

# OHV Van Lift Bed

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## Project Description

Off Highway Van (OHV) is a luxury van-life company that builds custom interiors for the Mercedes Sprinter van.

Our objective is to create a permanent bed system in a camper van that can be lowered into a comfortable position, and then raised to the ceiling when not in use.



Figure 1: Example OHV van

## Design



Figure 2: Assembled wall carriage subsystem

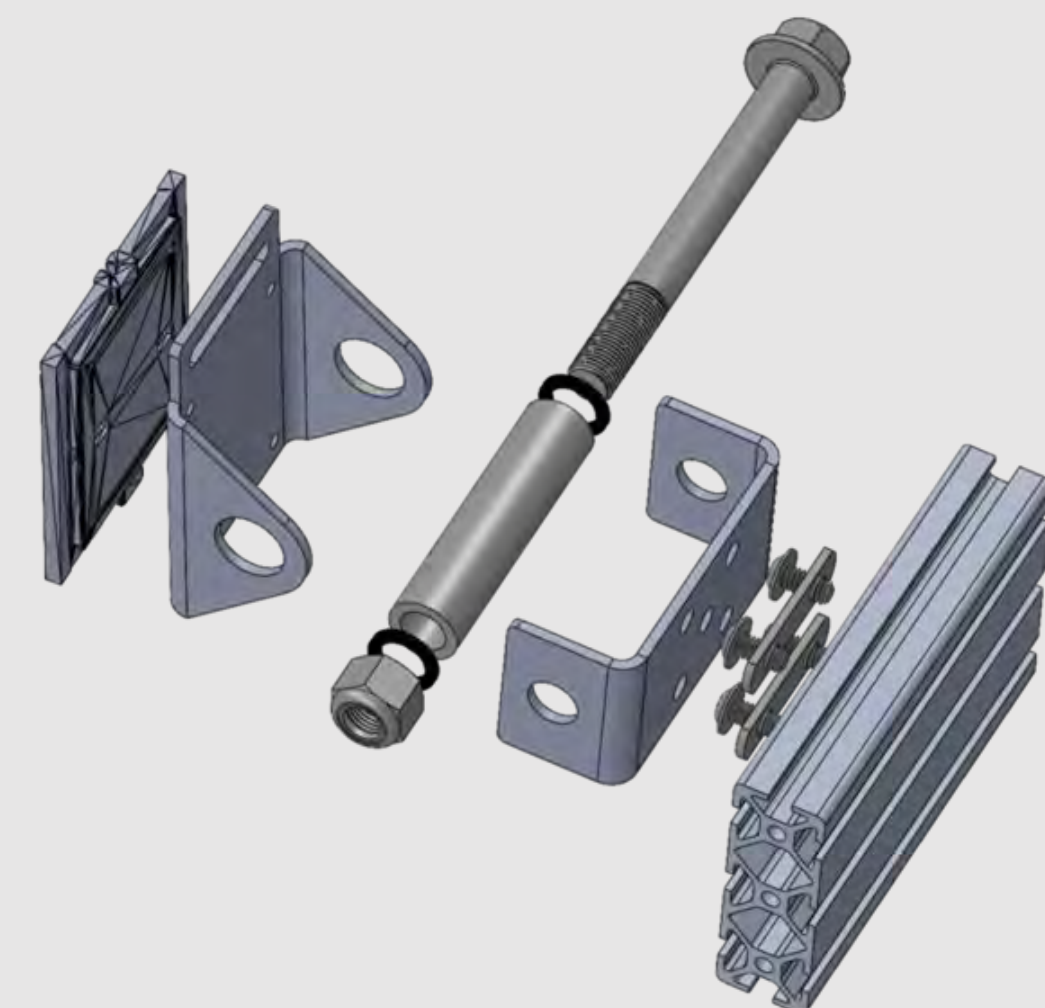


Figure 3: Wall carriage subsystem in exploded view

- The frame is connected to the wall carriages on both sides with a bolt and bracket assembly.
- The pivoting bracket accounts for the curvature of the van walls.



Figure 4: Retracting arms attached to the frame that adjust for van wall curvature

- A 3/4" DOM steel tube attaches the frame to the wall carriage via a pivoting gas shock.
- The arms are supported by custom machined linear pillow blocks bolted to the frame itself.
- The gas spring keeps the bed from rocking or rattling and provides the required stroke length to match the width of the van at different heights.

