

SPS WIM Site Evaluation Lessons Learned from the Pilots

NATMEC 2002

May 14, 2002



Overview

- The SPS Pilots and Results
- Weight Data and Equipment Activities
- Smoothness Checks



SPS Pilots and Results

- Verify that standards are achievable
- Validate the field activities
- Results for pilot sites



Research Data Criteria

SPS-1, -2, -5, -6 & -8	95 Percent Confidence Limit of Error
Single Axles	± 20 percent
Axle Groups	± 15 percent
Gross Vehicle Weight	± 10 percent
Vehicle Speed	± 1 mph (2kph)
Axle spacing	± 0.5 ft (150 mm)



Results by site

- PASS - Bending Plate - Texas, Florida
- Fail (Temperature) - Piezo - Florida, Maryland
- Fail (Speed) - Bending Plate - Arizona, Michigan



How were the results obtained?

- Data Collection Guide for SPS WIM Sites
 - Speed vs temperature regimes
 - Picking and measuring trucks
 - Classification verification
 - Analysis
 - Pavement smoothness



Speed vs. temperature regimes

- 3 speeds whose range covers 80 percent of the truck population speeds
- 3 temperatures not under direct control of the data collection team



Taking speed measurements

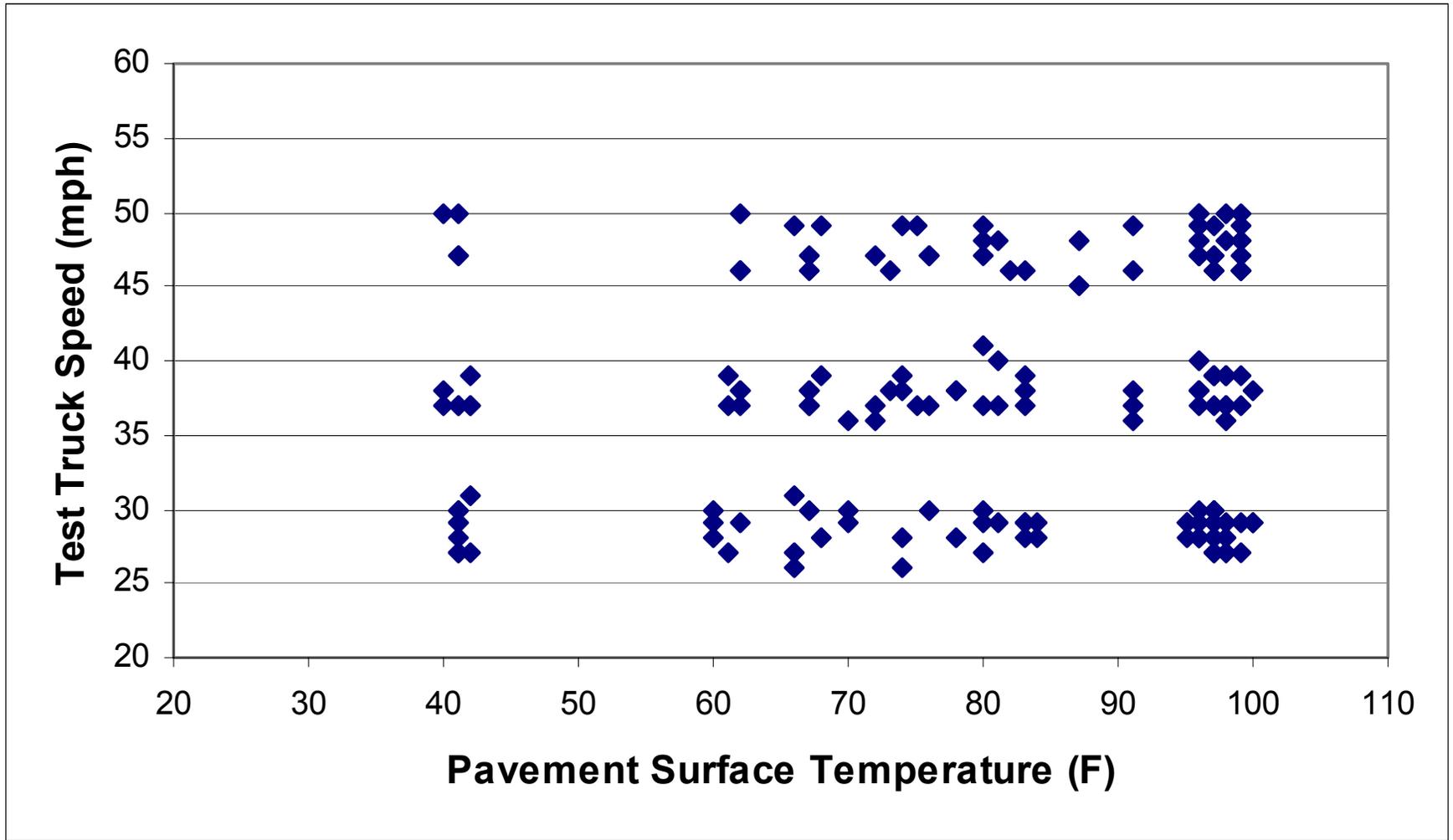


Taking the pavement's temperature

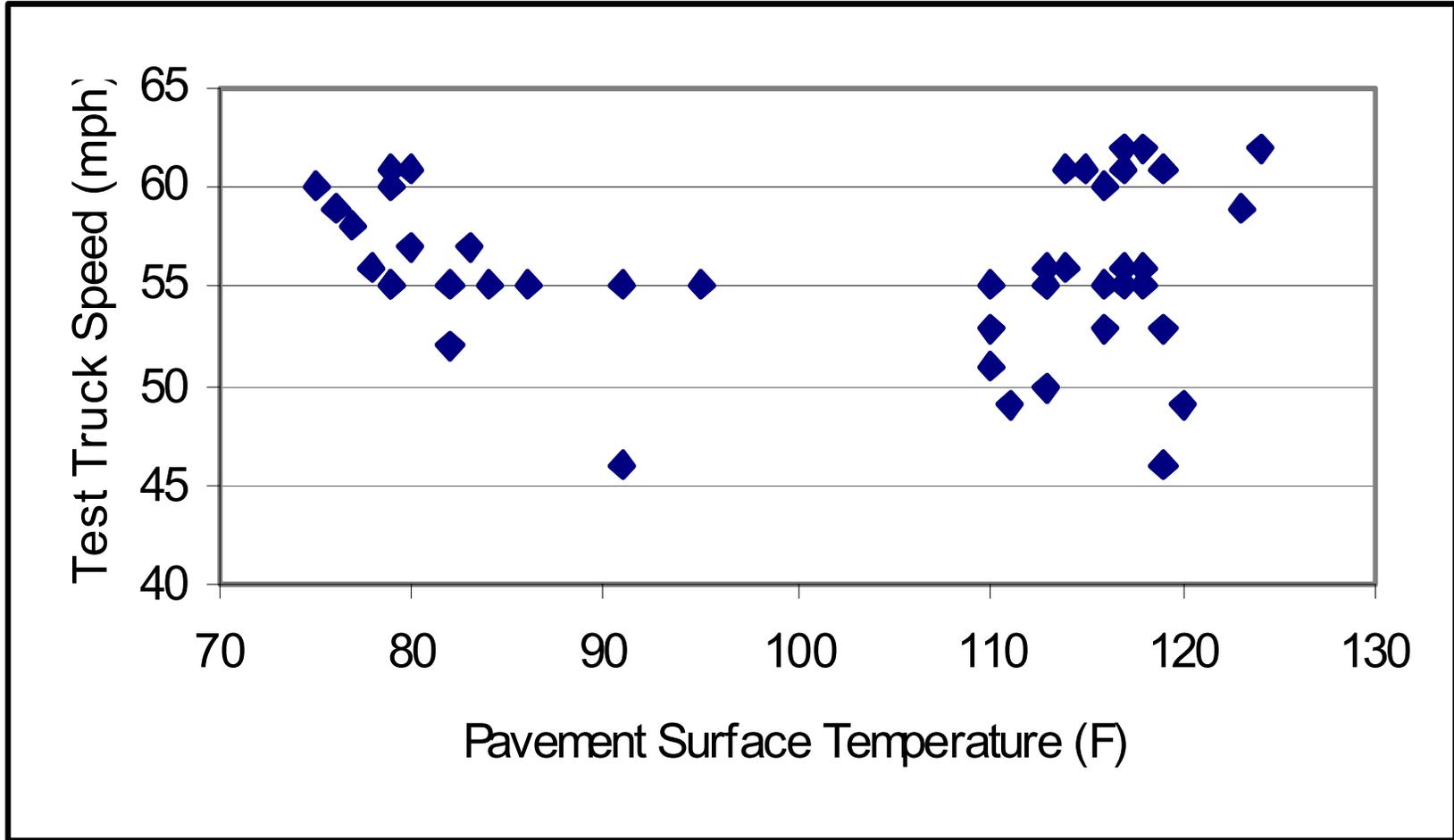


LONG TERM
Pavement
PERFORMANCE

Good Test Conditions



Poor Test Conditions



Trucks

- Air suspension 3S2 (Class 9) - mandatory
- 2nd truck either -
 - Predominant truck type for the site
 - 3S2 with different load, suspension, axle configuration
 - 3S3 loaded above 88,000 pounds



