

NTEA COMMERCIAL VEHICLE UPFITTING SUMMIT

Weight Analysis Fundamentals & Digital Tools for Smarter Upfitting

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Weight Fundamentals

Why do we need to do weight distribution calculations?

- **To meet customer application requirements**
- **To comply with Federal Motor Vehicle Safety Standards**
- **To comply with Federal/State/Municipal weight limits**

Weight Fundamentals

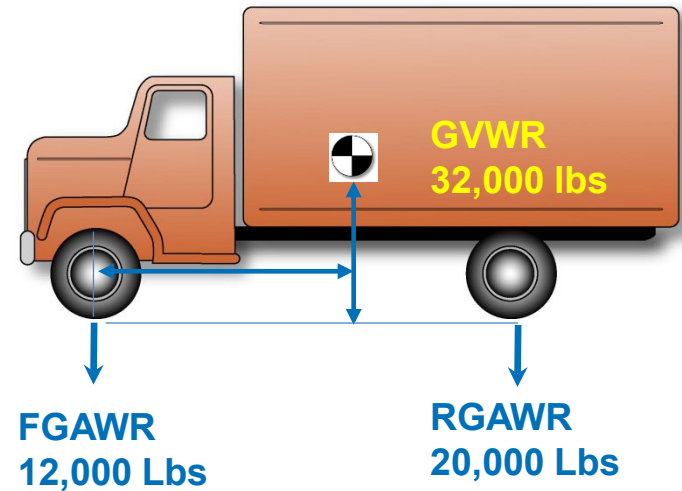
When should weight calculations be done?

- **As early as possible and ideally before a chassis is selected for the work truck application**
- **Start with the application and work backwards into the suitable chassis**

Weight Fundamentals

Actuals vs. Limits

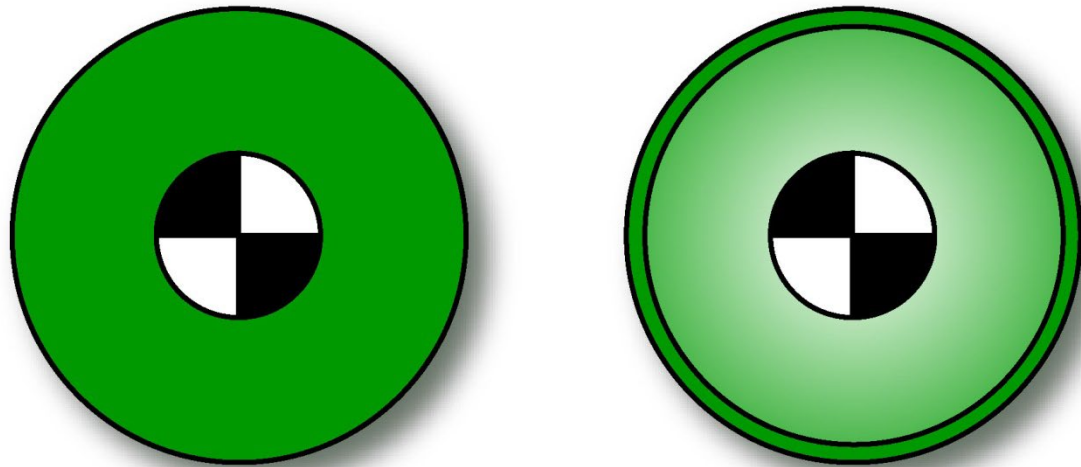
- Total loaded weight of vehicle vs. Gross Vehicle Weight Rating (GVWR)
- Actual weight on front and rear axles at the tires vs. Front and Rear Gross Axle Weight Rating (FGAWR & RGAWR)
- Location of Center of Gravity vs. OEM limitations for CG dimensional position (horizontal, vertical or lateral)
- Bridge Law



