



The Roof Raiser

ME Senior Design Team 41 - The Roof Raisers - ESI

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Problem

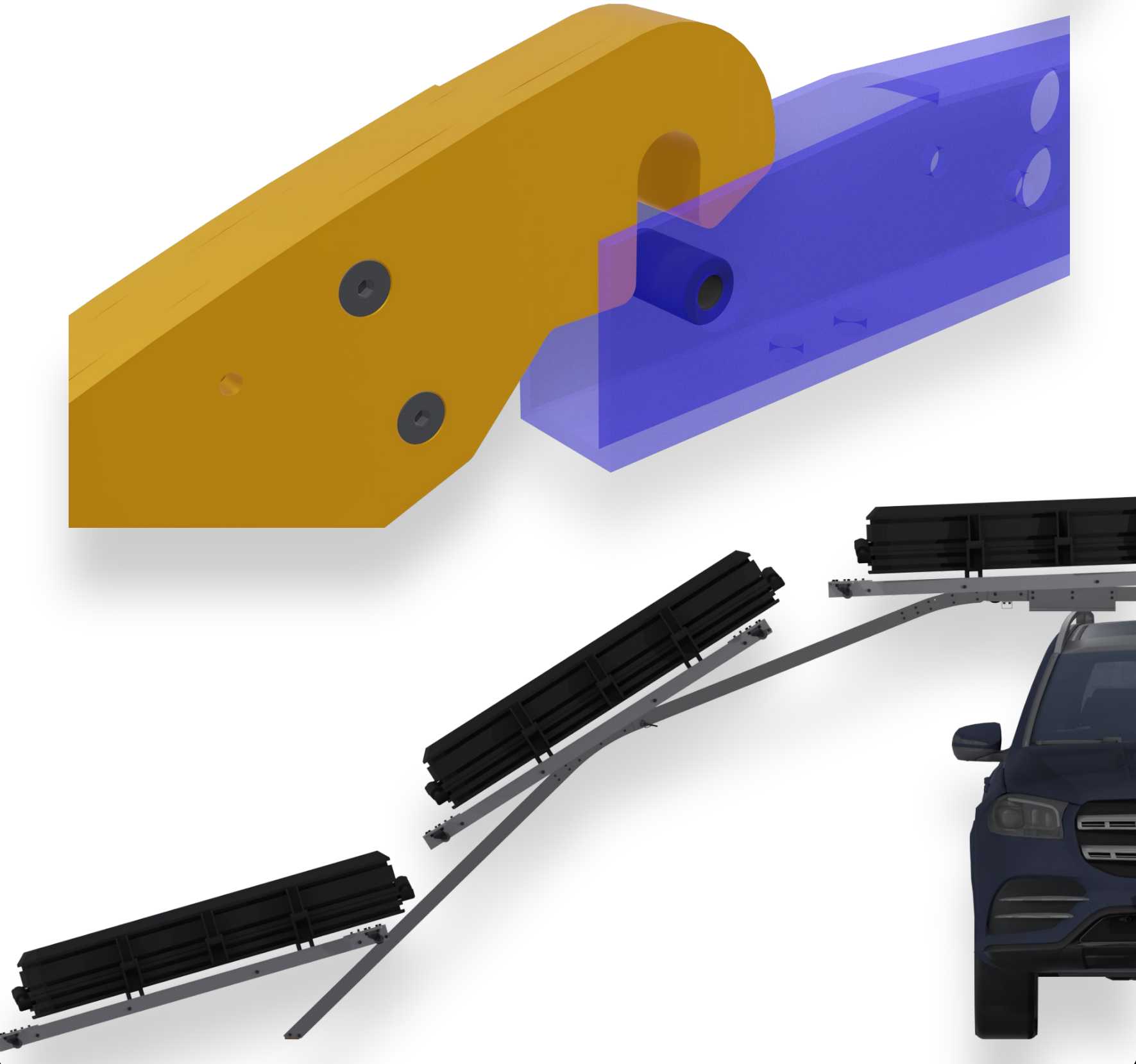
- Hard to lift & attach rooftop tents
- Large & bulky
 - Up to 300 pounds & 4' wide x 7' long
- Increases aerodynamic drag
- Switching accessories
 - Mounting accessories are tedious
- 4-5 people required

