



Mechanical Reliability & Productivity

Barry Kanuch, Chief Mechanical Officer

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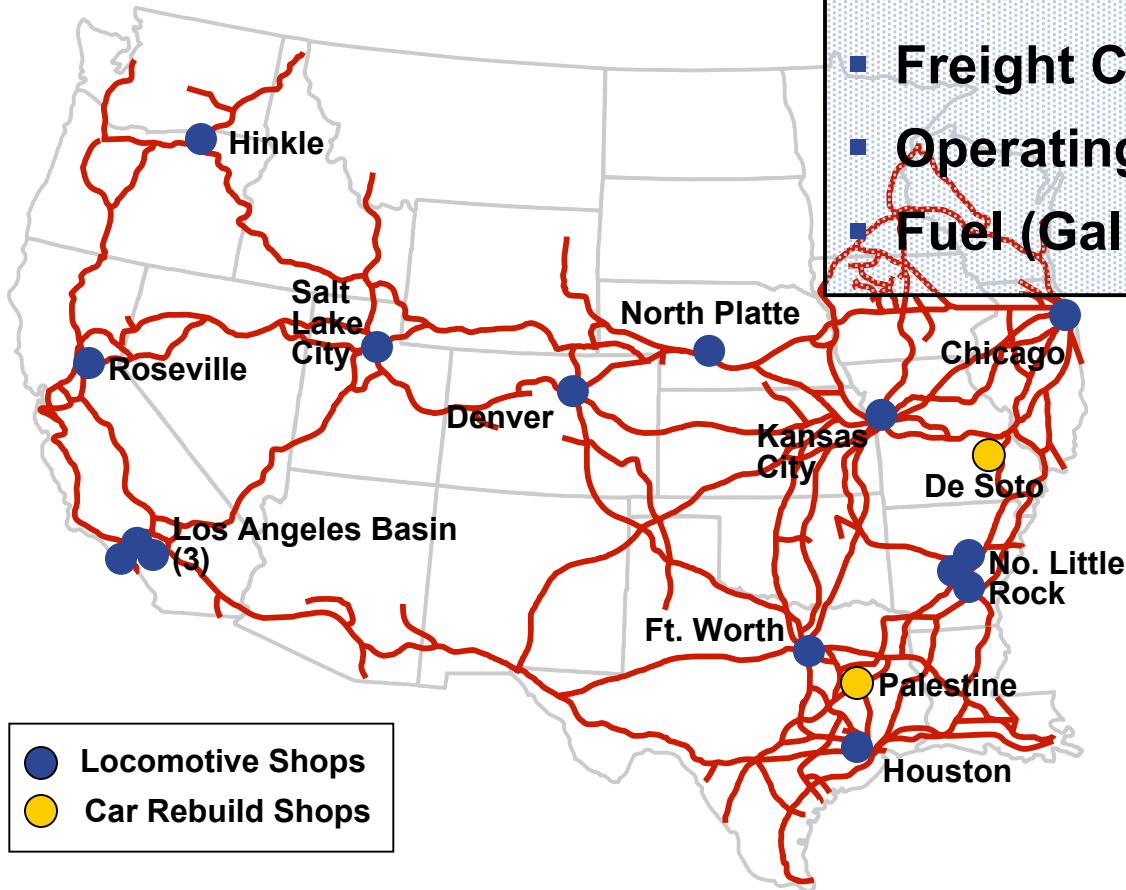


Mechanical Overview

Service, Maintain, Repair and Rebuild

As of 12/31/07

- Mechanical Workforce 9,000 +/-
- Locomotives 8,700+
- Freight Car Inventory 300,000+
- Operating Budget \$1.6 Billion
- Fuel (Gallons) 1.3 Billion