Key Concepts

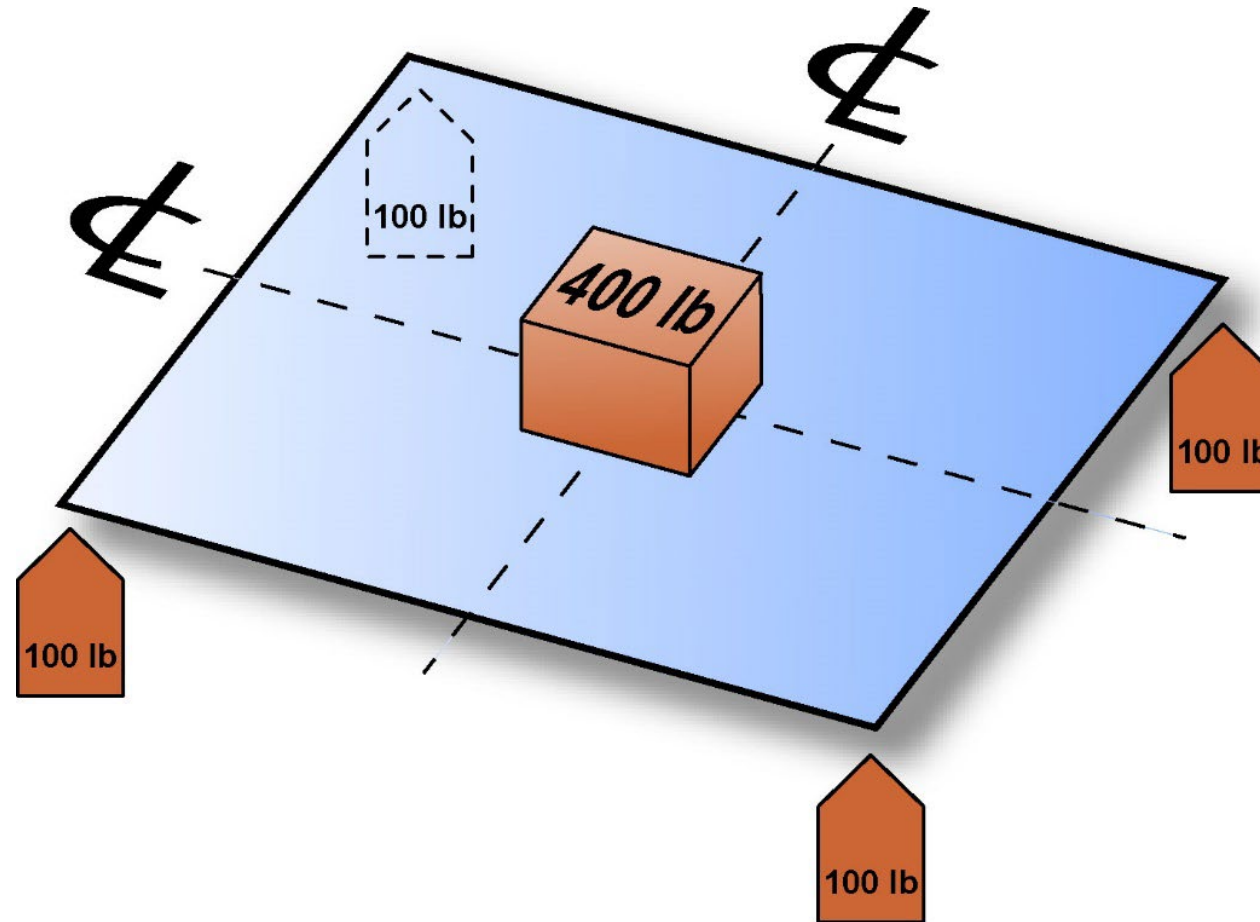
Center of Gravity

Being a point, means a 3-dimensional position, but not necessarily part of the physical object (e.g. hollow ball has same C.G. location at the center just as a solid one).



