

1. Background



Importance of Certifications:

Safety: Passenger & Cargo Safety

Efficiency: Load/unload cargo quickly

Current Problems

Completion Time: 1-2 weeks

Manpower: Multiple Employees

Modernization: Outdated, Impractical Methods

2. Requirements



Decrease time

required to complete each certification step by **50%**



Allow a **single employee** to complete all certification steps



Modernize data collection for all steps in the certification process

3. Dimensioning System



Large-Scale Laser Calipers

Laser-based system:
Laser Levels
Laser Distance Meters (LDM)

Capabilities

Up to 20 ft horizontal
Up to 10 ft vertical

Mobility and Storage

Caster wheels for ease of traversal
Toolless disassembly for storage

Accuracy Requirement
 ± 0.125 in. per 6 ft.

Testing
30 trials
99% confidence interval
 ± 0.111 in. per 6 feet

4. Weight Simulation System



Automated Distribution

User inputs desired weight,
system runs until desired weight is transported

IP67 Electronics Housing

Submersion test certified to ensure extreme cases of water do not impact electronics

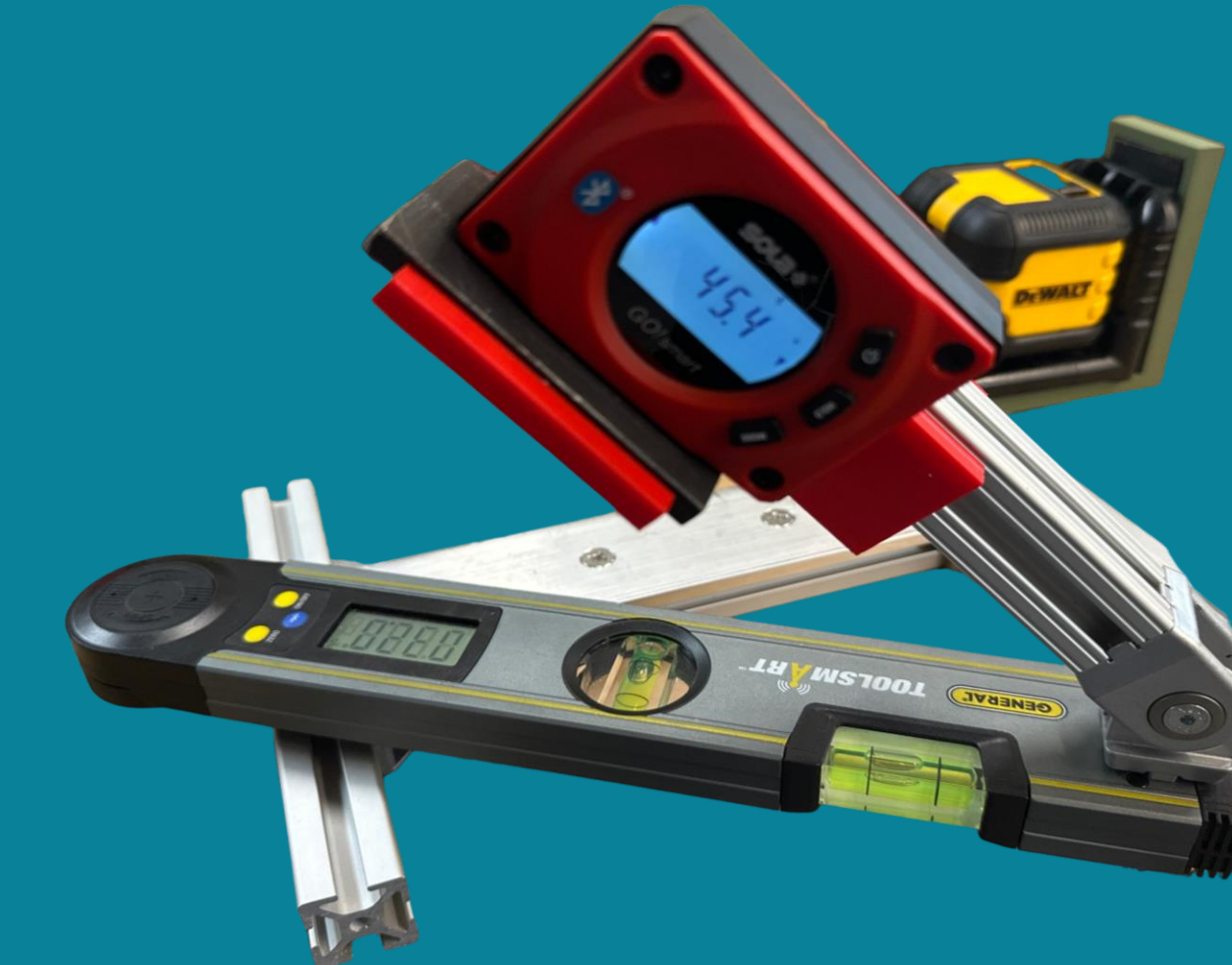
Modular Water Containers

Off-the shelf, standardized containers for loading water
Easy placement on vehicles

Accuracy Requirement:
 ± 0.5 lbs. per 25 lbs.