Air suspension



LONG TERM
pavement
PERFORMANCE

Steel leaf suspension



Blue test truck



Red Test Truck



LONG TERM
pavement
PERFORMANCE

Test trucks ready to run



LONG TERM
Pavement
PERFORMANCE

The 3S3 alternative



LONG TERM
Pavement
PERFORMANCE

The problematic dump truck



LONG TERM
Pavement
PERFORMANCE

Weighing a truck



Getting the within group spacing



LONG TERM
Pavement
PERFORMANCE

Finding the between group spacing



LONG TERM
Pavement
PERFORMANCE

Classification Verification

- State responsibility for the basic algorithm validation
- All vehicles in population
 - Not selective pick
 - Randomness from the start and stop pattern of collection



Doing the Analysis

- Statistics
- Graphs
- Forms

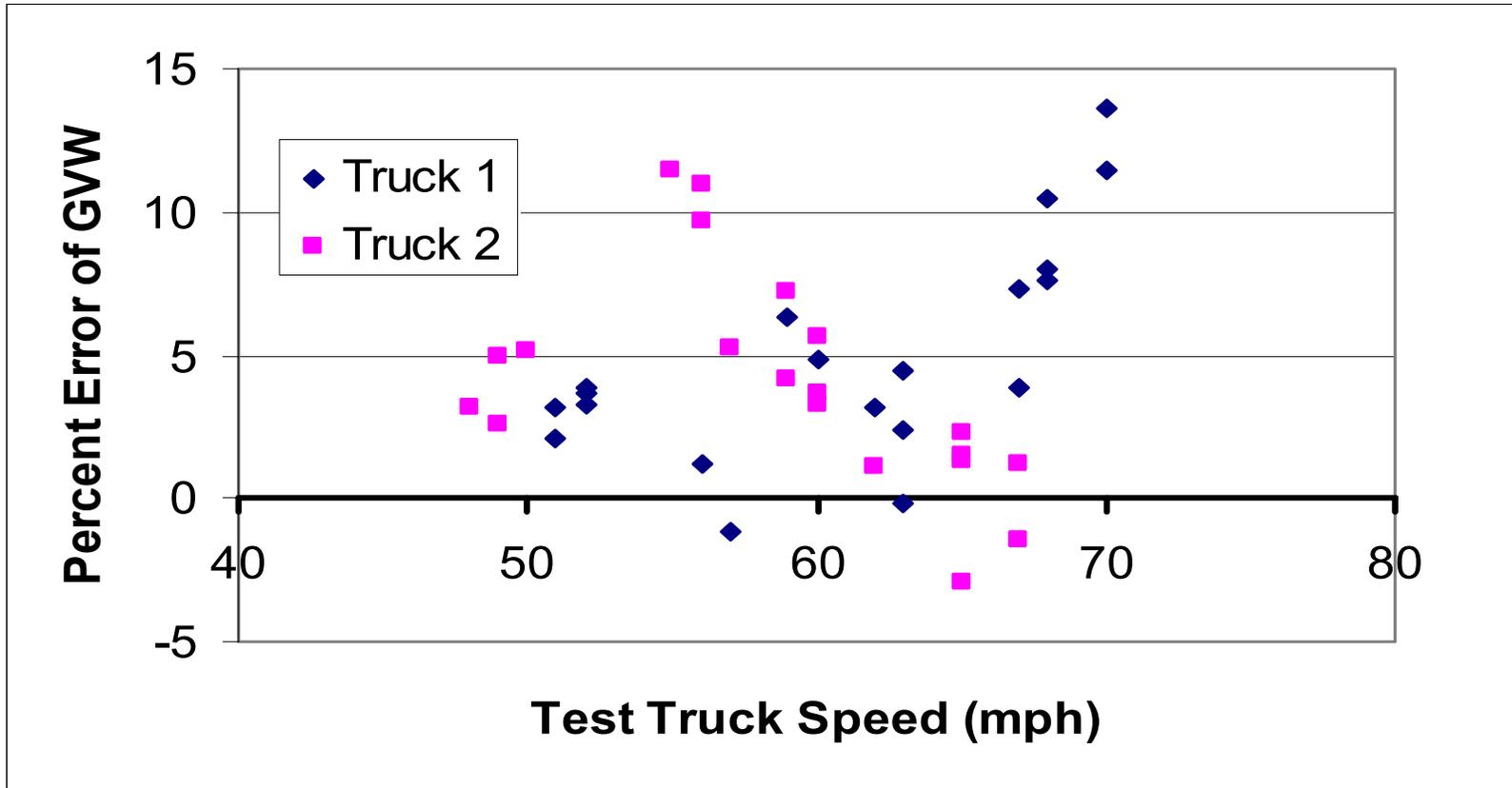


Sample Results

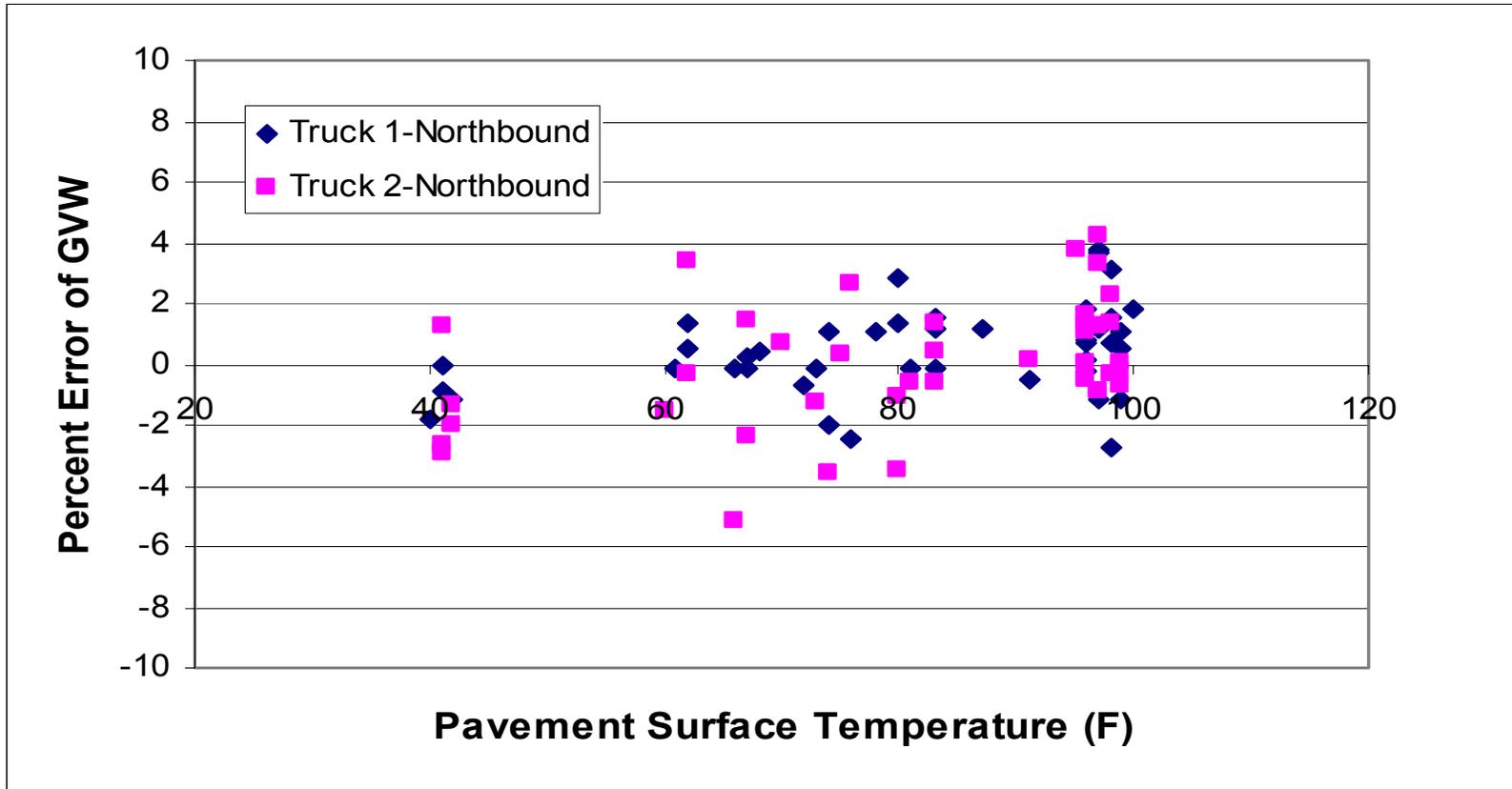
Characteristic	Tolerance	Computed 95% Confidence Interval	Pass/Fail
Axle weights			
Steering axles	± 20 percent	$2.2\% \pm 21.1\%$	FAIL
Tandem axles	± 15 percent	$-4.2\% \pm 22.8\%$	FAIL
Gross vehicle weight	± 10 percent	$-3.25\% \pm 18.9\%$	FAIL
Vehicle speed	± 1 mph [2 km/hr]	± 2 mph	FAIL
Axle spacing length	± 0.5 ft [150 mm]	+0.35 ft	PASS



