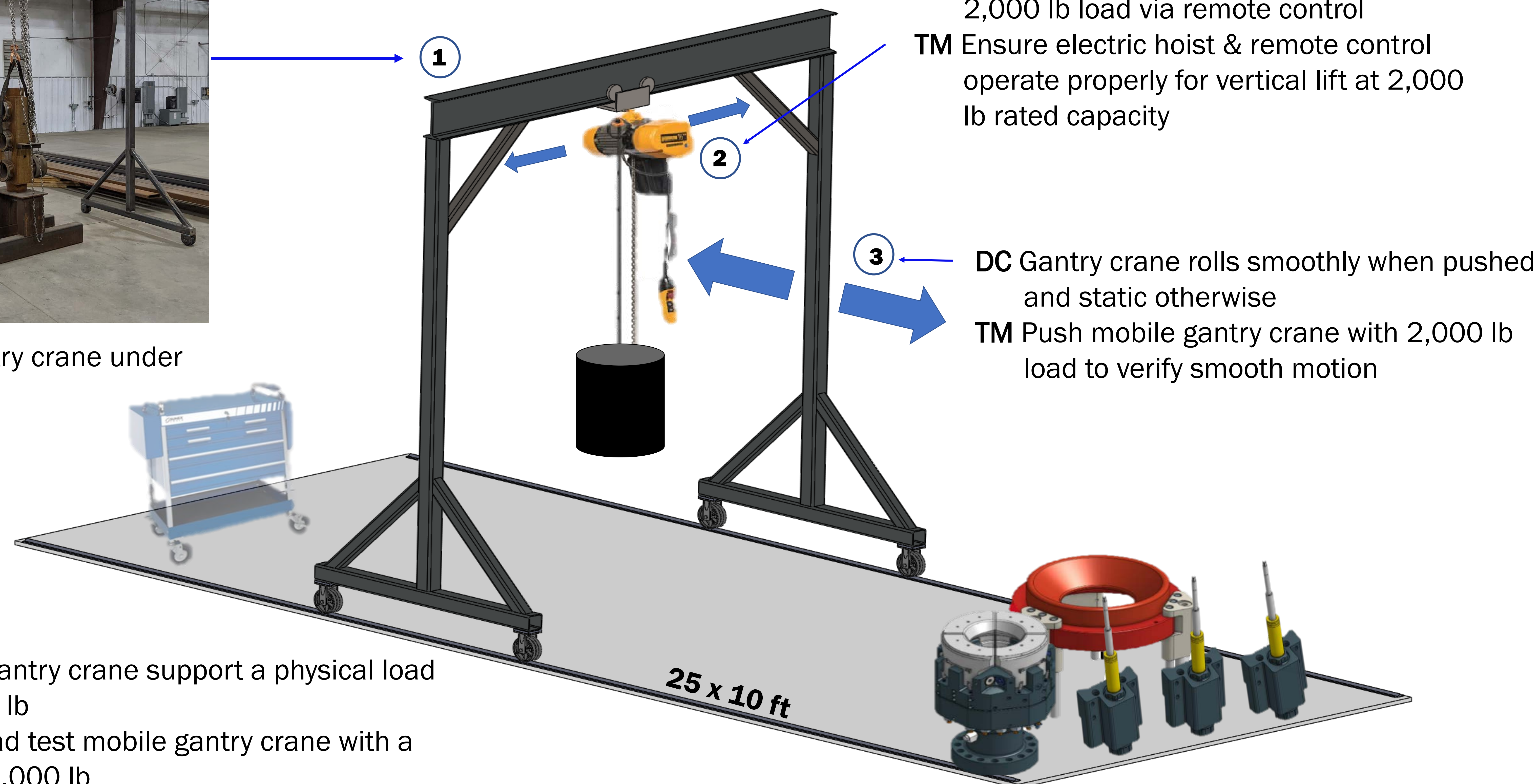


Methods

Design Criteria (DC)
Test Methods (TM)



Completed Gantry crane under load test



DC Electric hoist & trolley operate smoothly for lift and transverse movement with a 2,000 lb load via remote control

TM Ensure electric hoist & remote control operate properly for vertical lift at 2,000 lb rated capacity

