



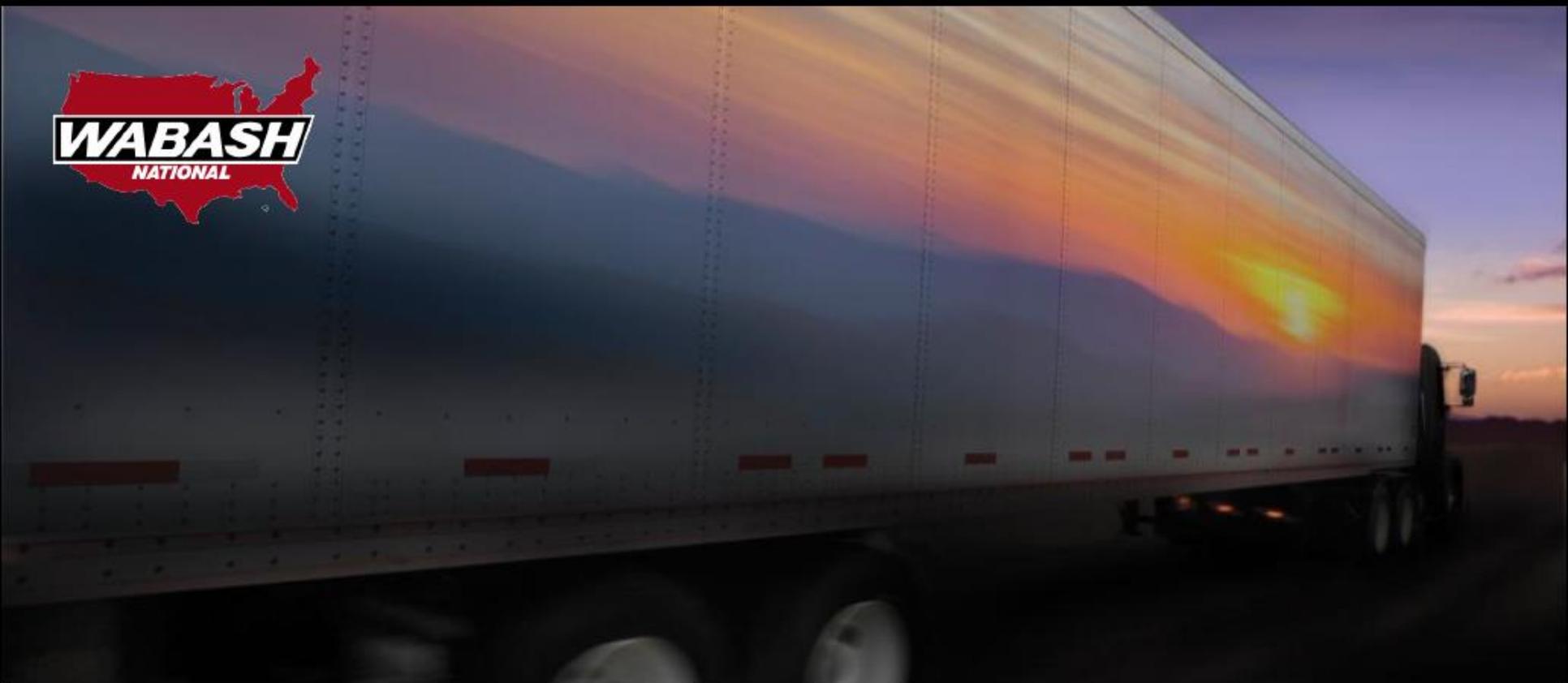
FUEL EFFICIENCY FOR TRAILERS

California Air Resource Board Symposium
Phase 2 Greenhouse Gas Emissions Standards for On-Road Heavy Duty Vehicles

22 April 2015

Gus Sumcad
Director Engineering

1. Introduction to Wabash National
2. Current State of Trailer Technologies
3. Next Generation of Trailer Fuel Efficient Technologies



INTRODUCTION TO WABASH NATIONAL

ABOUT WABASH NATIONAL CORPORATION

- Founded in 1985
- NYSE (WNC)
- 2014 Revenue: \$1.9B
- 6,000 Associates (full time & contract)
- 12 Manufacturing locations in 3 countries
- 18 Company-owned Retail Locations
- 2014 New Trailer shipments: 57,350



