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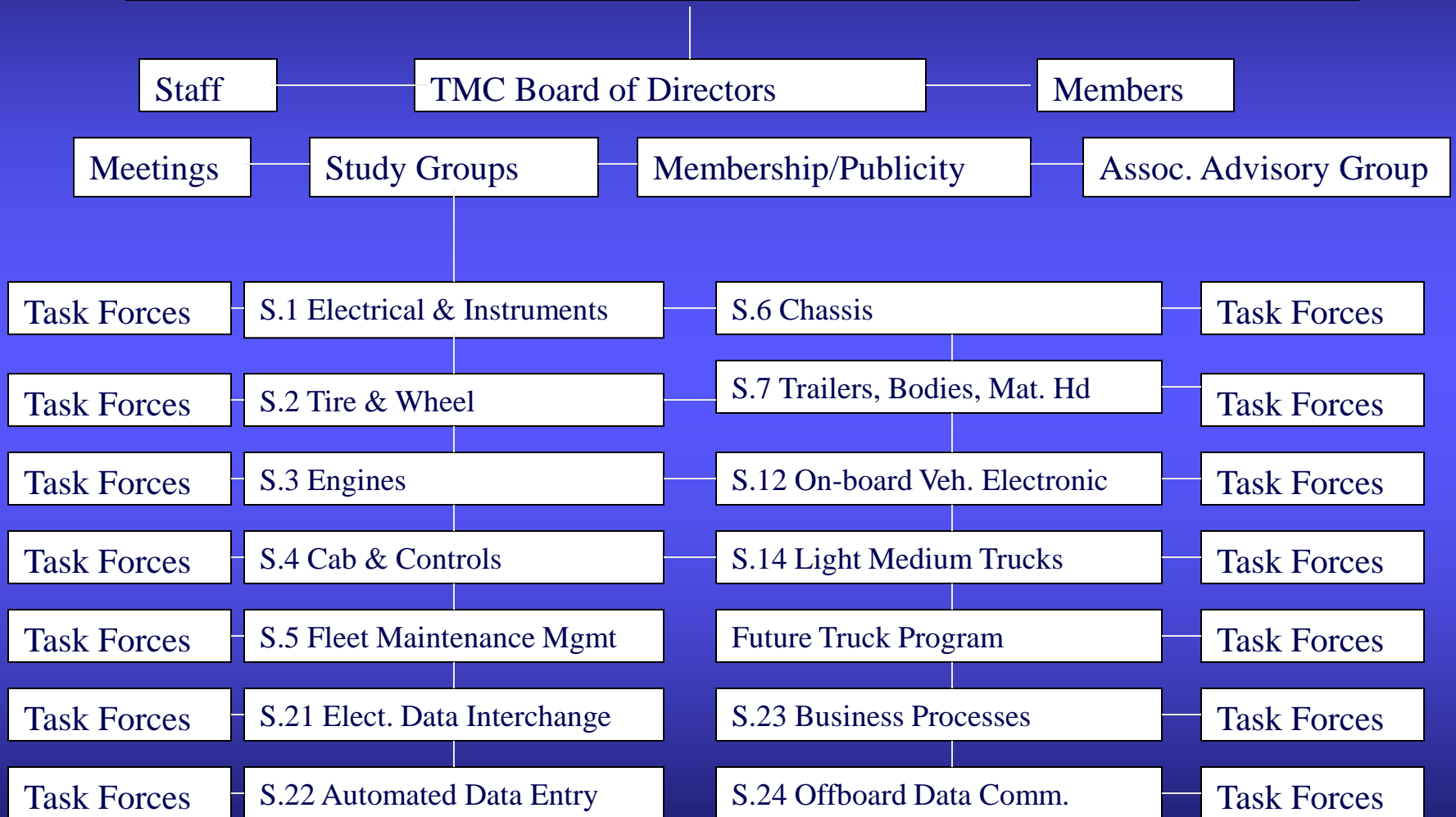
2002 Chairman of Technology and
Maintenance Council of The American
Trucking Association

Vice President of Maintenance for
Southeastern Freight Lines

Technology & Maintenance Council

Dedicated to the improvement of equipment and technology...

