

Rolling Stock Maintenance Fiscal Challenges for Rail Operators

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The Riding Public Expects Vehicles That Are:

- On time
- Warm in winter
- Cool in summer
- Available in sufficient numbers that minimize headways (Waiting)



Challenges to Keeping a State of Good Repair

- Increasing average fleet age
- Increased competition for State and Fed funds
- Mandates for upgrades, both funded and unfunded



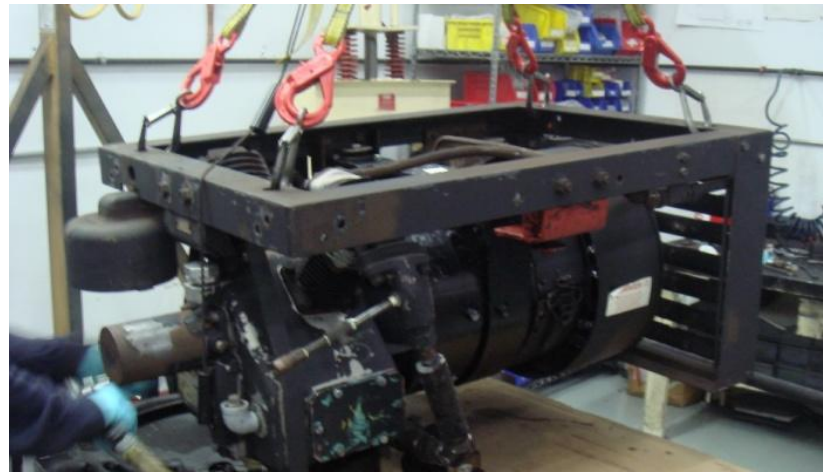
Who are the Stakeholders?

- The Agency / Operator
 - Management
 - Labor
- Funding Provider
 - Fed, State and Local
- Vendors / Suppliers
- End Users
 - Operations and Maintenance
 - The Customer



Long-Term Maintenance Strategies

- RCM – Reliability Centered Maintenance
- System replacement programs (SSRP, SRS, SMS etc.)
- Traditional Mid-Life Overhauls
- Run to Failure



Approaches to Fleet Management

- In-House Programs vs. Outsourced Efforts
 - Full Scale Program (all systems)
 - Selected Systems (scaled back to defined scope)
- Resolution of Issues
 - Repair Existing in Kind
 - Develop, Test, and Procure new solutions or technologies



Areas of Focus

- Safety
- Obsolescence
- Reliability
- Economies of Scale Points
- Materials Consolidation
- Product Improvements
- Amenities / Nice to Have's

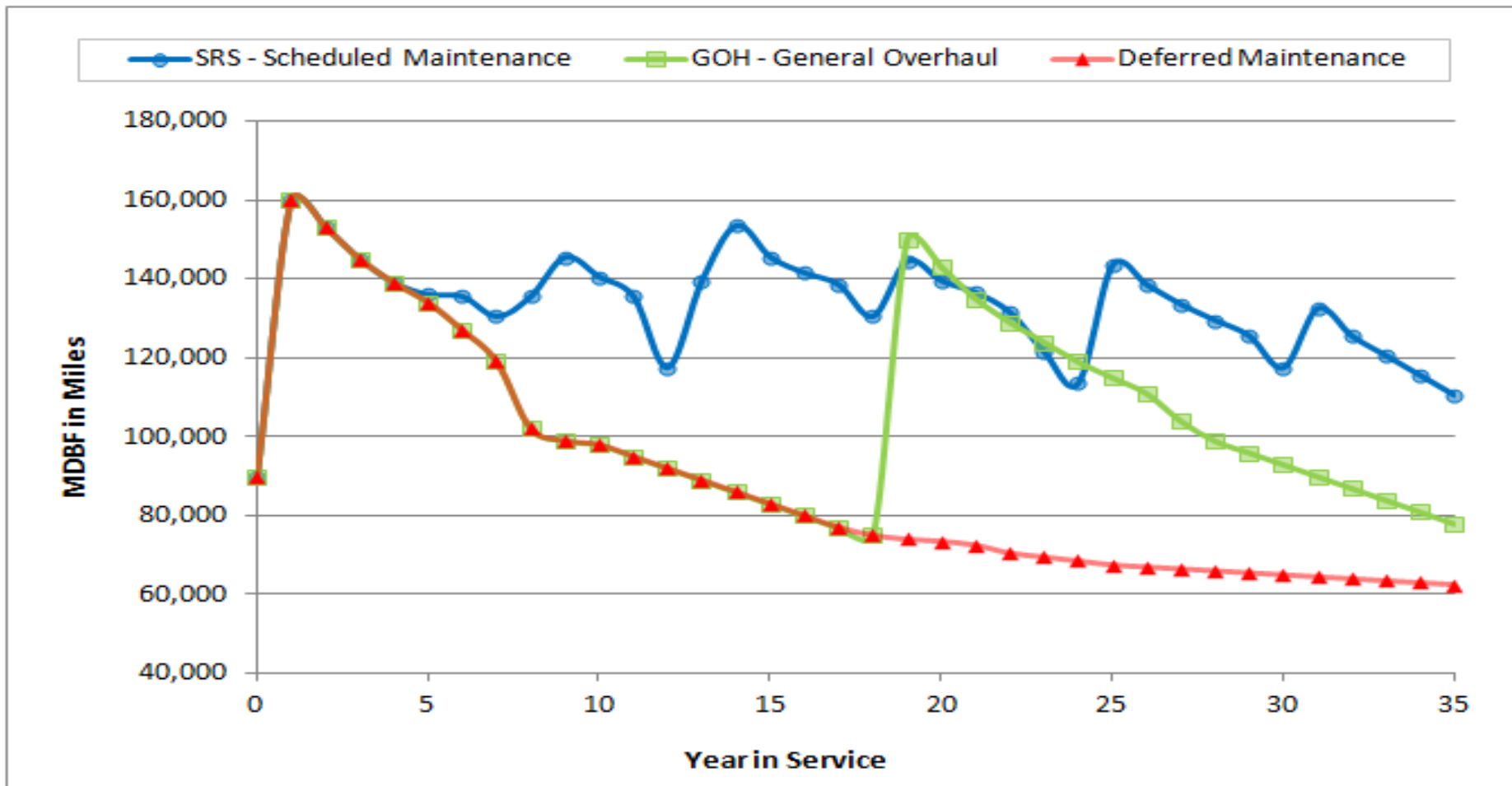
What is Right for Your Organization?

