

**Drowsy Driver Detection and Warning System
For Commercial Vehicle Drivers:
*Field Operational Test Design, Analysis, and
Progress***

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Estimated Total Problem Size

- Approximately 100,000 drowsy-related crashes per year.
- Approximately 1,357 drowsy-related fatal crashes resulting in 1,544 fatalities.
- Approximately 71,000 drowsy-related crashes involved non-fatal injuries.
- Estimated annual monetary loss is about \$12.5 Billion.

Drowsy Driver Technology Program

Problem Size

	Passenger Vehicles	Heavy Trucks
Total Est. Drowsy Crashes	96,000	3,300
Total Est. Involvement	95.9%	3.3%
Drowsy Related Fatalities	1,429	84
Fatalities Outside Vehicle	12%	37%
Drowsiness Cited by Police	.52%	.82%
Miles/Year Exposure	11k	60k
Years Operational Life	13	15
Primary Driving Period	Day	Night

*Estimates based on 5-year period 1989-1993 (Knippling & Wang, 1995)



Program Justification

- Previous trucking summit meetings identify drowsiness as the #1 driving problem.
- Drivers are often unaware of their deteriorating condition.
- Drivers are often motivated to keep driving.
- Incipient drowsiness can be observed and measured.

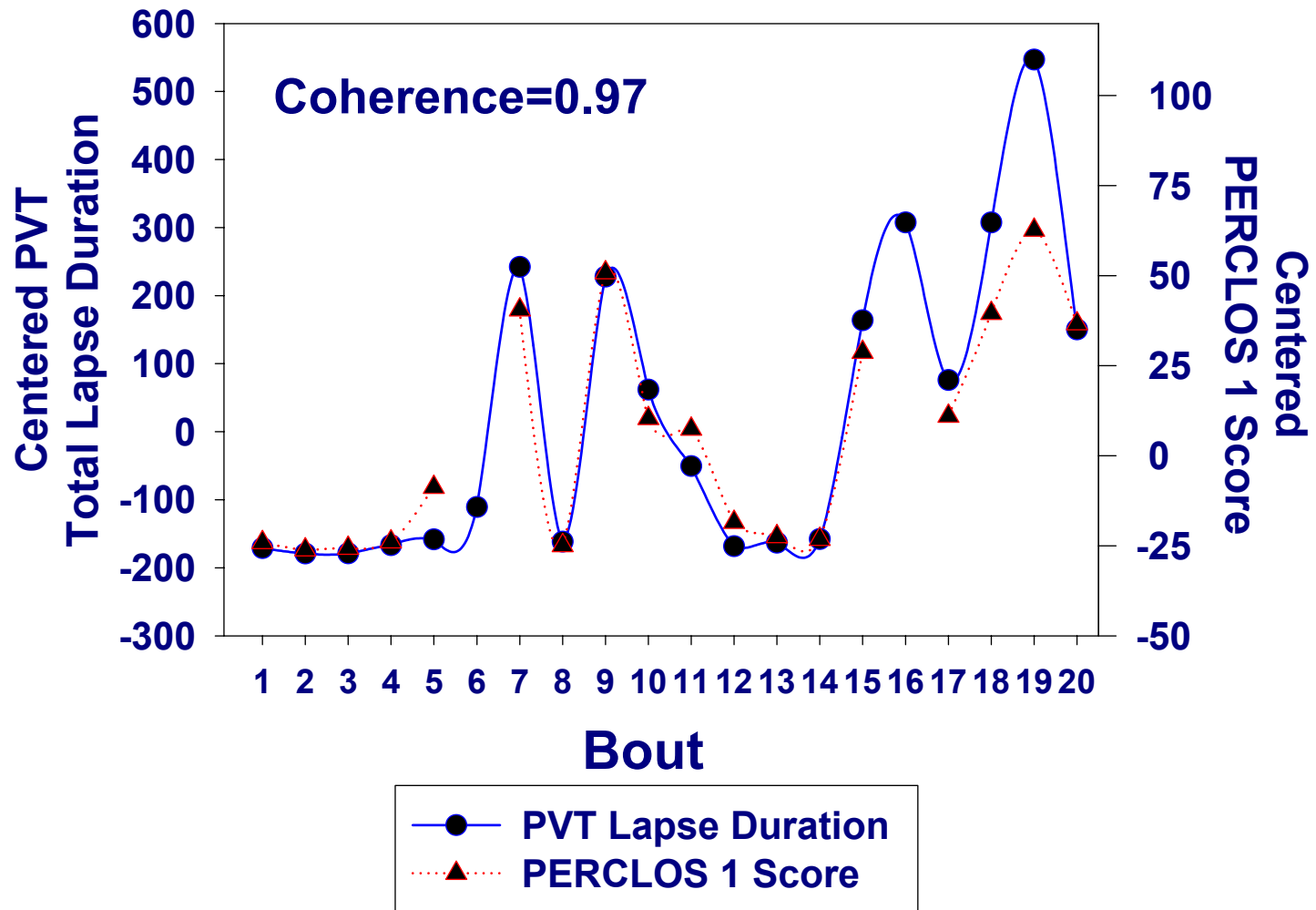
Program Objectives

- Reduce the injuries, deaths, and costs associated with drowsiness.
- Develop, test, and evaluate a prototype continuous/drowsiness detection and warning system for commercial vehicle drivers.

The Copilot



Coherence Over Bouts between 20 Minute Visual PVT Lapse Duration and PERCLOS 1 Score Subject 6109



Field Operational Test

- *Performance Period: October 2002 – October 2005.*
- *FOT Conductor – Virginia Tech. Transportation Institute (VTTI).*
- *FOT Independent Evaluator – Volpe Center.*

Research Questions

1. What is the distribution of drowsiness in the population of heavy vehicle drivers, and how do these groups differ in their performance w/ or w/o the warning system?
2. What are the effects of independent factors such as driver age, health, sleep patterns, road conditions, and type of trucking operation?
3. What is the effect of the warning system and independent factors on conflict driving, near collisions and severe near collisions?
4. What are the fleet acceptance and deployment prospects?

Experimental Design

■ Subjects

- 102 drivers, 34 single-unit heavy trucks.
- Long haul operations:
 - Howell's Trucking Company – 51 drivers.
- Overnight express operations:
 - Pitt-Ohio Express (PA Turnpike) - 6 drivers.
 - J.B. Hunt (Virginia Interstate) – 45 drivers.

Experimental Design

Alert
Disabled

Alert Enabled

A A A B B B B B B B B B

Experimental Group
34 Drivers/ Op.Type

A A A A A A A A A A A A

Control Group
17 Drivers/ Op.Type

1 2 3 4 5 6 7 8 9 10 11 12

Week

Analysis

Safety Benefits

- DDWS Effect on Drowsiness
 - Drowsy level w/ or w/o the DDWS.
 - Drowsiness varying by independent factors – age, health, sleep patterns, road conditions, type of trucking operation, etc.
- Driving Performance
 - Performance level w/ or w/o the DDWS.
 - Performance varying by independent factors – age, health, sleep patterns, road conditions, type of trucking operation, etc.

Analysis

- Conflict Driving
 - Conflict level w/ or w/o the DDWS.
 - Conflicts varying by independent factors – age, health, sleep patterns, road conditions, type of trucking operation, etc.

Causal Analysis

- Video Coding – Intervening variables.

Crash Estimation

- Monte Carlo Simulation

Status

Whereas, the process of data collection, reduction, and transfer has begun, there are no results to report at this time.

The final report is due October 30, 2005.

Further Information

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