2200 Fleet members + 1800 Associate members = 4000 Members



Three Categories of Standards

- ✱ Mandated or Strictly Regulatory
- ✱ Cooperative standards between government and industry
- ✱ Purely Industry-driven standards

Prejudices and Myths of Standards

- ✱ Standards stifle innovation
- ✱ Standards turn a product into a commodity
- ✱ Standards put the consumer at the mercy of the manufacturer
- ✱ Standards merely establish the lowest common denominator

Positive Elements of Standards

- ✦ Standards provide economies of scale and lower the cost of production
- ✦ Standards facilitate buyer-seller transactions involving complex goods
- ✦ Standards provide alternatives to legislation

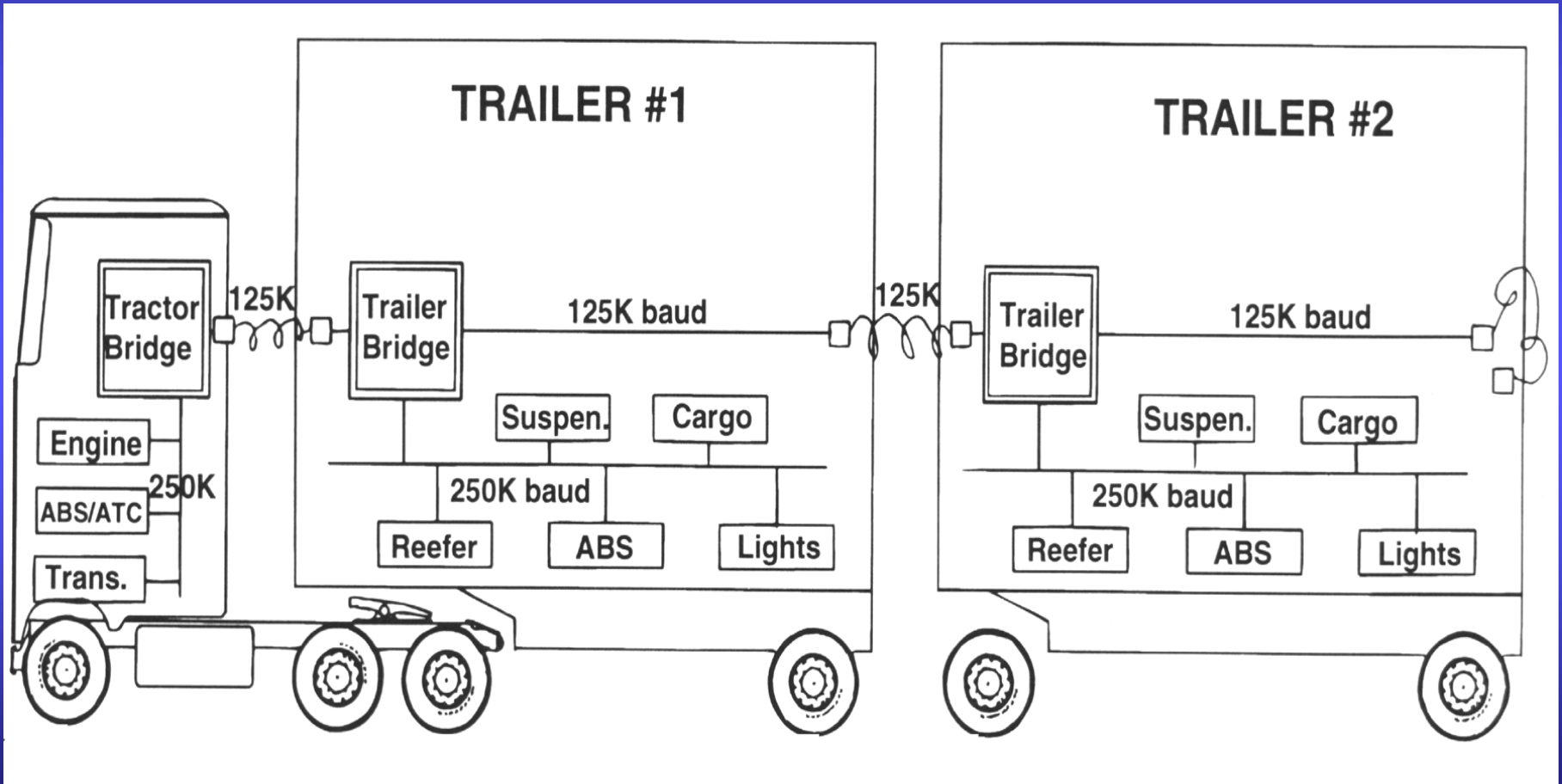
Cooperative Effort Between Government and Industry

