RWMEC

Who we are

Approved AAR Wheel Manufacturers

Mission - Support the WABL Committee and the Railroad Industry
Administrative

Graph showing the following categories and their percentages:

- 07 Obsolete
- 11 Good Condition
- 23 Govt. Reg.
- 25 Owner's Req.
- 90 Mate Wheel

- Administrative 56.21%
5 Year Trend – Administrative Wheels
Wear Related

Wear Related 15.10%

- 60=Thin Flange
- 64=High Flange
- 73=Thin Rim
- 98=Reapplication

Bar chart showing Wear Related 15.10% with categories:
- 60=Thin Flange
- 64=High Flange
- 73=Thin Rim
- 98=Reapplication

X-axis: 0, 10000, 20000, 30000, 40000, 50000
Y-axis: Bar heights corresponding to the categories.
5 Year Trend – Wear Related Wheels

![Graph showing the trend of Wear Related Wheels from 1999 to 2003. The data shows an increase from 1999 to 2001, followed by a decline until 2003.](image)
Environmental (28.53%)

- 65 High Impact
- 67=Out-of-Round
- 74=Thermal Cracks
- 75=Tread Shelled
- 76=Tread Build-Up
- 78=Tread Slid Flat
5 Year Trend - Environmental Wheels

Year

Environmental Wheels

150,000
140,000
130,000
120,000
110,000
100,000

1999 2000 2001 2002 2003
Cause for Removal

- 3 Most Frequent Cause for Removal of Environmental Wheels
  - Shelled
  - High Impact
  - Slid Flat
Wheel Failures

- 66 = Flange Cracked
- 68 = Rim Cracked
- 71 = Rim Shattered
- 72 = Rim Spread
5 Year Trend – Wheel Failures

Wheel Failures

Year

1999 2000 2001 2002 2003

Wheel Failures

600 700 800 900 1,000 1,100 1,200
Extrapolation

- We have problems extrapolating AAR data to cover the railroad industry. Repair information for some cars in the railroad industry is not the same as repair information supplied to the AAR CRB Program.
Total Car Repair Billing

$1.25 to $1.8 Billion
24-Year Trend
Shell/Spall Wheels

Shelled/Spalled Wheels

Year

Shelled/Spalled Wheels

Distribution of Failed Wheels by Year

2003 Wheel Failures by Year Manufactured

<table>
<thead>
<tr>
<th>Year Manufactured</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>81</td>
<td>0</td>
</tr>
<tr>
<td>84</td>
<td>0</td>
</tr>
<tr>
<td>81</td>
<td>0</td>
</tr>
<tr>
<td>84</td>
<td>0</td>
</tr>
<tr>
<td>81</td>
<td>0</td>
</tr>
<tr>
<td>84</td>
<td>0</td>
</tr>
<tr>
<td>81</td>
<td>0</td>
</tr>
<tr>
<td>84</td>
<td>0</td>
</tr>
<tr>
<td>81</td>
<td>0</td>
</tr>
<tr>
<td>84</td>
<td>0</td>
</tr>
<tr>
<td>81</td>
<td>0</td>
</tr>
<tr>
<td>84</td>
<td>0</td>
</tr>
<tr>
<td>90</td>
<td>0</td>
</tr>
<tr>
<td>93</td>
<td>0</td>
</tr>
<tr>
<td>96</td>
<td>0</td>
</tr>
<tr>
<td>99</td>
<td>0</td>
</tr>
<tr>
<td>2003</td>
<td>0</td>
</tr>
</tbody>
</table>
Wheel Removals by Year Manufactured

2003 Wheel Removals by Year Manufactured

Quantity

Year Manufactured
<table>
<thead>
<tr>
<th>Category</th>
<th>Average Wheel Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative</td>
<td>11 Years</td>
</tr>
<tr>
<td>Wear Related</td>
<td>14 Years</td>
</tr>
<tr>
<td>Environmental</td>
<td>9.3 Years</td>
</tr>
<tr>
<td>Wheel Failure</td>
<td>12.6 Years</td>
</tr>
</tbody>
</table>
## Average Wheel Life/Car Type