DC Gantry crane rolls smoothly when pushed and static otherwise

TM Push mobile gantry crane with 2,000 lb load to verify smooth motion

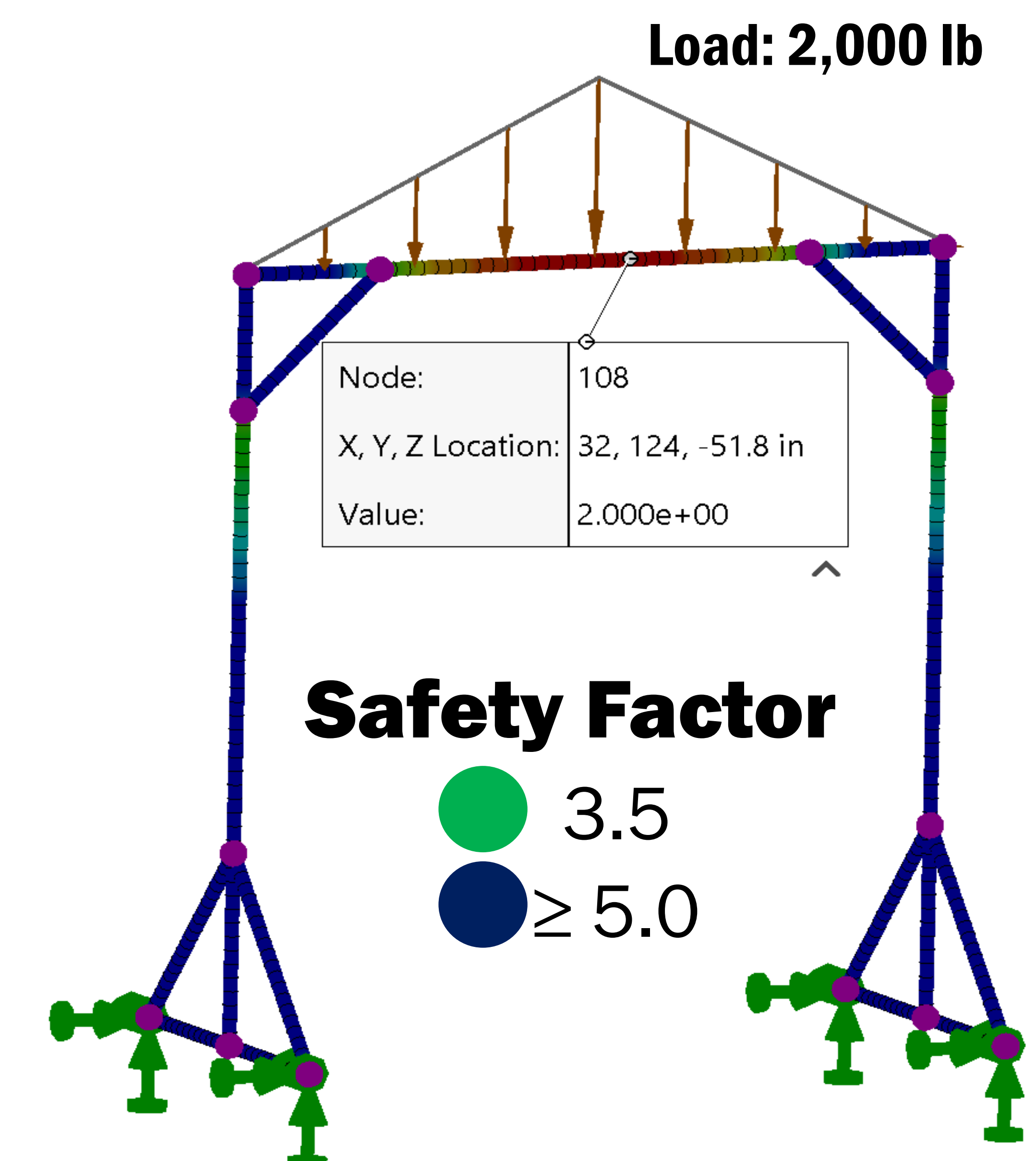
DC Mobile Gantry crane support a physical load of 4,000 lb

TM Static load test mobile gantry crane with a load of 4,000 lb

Results

Results

1. Passed load test.
2. Expecting full functionality of hoist & trolley via remote control (off-the-shelf-items)
3. Expecting full movement when installed