- ✦ Example: Federal Highway Administration's Zero-based review
- ✦ Conflict Between Federal Motor Carrier Safety Regulations and Federal Motor Vehicle Safety Standards
- ✦ Federal Motor Carrier Safety Regulations written before the existence of NHTSA and Federal Motor Vehicle Safety Standards

Industry-driven Standards

- ✦ Successful implementation with electronic standards
- ✦ Standardization of electronics and diagnostics a must for fleets
- ✦ J1708/1587 dominate the industry today

Future Tractor-Trailer Communications Protocol (J1939)



Summary

Three Types of Standards

- ✦ Strictly Regulatory
- ✦ Cooperative Standards Between Government and Industry
- ✦ Industry-driven Standards

TMC/ATA Philosophy

- ★ “. . . if a proposed regulation is good . . . that is — if the public benefit exceeds the cost — we are bound by good faith to attempt to meet it.”

Vehicle Maintenance Reporting Standards (VMRS) Coding Convention.

Vehicle Maintenance Reporting Standards (VMRS) Coding Convention.

Establishes Universal Reporting Language for Industries Which Use Equipment.

VMRS Is the Trucking Industry's Common Shorthand for Equipment Maintenance Reporting

What is VMRS?

- ✦ VMRS Is More Than Just a Coding Convention for Parts.
- ✦ 56 Code Keys and 14 Instruction Sets Provide Standard Language for Identifying Equipment Specifications, Labor Functions, Parts Condition, etc.
- ✦ In Use Since 1970

VMRS Overview

The VMRS Coding Convention Consists of five systems of standard data codes.

- Vehicle / Equipment Master Record Codes
- Repair Order Codes
- Maintenance Facility Information Codes
- Manufacturer Codes
- Component Codes

Vehicle / Equipment Master Record Codes

- ✦ Identify and classify the characteristics of the functions and specifications of equipment.
 - Describes the equipment, its configuration, application, horsepower, etc.
 - Consists of 56 different datasets or “Code Keys.”
 - Easily Establishes a Vehicle “Birth Certificate.”

Repair Order Codes

- ✦ Consist of 5 Code Keys
 - Code Key 14 - Reason for Repair
 - Code Key 15 - Work Accomplished
 - Code Key 16 - Repair Priority
 - Code Key 17 - Repair Site
 - Code Key 18 - Technician Part
Condition Code

Manufacturer and Component Codes

- Code Key 33 -Component Codes
 - Describes equipment components
- Code Key 34 - Manufacturer/Brand Codes
 - Identifies manufacturers of equipment and replacement components

Code Keys 33 and 34 Most Widely Recognized Aspect of VMRS

Basic Requirements for Implementing VMRS

- Parts Codes are broken into three subsets
 - System Codes: Code Key 31
 - Describe the various operating systems of the equipment
 - Assembly Codes: Code Key 32
 - Describe the assemblies within the various systems
 - Component Codes: Code Key 33
 - Describe the specific parts within the assemblies

System Codes

- System Codes identify the various operating systems of the vehicle
 - Currently there are 99 different
 - System Codes: examples
 - 001 - Air Conditioning
 - 018 - Wheels, Rims, Hubs, and Bearings
 - 045 - Power Plant
 - 065 - Hydraulic Systems

Assembly Codes

- Identify and describe assemblies with a system
 - For System - 045 Power Plant
 - 045-001 - Front Covers
 - 045-002 - Cylinder Block
 - 045-003 - Crankshaft
 - 045-004 - Flywheel
 - ... etc. ...

Component Codes

- Identify and describe parts within assemblies
 - For System-Assembly
045-008 Power Plant-Camshaft
 - The Component Code for the idler gear would be: 045-008-014 Gear - Idler

15 Advantages to VMRS

★ **VMRS Is Easy to Use**

- ★ Designed for Shop Level
- ★ Useful for Management Level
- ★ Allows Shop Personnel to Communicate Accurately With Accounting Personnel Regarding Cost Information.

15 Advantages to VMRS

☀ VMRS Is Cost Effective

- ☀ Fleet Doesn't Have to Create Its Own Coding Convention
- ☀ TMC Maintains Standard, Makes Improvements.