- Locomotive Shops
- Car Rebuild Shops

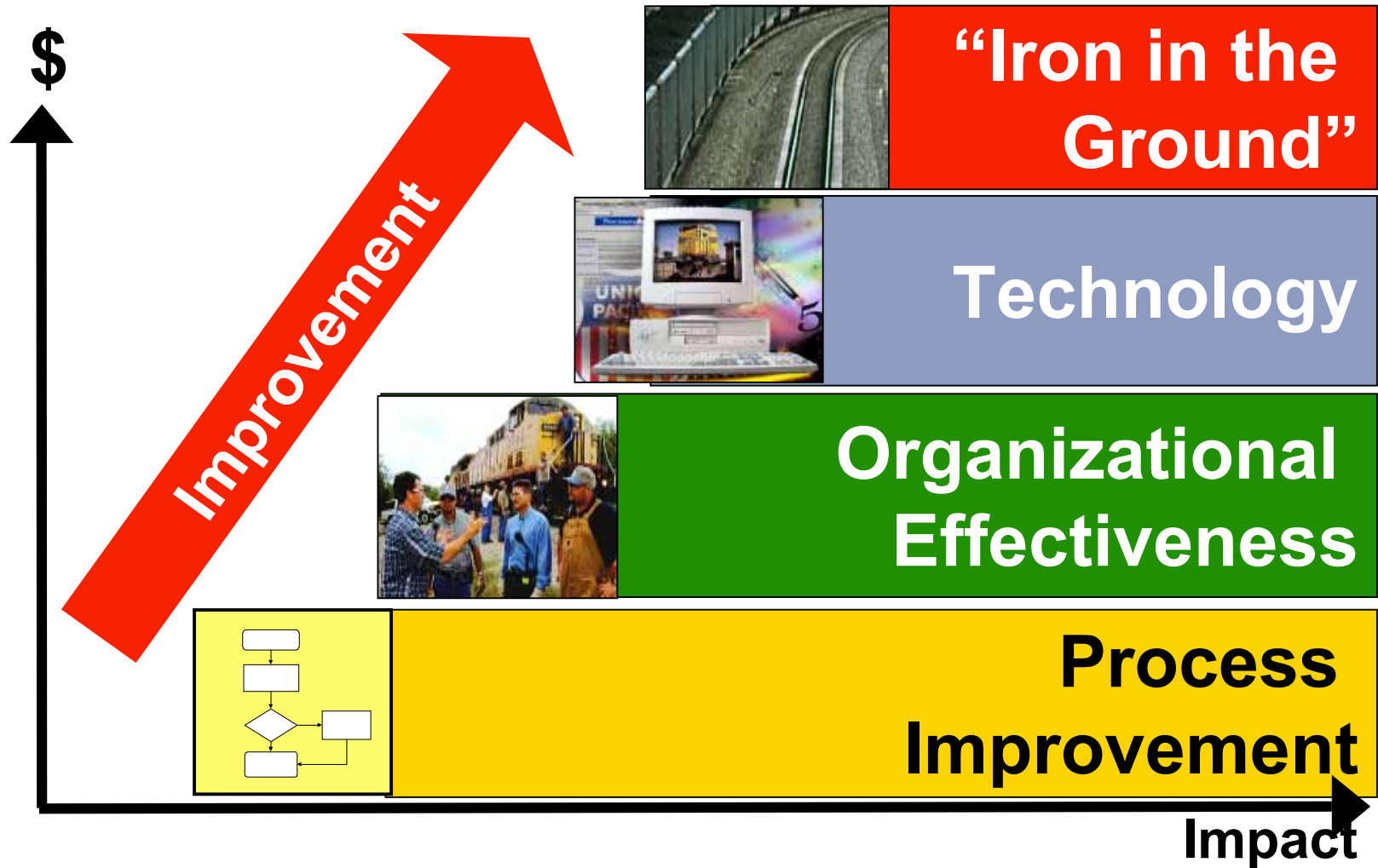
Mechanical Strategy

Conference Topics

- People
- Safety
- Reliability
- Asset Utilization
- Leverage Technology



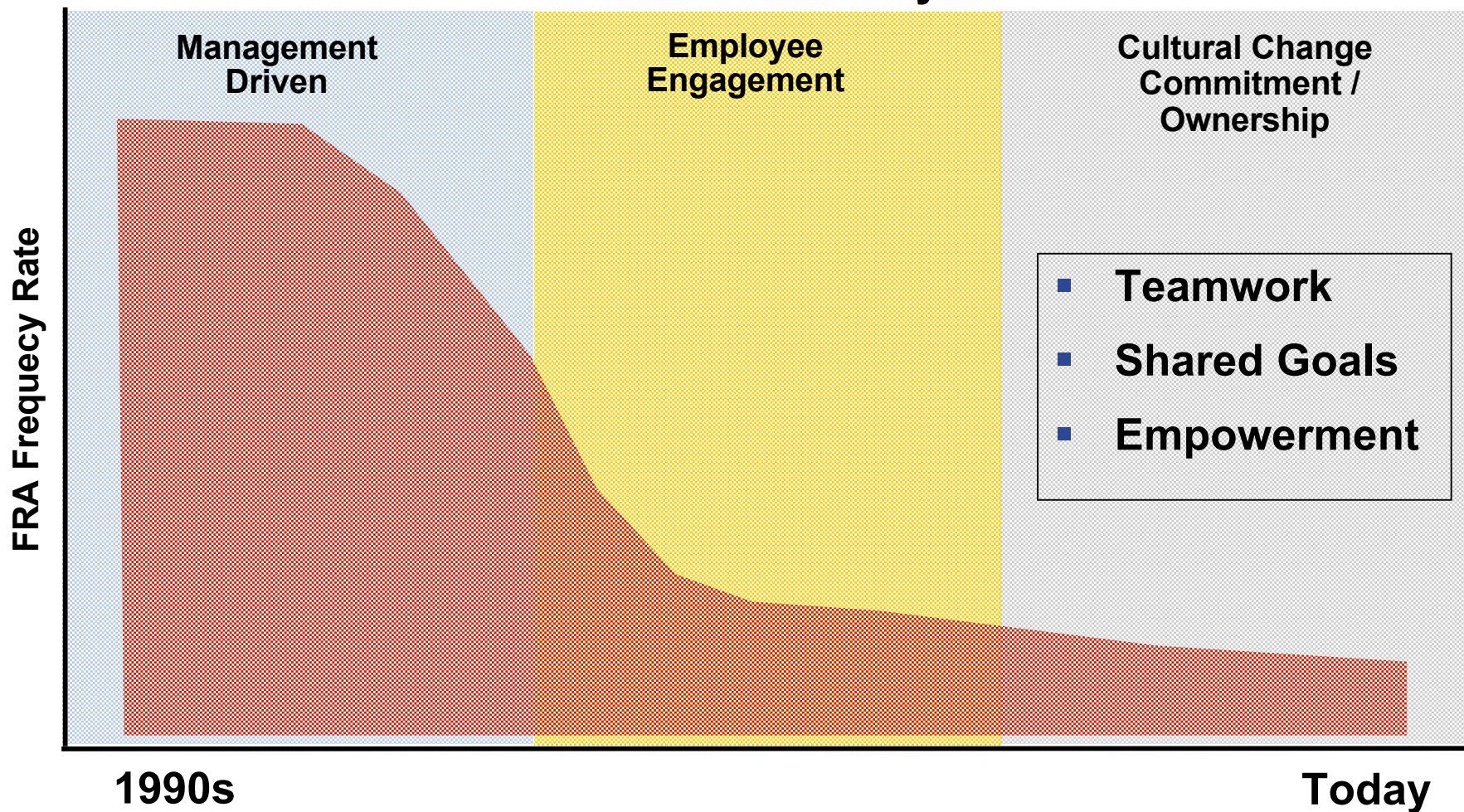
Improvement Hierarchy



