

Modular Utility Rack and Accessory Line

Ian Thomas

California Polytechnic State University

San Luis Obispo, California

There is a large gap in the market for heavy duty work racks for fleet vehicles. Modular racks have recently been introduced to the industry allowing contractors the ability to customize them to their needs. However, all customizable racks are limited to lightweight applications. The high strength steel rack I have designed is both modular, and sturdy enough to handle up to an estimated one thousand pounds. On our website, contractors will be able to scroll through the available attachments for his make and model rack and view them built on to his vehicle in 3D computer generated graphics.

Key Words: Utility Rack, Fleet Vehicles, Modular, Storage, Lumber

Introduction

This project came about through my passion for metal fabrication and desire to bring a new and innovative truck rack into the construction industry. I spoke to a local business owner of *Hendrix Construction* about funding the project and keeping the prototype for use in his business when completed and he loved the idea. I then drew up plans for a modular work rack that would fit on all current F-series Ford trucks along with a few modular accessories that would be available for easy addition to each rack after initially purchased. He chose the accessories that his company truck would benefit from and the project materialized!

Method

After drawing up the final large sized plans and having them approved by John (owner of Hendrix Construction), I created a materials list and started placing orders. I had *B & B Steel and Supply* in Santa Maria ship the metal I required to Cal Poly free of charge. After transporting the material to my home, I ordered all hardware required from *Fastenal* here in San Luis Obispo. Upon receiving all materials, I then began fabrication using the tooling I have acquired over the years building custom off road vehicles and motorcycles. The main tools used were as follows:

- 180 MIG welder
- 9" angle grinder
- 4 1/2" angle grinder
- Corded drill
- Impact drill
- Jigsaw
- Bench grinder
- Air Compressor
- Pneumatic die grinder
- Nutsert Tool
- Measuring and marking tools

John was kind enough to lend me the truck for a weekend to build the basic frame of the rack into the vehicle. Once everything was sized and tack welded I returned the truck. Over the next month I fabricated the remainder of the base model rack and the accessories John chose. The accessories built are as follows:

- Mid length spreader bar for shorter material
- Truck bed/reverse lighting
- Brake lighting
- Load tie down points
- Window protection bars

After completion of the rack and accessories, John lent me the truck once again for final fitment. Following completion of my responsibilities, John handed the rack over to a friend of his for professional sandblasting and powder coating.

Results

What follows is the final deliverable before being handed back to John for finishes. As shown, I built the main frame from 2x4" angle iron, the crossbars from 2x2" mid-wall square tube, the spreaders from 1x2" mid-wall rectangle tube, and the window protection from 1" diameter round tube.



Discussion

While building the rack only two mistakes were made, one extra mounting hole was drilled (incorrect placement) and the light bezels were made from too thin of material causing them to warp during cooling after welding. The extra hole was corrected by filling it with weld material and I made a relief cut on each of the light bezels followed by patch welding. Even though all fabrication went as planned, after seeing the finished project there is one revision I would make to my design. I would make the entire rack 2" taller to accommodate for a over cab rack that would make hauling full length material possible without the risk of it scraping the roof of the cab when bending. Even though John doesn't have a need for this, it would be a great optional accessory for contractors looking to haul long material in a short bed truck.