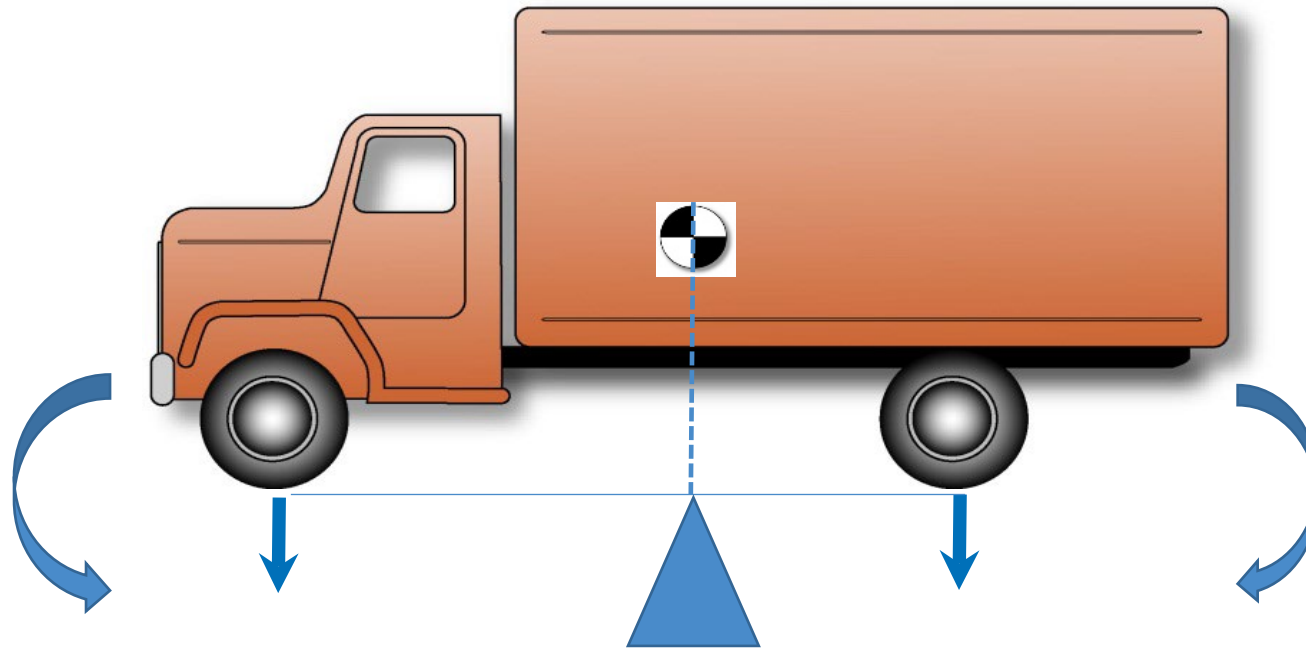
Key Concepts

Center of Gravity



Key Concepts

Center of Gravity

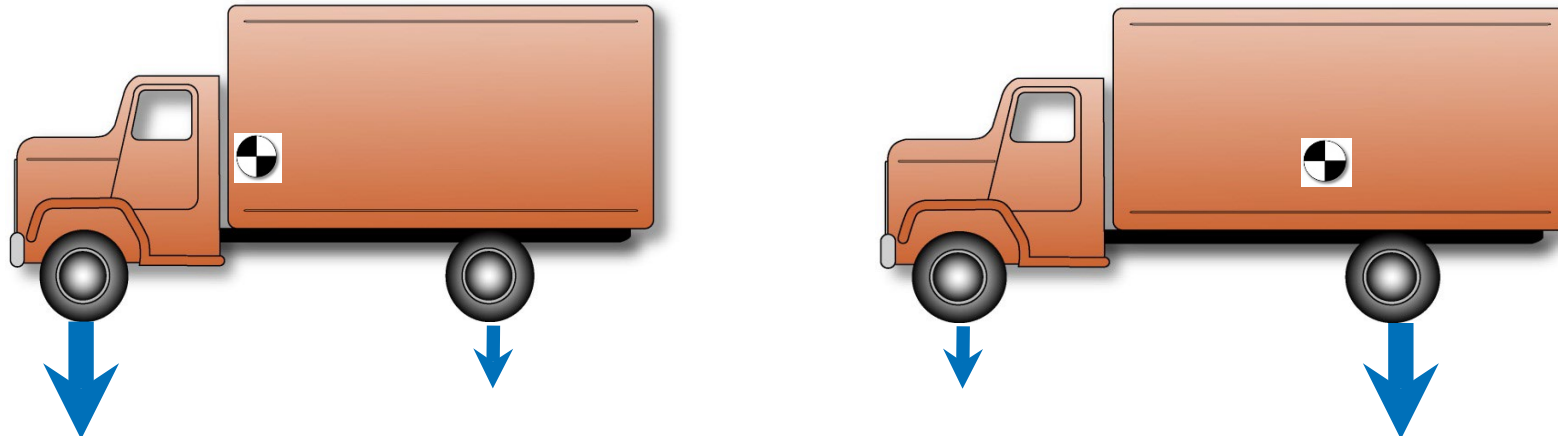


Key Concepts

Center of Gravity:

What do we know about it without doing math?

- Closer to the front or rear axle distributes more weight to that axle.
- Staying within axle ratings when loaded helps ensure proper front/rear distribution
- Ratio of GAWR to GVWR gives good distribution to shoot for with particular vehicle



Key Concepts

Center of Gravity:

What do we know about it without doing math?