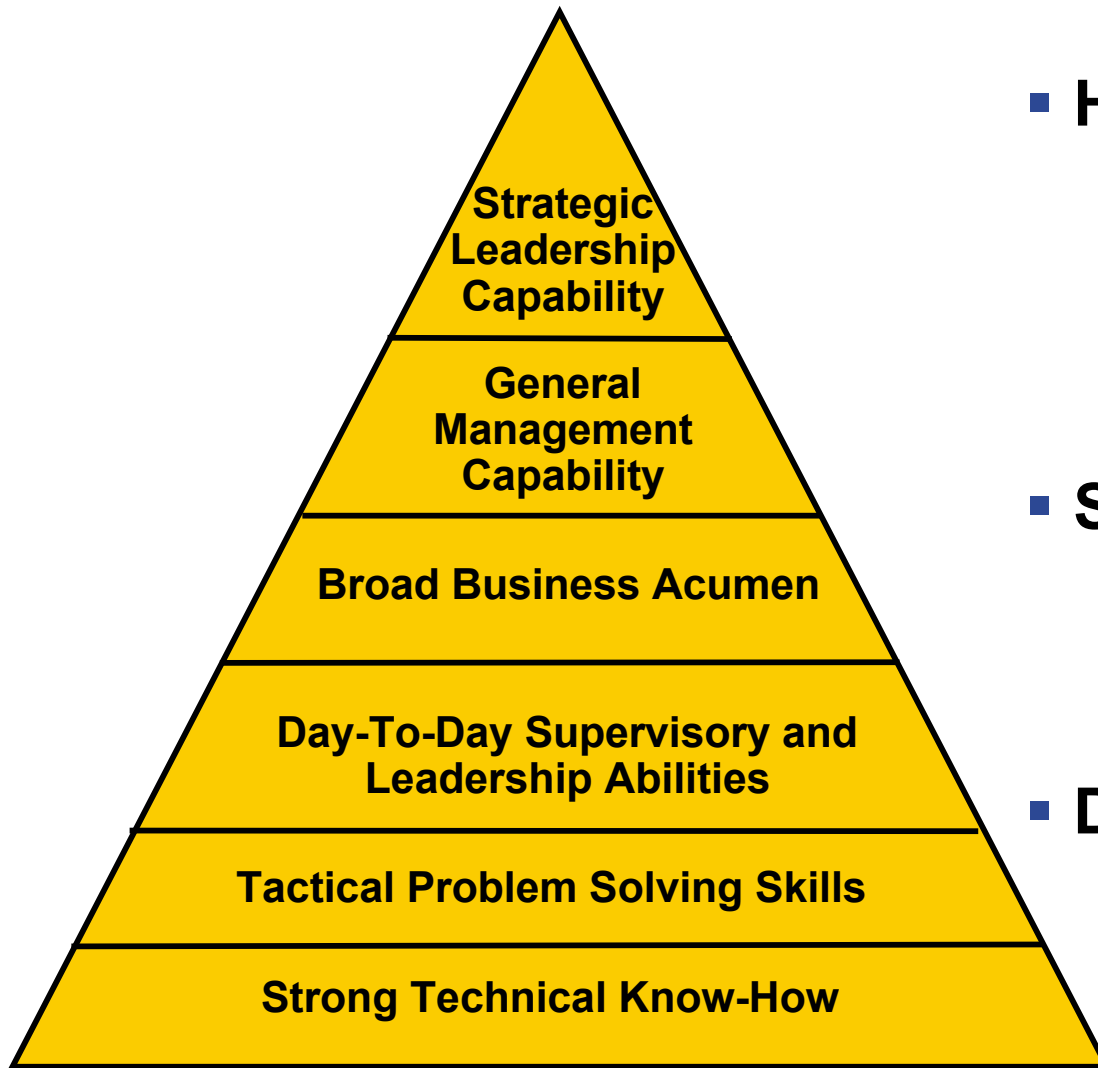
Our Culture Drives Our Business Safety

Union Pacific Mechanical Employees

Behavior Based Safety Process



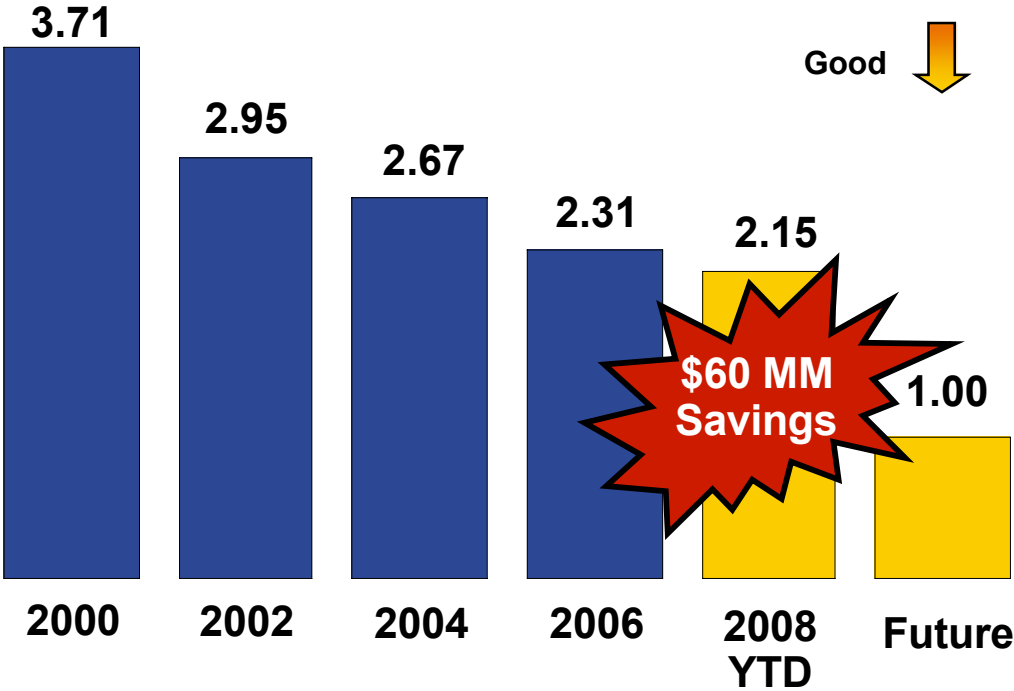
Our People are a Competitive Advantage



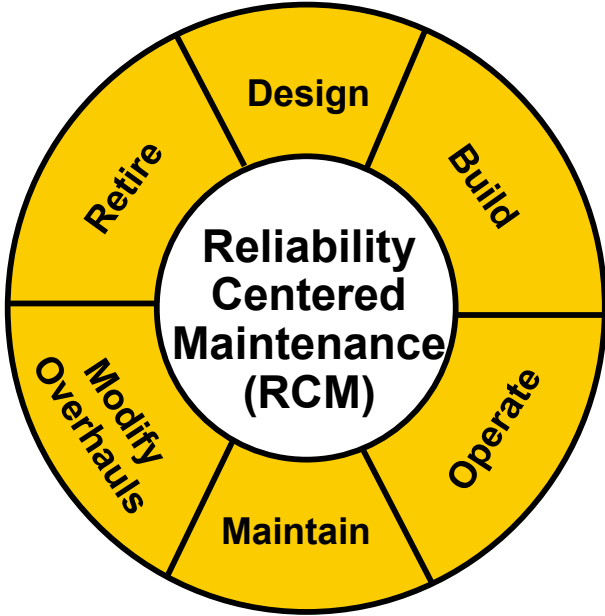
- **Hire the Best**
 - **Community Colleges**
 - **Technical Exams**
 - **College Hires**
- **Strong Technical Skills**
 - **“Super” Technicians**
 - **New Training Program**
- **Develop Strong Leaders**
 - **Supervisor “Degree” Program I & II**

Locomotive Reliability

Road Failures per Locomotive Year (FLY)



