

# **Study of Effectiveness of On-Board Safety Systems**

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**Federal Motor Carrier Safety Administration**

# Outline

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# Purpose

***To evaluate the effectiveness of on-board safety systems in commercial motor vehicles***

The three on-board safety systems:

- ≡ Forward collision warning systems
- ≡ Lane departure warning systems
- ≡ Electronic stability control systems\*

# Background

- 2/2009 FMCSA published:
  - ≡ *Analysis of Benefits and Costs of Forward Collision Warning Systems for the Trucking industry*
  - ≡ *Analysis of Benefits and Costs of Lane Departure Warning Systems for the Trucking Industry*
  - ≡ *Analysis of Benefits and Costs of Roll Stability Control Systems for the Trucking Industry*

# Background (cont'd)

- Posted Product Guides for the three OBSS
- Determined that analyses of cost/benefits of the three OBSS based on modeling – **not real-world data**
- Made decision to collect real-world data on the three OBSS

# Background (cont'd)

- 3/2009, FMCSA contracted with Virginia Tech Transportation Institute (VTTI) to
  - ≡ Conduct literature survey
  - ≡ Identify data sources on OBSS
  - ≡ Draft research design plan
  - ≡ Convene expert review panel
  - ≡ Revise the research plan
  - ≡ Execute the research plan
  - ≡ Compile final report

# Accomplishments

- Surveyed literature on past OBSS research
- Completed market research on types of OBSS available
- Compiled measures of effectiveness (examples)
  - ≡ Crash reduction
  - ≡ Reduced workload
  - ≡ Driver acceptance
  - ≡ Cost-effectiveness

# Accomplishments (cont'd)

## ■ Complied with

- ≡ IRB Ethical standards
- ≡ OMB Survey Burden Requirements
- ≡ Guidance for non-disclosure agreements (NDA)

## ■ Drafted Research Design Plan

# Accomplishments (cont'd)

- 12/20/2009 Established Expert Review Panel
  - ≡ 2 Research specialists
  - ≡ 2 Fleet safety directors
  - ≡ 1 Trucking insurance representative
- 01/14/2010 Expert Review Panel met to critique Research Design Plan

# Research Design Plan

1. What are the safety benefits of each of the three OBSS?
2. Are there any unintended side effects associated with each of the three OBSS?
3. Are these OBSS cost-effective?
4. What are the opinions and perceptions regarding each OBSS?

# Research Design Plan (cont'd)

1. What are the safety benefits of each of the three OBSS?
  - ≡ For the crash types intended to be addressed by the OBSS, what are the reduction in
    - crash frequency?
    - severity?

# Research Design Plan (cont'd)

## ≡ Crash types

- ▶ Forward Collision Warning System
  - Rear-end truck striking
- ▶ Lane Departure Warning System
  - Single vehicle roadway departures
  - Same direction lane departures
  - Opposite direction lane departures
- Electronic Stability Control
  - Rollover crashes involving combination trucks

# Research Design Plan (cont'd)

2. Are there any unintended side effects associated with each of the three OBSS?
  - ≡ Is there an increase in other crash types, i.e., crash types NOT intended to be addressed by a particular OBSS?
    - ▶ For example, does electronic stability control result in more rear-end striking crashes?
  - ≡ What are the Risk Odds Ratio for each crash type NOT to be addressed by each the OBSS?

# Research Design Plan (cont'd)

## 3. Are these OBSS cost-effective?

### Return on Investment (ROI)

- ▶  $\text{ROI (\$)} = \text{Costs (\$)} - \text{Benefits (\$)}$

### Break-even point

- ▶ At what point in time will carrier recoup initial purchase costs for the OBSS?

### What is the benefit/cost ratio?

- ▶ What are the total benefits divided by the total costs?

# Research Design Plan (cont'd)

## ≡ Costs

- ▶ Initial costs
- ▶ Installation
- ▶ Training
- ▶ Maintenance Return on Investment (ROI)

# Research Design Plan (cont'd)

## ≡ Benefits

- ▶ Reduced crashes
  - Replacement labor
  - Worker's compensation
  - Operational
  - Environmental
  - Legal
  - Insurance

# Research Design Plan (cont'd)

4. What are the opinions and perceptions regarding each OBSS?

- ≡ Purpose -- to capture any qualitative information from OBSS users that are **not captured** in the quantitative information

# Research Design Plan (cont'd)

- Recruitment of Motor Carriers
  - ≡ VTTI Database
    - ▶ Participated previously
    - ▶ Willingness to participate
  - ≡ Advertisement in *Transport Topics*
  - ≡ Work with American Transportation Research Institute (ATRI)
  - ≡ 32 carriers have signed on
    - ▶ Non-disclosure agreements

# Research Design Plan (cont'd)

	Forward Collision Warning Systems	Lane Departure Warning Systems	Electronic Stability Control Systems
Power Units	4,967	5,516	36,167
No OBSS	29,707		



# Research Design Plan (cont'd)

- Interview OBSS Users for Opinions and Perceptions
  - ≡ Six focus groups – 2 for each of the 3 OBSSs
    - ▶ Separate sessions for truck drivers
    - ▶ Separate sessions for safety managers
  - ≡ Work with participating carriers to get interview volunteers
    - ▶ Post flyers
    - ▶ Motor carrier announcements

# Research Design Plan (cont'd)

## ≡ Carrier information

- ▶ Unionized
- ▶ On-board safety systems
  - Model
  - Date installed
- ▶ Fleet type
- ▶ Commodities hauled
- ▶ Speed limiter

# Research Design Plan (cont'd)

## ■ Design Approaches

- ≡ Before-After Study
- ≡ Cross-sectional study
- ≡ **Retrospective Cohort Study**

# Schedule

- 02/19/2010 Address issues in critique & finalize Research Design Plan
- 03/19/2010 FMCSA to decide go/no-go with final Research Design Plan
- The rest of schedule is based on “go” decision

# Schedule (cont'd)

- 03/22/2010 Collect data
  - ≡ Existing data from participating fleets
  - ≡ New data from 6 participating fleets for qualitative part of the study
  - ≡ 6 focus groups providing opinions & perceptions -- 2 for each of the 3 OBSSs with separate sessions for
    - Drivers
    - Safety managers

# Schedule (cont'd)

- 07/20/2010 Data analysis due to FMCSA
- 08/20/2010 Data collection report due
- 12/20/2010 Draft final report due
- 03/10/2011 Final report due

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