

Impact of Reliability Centered Maintenance Program

**Long Island Rail Road
&
Metro-North Railroad**

Maintenance of Equipment

Objective

- Describe the success of the MNR/LIRR Reliability Centered Maintenance (RCM) goals for protecting the M7 fleet's reliability and availability
- Describe Critical Components of the RCM process
- Describe Common Goals & Opportunities
- Demonstrate RCM effectiveness
- Discuss Future Challenges

Reliability Centered Maintenance (RCM)

What is it?

A maintenance strategy to maximize vehicle availability while simultaneously minimizing material and labor costs as well as unscheduled repairs.

- Maintain Vehicle through-out design life
 - Protect Capital Investment over 35 Years
- Maximize fleet reliability and availability
 - Improve OTP and Consist Compliance
- Minimize life-cycle cost
 - Strategic uses of Capital and Operating resources

Critical Components of RCM

- **Regulatory Safety Inspection Compliance**

FRA regulations for Air Brake, Event Recorder, ATC, etc.

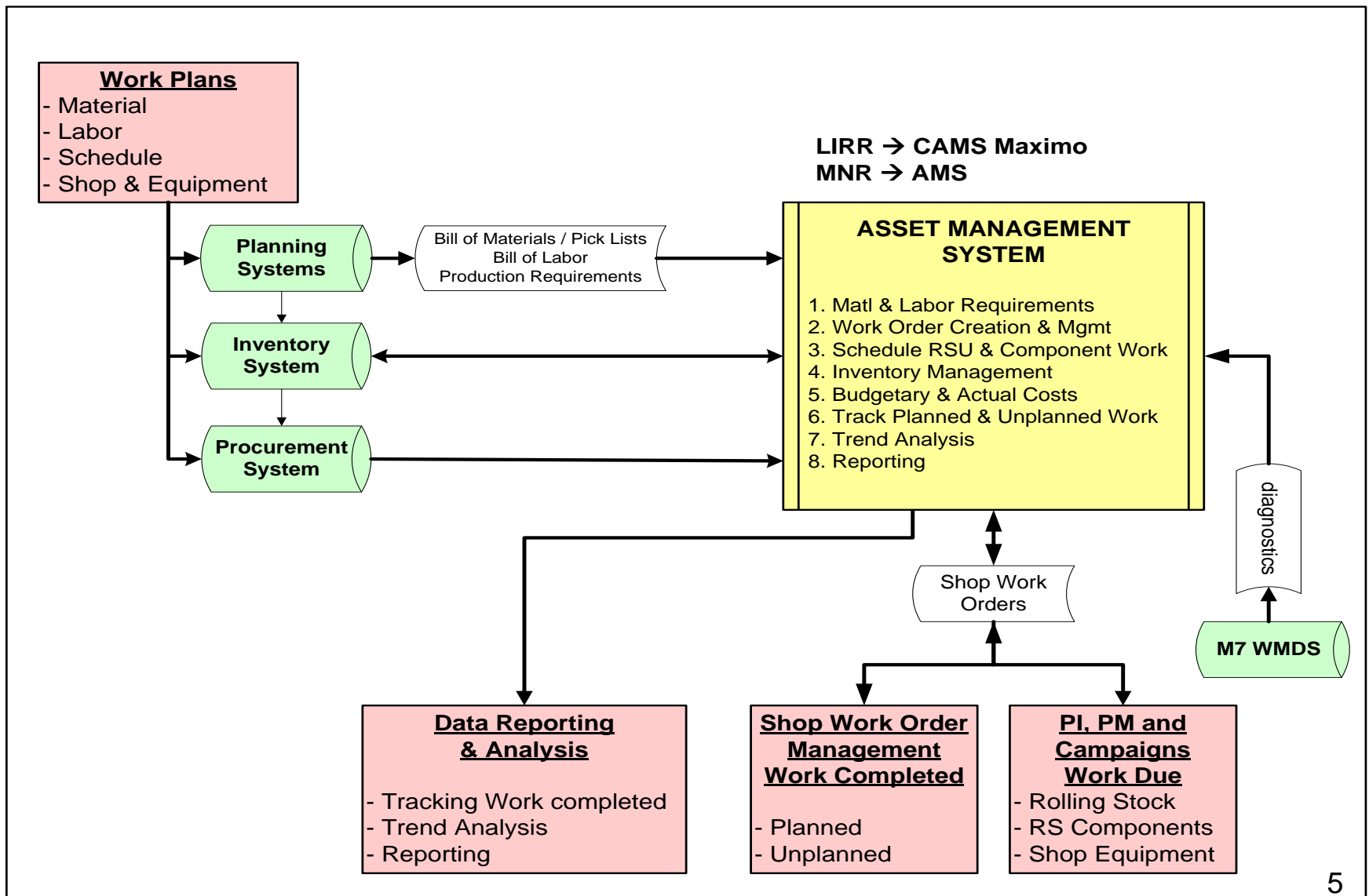
- **Periodic Inspection & Maintenance**

*Cyclical Car-Level Maintenance performed during Calendar Day, 45-Day, 60-Day, 92-Day, 180 Day, 1-Year maintenance events. Performed at equipment maintenance facilities with **basic resources**.*

