

# Fixing What's Broken: Implementing Compatible Wheel/Rail Profiles for Transit

– *Wyman Jones, LA Metro*



# System Problems

- Planners & Public want High Speed Service
- Design Groups use general rail standards
- Manufacturers want to sell standard products
- Transit Agencies want Cost Effective Designs
- Lack of Rail O&M knowledge of the designers
  
- Track and Vehicle not compatible in operation
- Fleet O&M Costs (15 married pair) = \$380,000 per year
- Excessive Rail O&M Costs
- Extensive Down Time or Service Disruptions



# System Acceptance Testing

- Since the System Testing was required before the New Heavy Rail Cars were provided, RTD acquired loan of what was said to be a similar Heavy Rail Transit Car for Acceptance Testing.
- Miami Heavy Rail Transit Vehicle (28" dia. Wheels)



- During system testing.
  - Showed no wheel wear
  - No abnormal rail wear



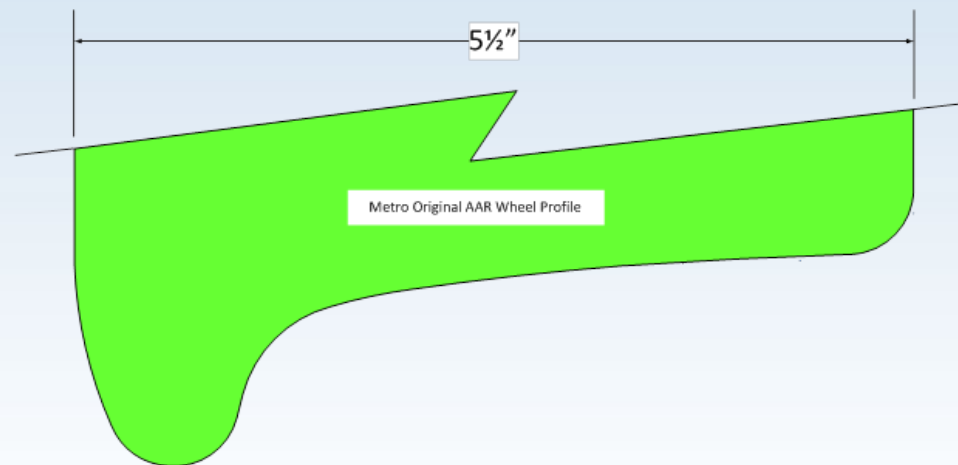
# The LA Metro Transit Problem

- Continuous build-up of metal shavings in curves and switch areas, Wheel Flanges required truing every 5,000 to 7,000 miles.
- BRENDA Heavy Rail Transit Vehicle
- (34½" dia. Wheels)      (7'-7" Axle Spacing )      (Wheels Tossed after 19,000miles)



# Original Wheel / Rail Problem

- Original AAR Standard 1:20 Wheel



- Resulted in less than 19,000 miles per wheel
- Not close to expected wheel Life of 200,000 miles



# Typical Wheel Profile Solutions

- Change to AAR 1B Worn Wheel Profile



- Improved Wheel Life to between 20,000 to 25,000 miles, still not close to 200,000 miles



# Alternative Wheel / Rail Solution

- Change wheel hardness from original Class “A” hardness to a Class “C” hardness.
- Transferred Wear Problem from Wheel Wear to Rail Wear creating more O&M Problems due to track down time and Service Delays.
- A 6 Degree (955’ Radius) Curve had to be replaced in less than 2-years of operation.
- Returned to a Wheel Hardness compromise of a Class “B” hardness with slightly more wheel life and still an acceptable rail Life.



# Excessive Rail Wear

- Resulted in LA Metro acquiring a re-furbished Fairmont-Tamper RGH-16 Rail Grinder.





# Additional Wheel/Rail Solution

- Introduce the addition of Kelsan LCF (Low Coefficient of Friction) stick lubricators.
- Mounted in a cassette bracket on all wheels.



# Initial LA Metro Results

- By changing Wheel Profile to an AAR 1B Worn Profile, the Wheel Life moved from 19,000 miles per wheel to 25,000 miles.
- By adding Flange Lubricators to all wheels, the Wheel Life jumped from 25,000 miles per wheel to 75,000 miles.
- The Traditional Mitigation Methods did not provide any solution towards a 200,000 mile expected wheel life.



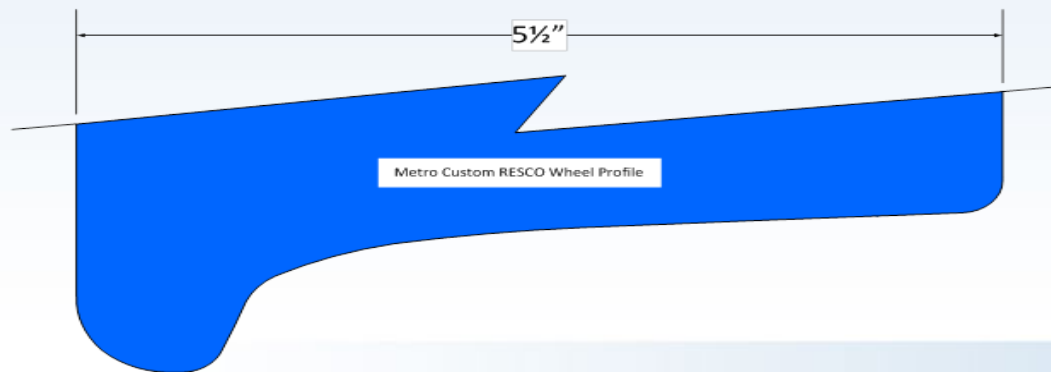
## Need for “Outside the Box” Solution

- Developed a Special Task Force to review design and Operating Issues.
- Rail Car was designed for:
  - High Speed Operation (150 mph operation)
  - Not suitable for the tight radius curves required in the La Metro Tunnel Alignment
- Need for Custom Wheel/Rail Design Solution



