

# ***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.*

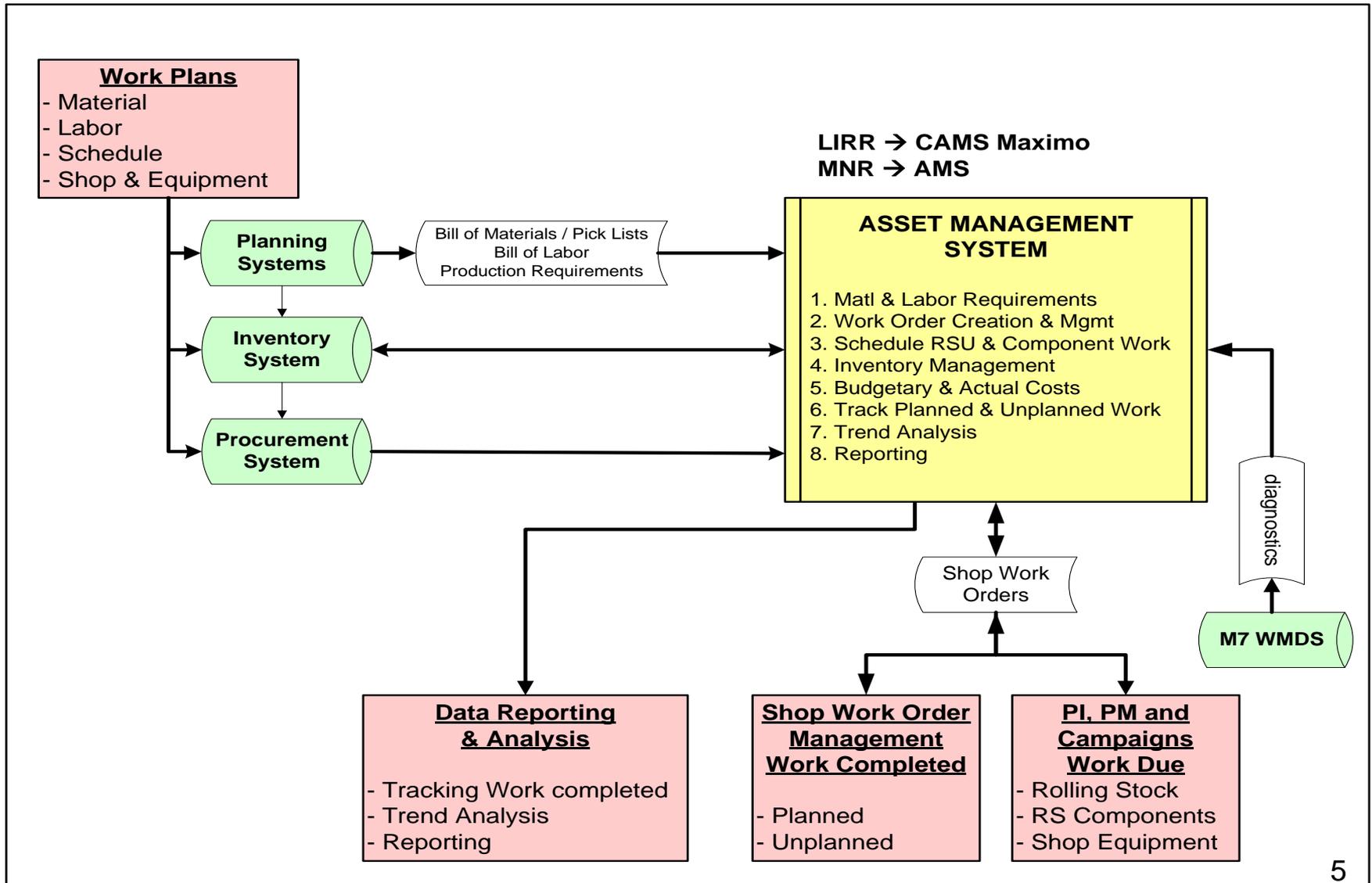
- **Periodic Inspection & Maintenance**

*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 analysis 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.