- What Matters Is:
 - Understanding the benefits / limitations of the method chosen
 - Taking the time to lay the foundation
 - **Commitment to the plan** by all parties at all levels

Successful Implementation will result in

- Establishment of Safe Minimum Levels of maintenance
- Eventual reduction of labor costs
- Increased asset reliability, availability and service life
- Greater risk awareness for management and staff

What this looks like



Maintenance Strategy Options

- Scheduled Maintenance
- General Overhaul (GOH)
- Deferred Maintenance (D/M)

Scheduled Maintenance

- Perform scheduled car inspections in conjunction with a component overhaul program at periodic cycles
- Also called SSRP (MBTA) SMS (NYCT), SMP (BART), RCM (LIRR/MNR), etc.

General Overhaul (GOH)

- Perform scheduled car inspections in conjunction with a comprehensive overhaul at the midpoint of a car's life
- Also called mid-life overhaul

Deferred Maintenance (D/M)

- Perform scheduled car inspections in conjunction with reactive campaigns
- Also called 'run-to-failure'

Impact of Method Choice on Cost Per Car

| | PM Costs | Corrective Maintenance | Spare | Total Cost (nom.) | Total Cost (NPV) |
|-----|---------------------|-----------------------------------|--------------|----------------------------------|-----------------------------|
| SMS | \$946,932 | \$347,640 | \$55166 | \$1,349,738 | \$749,670 |
| GOH | \$1,076,578 | \$488,948 | \$78,228 | \$1,643,754 | \$879,390 |
| D/M | 0 | \$2,118,796 | \$321,360 | \$2,440,156 | \$987,188 |

**(adjusted for inflation, Non FRA Required)*

Goal of a Maintenance Program

Is to focus economic resources on equipment(s) that will cause the greatest interruption to the operation should it fail

Key to Success:
Identify Preventable Failures

Risks Associated with Equipment Failures

Recognize 3 Primary Risks from Equipment Failures.

Safety
Operations
Budget



Environment

Environmental impacts are a subset risk of the Primary 3

Advantages of a Long Term Maintenance Program

- Funding spread over multiple FY budgets
- React rapidly to undesirable failure modes
- Potential for reduced labor costs
- Minimizes impact to vehicle availability
- Can and should reduce overall Life Cycle Costs
- Maintain control and adjust for changes in the operation

Disadvantages of a Long Term Maintenance Program

1. Significant upfront costs for:
 - Evaluating / Developing each component in the workscope
 - Training
2. Savings not immediately seen by Senior Management
3. Commitment to an Ongoing Process by Everyone, Everyday!
4. Plan must be flexible enough to be sustainable when unexpected changes in priorities, management and facility infrastructure occur

Conclusion

1. Workscope and internal capabilities will shape method choices
2. If done well, lower maintenance costs, increased performance indicators and extended vehicle life can be expected
3. **Commitment is Key!**

Discussion / Q&A