- **Planned Long Term Maintenance**

*Higher System-Level Maintenance performed when components reach end of useful life and require either overhaul or replacement. Performed at equipment maintenance facilities with **enhanced resources**.*

Asset Management Systems & RCM Process



Common Goals & Opportunities

- **Ongoing Life-Exploration**
Systems and Components are evaluated to establish rates of wear in order to determine when they require overhaul or replacement
- **RCM Review of Maintenance Effectiveness**
Ongoing review of trends, component condition and reliability, failures, and shop efficiency
- **LIRR/MNR Joint RCM Task Force**
Sharing of RCM, Engineering and Trend Analysis
- **Condition Monitoring Systems**
Ride Quality Meter, Vibration Analyzer, Acoustic Bearing Tester
- **Design Modifications**
When Components are identified to require a design change to improve component reliability or extend useful life

LIRR - RCM Program Effectiveness

LIRR M-7 RCM Interval Optimization & Cost Avoidance

System	Mac Interval	RCM Interval	Cost Reduction	Comments
AIR BRAKE VALVE C/O	3 year	6 year	\$3,098,846	Age Exploration Waiver
3 , 6 YEAR ASU	3, 6 year	3, 3, 9 yr.	\$323,568	Desiccant c/o at 3 yr., Overhaul at 9 yr. due to teardown anlysis and inspection.
Relay C/O	5 year	8, 12 year	\$1,033,767	Split from 116 relays to 36 at 8 yr. 80 at 12 yr. due to tear down analysis & inspection.
HVAC	5 year	10 year	\$1,975,968	BOM Reduction and Interval Change due to tear down analysis & inspection.
Aux Power	5 year	6, 12 year	\$1,300,194	Replace bearing on A1556, moved Caps out
Electric Coupler	5 year	12 year	\$1,369,536	Moved overhaul from 5 to 12 year due to age exploration.
Wheels	5 year	10 year	\$2,573,397	All wheels 2 inches or larger stay on Trucks
Interior Car-Body	10 year	8, 16 year	\$6,452,984	Delayed seat / cover replacement with age exploration
Halls Transformer	20 year	6 year	(\$61,250)	High fleet failure rate, required inclusion in earlier interval
Anti-Yaw Damper	5 year	RR	(\$1,041,600)	Excessive leakage required additional RR
Charging Contactor	12 year	6 year	(\$180,600)	Excessive tip wear, required addition to Propulsion System earlier interval

\$16,844,810 Total Yearly Reduction

\$84,224,050 Total Reduction over 5 year program

Note: Use PI scheduling and PI department to increase Shop capacity in order to optimize RCM intervals on systems and components

MNR - RCM Program Effectiveness

- Reduced Fleet Labor requirement by 9.7% over the past ten years – Saving \$17M Annually
- Material Reduction Initiatives in 2010 saved \$24M
- Eliminated Off-Property Overhaul Projects saving Capital Funds
 - M3 PIP allows 138 Cars to operate reliably until replacement in 2020
 - 100 Center Door Coaches did not require overhaul due to 12Yr and 16Yr RCM

LIRR Challenges

- Implementation of PTC and ESA 250 Hz
- Diesel Locomotive Heavy Repair Facility
- Results of installing M7 GSA FMI design modifications.

MNR Challenges

Harmon Shop Replacement:

- Replace 100 year old Harmon Shop with a new EMU Shop to provide facilities required to implement M7/M9 higher level RCM

New Haven Shop Facilities:

- Work with CDOT to ensure New Shop Facilities are operational by 2014 to support higher level RCM maintenance for the new M8 Fleet

Enterprise Asset Management System

- Identify and acquire real time business tools to support cost-effective Reliability Centered Maintenance of rolling stock and establish new business processes based on PAS 55

PTC Implementation

- Design and Implementation of on-board systems by 12/31/2015

IEC M7 RCM Comments

- Railroads' RCM Programs are logically structured and efficient.
- The time interval maintenance periods are evolving in a sound manner based on shared operational data.
- Railroads' have the appropriate software tools to manage the program and progress improvements.