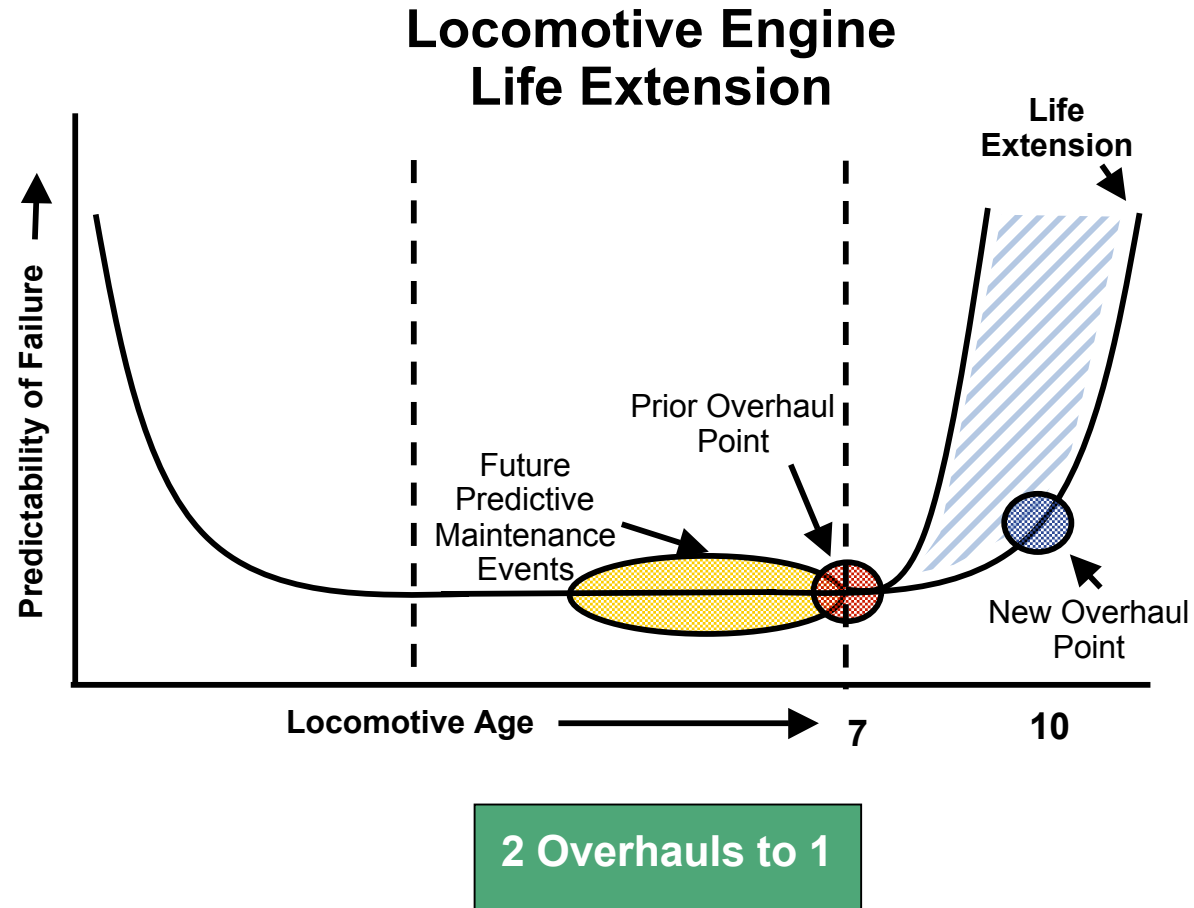
Life Cycle Cost



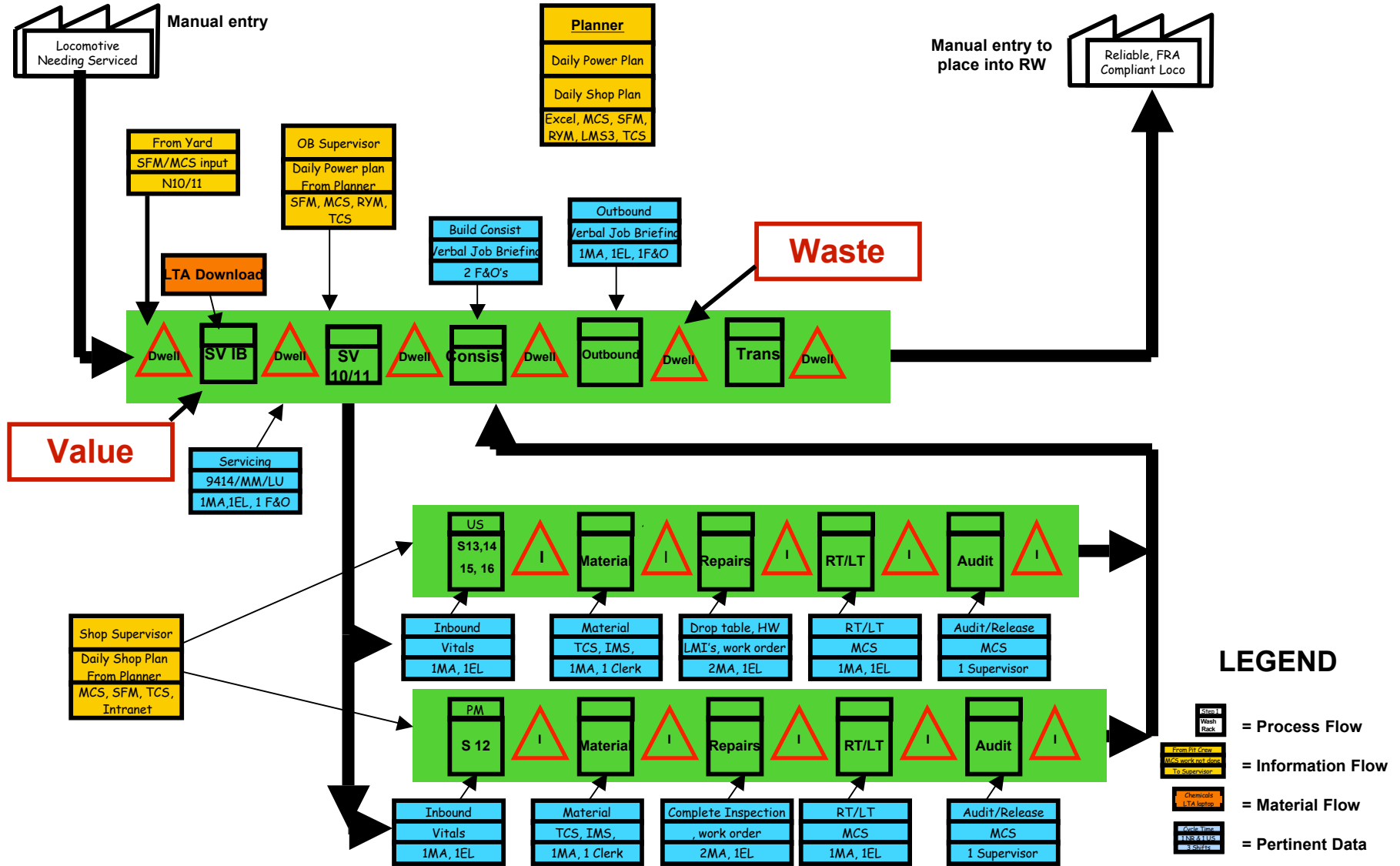
Locomotive Reliability

Maintain for Reliability

- Reliability Centered Maintenance (RCM)
 - Weibull Based Failure Analysis
 - Lifecycle Analysis
 - Reactive to Predictive