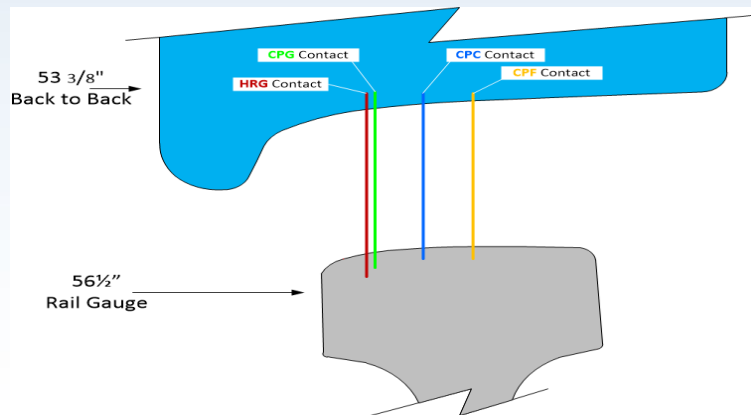
# Custom Wheel / Rail Profiles

- Created a Special Wheel Profile to work with a Custom Rail Grinding Program for system compatibility.
- Wheel Profile = Metro Custom RESCO Profile



# Custom Curve Rail Grinding Profiles

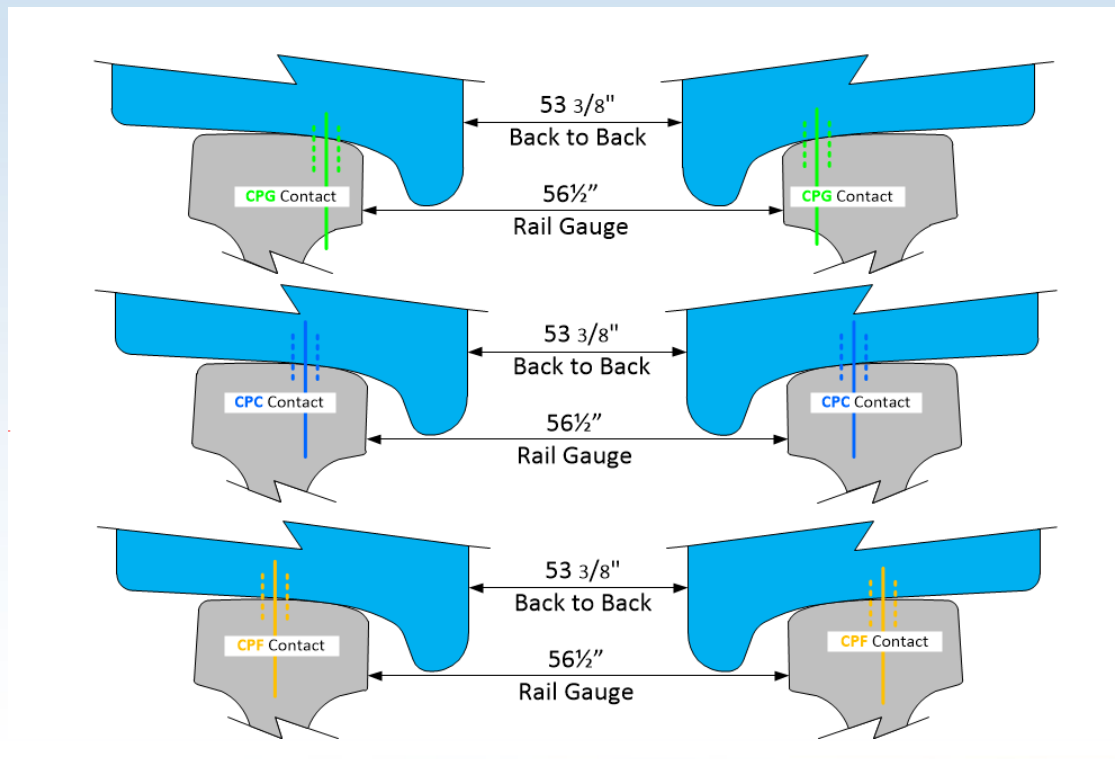
- Created a special set of Custom Rail Grinding Templates for Curve Negotiation to support the Metro Custom RESCO Wheel Profile.



- Curves > 5,000 feet = CPC.
- Curves < 1,500 feet = CPG & CPF
- Curves < 1,000 feet add HRC



# Custom Tangent Rail Grinding Templates



# LA Metro Wheel / Rail Results

- Exposed the importance of a complete Rail System Design which incorporates both vehicle and alignment with operating experience.
- By stepping outside the traditional Wheel / Rail solutions even the worst possible performance can be objectively re-designed by using a custom Wheel /Rail Interface.
- The LA Metro has been able to achieve in excess of 500,000 miles per wheel and minimum rail wear since the introduction of Custom Profiles.



# •High Speed Curve Performance: (47 mph to 53 mph)





- **Existing Vehicle Performance Evaluation:**
  - **On High Speed Curved Track**
    - **Little to No Flange Contact**
    - **No excessive Noise Issues through curved track**



• **High Speed Tangent Performance:** (53 mph to 69 mph)



- **Existing Vehicle Performance Evaluation:**
  - **On High Speed Tangent Track**
    - Little to No Hunting
    - No apparent Noise Issues on tangent track



- **Existing Vehicle Performance Evaluation:**
  - **On High Speed Tangent Track**
    - Little to No Hunting
    - No apparent Noise Issues on tangent track



# This Concludes the Presentation