## Overview

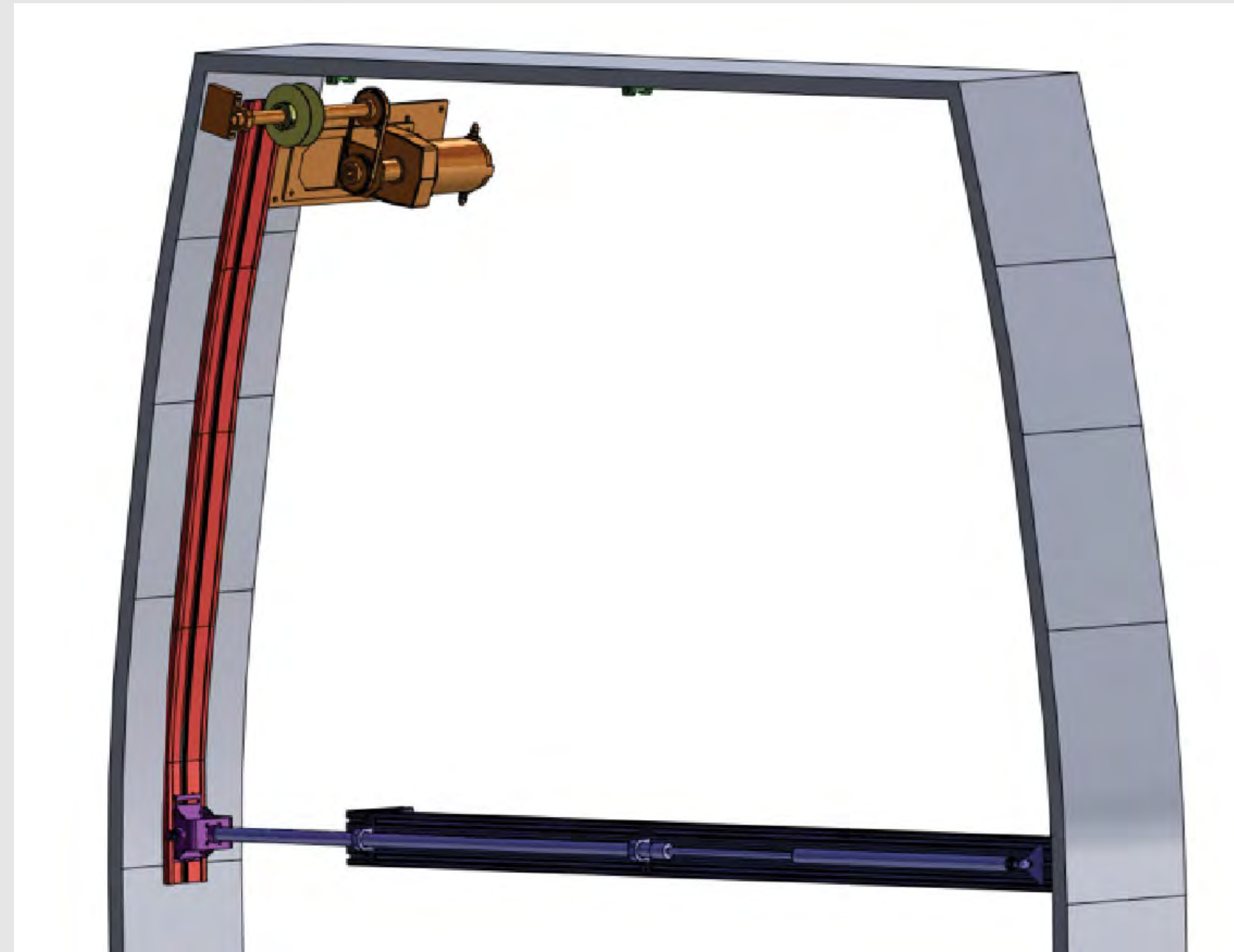


Figure 5: Lift bed assembly represented in a CAD model with each subsystem in a different color and labeled. The IGUS Rail system is shown in red, the Drive System in orange, the Strap Spool in yellow, the Strap Guides in green, the Frame Slice with Arm in blue, and the Wall Carriages in violet.

