The Importance of Fleet Safety Culture to Reduce Crashes

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VTTI Organizational Structure

15 Research Programs and Groups
- Advanced Automotive Research
- Automated Vehicle Systems
- Data Reduction and Analysis Support
- Infrastructure-based Safety Systems
- Center for Partnerships, Public Policy and Outreach
- Injury Biomechanics
- Sustainable Mobility
- Sustainable Transportation Infrastructure
- Technology Development
  - Truck and Bus Safety
- Vulnerable Road User Safety
- Motorcycle Research Group
- Global Center for Automotive Performance Simulation
- Center for Technology Implementation
- National Tire Research Center
Truck and Bus Focus Areas

• Driver behavior and safety/health

• Safe operating conditions

• Education, training, and policy support

• Advanced vehicle technology
Industry and Sponsors

- Commercial Fleets
  - All US OEMs
  - Tier 1 and 2 suppliers
- Equipment suppliers
- Insurance
- Associations/Groups
  - Presentations
  - Discussions
Study Impact

- NY Times - In Study, Texting Lifts Crash Risk by Large Margin July 27, 2009
- Washington Post - Study Finds Link Between Text Messaging, Truck Crashes July 29, 2009
- CNN – Accidents Prompt Summit on Distracted Driving August 4, 2009
- CBS NEWS- Shocking Stats on Texting While Driving August 29, 2009
- NY Times- Texting While Driving Banned for Federal Staff October 1, 2009
- NY Times - Truckers Insist on Keeping Computers in the Cab September 27, 2009
- USA Today - Feds ban texting by truck, bus drivers January 27, 2010
- Land Line Magazine - The right call? November 2011
- Wright and Schulte – Ohio Truck Accidents: Texting Truck Drivers 23 Times More Likely to Crash June 5, 2013
- Robeson Forensic – Asleep at the Wheel: Sleep Deprivation and Fatigue in Commercial Trucking March 11, 2014
- VT News - Transportation institute awarded $55 million in federal contracts on truck safety, automated vehicles July 21, 2014
- Fleet Owner - FMCSA awards $2.5 million to study split sleeper impact December 30, 2015
- JOC.com – Virginia Tech to Conduct Critical Truck Driver Work Hours Study February 5, 2015
- NewsPlex.com - Study to Look at Truck Driver Sleep Regulations January 7, 2016
- Politifact.com – Can you drive the length of a football field in the time it takes to check a text? February 15, 2012
Background

• In 2018, FMCSA identified 2,864 high-risk carriers
• Thousands of other carriers with unsatisfactory safety records
• Companies may be unaware of strategies others have used to successfully improve safety
Objective

- Conduct case studies of carriers that have significantly improved safety performance
  - What strategies were successful?
  - What interventions were not effective?
  - Barriers to implementation?
  - Strategies to overcome barriers?
What did we do?

- Identify 9 eligible carriers
- In-depth interviews
- Content analysis to organize into the Haddon Matrix
Case Studies

What initiated the safety improvement

Timeline for improvement

Safety interventions

<table>
<thead>
<tr>
<th>Hiring</th>
<th>Training</th>
<th>Safety culture</th>
<th>Safety tech</th>
<th>Dispatch</th>
<th>Vehicle</th>
</tr>
</thead>
</table>

Center for Truck and Bus Safety
## Carrier Demographics

<table>
<thead>
<tr>
<th>Carrier</th>
<th>Size</th>
<th>Reason for Improvement</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>&gt;1000</td>
<td>Internal benchmarking found safety goals not met.</td>
<td>2012-2018</td>
</tr>
<tr>
<td>B</td>
<td>501-1000</td>
<td>Increased crash rates, crash indicator BASIC rose above the 90(^{th}) percentile.</td>
<td>2018</td>
</tr>
<tr>
<td>C</td>
<td>501-1000</td>
<td>Internal benchmarking revealed increasing crash rates.</td>
<td>2013-2018</td>
</tr>
<tr>
<td>D</td>
<td>101-500</td>
<td>HOS BASIC scores above 90(^{th}) percentile.</td>
<td>2012-2018</td>
</tr>
<tr>
<td>E</td>
<td>101-500</td>
<td>Internal benchmarking identified areas where improvements could be made.</td>
<td>2012-2018</td>
</tr>
<tr>
<td>F</td>
<td>51-100</td>
<td>BASIC were close to alert threshold.</td>
<td>2017-2018</td>
</tr>
<tr>
<td>G</td>
<td>51-100</td>
<td>Change in carrier ownership, opportunity to start fresh, and high BASIC scores.</td>
<td>2012-2018</td>
</tr>
<tr>
<td>H</td>
<td>101-500</td>
<td>Upward trend in crashes, crash indicator BASIC percentile of 92.7</td>
<td>2014-2018</td>
</tr>
<tr>
<td>I</td>
<td>&lt;50</td>
<td>Increased trend of smaller crashes and claims, large number of HOS violations</td>
<td>2017-2018</td>
</tr>
</tbody>
</table>
# Carrier Safety Improvements