Solution

- The Roof Raiser
 - Allows for lifting tent from the ground to the roof
 - One person operation
 - Convenient, easy operation
 - Compatibility with all rooftop accessories
 - Powered by a hand drill

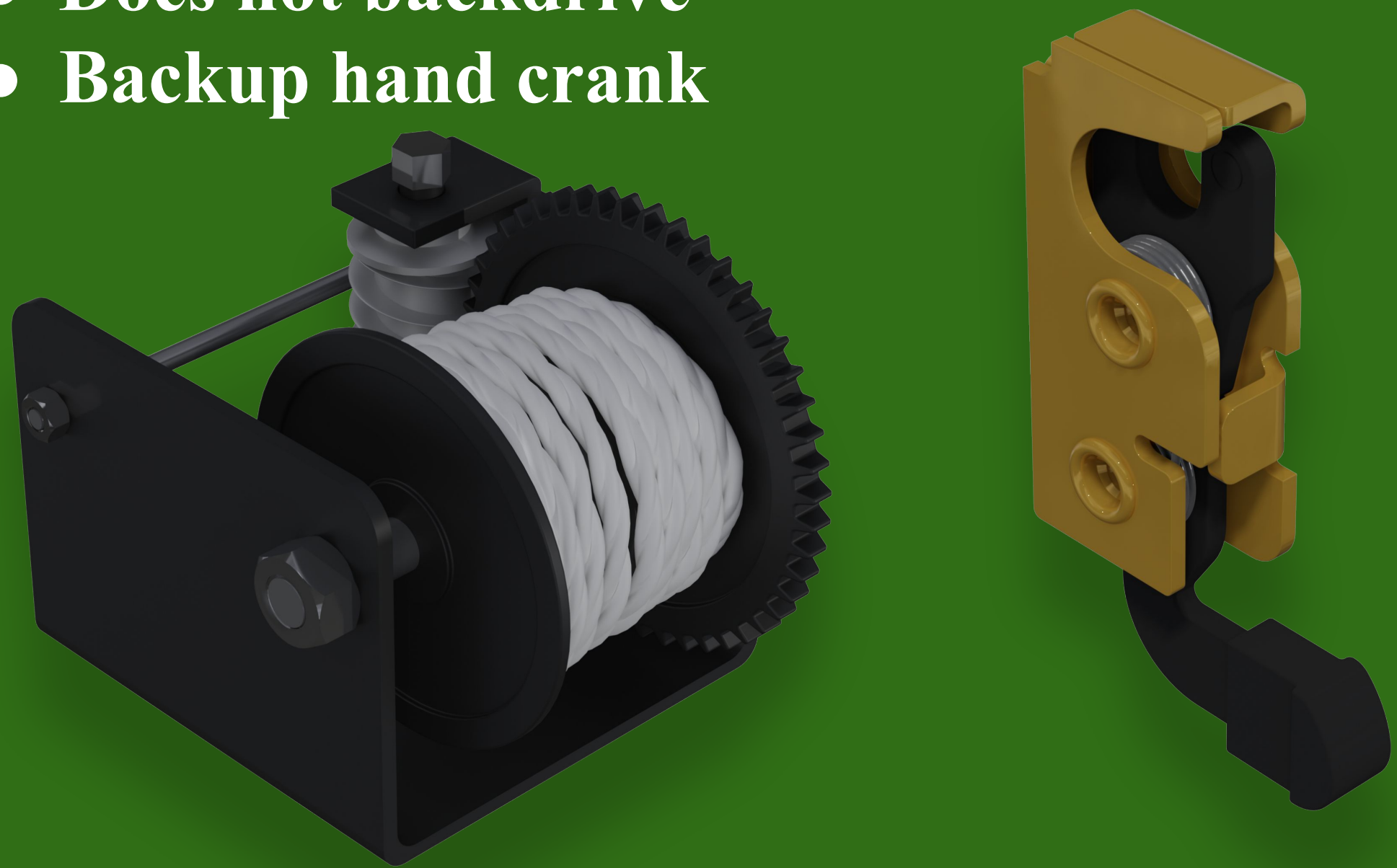
Ramps

- Useable on all different vehicle types & heights
- Rounded corners allow for easy transitions
- Each ramp removable & stowable
 - Separates into 2 pieces
 - Only 18 pounds