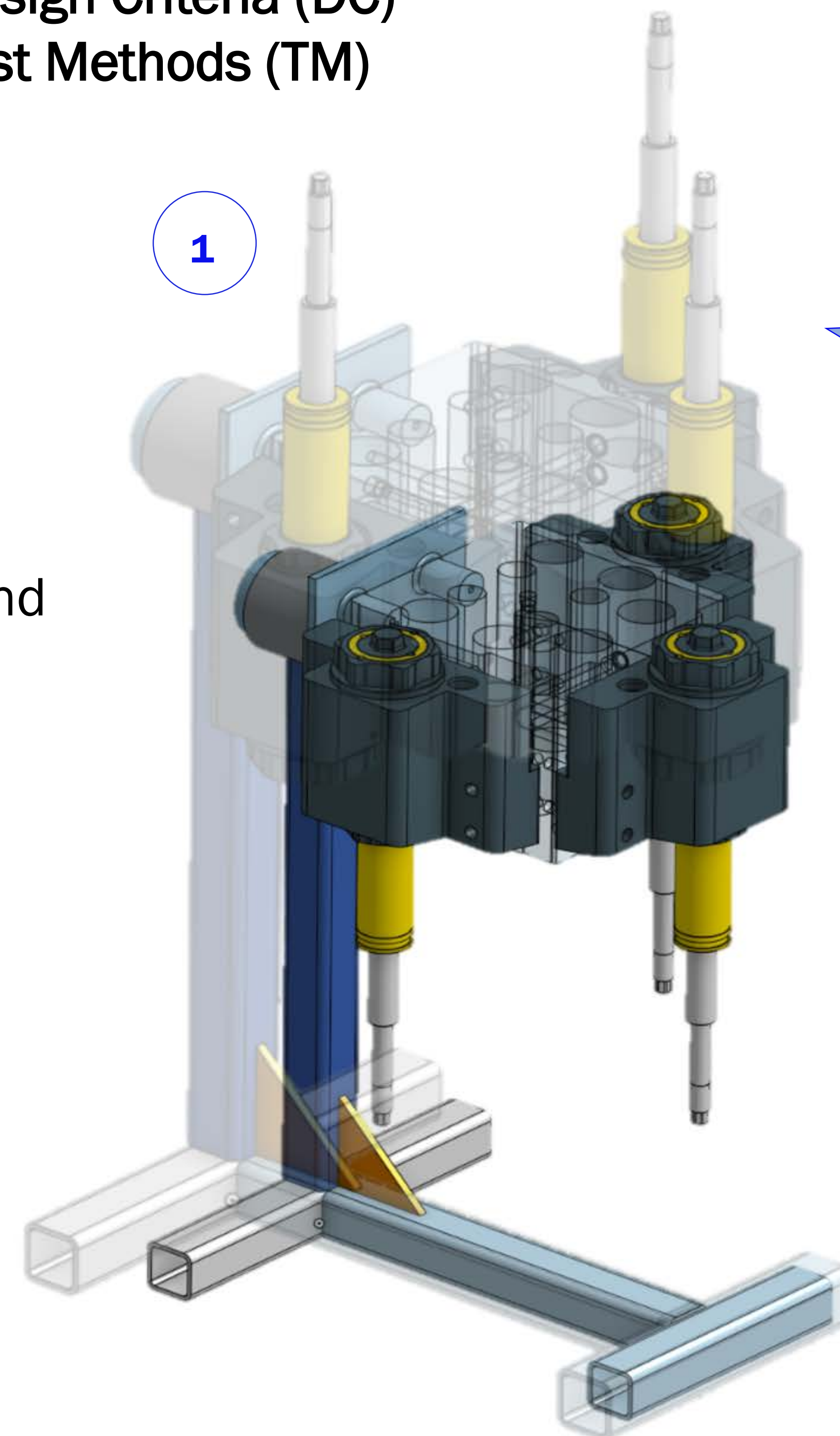


Finite element analysis on the gantry crane using SOLIDWORKS proved that the new lift-assist device supports 2,000 lb with a minimum safety factor of 2.