15 Advantages to VMRS

- ✦ Follows Accepted Accounting Practices
 - ✦ Complies with Most Recognized Accounting Disciplines.
 - ✦ Uses Uniform System of Accounts.

15 Advantages to VMRS

★ VMRS Enables Sound Budgeting

- ★ Helps in Budget Preparation
- ★ Allows Accurate Equipment Forecasting and Parts Utilization
- ★ Helps Determine Labor Requirements

15 Advantages to VMRS

☀ VMRS Helps Control Costs

- ☀ Provides Detailed Records
- ☀ Allows Analysis of Parts and Labor
- ☀ Provides Repair History, and Offers the Basis for a Equipment Life Cycle Database

15 Advantages to VMRS

- ★ VMRS Improves Facility Management
 - ★ Codes for Complete Labor and Material Distribution
 - ★ Provides Data for Purchasing Decisions

15 Advantages to VMRS

- ✦ VMRS Tracks Labor Distribution
 - ✦ Codes for Direct and Indirect Labor

15 Advantages to VMRS

- ★ VMRS Helps Control Parts Inventory
 - ★ Provides Complete Details to Parts Use
 - ★ Makes Inventory Management Easier
 - ★ Provides Documentation for Inventory Tax Purposes

15 Advantages to VMRS

- ✦ VMRS Supports Warranty Claims
 - ✦ Ideal Audit Trail for Warranty Claims
 - ✦ Wide Acceptance by OEMs and Suppliers

15 Advantages to VMRS

- ★ VMRS Improves PM Programs
 - ★ Provides Means of Evaluating PM Programs (e.g., Intervals, Staffing, etc.)

15 Advantages to VMRS

- ✦ VMRS Helps Fleets Benchmark
 - ✦ Provides Data for Measuring Performance and Reliability of Equipment, Parts, etc.

VMRS Assists Equipment Replacement Decisions

- ✦ VMRS allows data gathering to support decisions concerning most cost effective vehicles and components for future specifications
- ✦ VMRS allows detail reporting of various equipment fleets to determine when vehicles should be replaced

VMRS: A Dynamic Standard

- ✦ VMRS Now Managed By TMC
- ✦ VMRS Changing to Meet Changing Needs of Trucking and Other Industries
- ✦ Latest Version—“VMRS 2000”
- ✦ First Major Upgrade in 20 Years.

A U.S. Operator's
Perspective of
Predictive Maintenance
versus Normal
Preventative
Maintenance

Preventative Maintenance vs. Predictive Maintenance

- ✦ Preventative Maintenance is maintenance based on manufacturers suggestions to cover worse case scenarios
- ✦ Predictive Maintenance is maintenance based on data gathered during operations of the equipment

Predictive Maintenance Required Data

- ✦ Vocational Fleets
- ✦ Matching Vehicles
- ✦ Identify Component
(SYS-45 Assembly-008 Part #014)
 - ✦ Number of units in fleet
 - ✦ Like vocation

Predictive Maintenance

- ✦ Evaluate Components
 - ✦ Average Utilization
 - ✦ All components average replacement utilization
 - ✦ Why replaced (Reason for Repair and Failure Code)

Predictive Maintenance

☀ Field \ Computer Input

☀ Part Analysis

- ☀ Reason for Repair and Failure Codes

☀ Data Analysis

- ☀ Utilization and Vocation

☀ Organize data through VMRS

Predictive Maintenance for Forklift Timing Belts

71 total forklifts in fleet

23 units had timing belt replaced

14 belts replaced with Failure Code 099
(manufacturers recommendation)

9 belts replaced with Failure code 044
(worn per technician)

All parts evaluated for extended running

Predictive Maintenance

- ✱ 3000 hours – Manufacturers recommended replacement for timing belt
- ✱ 6000 hours – Extended replacement hours based on data gathered

Predictive Maintenance Savings

Cost Savings of Predictive vs. PM Maintenance
 18,000 Estimated Forklift Life Hours

6,000	Belt Life \ Hours	3,000
71	lifts	71
<u>X \$179.18</u>	parts & labor	<u>X \$179.18</u>
<u>X 3</u>	belt changes	<u>X 6</u>
\$38,165.34	U.S. dollars	\$76,330.68
\$91,688.03	New Zealand	\$183,376.06

Is The Effort Worth It?

Only you can decide if the cost of implementing predictive maintenance can be offset by the savings generated by doing less maintenance. Each company and fleet are different.