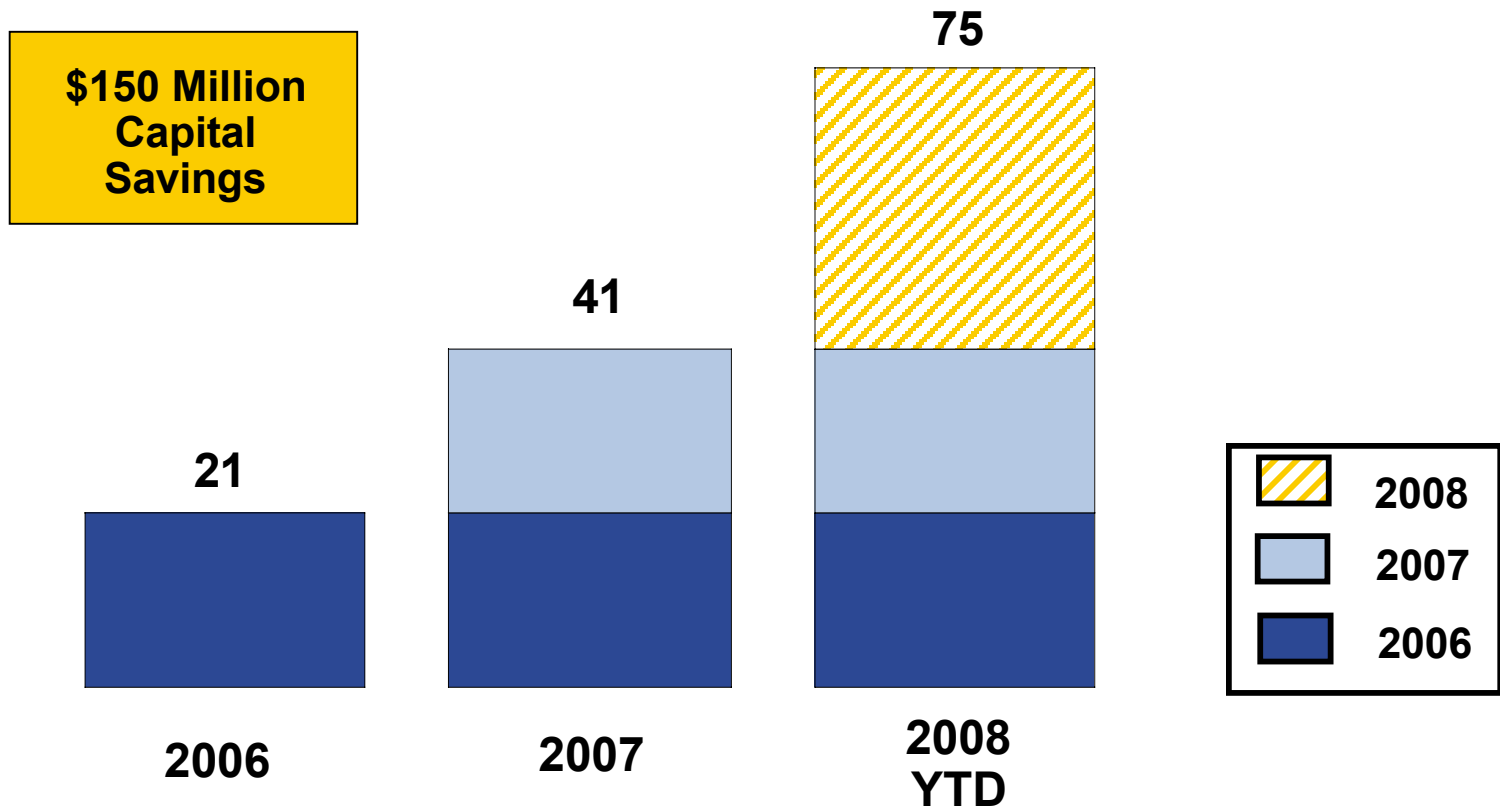


Locomotive Shop "Value Stream" Map



Asset Utilization

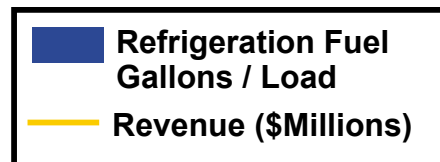
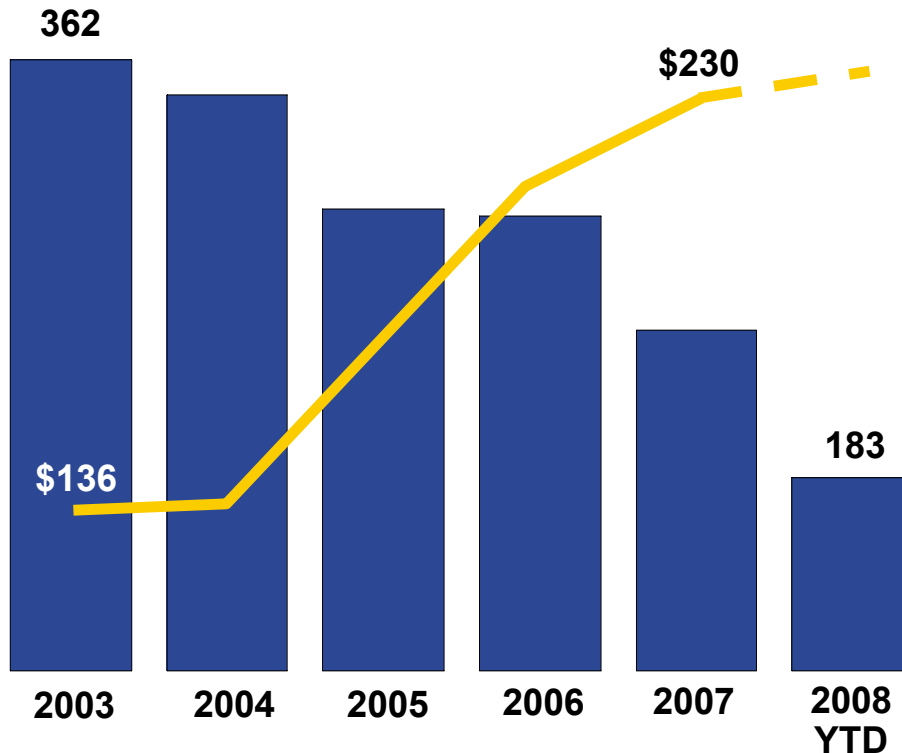
Locomotives Generated from Improved Repair Cycle Time