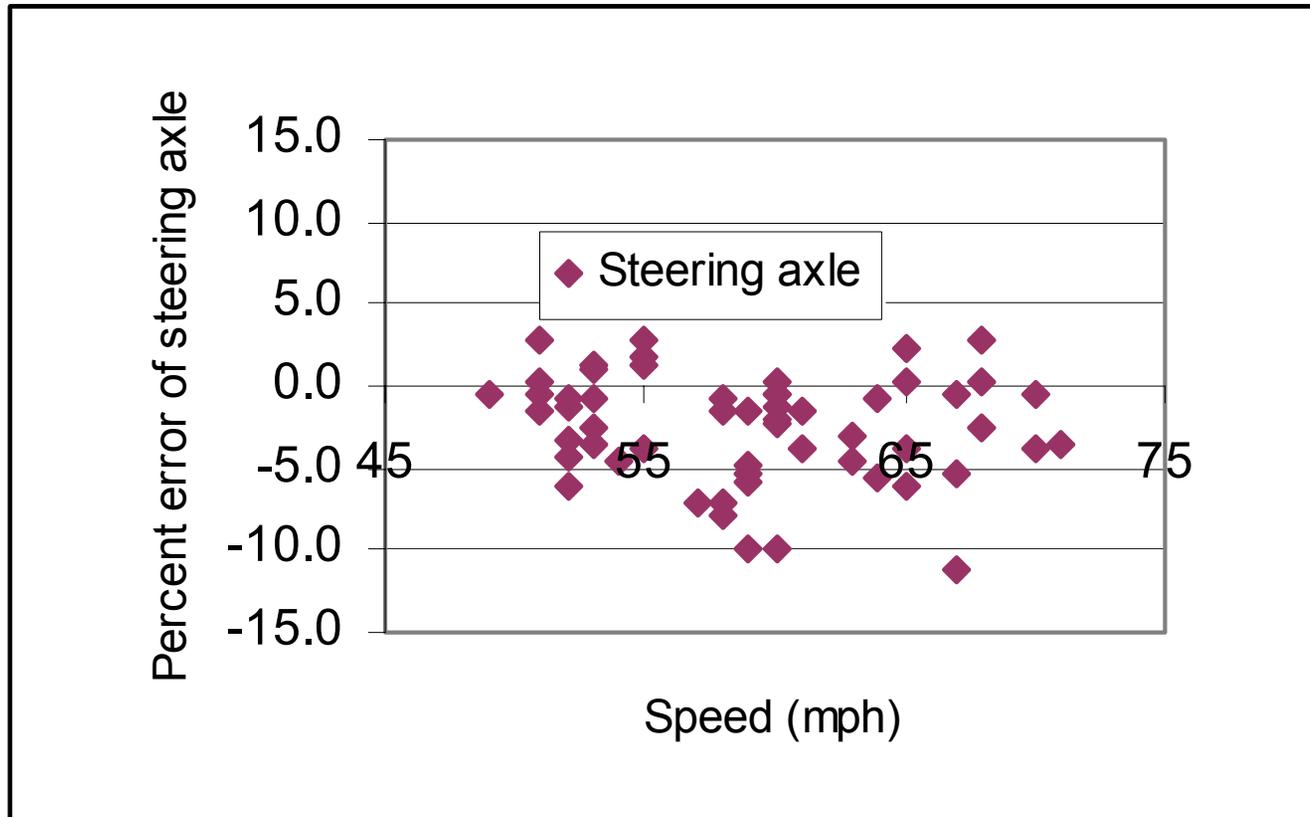
GVW and Speed



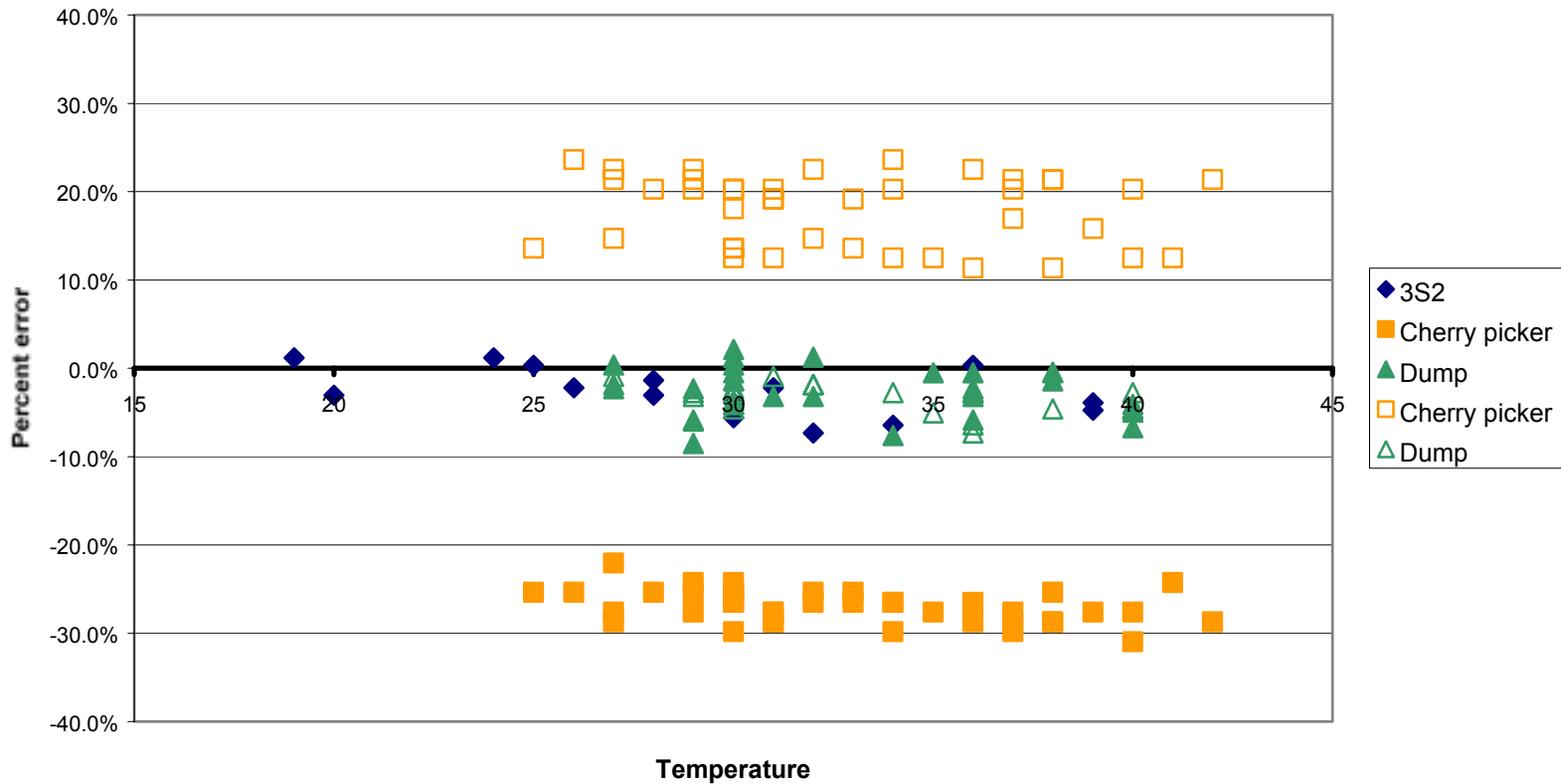
GVW and Temperature



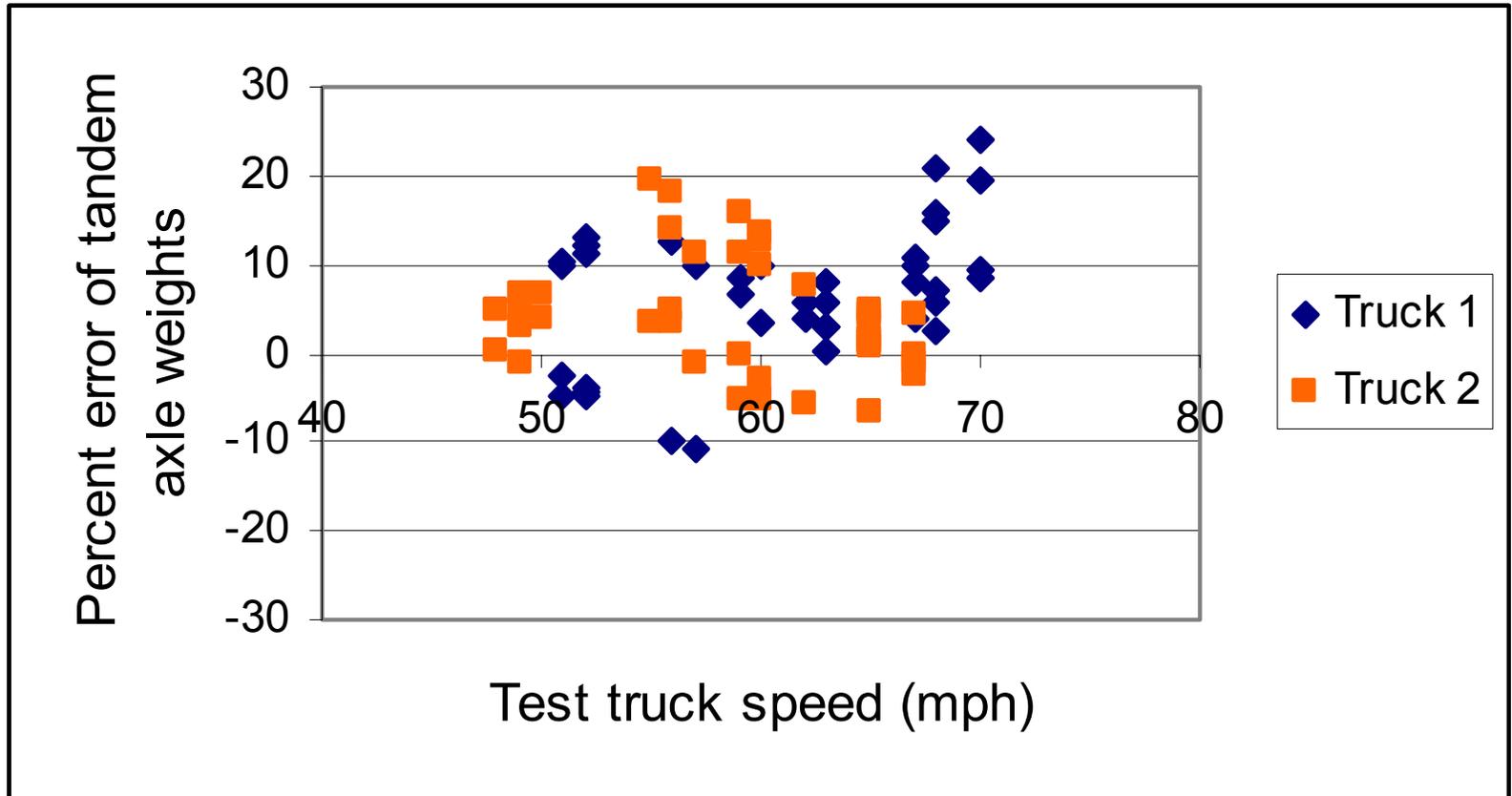
Single axles and speed



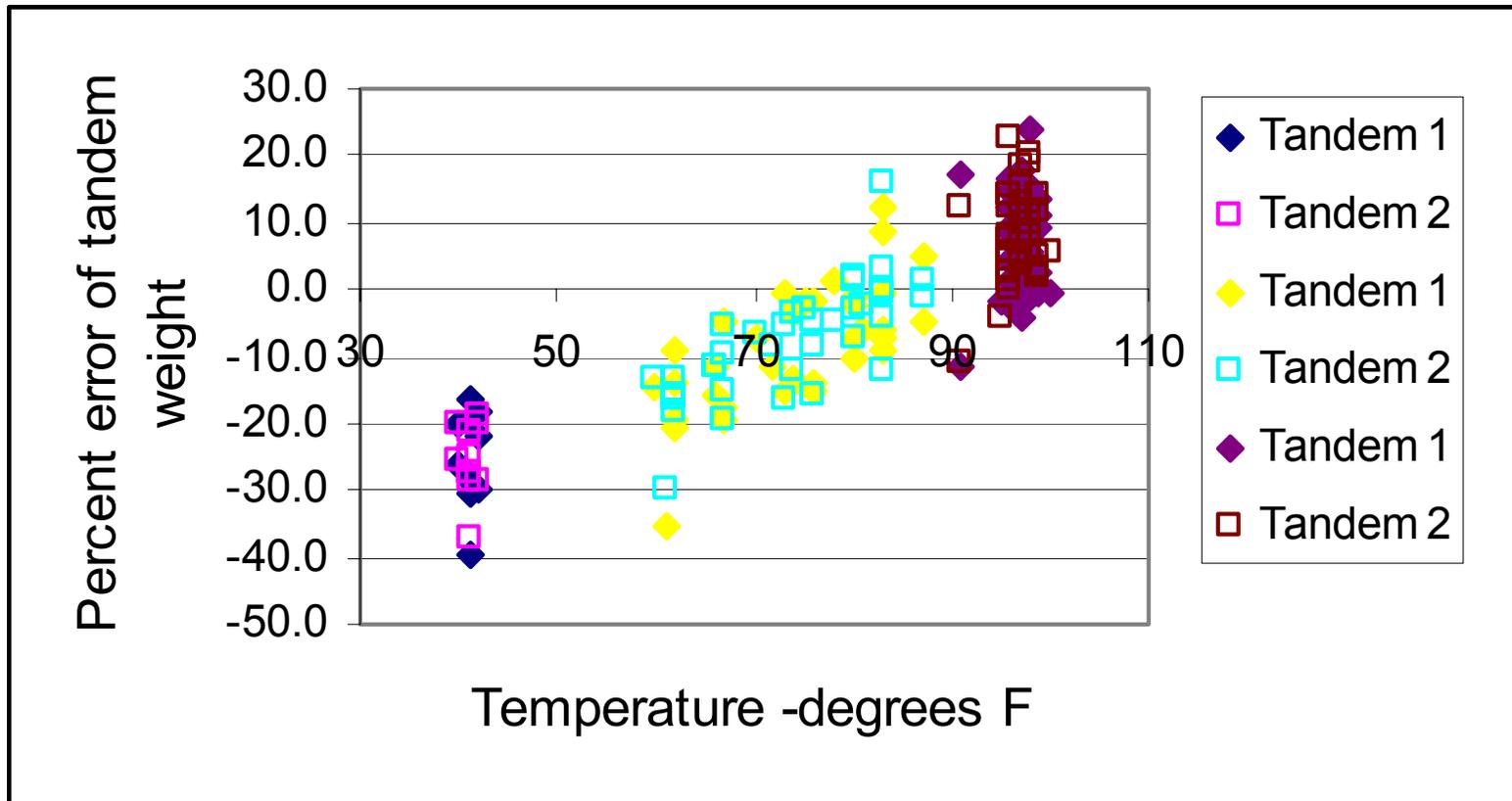
Single Axles and Temperature