- #1 in Total Trailer production for 19 of past 25 years
- #1 in Dry Van Trailer production
- #1 Manufacturer of Liquid Tank Trailers
- #3 in Refrigerated Van Trailer production
- Top 3 in Platform Trailer production

Source: Trailer Body Builders Magazine



Innovative leader of transportation products



WABASH NATIONAL AERODYNAMICS PROGRAM

- Expertise: Dedicated team that designs and supports aero products
- Extensive Testing: Computer Simulation Modeling, Wind Tunnel Testing, Track Testing, Test Lab Durability Testing, and Road Testing
- Outreach: EPA, NHTSA, CARB, and other stakeholders



Expertise in trailer design, aerodynamics & fuel efficiency





**CURRENT TRAILER
FUEL EFFICIENT TECHNOLOGY**

Trucking Fleet Initiatives

- *Increased payload capacity*
- *Reduce weight*
- *Improve fuel efficiency*
- *Low total cost of ownership*
- Safety
- Extend lifecycle

Technology Initiatives

- *Improvements in Aerodynamics/Fuel Efficiency*
- *Development of High Strength and Lightweight Materials and Components*
- Improvements in Product Safety
- Corrosion-resistant Technologies

- fuel efficiency related

CURRENT FUEL EFFICIENCY TECHNOLOGY EXAMPLES



Trailer Mounted Gap Reducers
Saves 1-2%



Trailer Boat Tails
Saves 1-6%



Trailer Side Skirts
Saves 4-8%



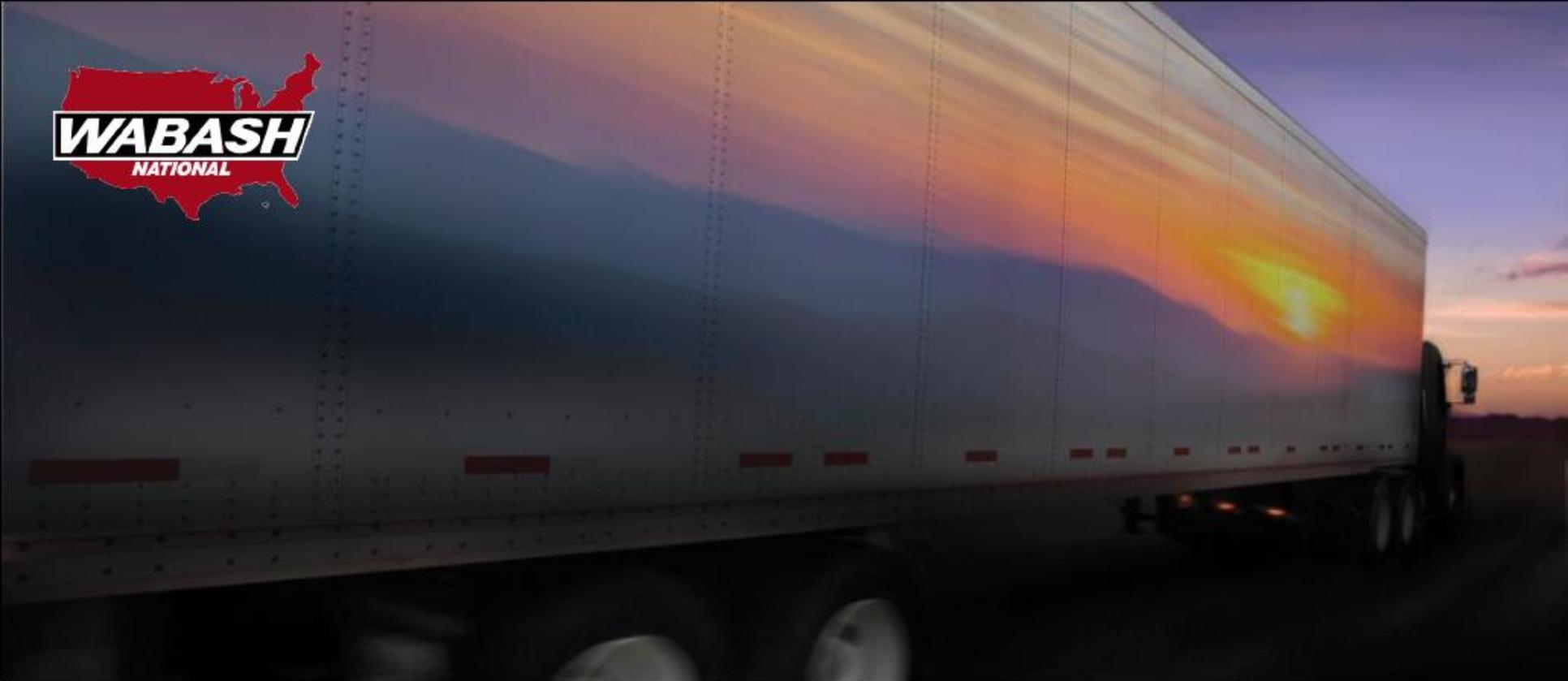
Low Rolling Resistance Tires
Saves 2-4%
(Duals and Wide Base)