Asset Productivity

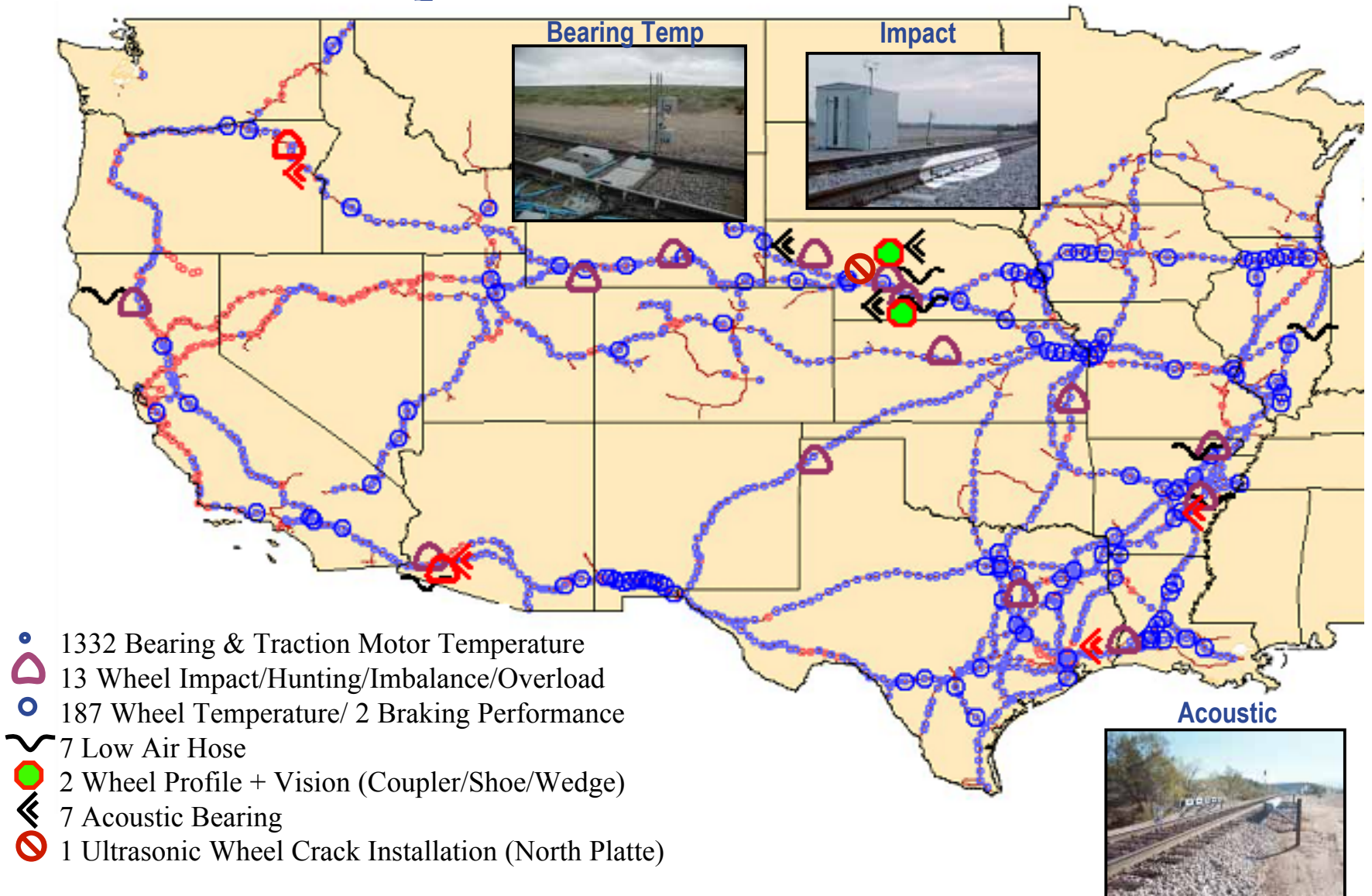
Refrigerated Box Cars

Improving Fuel Efficiency



- Remote Monitoring
- Remote Start/Stop
- Improved Customer Service
- Reduced Mechanical Inspections

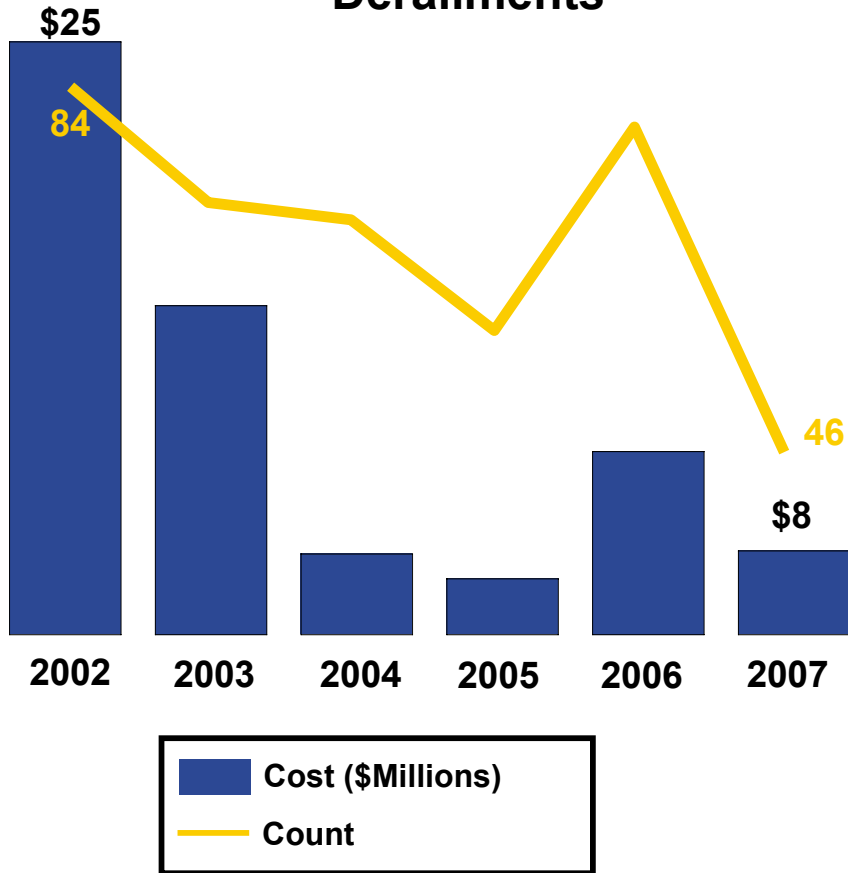
Network Wayside Detection



Freight Car Productivity & Reliability

Training and Technology

Mechanical Caused Main Line Derailments



- Wayside Detection
- Employee Training
- In Train Repairs

Strategic Sourcing – Project OR

Total Cost of Ownership (TCO)