Methods

Design Criteria (DC)
Test Methods (TM)

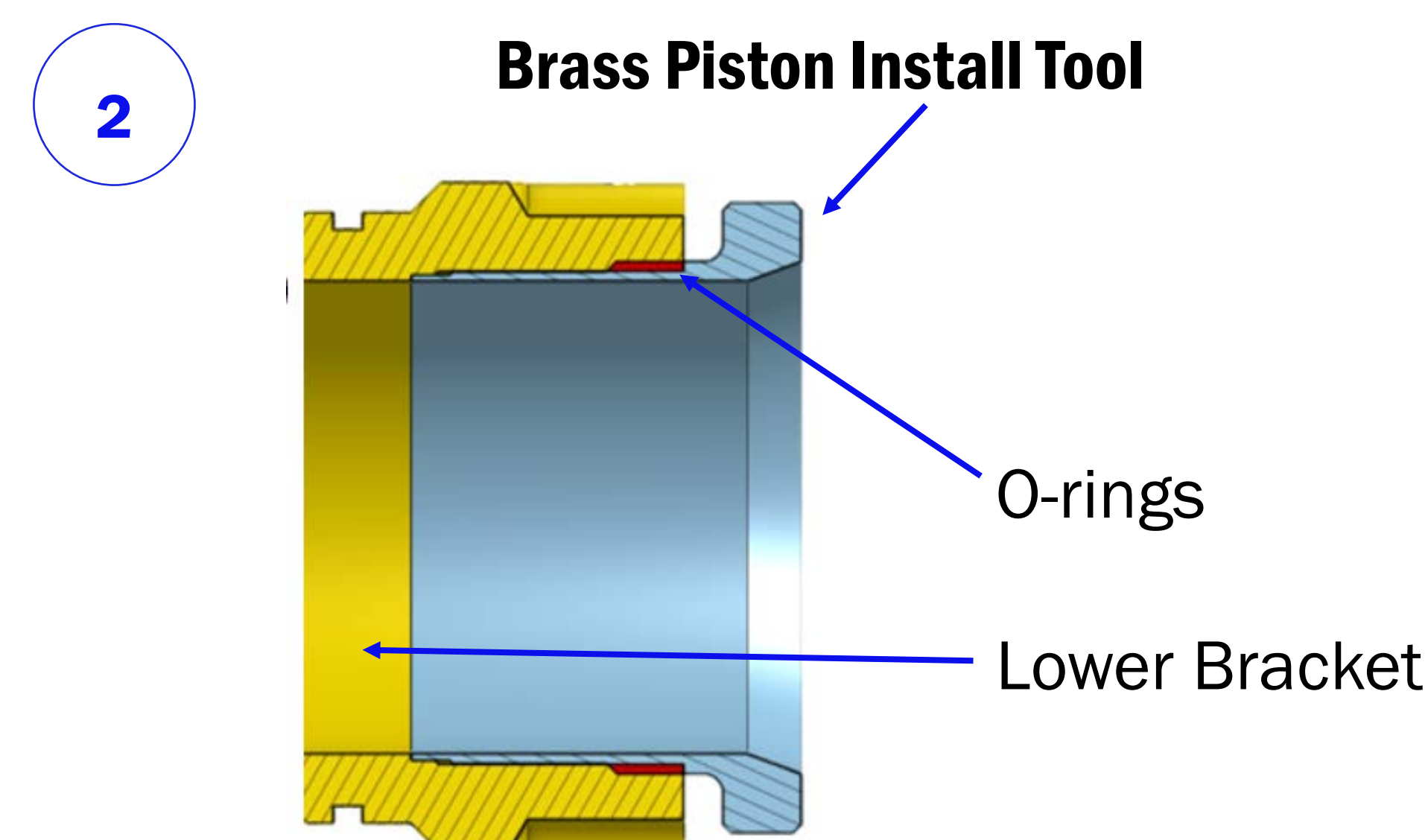
DC Reduce time in the assembly of the pistons subassemblies
TM Test functionality of the 3 test and build sides of the block