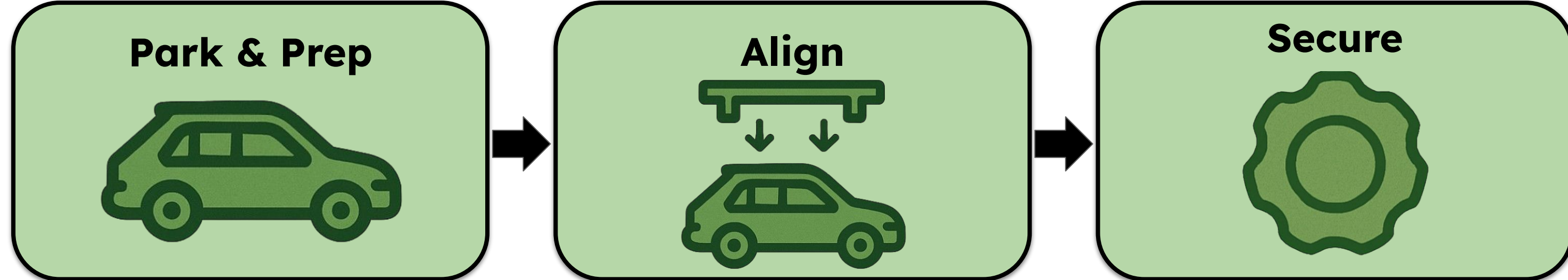
Winch & Latch

- Powered with drill
- Does not backdrive
- Backup hand crank

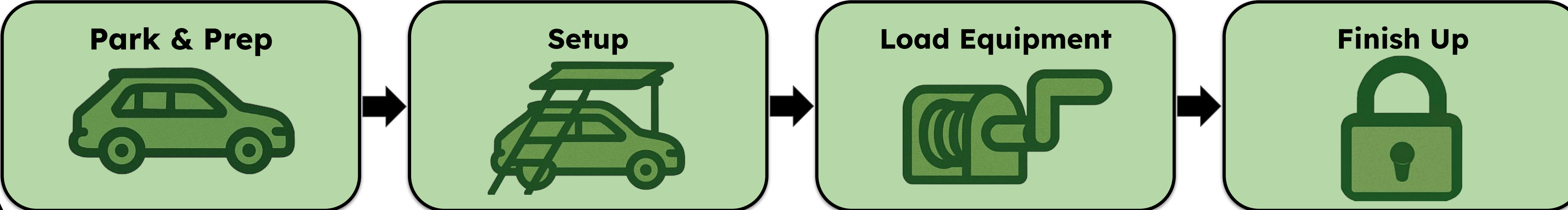


User Experience

One-Time Initial Installation (2 Person ~ 10 Minutes)