- External Factors

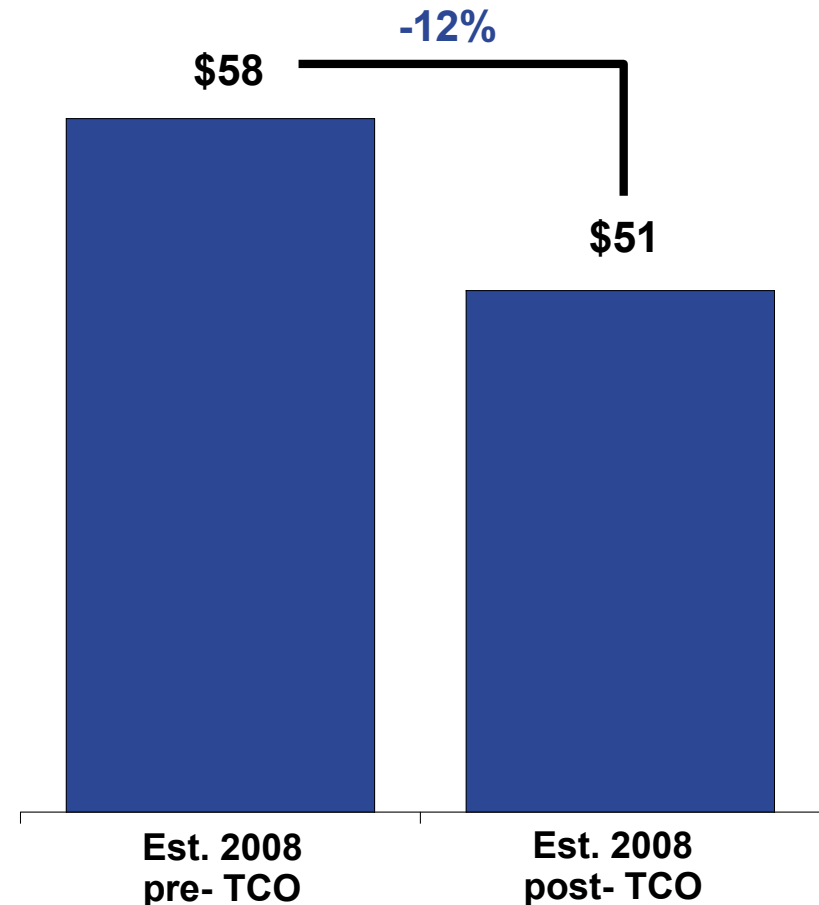
- Rising Commodity Prices
- Increased Demand / Smaller Supplier Base

- Internal factors

- Total Cost of Ownership (TCO)
- Predictive Maintenance vs. Reactive

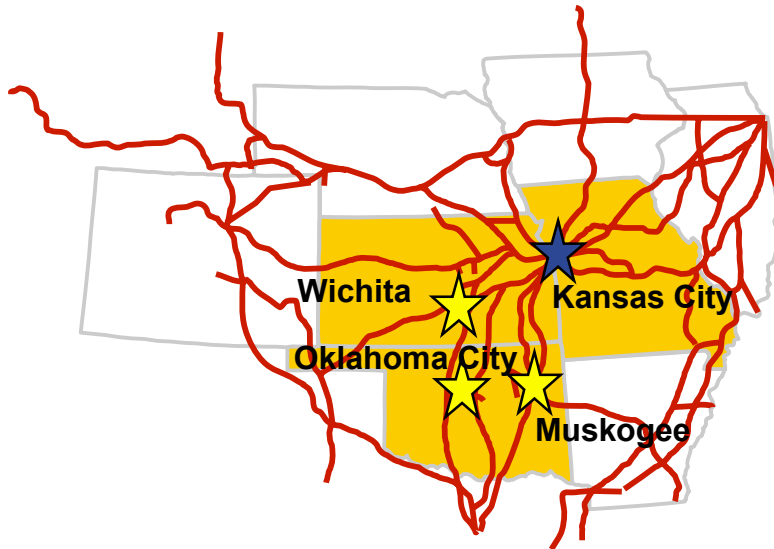
- Supplier Quality and Development

Engine Lube Oil (\$Millions)



Capital Efficiency

Locomotive Service Pits



- ★ New Locomotive Pit
- ★ Major Shop

- Incremental Capital Investment
- Reduces Locomotive “Out of Service” Days
- Additional Fuel Savings
- 18% Return on Investment from Completed Locations

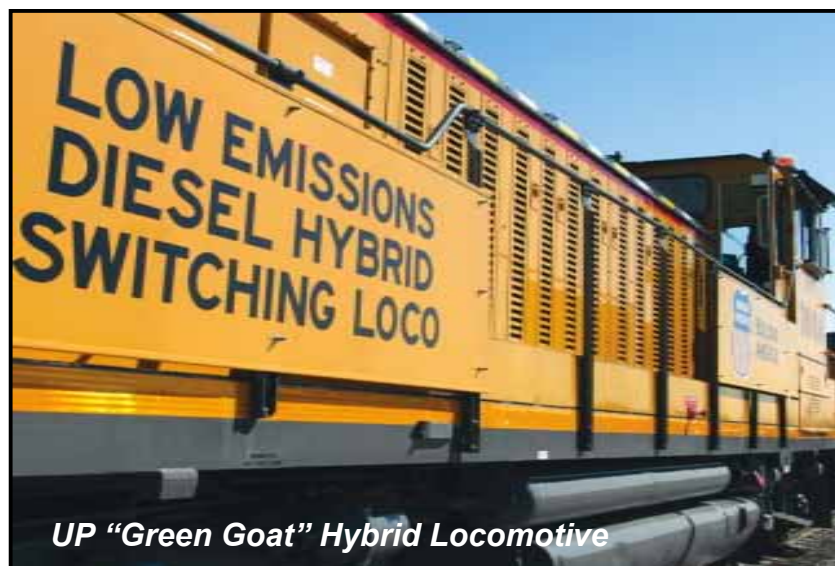
Locomotive Technology

Reducing Emissions

- Emission Overview
- 21 Hybrid and 163 “Gen Set” Locomotives*
- 830 EPA Tier 2 Locomotives*
- 59% of Fleet EPA Certified*
- Future Regulations



UP “Gen Set” Locomotive



UP “Green Goat” Hybrid Locomotive

Freight Car Technology

Electronically Controlled Pneumatic Brakes (ECP)

- **Intermodal Pilot**
 - **Fall 2008 - Sunset Corridor**
 - **10 Locomotives and 2 sets of 125 intermodal cars**
- **Items to Evaluate**
 - **Fuel and Emission Impact**
 - **Maintenance Expenses**
 - **Train Handling/Braking**
 - **Run Times**
 - **Train Inspection**
 - **Train Line Distributed Power**



Summary

- **Safety**
- **Employee Engagement**
- **Workforce Strategy**
 - **Sourcing/Development**
- **Reliability/Utilization**
- **Emissions**
- **Leverage Technology**

Create Value