The lift bed is lifted by a motor mounted in the upper corner of the van. This motor pulls straps that are guided into rail system that conceal the straps and avoid any pinch points leading to safety concerns. Due to the curvature of the van walls, the bed frame needed to be able to adjust its width as it slides up the rails. Another design consideration was that OHV wanted the bed to be sleek, without any loose ends and minimal visible parts.

## Analysis

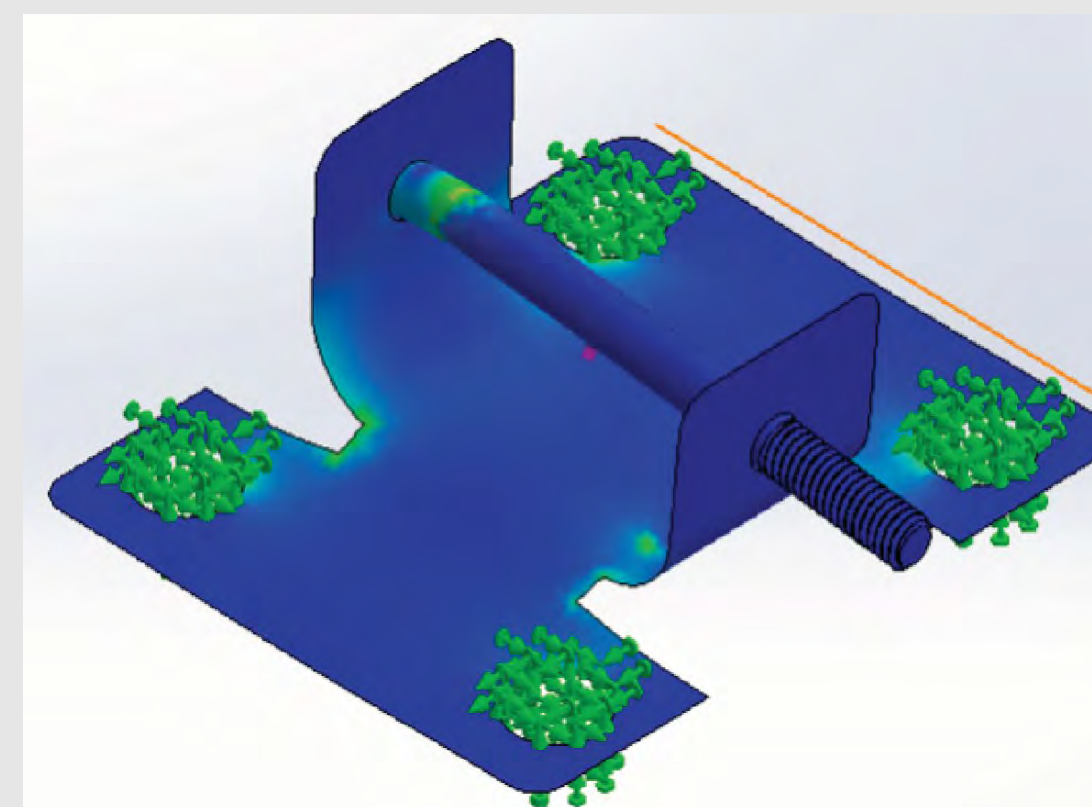


Figure 8: Finite Element Analysis of a bracket supporting the strap

The brackets attached to the wall carriage which guide the straps along the van walls were simulated in Finite Element Analysis software to verify they were strong enough for the weight capacity requirements. Further testing will be done by OHV.

## Results



Figure 6: Lift bed frame attached to wall with spooling system

Metric #	Metric	Value
1	Space under bed frame	150ft <sup>3</sup>
2	Weight capacity	200lb (Lifting) 600lb (Stationary)
3	Vertical range of the bed	32" - 67" above floor
4	Bed dimensions	55"x 72"
5	Voltage/Amperage	12V/60A
6	Lift time	60s

Figure 7: Project specifications guided by OHV

## Conclusion

The van lift bed was designed, manufactured, and assembled into one of OHV's vans. The lift bed is capable of meeting all requirements specified by OHV (Figure 5) and additionally manages to look sleek and visually clean as almost all of the components can be hidden.

After passing the prototype to OHV there is further testing to be done. User and safety testing will be the next step into integrating the lift bed into a van before it can be sold as a product. Further aesthetic measures will be taken by OHV to make sure the prototype matches the company's luxury look.