Tandem Axles and Speed



Tandem Axles and Temperature

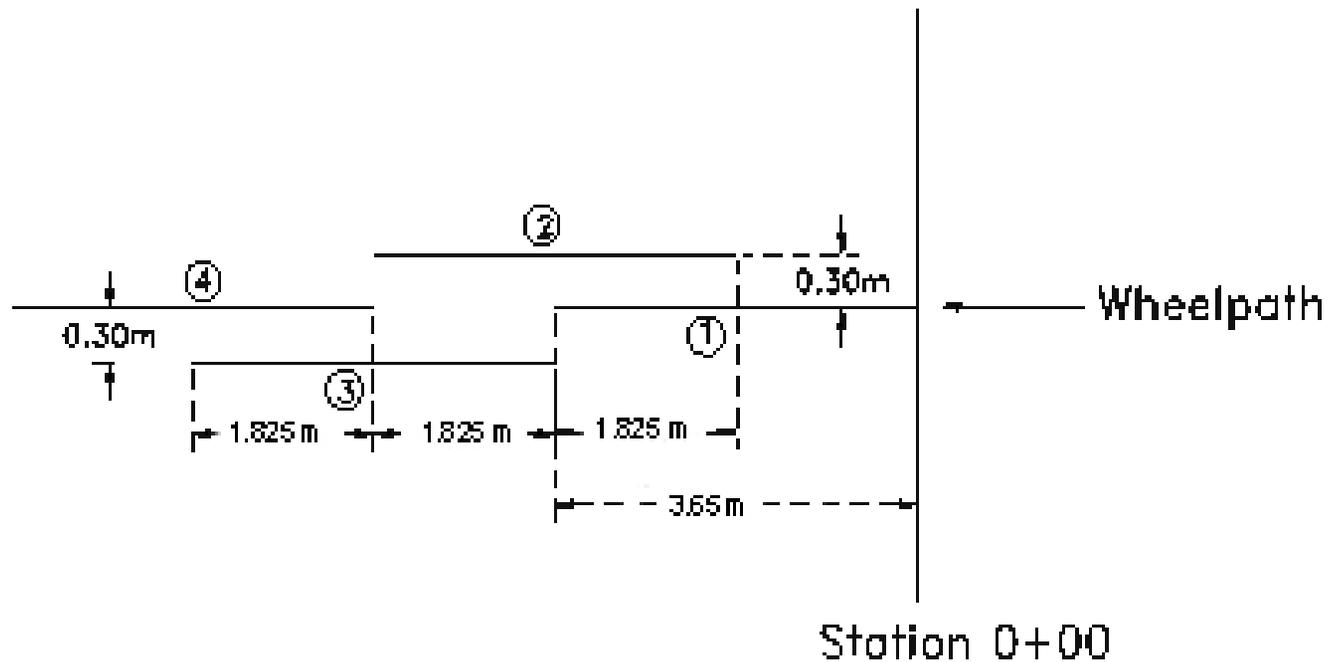


Pavement Smoothness

- Two types of dynamic loads
 - Long Wavelength
 - Short wavelength
- Two testing devices
 - Straight edge
 - Profiler



Straight Edge Test Pattern



Straight Edge in Use



LONG TERM
Pavement
PERFORMANCE

Profiler

- Measures relative elevations at 25mm intervals
- Sensors at both wheel paths
- Continuous coverage
- Left, right and center runs x 5





Profiler being prepped



What Have We Learned?

- Research weight data criteria are achievable
- Speed and temperature targets can be met
- “How smooth is smooth enough?” is an outstanding question



What Have We Learned?

- Training is needed for all participants
- A set of Go/ No Go criteria needs to be established