Testing:
148 trials
99% confidence interval
 ± 0.35 lbs. per 25 lbs.

5. Tiedown Measuring Tool



Two Measurements Required:

Measures vertical and horizontal angles to calculate effectiveness

Digital Tools:

Angle measuring device in horizontal and vertical planes up to 0.1° readouts

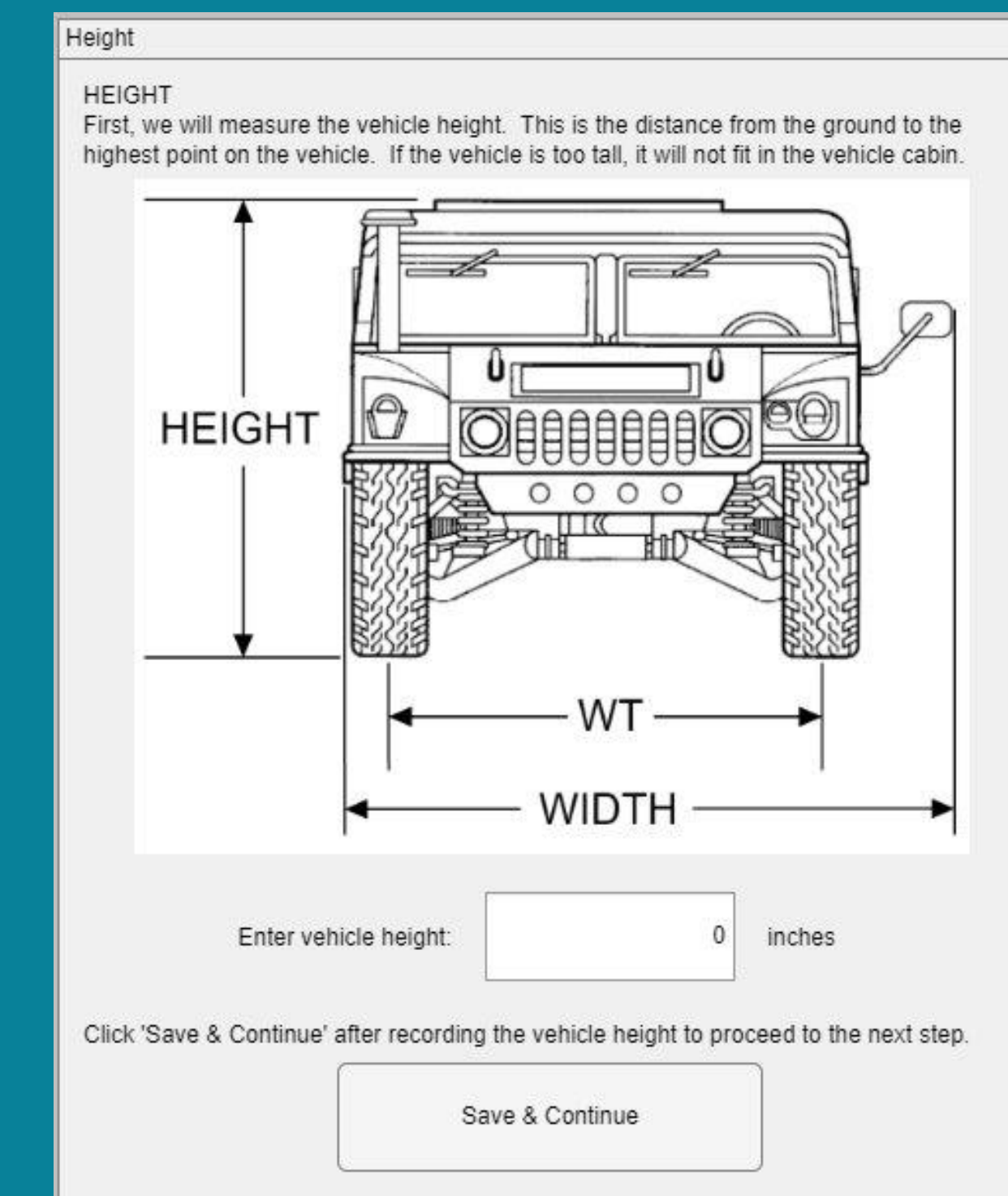
Tiedown Companion App:

User inputs vertical and horizontal angle
App outputs tiedown effectiveness

Accuracy Requirement:
 $\pm 1^\circ$

Testing:
41 trials
99% confidence interval
 $\pm 1^\circ$ vertical & horizontal

6. Procedural Application



Guided Instructions:

Step-by-step walkthrough of all dimensioning steps

Automatic Excel Output

Measurements input, application outputs pass/fail results

Simultaneous Certification

Single vehicle checked against all available aircraft parameters

7. Conclusions

Requirements Met?

Time: -66.7%

Single Employee: Y

Modernized: Y

Future Work:

Full Automation

Motorized dimensioning
Bluetooth capabilities

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