<table>
<thead>
<tr>
<th>Type of Car</th>
<th>Wheel Life, Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Box</td>
<td>12.9</td>
</tr>
<tr>
<td>Gondola</td>
<td>9.0</td>
</tr>
<tr>
<td>Hopper</td>
<td>10.0</td>
</tr>
<tr>
<td>Covered Hopper</td>
<td>12.4</td>
</tr>
<tr>
<td>Tank</td>
<td>13.7</td>
</tr>
<tr>
<td>Flat</td>
<td>9.1</td>
</tr>
<tr>
<td>Articulated</td>
<td>6.1</td>
</tr>
</tbody>
</table>
## Distribution of Wheel Types

<table>
<thead>
<tr>
<th>Wheel Type</th>
<th>HT-CP</th>
<th>NHT-CP</th>
<th>HT-SP</th>
<th>NHT-SP</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAR Raw</td>
<td>86.7%</td>
<td>8.6%</td>
<td>1.5%</td>
<td>3.2%</td>
</tr>
<tr>
<td>AAR Accel.</td>
<td>88.8%</td>
<td>8.5%</td>
<td>0.9%</td>
<td>1.8%</td>
</tr>
</tbody>
</table>
Distribution of SP Wheels

SP Wheels by Car Type

- Box Car
- Cov. Hop.
- Flat Car
- Gondola
- Hopper
- Tank Car

Chart showing the distribution of SP wheels by car type, with the number of wheels ranging from 0 to 10,000.
RWMEC Recommendations

- Already Implemented
  - accelerate removal of straight plate wheels
  - improving their wheel marking procedures
UT Inspection of Re-profiled Wheels

- Effective January 1, 2003
- Inspected in Radial Direction
- Improve Railroad Safety
- Similar to UT Inspection for New Wheels
# Distribution of Wheel Types

<table>
<thead>
<tr>
<th>Wheel Type</th>
<th>HT-CP</th>
<th>NHT-CP</th>
<th>HT-SP</th>
<th>NHT-SP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failed Wheels</td>
<td>80%</td>
<td>12%</td>
<td>2%</td>
<td>6%</td>
</tr>
<tr>
<td>Wheel Type</td>
<td>HT-CP</td>
<td>NHT-CP</td>
<td>HT-SP</td>
<td>NHT-SP</td>
</tr>
<tr>
<td>AAR Raw</td>
<td>86.7%</td>
<td>8.6%</td>
<td>1.5%</td>
<td>3.2%</td>
</tr>
<tr>
<td>AAR Accel.</td>
<td>88.8%</td>
<td>8.5%</td>
<td>0.9%</td>
<td>1.8%</td>
</tr>
</tbody>
</table>
Calculations

- NTCP wheels make up approximately 8.5% of the population
- NTCP wheels make up approximately 12% of the failed wheels
- The percentage of failed wheels is almost fifty percent greater than the percentage of NTCP Wheels in service
RWMEC Recommendations

- Improve air brake testing methods.
- Train employees about the proper use of hand brakes.
Comparisons

- Removals for shelling and high impact are more common for 36-inch and 38-inch wheels.
- 36-inch wheels have a higher percentage of wheels removed for slid flat, thin flange, built-up-tread and out-of-round.
Comparisons

- Covered Hopper Cars have the most wheels for all causes.
- Tank cars and covered hopper cars have the most wheel removals for shelling
Future

- Wheel manufacturers continue to revise their wheel designs and process controls.
- RWMEC continues to review information from the CRB database.
THANKS

- RWMEC thanks the AAR for providing 2003 wheel repair data for this analysis and report.
- RWMEC thanks the Railway Supply Institute for the opportunity to present this information at the 2004 RSI conference.