

CMV Tire and Vehicle Stability Research



U.S. Department of Transportation
Federal Motor Carrier Safety Administration

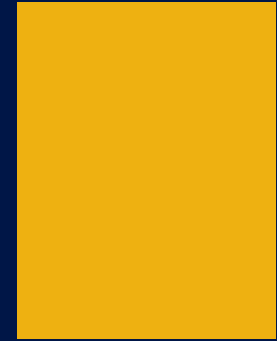
Lance Decker

Federal Motor Carrier Safety Administration

2024

SAFETY
RESEARCH
FORUM

VIRTUAL EVENT



CMV Tire and Stability Situation

- Tire Improvements across the board
- Still a problem
- Tires were the most common vehicle-related factors for large trucks in fatal crashes. (Large Truck and Bus Crash Facts 2017 – 2021)



<https://legalatlanta.com/blamingroad-debris-how-to-handle-a-car-accident-with-debris-as-the-culprit/>

CMV Tire and Stability Situation

- Heavy trucks disproportionately in fatal accidents¹
- Causes of rollovers²
- Rollovers are especially violent³
- Estimated costs⁴
 - \$148,279 for a non-injury crash
 - \$7.2M for a fatal injury crash



<https://iowacapitaldispatch.com/2023/02/22/senate-passes-trucking-company-liability-limits/>

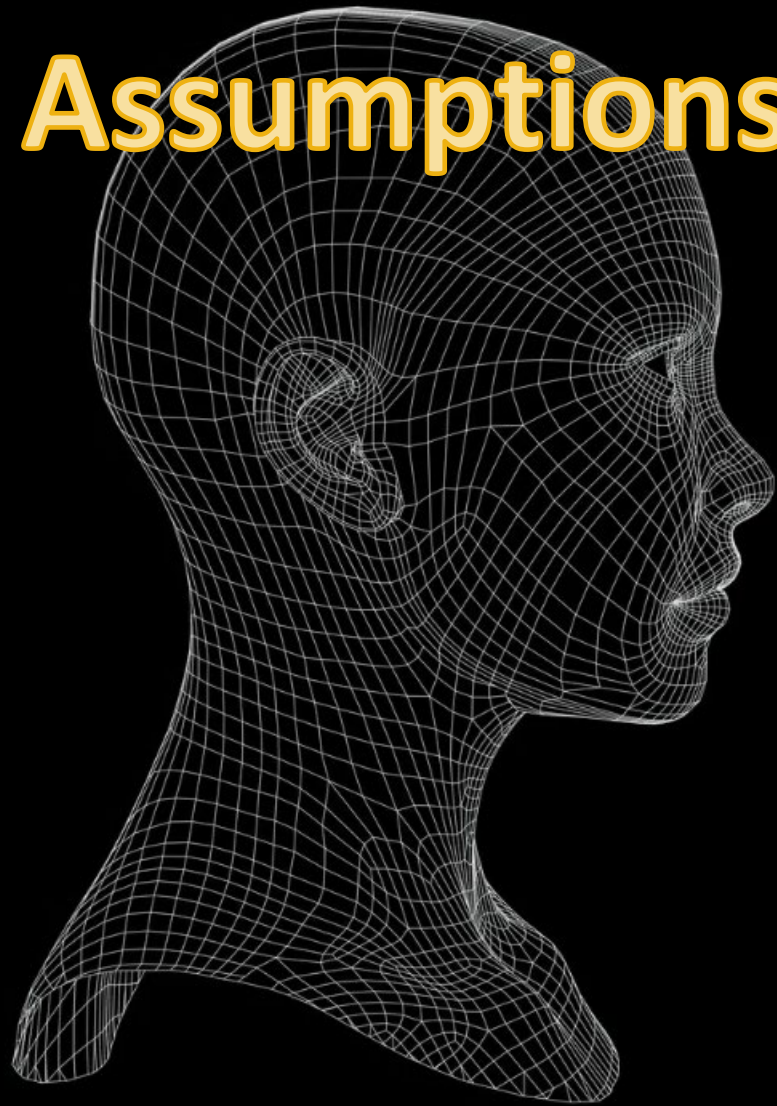
1 <https://www.fmcsa.dot.gov/ourroads/large-trucks-and-buses-numbers>

2 <https://www.fmcsa.dot.gov/research-and-analysis/research/large-truck-crash-causation-study>