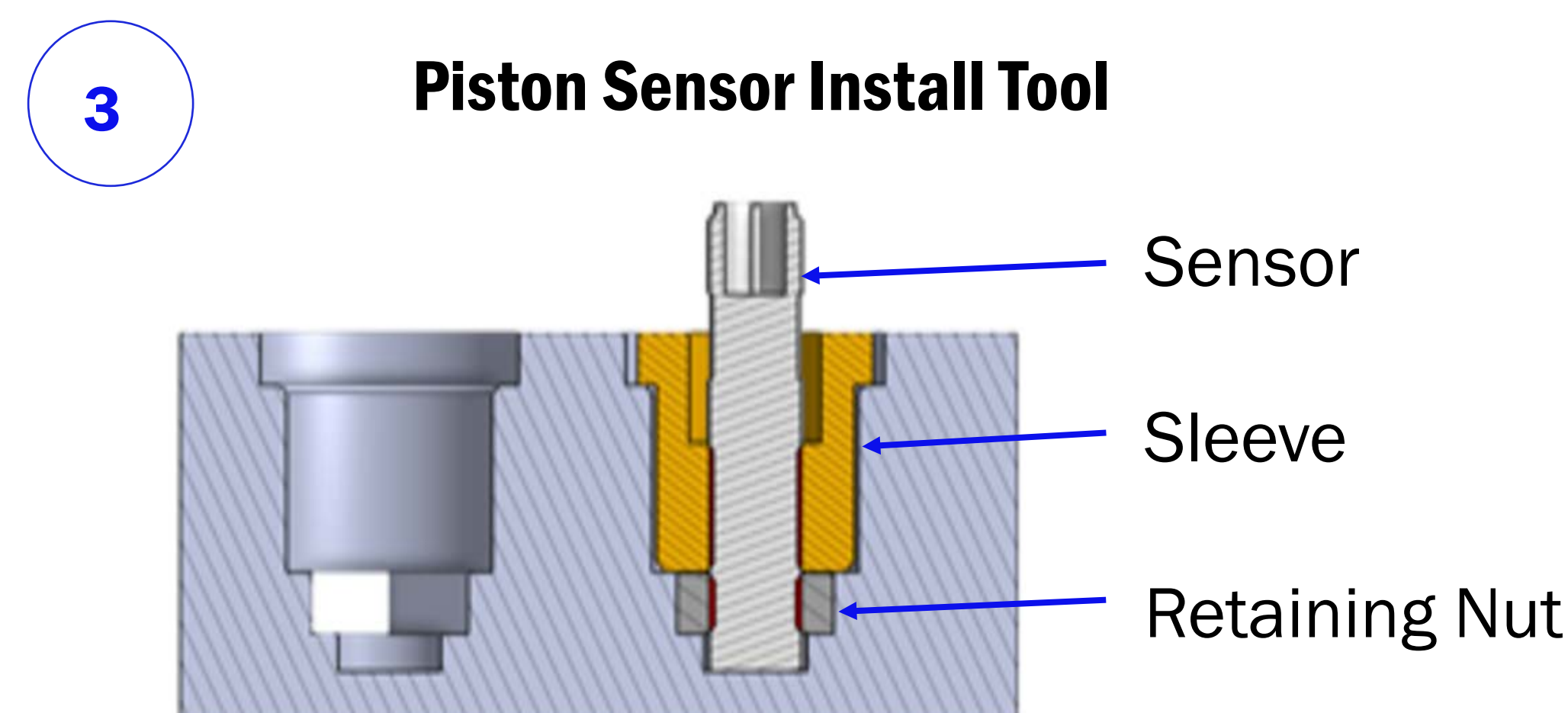
DC 360° Rotational ability for ease of assembly

TM Test block to ensure that block rotates 360°

DC All in one test and build stand
TM Pressurizing the pistons after they are fully assembled



DC Instillation tool for prevention of O-ring damage during assembly
TM Tracking the number of damaged O-rings



DC Instillation of piston sensors
TM Tracking the number of damaged piston sensors

Results

Results

1. The block will perform the required building and pressurizing for testing
2. No O-rings have been damaged since addition to assembly process
3. No sensor have been damaged since addition to the assembly process