- Vertically we want it as low as possible, and within limits set by Chassis OEM. However, longer wheelbase vehicles can have a higher limit set by OEM to aid in dynamic weight transfer to front axle during braking.
- Laterally, we want it as close to the centerline of the vehicle as possible. Too far one side or the other can exceed corner weight limits.

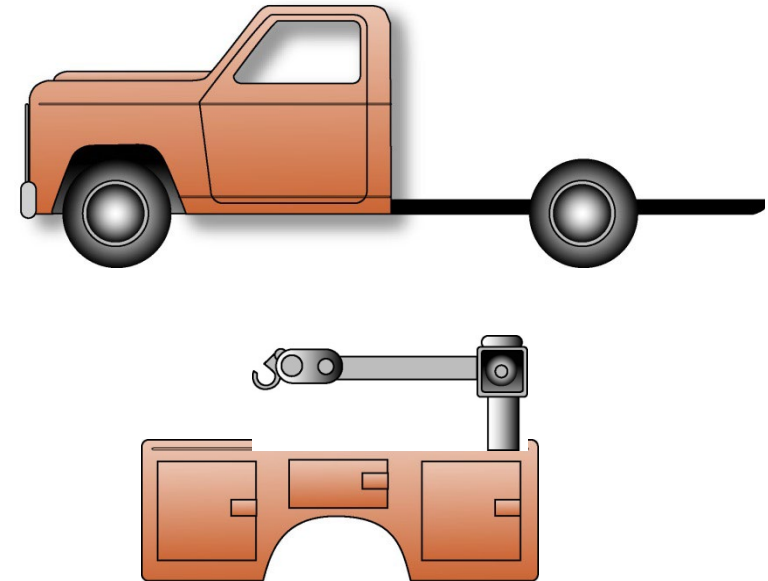
Why payload and equipment weights is the starting point

- The total weight of the vehicle is very important to not only the GVWR desired but also what other restrictions and limitations could influence your chassis choice.
 - Determine the bare weight of the body and permanent equipment
 - Determine payload need including passengers and their gear
 - Determine if you will use this vehicle for towing
- Compare to desired chassis size and the bare chassis curb weight with all options included.

Payload Analysis

Gather the 'chunks'

- Base curb weights, GVWR, GAWRS of chassis/completed vehicle
- Body weight
- Added Equipment Weights
- Don't forget the occupants!

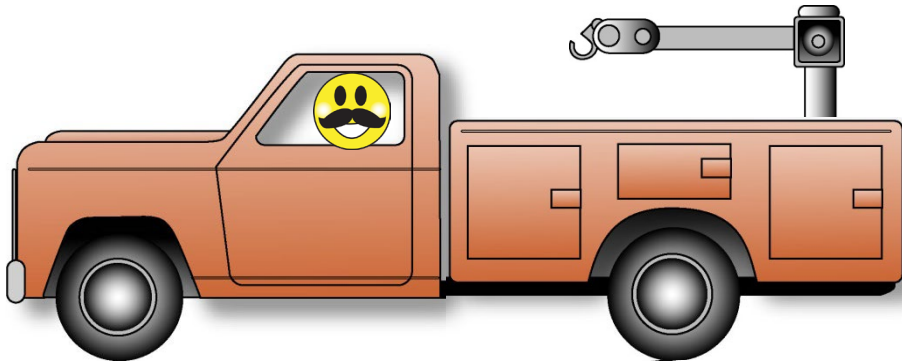


Payload Analysis

Body and Equipment

- Chassis Wt = 7,759 lb
- Service Body Wt = 3,490 lb
- Compressor Wt = 495 lb
- Crane Wt = 1,797 lb
- Stabilizer = 500 lb
6,237 lb

Payload Analysis



GVWR: 19,500 lbs.

Chassis: 7,759 lbs.

**Body, Crane,
Compressor &**

Outriggers: 6,237 lbs.

Occupants: 450 lbs.

(150lbs. x # of seats)

14,446 lbs.

Payload (Cargo) Capacity = 5,054 lbs.

If payload capacity is less than customer requirements or negative, do not proceed!

**NTEA COMMERCIAL VEHICLE
UPFITTING SUMMIT**

Welcome Martin

TruckScience

Axle Weight Calculator

NTEA COMMERCIAL VEHICLE
UPFITTING SUMMIT

Who is TruckScience?

