



The Mack IVI Partnership

FDOT Presentation
Intelligent Vehicle Initiative
Tallahassee, Florida
October 11th, 2001

Mack Partnership

- Mack Trucks, Inc.
- McKenzie Tank Lines
- VES - Vehicle Enhancement Systems
- XATA Corporation
- RBC - Richard Bishop Consulting
- Assistware Technologies

Program Participants



- Mack Partnership
- FHWA
- Battelle - Independent Evaluator
- State DOTs

Intelligent Vehicle Initiative



- Cost Share Cooperative Agreement with the Federal Highway Administration (FHWA) and “the Mack Partnership”
- Effort to accelerate the deployment of safety systems in the Heavy Duty Truck Industry

Mack Partnership Program Goals

- Evaluate Performance of Advanced Safety Systems to:
 - Improve Highway Safety
 - Reduce Initial and Secondary Accidents
 - Improve accuracy and time of response in emergency situations
 - Reduce impact on environment
 - Hazardous material spills
 - Congested traffic emissions

McKenzie Tank Lines
Intelligent Vehicle Initiative Fleet
36-Vehicles/\$2.4 Million Program
Cost Share Co-Operative Agreement



9/16/2000

Areas of Investigation



- LDWS: Lane Departure Warning System
- TAS : Trucker Advisory System
- ACN : Automatic Collision Notification
- Support Technology: Eaton Vorad Collision Warning System w/SmartCruise

Safety Technologies Benefits



- LDWS: Will improve safety related to run-off-road, side swipe, and lane change related incidents
- TAS: Will improve safety in historically dangerous areas through improved information to driver
- ACN: Will reduce consequences of accidents: loss of life, medical injuries, environmental damage, and traffic delay costs

McKenzie Tank Lines
Safety Improvements
Utilizing Advanced
Technology



LDWS - Lane Departure Warning System



- Vehicle Traveling in Center of Lane
- Lane has Solid Lane Boundary on Right Side
- Lane has Dashed Lane Boundary on Left Side

LDWS - Lane Departure Warning System



- Vehicle Drifting Towards Left Side Dashed Boundary
- Audible Warning Tone Sounds at this Point
- Alertness Index Score 67 - Normal Range 70-90

LDWS - Lane Departure Warning System



- Vehicle Drifting towards Dashed Right Lane Boundary
- Audible Tone Sounds at this Point

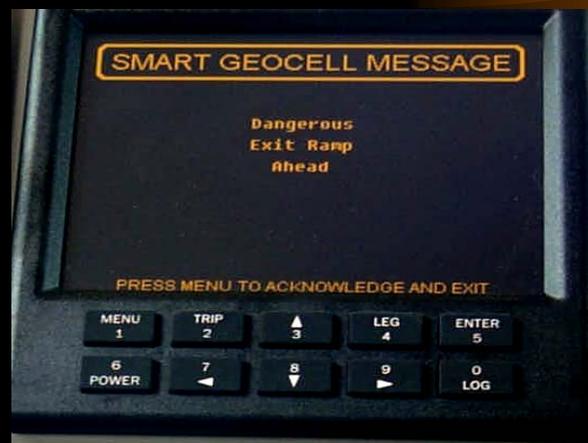
TAS - Trucker Advisory System

- State DOT Identifies Hazard Zones and Areas are Assigned GPS Coordinates
- As Driver Enters Hazard Zone Mack's VIP+ Information Center Identifies Type of Hazard to be Encountered by the Driver (Construction Zone, High Rollover Risk, Tight Merge & Weave Area, Congested Area, etc....)

TAS - Trucker Advisory System

- Provides Valuable Area Specific Hazard Information to Assist Driver in Making Better Informed Driving Decisions
- Identifies Hazards When Operating in Unfamiliar Traffic Lanes
- Future Can Provide Real-Time Hazard Information
- Better Informed Driver's Operate Safer

TAS - Vehicle Information Profiler w/Geocell Warning Message



TAS - 6 minute data packet



- When a geo-cell is entered the onboard electronics logs the previous 1 minute of data as the baseline of the event.
- The next five minutes will also be recorded.
- Resulting in a six minute data packet for analysis.

TAS - Data Collection



- Vehicle Speed
- Throttle Position
- Brake Application
- Cruise Control
 - Activated
 - Set Speed
- Engine Brake
- Clutch Activation
- Engine RPM
- Time & Date
- Driver ID
- Vehicle ID
- Rapid Deceleration
- Engine Torque

TAS - Data Collection

- VORAD
 - Driver Warnings
 - Following Distance
 - Driver ID
 - Traffic level / # vehicles detected
 - Blind spot object detected
 - Closing rate to object
 - Yaw rate
- Additional sensors added
 - Lateral Acceleration
 - Vehicle roll angle
 - GPS time, location & vector
 - Turn signals
- ◆ SafeTrac
 - Lateral Offset
 - Lateral Velocity
 - Alertness Index
 - Ambient Light Level
 - Road Curvature
 - Lane Excursions
 - Driver Warnings
 - Digital Snapshots: 3 per event

TAS - Data Collection

- Addition of Safe TRAC system allows for Digital Snapshots to be taken
 - One snapshot to occur at time of driver warning
 - Two more snapshots to be taken.
 - Specific timing is tbd
 - Snapshots will be automatically & wirelessly uploaded to web site with other IAHW data. Each snapshot is 19.2kbytes of data.

Data Downloads



- Number of lane and road departure events
- Number of contacts involving TAS zones, 1 to 3 per day
- Data stored on-board in the Onvoy unit
- Data is downloaded daily via cellular or Low Earth Orbit Satellite (OrbComm)
- Data is available at a private web site for Team analysis

ACN - Automatic Collision Notification



- Sudden Deceleration/Acceleration Followed by 0 MPH or Triggered Rollover Sensor Activates Event Notification
- Event Notification is sent via E-Mail to McKenzie Tank Lines CNC (Central Network Center), Safety Dept. and Emergency Response

ACN: E-Mail Message Examples

Rollover

- From: xatanet@xata.com
- Sent: Wednesday, September 26, 2001 2:23 PM
- To: jkennedy@mckenzieatank.com
- Subject: EMERGENCY CRASH NOTIFICATION
- Vehicle: 6101
- Driver: Unknown
- Time: 09/26/01 02: PM
- Latitude: 30.48755
- Longitude: -84.29225
- State: FL
- City: Tallahassee
- Sensed by: Tilt Sensor
- Road Speed: 43 MPH

Accident

- From: xatanet@xata.com
- Sent: Wednesday, September 26, 2001 12:54 PM
- To: jkennedy@mckenzieatank.com
- Subject: EMERGENCY CRASH NOTIFICATION
- Vehicle: 6204
- Driver: Unknown
- Time: 09/26/01 12:50 PM
- Latitude: 30.43809
- Longitude: -84.35756
- State: FL
- City: Tallahassee
- Sensed by: Crash Sensor
- Road Speed: 8 MPH

ACN - Automatic Collision Notification

- CNC Personnel Identify Tractor/Trailer Combination and Commodity Hauled then Notify Local Authorities as to the Commodity and Associated Dangers
- Early Notification Allows Quicker Properly Prepared Response Actions
- Quicker Response Saves Lives, Protects Environment, and Decreases Traffic Delays

McKenzie Tank Lines Breaking the Sound Barrier of Safety Technology



Commodity Protection and Public Safety

- In this time of uncertainty we provide unparalleled safety measures to drivers, customers and the public.
- Password protected engine functions - Theft Deterrence Technology
- Full safety glass all-around



McKenzie Tank Lines Safety & Maintenance a Powerful Combination



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