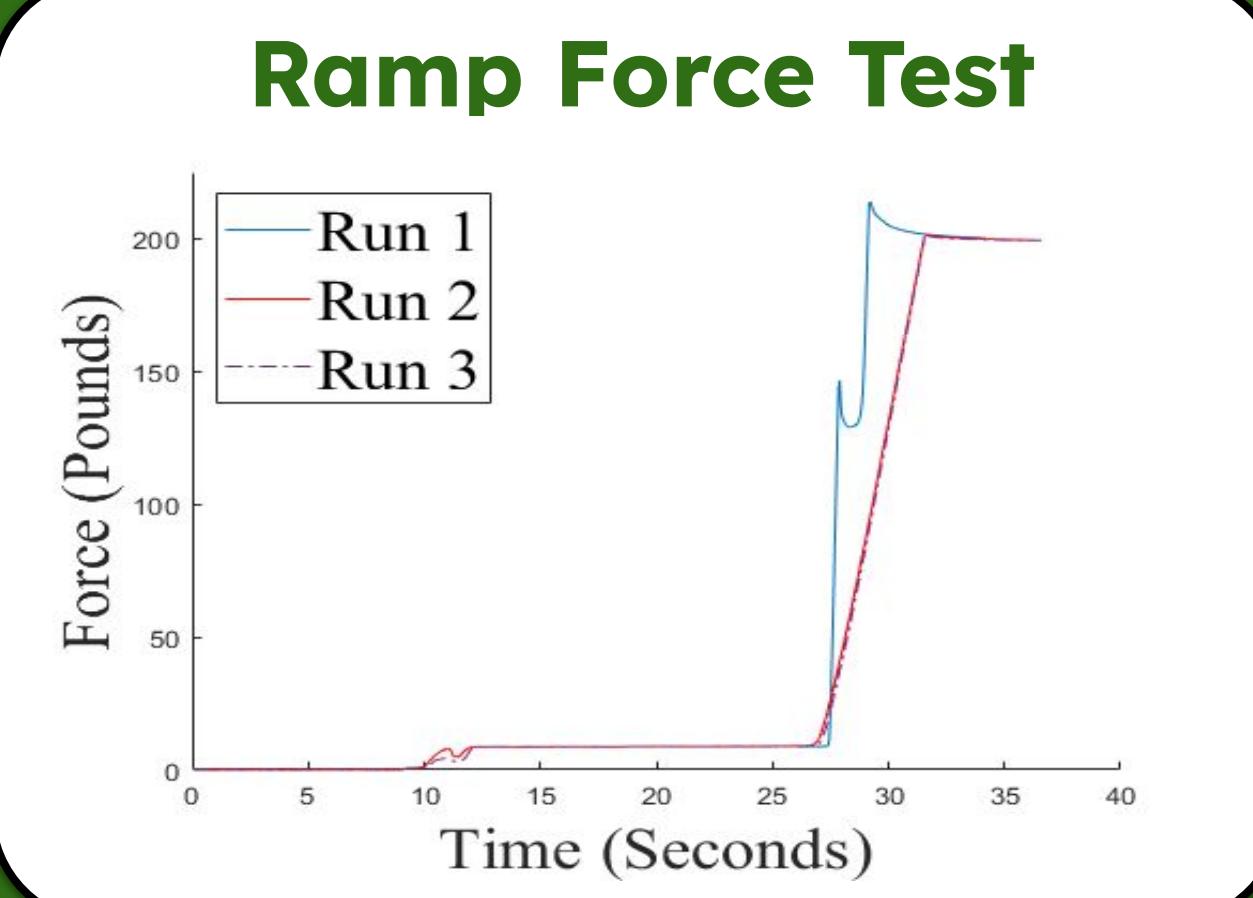


Typical Use (1 Person ~ 5 Minutes)



Testing & Specs

- Critical components tested to 400 lbs static loading
 - Hooks tested in Universal Testing Machine (UTM)
 - Ramps: 1.5" deflection
 - Platforms: 0.5" deflection
- On-vehicle system testing
 - Installation time: 10 min
 - Operation time: 5 min
 - Age range: 18 - 80
 - Height range: 4'11"-6'4"