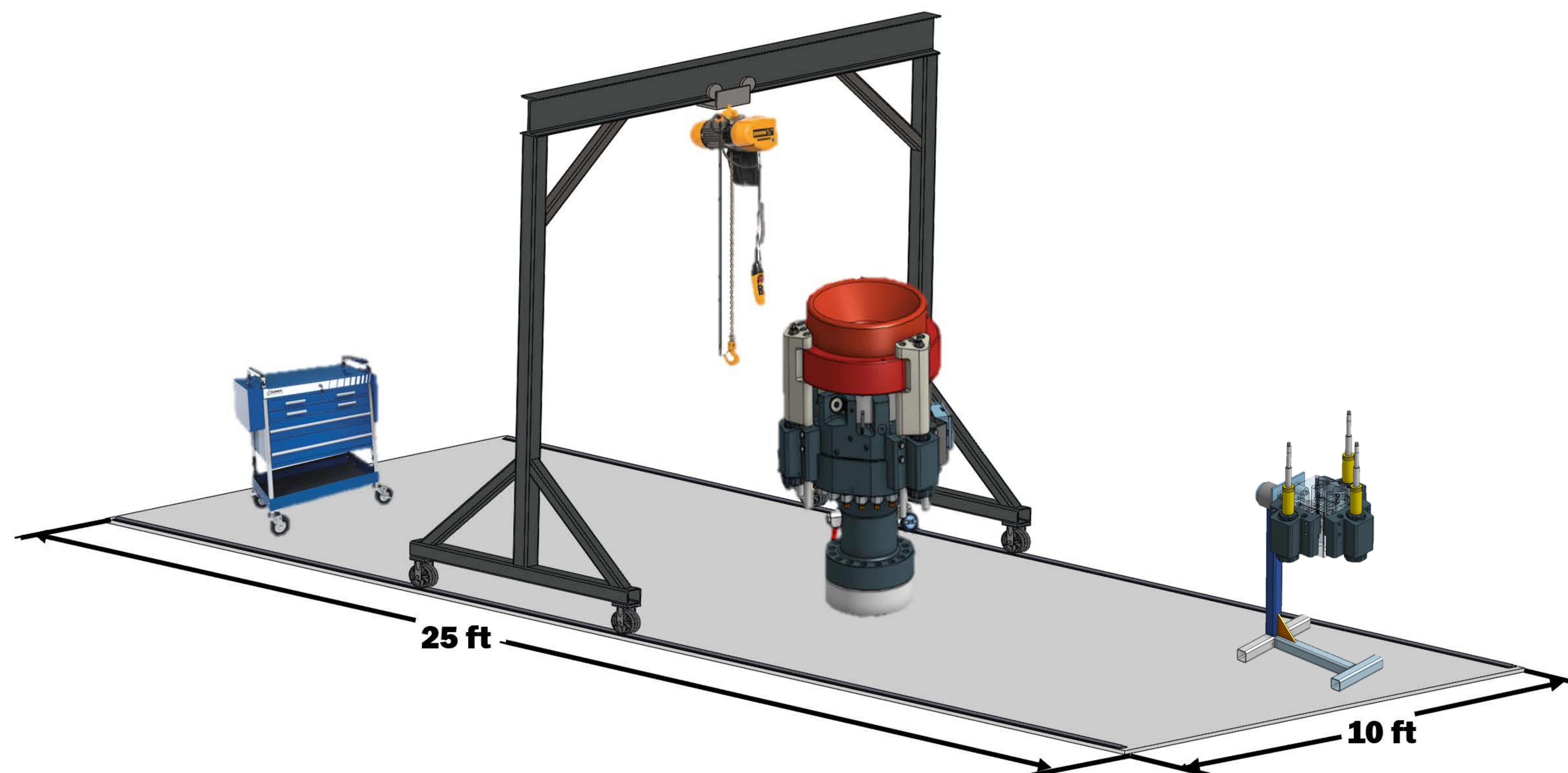
Conclusion

Reduce Assembly Time by 50%

Triple FracLock Monthly Production per Station

No Broken Sensor and O-rings w/ Install Tools

\$600,000 in Labor Savings for 4-years Contract for 4 stations



Part Name	Source	Cost
I-beam, W 6X9	Pacific-Steel, Grand Junction, CO	\$66
Square Tube, TS 2X2X1/8	Pacific-Steel, Grand Junction, CO	\$64
Square Tube, TS 3X3X1/8	Pacific-Steel, Grand Junction, CO	\$166
Grainger H4 Electric Chain Hoist	www.grainger.com	\$3,191
Strongway Electric Trolley, 2,200 lb. Capacity	www.northerntool.com	\$180
Stand, Automotive Engine, 1,250 lb. Capacity	www.grainger.com	\$228
V-groove Track, L 1.5X1.5X1/4	www.mcmaster.com	\$74
V-groove Casters, 800 lb. Capacity	www.mcmaster.com	\$176
Total		\$4,145