<table>
<thead>
<tr>
<th>Carrier</th>
<th>Size</th>
<th>Safety Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>&gt;1000</td>
<td>1) 19.5% reduction in reportable crash rate, 2) 20 percentile improvement in CSA, 3) 56% reduction in rear-ends</td>
</tr>
<tr>
<td>B</td>
<td>501-1000</td>
<td>1) 31.7% reduction in reportable crash rate, 2) 70 percentile improvement in CSA</td>
</tr>
<tr>
<td>C</td>
<td>501-1000</td>
<td>1) 75.6% reduction in prevenables, 2) 17 percentile improvement in CSA</td>
</tr>
<tr>
<td>D</td>
<td>101-500</td>
<td>1) 45 percentile improvement, 2) eliminated all rollovers and rear-ends</td>
</tr>
<tr>
<td>E</td>
<td>101-500</td>
<td>1) 35.8% reduction in reportable crashes</td>
</tr>
<tr>
<td>F</td>
<td>51-100</td>
<td>1) 66.3% reduction in reportable crash rate, 2) 44 percentile improvement in CSA</td>
</tr>
<tr>
<td>G</td>
<td>51-100</td>
<td>1) 26.3% reduction in reportables since 2012, 2) 66.3% reduction since 2017, 3) 38 percentile improvement in CSA</td>
</tr>
<tr>
<td>H</td>
<td>101-500</td>
<td>1) 24.4% reduction in reportable crash rate, 2) 39.7 percentile improvement in CSA</td>
</tr>
<tr>
<td>I</td>
<td>&lt;50</td>
<td>1) 53.6% reduction in crashes, 2) Zero reportables, 3) 46 percentile improvement in CSA</td>
</tr>
</tbody>
</table>
Key Takeaway #1: Safety Culture

- All 9 carriers indicated the importance of improved safety culture
- All aspects of operations affect safety
  - Who you hire
  - How you train
  - When you train
  - Performance management
  - Routes
  - Dispatch
  - Maintenance
Improving Safety Culture: Driver-Focus

It starts with getting the correct drivers the first time

- Get to know who the applicant is
- Stick to your hiring criteria
- Competitive pay and benefits

Safety training

- Use training to reinforce importance of safety
- Not use for new drivers
- Use of technology (online training, simulators, etc)
- Driver mentor program
Correctable behaviors
Inadequate Scanning
Demonstrating Safe Behaviors

This video contains identifiable information that is protected by the Virginia Tech IRB. Do not duplicate or distribute.
Create Buy-in

Safety culture starts at the top
• “Walk the talk”
• Frequent and consist communication focused on safety
• Address driver comments/concerns
• Share fleet-level safety data

Safety is owned by everyone in the organization – not just drivers

Create family environment
• Concern for safety
• Bring in driver families
• Driver recognition
Driver Accountability

“Other-directed” accountability to “self-directed” accountability

• Encourage and recognize participation
• Consider factors influencing decisions
• SMART goals
• Provide feedback
• “fact-finding” vs. “fault-finding”
• Incorporate driver feedback/suggestions
Key Takeaway #2: Safety Technologies

- 8 of the 9 carriers used technologies to improve
  - AEB, LDW, BSW, telematics, video OBMS
- AEB: 56% reduction in rear-ends; 26.3% reduction in DOT-reportable crashes
- Video monitoring: 53%-66% reduction incidents
- AEB/LDW/video: 31%-36% reduction in DOT-reportable crashes; 75% reduction in preventable incidents
Automatic emergency braking
Lane Departure Warning
Driver Monitoring
Implementing Safety Technologies

Step 1: Determine which technologies address your carrier’s needs

• Evaluate the current state of risky driving in your fleet

• Identify the following
  • 3 most frequent risky driving behaviors
  • Other severe risky behaviors
  • Frequency compared to industry
  • Management’s response
  • Contributing factors
Evaluate available technologies

• Review currently available technologies
  • What are their capabilities?
  • Capture data on necessary behaviors?
  • Cost?
  • Compatibility with other technologies and software?
  • ROI information?