Trailer Under Tray Systems
Saves 1-3%



Tire Inflation
Saves 1-2%

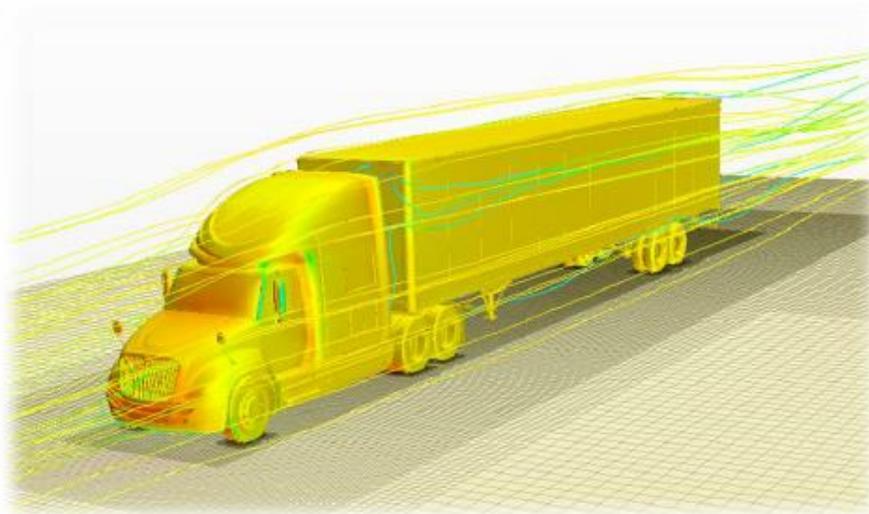




NEXT GENERATION OF TRAILER FUEL EFFICIENCY TECHNOLOGY

TRAILER AERODYNAMICS TECHNOLOGY CONSIDERATIONS

- Real World, Quantifiable Fuel Efficiency Benefits
- Cost Effective/ROI
- Safety and Durability
- No Interference with Normal Operations
- Effect on Freight Capacity (Freight Efficiency)



WABASH NATIONAL'S NEWEST PRODUCTS OFFERINGS



**DURAPLATE™
AEROSKIRT™**



**WABASH
AEROSKIRT CX™**

4-6% Improvement



**WABASH
VENTIXDRS™**
PATENT PENDING



**WABASH
AEROFIN™**
PATENT PENDING

SmartWay Elite Aerodynamic Technology Combination



> 9% Improvement



Multiple Fuel Savings options. Typical payback is 12-18 months.