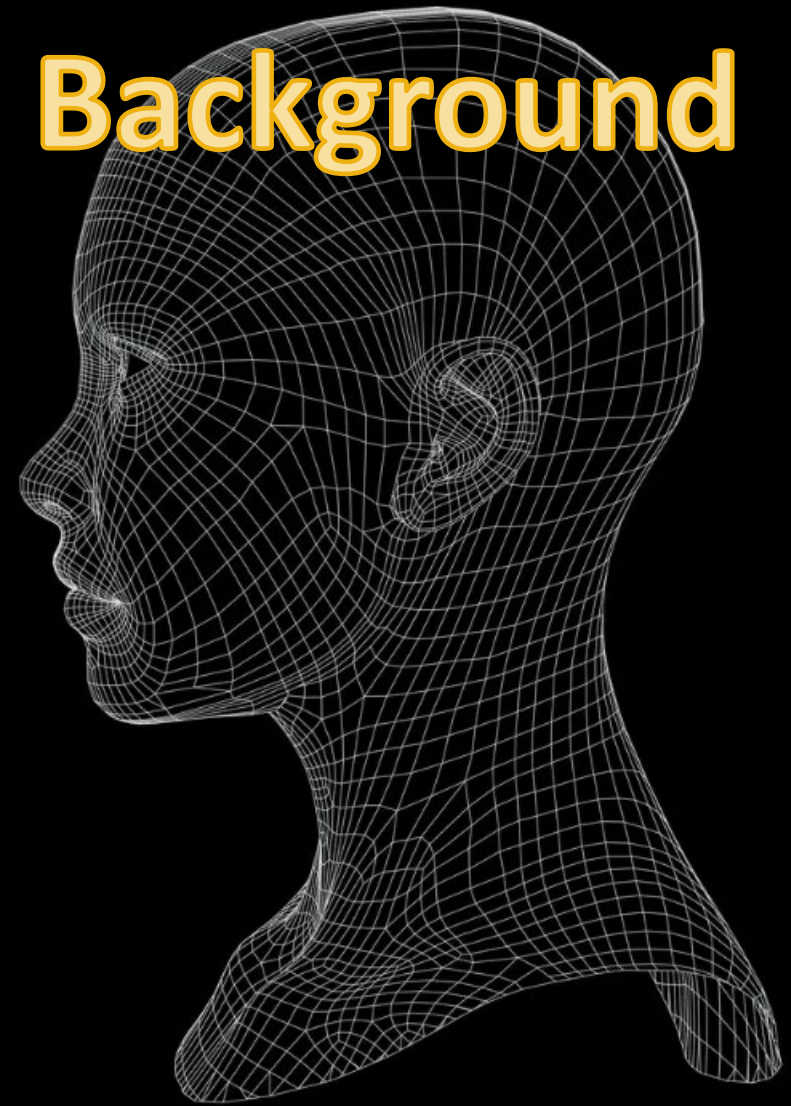
3 Winkler, Christopher .B., 1999, Rollover of Heavy Commercial Vehicles. Society of Automotive Engineers, Warrendale, PA, 1999

4 Four Ways GPS Tracking Cameras can Reduce the High Cost of a Truck Accident (<https://hdfleet.com/cost-of-a-truck-accident-to-a-company/>)

Assumptions



Background



Reasons to Study

- Lack of information on how tires are failing on CMVs
 - Not all failures are found in inspections & crash investigations.
 - Some are resolved without reporting.
- No comprehensive understanding of how weight is carried across tires.
 - Uneven weight distribution means the vehicle is less stable. Less stable CMVs are more apt to crash.
- Tire use and abuse may make tires unserviceable earlier than treadwear indicates. Some damage is not visible.

Why Now?

Intelligent Tire Technology is Emerging



Weight Scales





Research Questions

- What factors cause CMV tire failures under typical use patterns?
- How many CMV tire failures occur each year?
- Are trucks carrying loads that equally distribute weight across all tires?
- What impacts do periods of misuse/abuse have on tire life?
- What are the primary and secondary costs of tire failures?
- What contributing factors for tire failures have been missed/ignored?
- What emerging technologies can reduce tire failures?
- What vehicle changes can be recommended to improve safety?
- What is the environmental impact of small tire debris on highways?



Research Roadmap

1. MCMIS Data Analysis
2. Static weight distribution
3. Longitudinal Study
4. SBIR Project

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MCMIS Data Analysis – Flat/Low/Leaking by Position

Percentages (by table)

Axle	Location / Side						Grand Total
	I		NA		O		
	L	R	L	R	L	R	
1			0.21%	0.10%		0.10%	0.42%
2	4.69%	6.88%			2.71%	4.69%	18.96%
3	7.92%	9.38%			3.44%	6.25%	26.98%
4	8.13%	8.65%			3.96%	6.35%	27.08%
5	8.96%	7.08%			4.38%	6.15%	26.56%
Grand Total	29.69%	31.98%	0.21%	0.10%	14.48%	23.54%	100.00%

3 years of Violations random sampling of 21,365 records

Contact Information

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