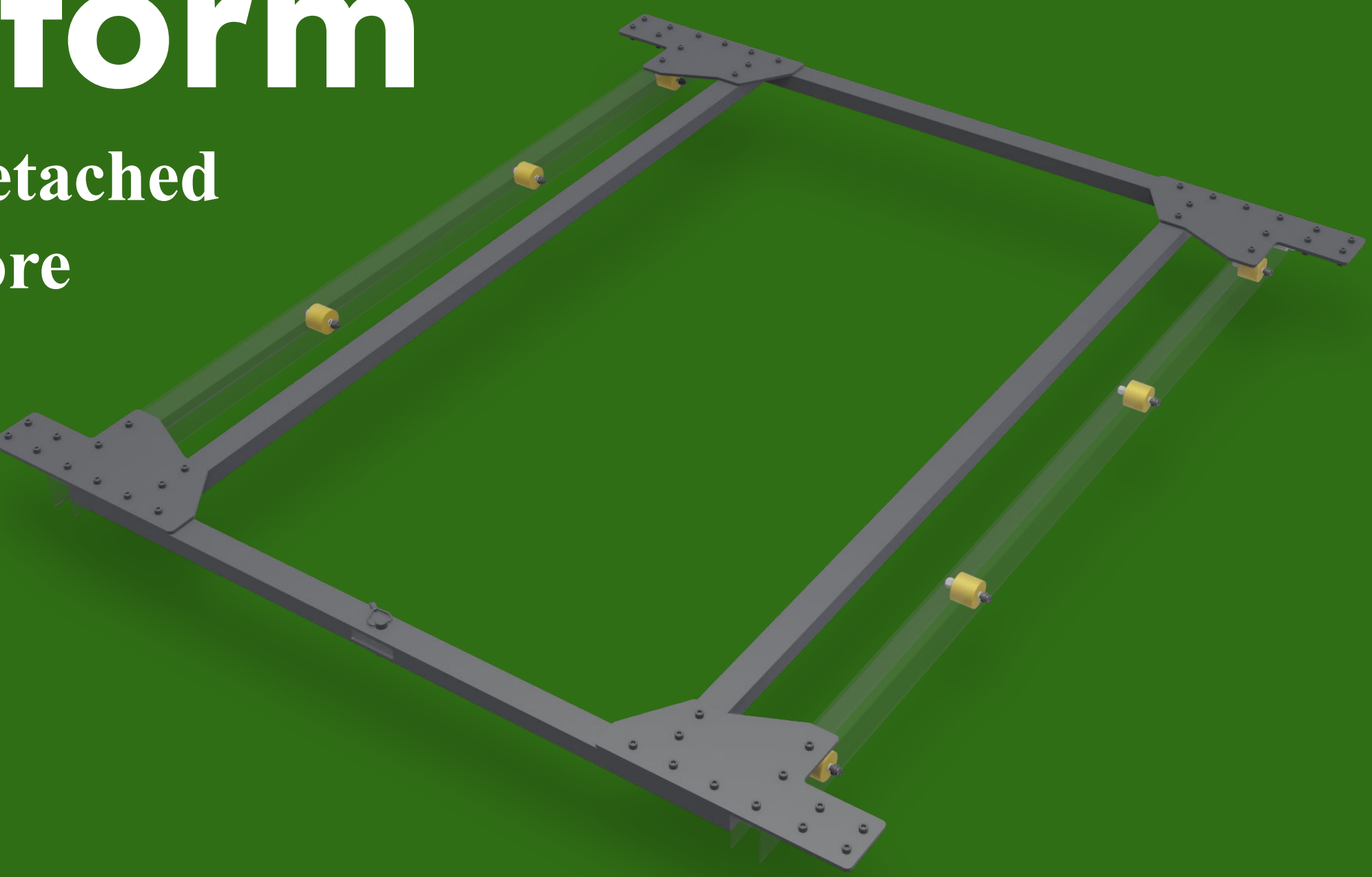


Specifications Table

Overall Weight: 80 lbs	48" W 64" L 8" H	2 Person Install
Load Capacity: 300 lbs	6061 Aluminum	1 Person Operation

Platform

- Has wheels to assist with rolling when detached
- Compatible with bike racks, tents, & more
- Easy to install accessories before lifting
- Permanently installed to accessories



Future Work

- Refine design
- Test to ISO 11154 Standard
- Larger design for vans & other large vehicles
- Market
 - Material cost at scale: \$1,000
 - Retail cost to customer: \$1,999
 - Market size: 500,000 Users
 - Units to break even: 400 Units