WABASH NATIONAL NEW PRODUCT LAUNCH – VENTIX DRS & AEROFIN

TMC Show February 16-19, 2015 @ Music City Center, Nashville, Tennessee



From Concept to Reality: Providing practical & effective solutions to the market



WABASH NATIONAL LTL AEROSKIRTS – CURRENT PRODUCTION

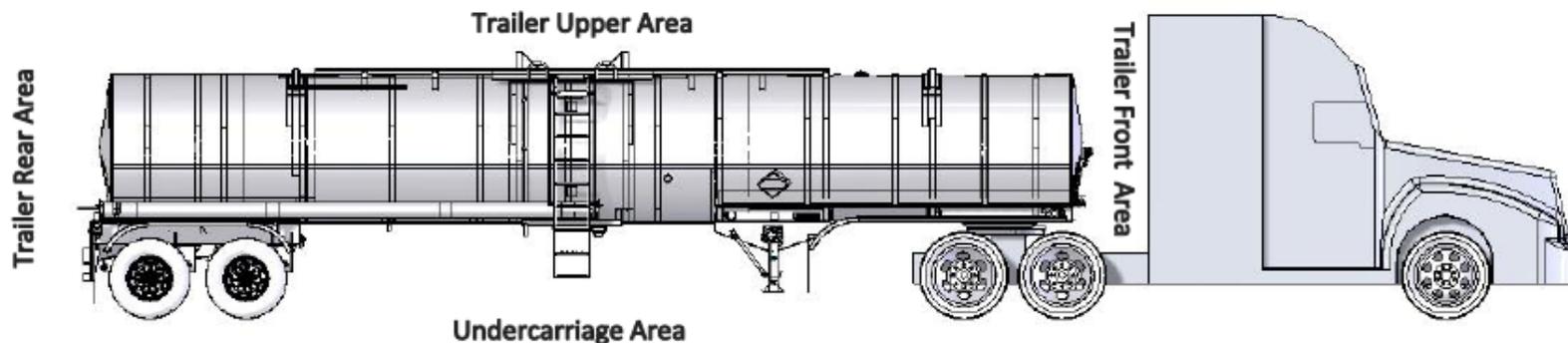


Customers adopting technology to reduce fuel consumption & manage costs



TANKER AERODYNAMICS – LEVERAGING WHAT WE KNOW

- Most Tanker Trailer applications are highly customized
- Applications largely local and regional transportation
- Local and regional hauls average less than 65mph
- Aerodynamics improvement benefits in local and regional speed likely limited
- Standardized *skirt* designs limited by undercarriage custom plumbing, piping, and accessibility requirements
- Possible *wake convergence device* opportunities – could reduce wake in Trailer Rear Area

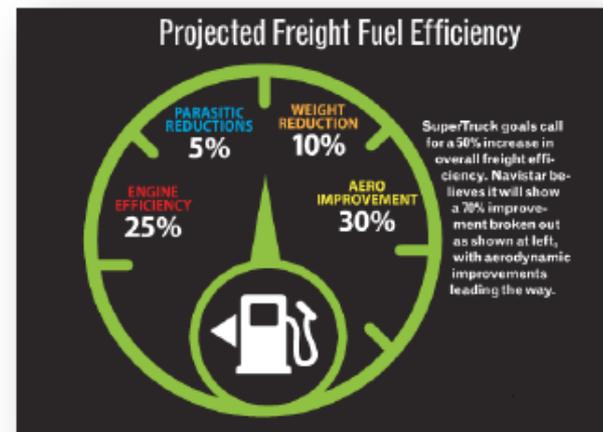


Tankers will not likely see benefits of aerodynamics devices because of duty cycle

WABASH NATIONAL INNOVATION – VENTIX DRS & SUPERTRUCK

Navistar SuperTruck Projected Freight Fuel Efficiency – 70% improvement¹

- 30% aerodynamics improvement
- 25% engine efficiency improvement
- 10% weight reduction
- 5% reduction in parasitic loads



Wabash National & Navistar Aerodynamics Collaboration

- Rear
- Nose
- Underbody
- Side Skirts – Ventix DRS @ 8.5% FS



Initial Wind Tunnel testing results indicate goal is achievable

- 0.300 Cdw
- 30% system reduction in Cd
- 15% FS

¹ December 2014, Truckinginfo.com, "Navistar Outlines SuperTruck Progress"

TRAILER AERODYNAMICS – FUTURE OPPORTUNITIES

- Trailer shape → requires changes in length, weight, and height regulations (State and Federal)
- Matching tractor and trailer → requires greater collaboration between truck and trailer manufacturers
- Variable Ride Height Suspensions → new technology in development
- Lighter Weight Components → costs Vs weight savings benefits



SOURCE: Navistar SuperTruck DOE Merit Review, May 2014

Technology and design will continue to evolve – fuel savings \$ are the driver