



How tomorrow moves

Lean Six Sigma... Fuel Consumption Matters



## TRANSPORTATION

### COMPANY OVERVIEW

- ❑ Leading transportation supplier in the US.
- ❑ Headquartered in Jacksonville, Florida.
- ❑ Provides traditional rail services.
- ❑ Network of 21,000 route miles of track in:
  - 23 States • District of Columbia • 2 Canadian provinces
- ❑ Operation:
  - 1200 trains per day • 20,000 carloads per day
  - 4,000 locomotives • 80,000 freight cars

### BUSINESS OPPORTUNITY

- ❑ Fuel = 10% of operating expenses.
- ❑ Fuel prices were skyrocketing.
- ❑ CSX locomotives left idling when not in use.

#### Wasted Fuel due to Idling Locomotives

4 gallons of fuel per hour, 30 Million gallons per year

CSX Average Idle Time (hours) =>

Weekdays	12
Weekends	14 - 16

#### Impact of Long Idling

- Engine leaks
- Increased maintenance costs

#### Solution Identification

- Decrease fuel consumption from idling
- Reduce associated maintenance costs

### PROCESS IMPROVEMENT METHODS

#### CSX 2004 Locomotive Shutdown Project

##### Current State Assessment – Determine Idling Fuel Wastage

Historical Idle Times • Locomotives in Transit • Gallons per hour when Idling  
 CSX Shutdown Rules • Benchmarking of Other Railroad Shutdown Practices

##### Analytical Tools – Assess Impact of Project on Stakeholders

FMEA • Change Acceleration Process Tools • Driver Trees • Questionnaire  
 Define, Measure, Analyze, Improve & Control (DMAIC)

##### Stakeholders – Launch & Champion Project & Allocate Resources

Senior Leadership • Locomotive Management & Shop • Finance • Purchasing  
 Transportation Management • Train & Engine Departments • Environmental

##### Lean Six Sigma – Assess Likelihood of Project Success

Impact on Existing Initiatives & Customers • Projected Benefits & Savings

### ROOT CAUSE IDENTIFICATION

#### Root Cause Analysis – FMEA with Cause & Effect Matrix

- Identify important stakeholder issues.
- Relate inputs to customer requirements.
- Prioritize potential root causes.

#### Root Cause – CSX Fuel Shutdown Rules

- 1) Shutdown if not in use for 30 minutes and
- 2) Ambient temperature is above 40° F.

### SOLUTION IMPLEMENTATION

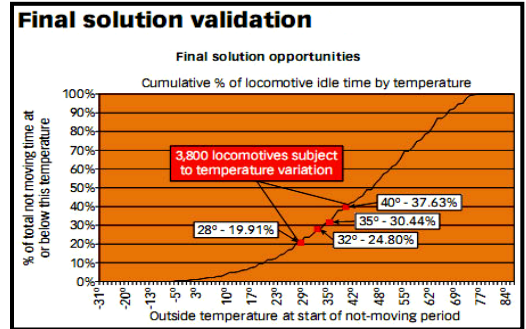
- ❑ Other railroad companies supported:
  - 1) Lower shutdown temperatures
  - 2) Shorter time thresholds

#### 1% Change in Shutdown Performance Generates

- 500,000 gallons of fuel annually
- \$1 million in savings

#### CSX Fuel Shutdown 2 Rule Change

- 1) Decrease shutdown temperature from 40° F to:
  - 28° F at 24/7 manned locomotive shops
  - 35° F for all others
- 2) Reduce time threshold to 15 minutes.



### RESULTS

- ❑ **Cost Savings of \$3.6 million in 2004.**
- ❑ **\$28 million in Cost Savings over 3 years.**
- ❑ Fuel savings of more than 14 million gallons.
- ❑ Reduction of 650,000 barrels of a non-renewable resource.
- ❑ Invitation to join the EPA greenhouse gas initiative.