• Contact vendors
  • Technical/training support?
  • Price reductions?
  • System life span?
  • Ability to customize software?
Pilot Test

• Select one or more technologies to pilot test
• Select drivers and trucks
• Perform regular activities and collect data
• Evaluate performance of the technology
  • Drivers’ evaluations?
  • Track necessary behaviors?
  • Experience with the vendor/software?
  • Additional services/tools needed?
  • Implementation process?
• Select a technology or test another system
Return on Investment

• Each of the fleets indicated a positive ROI
  • Supported by research
• Latest generation of technologies address previous shortcomings
• Zero companies decided to not go for 100% penetration
ADAS ROI Calculations

• www.vtti.vt.edu/roicalculator
Center for Truck and Bus Safety

Tech-Celerate Now

ADAS VIDEOS

A Truck Operators’ Guide to ADAS
Download

A Return on Investment Guide to ADAS
Download

www.tech-celeratenow.org
Key Takeaway #3

• Be proactive in addressing driver safety
• 59 of the 69 critical strategies are pre-crash countermeasures
• Focus on correcting behaviors prior to crash
• Preventative maintenance
• Zero tolerance for unsafe scheduling practices
# Haddon Matrix Results

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>People</th>
<th>Environment</th>
<th>Management Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>- AEB</td>
<td>- Participant in FMCSA’s pre-employment screening program (PSP)</td>
<td>- Visible safety pledge signage in terminals</td>
<td>- Non-monetary safety awards</td>
</tr>
<tr>
<td>- LDW</td>
<td>- Require previous driving experience</td>
<td>- Plan routes for 45 mph average</td>
<td>- Monetary safety bonuses</td>
</tr>
<tr>
<td>- Blind spot detection</td>
<td>- On-the-job training for all drivers</td>
<td>- Mandatory stops in bad weather</td>
<td>- Frequency safety communication</td>
</tr>
<tr>
<td>- Stability control systems</td>
<td>- Finishing program for new drivers</td>
<td>- Schedule routes based on individual sleep patterns</td>
<td>- Positive, non-confrontational coaching sessions</td>
</tr>
<tr>
<td>- Speed limiters</td>
<td>- New hire monitoring</td>
<td>- Monitoring driving time in real-time</td>
<td>- Open door policy</td>
</tr>
<tr>
<td>- Road hazard systems</td>
<td>- Face-to-face interview</td>
<td></td>
<td>- Full-time trainers to maintain consistent safety message</td>
</tr>
<tr>
<td>- Video-based OSM systems</td>
<td>- Hiring criteria for involvement in previous crashes</td>
<td></td>
<td>- Management buy-in to safety programs</td>
</tr>
<tr>
<td>- Monitor wear and test</td>
<td>- Hiring criteria for previous citations and inspections</td>
<td></td>
<td>- Zero tolerance for HOS violations</td>
</tr>
<tr>
<td>- Replace parts when issues arise</td>
<td>- Past employer referrals</td>
<td></td>
<td>- Ownership top management safety communication</td>
</tr>
<tr>
<td>- 24 hour a day maintenance shop</td>
<td>- Driver referrals</td>
<td></td>
<td>- Driver scorecards</td>
</tr>
<tr>
<td>- Service trucks before 10,000 miles</td>
<td>- Driving simulator assessment</td>
<td></td>
<td>- Family events</td>
</tr>
<tr>
<td>- Service trailers every 30 days</td>
<td>- Driving simulator training</td>
<td></td>
<td>- Encourage family involvement in safety</td>
</tr>
<tr>
<td>- Inspect truck and trailer every 30 days</td>
<td>- Online training</td>
<td></td>
<td>- Family culture</td>
</tr>
<tr>
<td>- Load specific pre-trip checklists</td>
<td>- Hair drug testing</td>
<td></td>
<td>- Progressive discipline policy</td>
</tr>
<tr>
<td></td>
<td>- Physical fitness/ aptitude test</td>
<td></td>
<td>- Internal and external safety benchmarking</td>
</tr>
<tr>
<td></td>
<td>- Safety pledge</td>
<td></td>
<td>- Share key carrier-wide crash and incident data with drivers</td>
</tr>
<tr>
<td></td>
<td>- Monthly or quarterly in-person safety meetings</td>
<td></td>
<td>- Share carrier-wide safety cost data with drivers</td>
</tr>
<tr>
<td></td>
<td>- Coaching sessions based on OSM data</td>
<td></td>
<td>- Accountability for safety in all departments</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Wellness checks on drivers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Educating all department on their impact on safety</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Health and wellness program</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Drivers collaborate to develop safety strategies</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>At scene</th>
<th>Post-crash</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle repair or replacement</td>
<td>- Use of video-based OSM to find identify objective data on crash causes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Progressive discipline policy based on crash causes</td>
<td>- Use of video-based OSM data for driver excuses</td>
</tr>
<tr>
<td></td>
<td>- Health and wellness checks</td>
<td>- Internal tracking of crashes for data analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Internal and external benchmarking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Driver incident reporting system</td>
</tr>
</tbody>
</table>
Key Takeaway #4

• Not one right answer
  • Stick to your policies
  • Choose safety first

• Careful evaluation of your needs
  • Types of crashes/violations
  • Self-reported problems from drivers
  • ASK

• BUT, safety starts at the top
Conclusions

• Consistency across the nine carriers
  • 66.7% indicated creating a strong safety culture played a major role in improved safety
  • 66.7% indicated safety technologies played a major role in improved safety

• Be proactive

• Provided objective data to support safety technologies and improved safety culture

• Not a single fix to improve safety
Questions?

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Thank you!

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