- Developing truck spec'ing software since 2010
- Partnered with NTEA in 2019
- Empowering professionals to configure safe, legal and efficient trucks
- Used by 200+ NTEA members

Who uses our software?

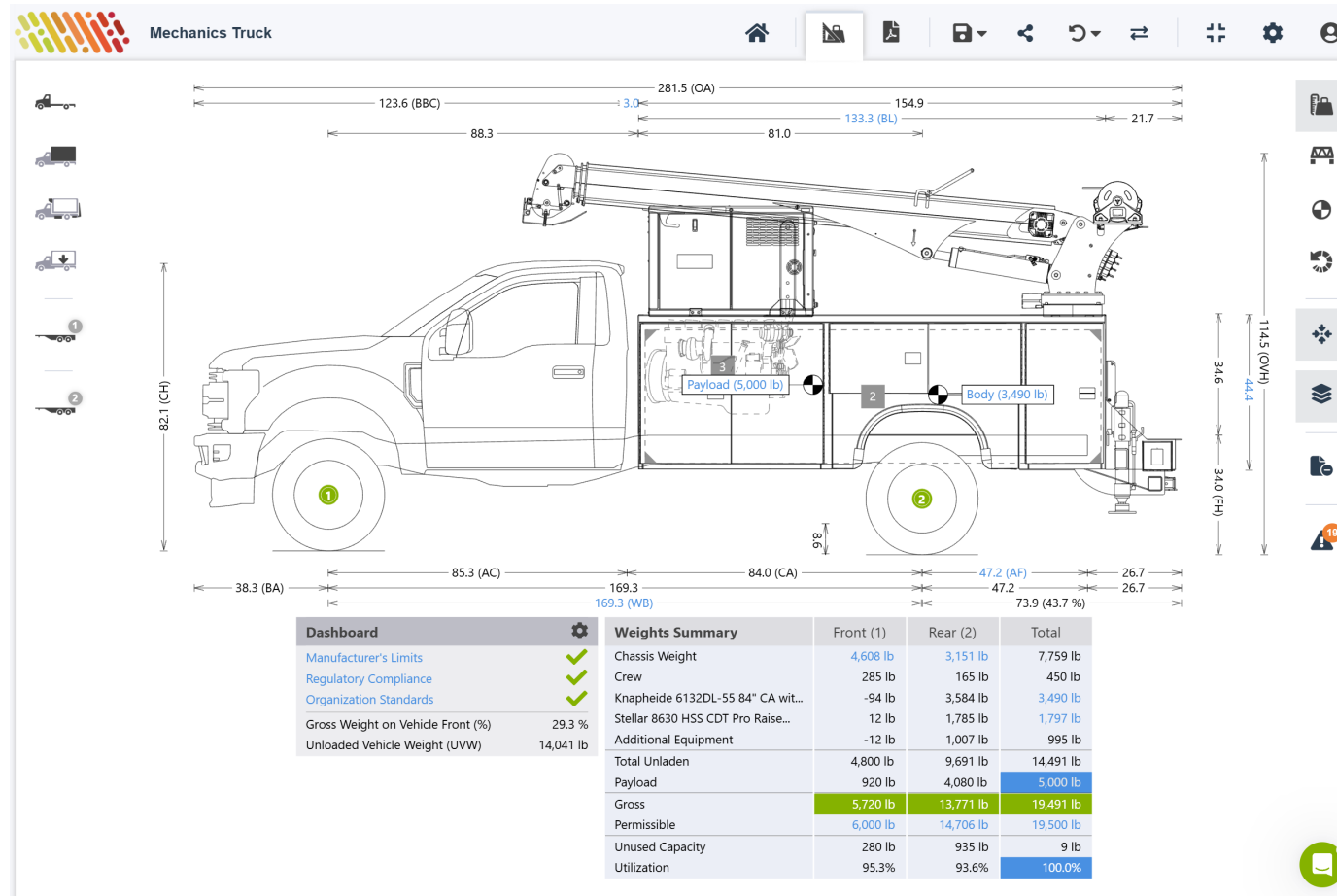
- Upfitters / Distributors
- Body & Equipment Manufacturers
- Fleets
- Chassis Vendors
- Chassis Manufacturers

Some of our NTEA customers



**NTEA COMMERCIAL VEHICLE
UPFITTING SUMMIT**

Live Demo



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- Visit truckscience.com

Questions

