2005 AAR CAR REPAIR BILLING WHEEL REMOVAL ANALYSIS

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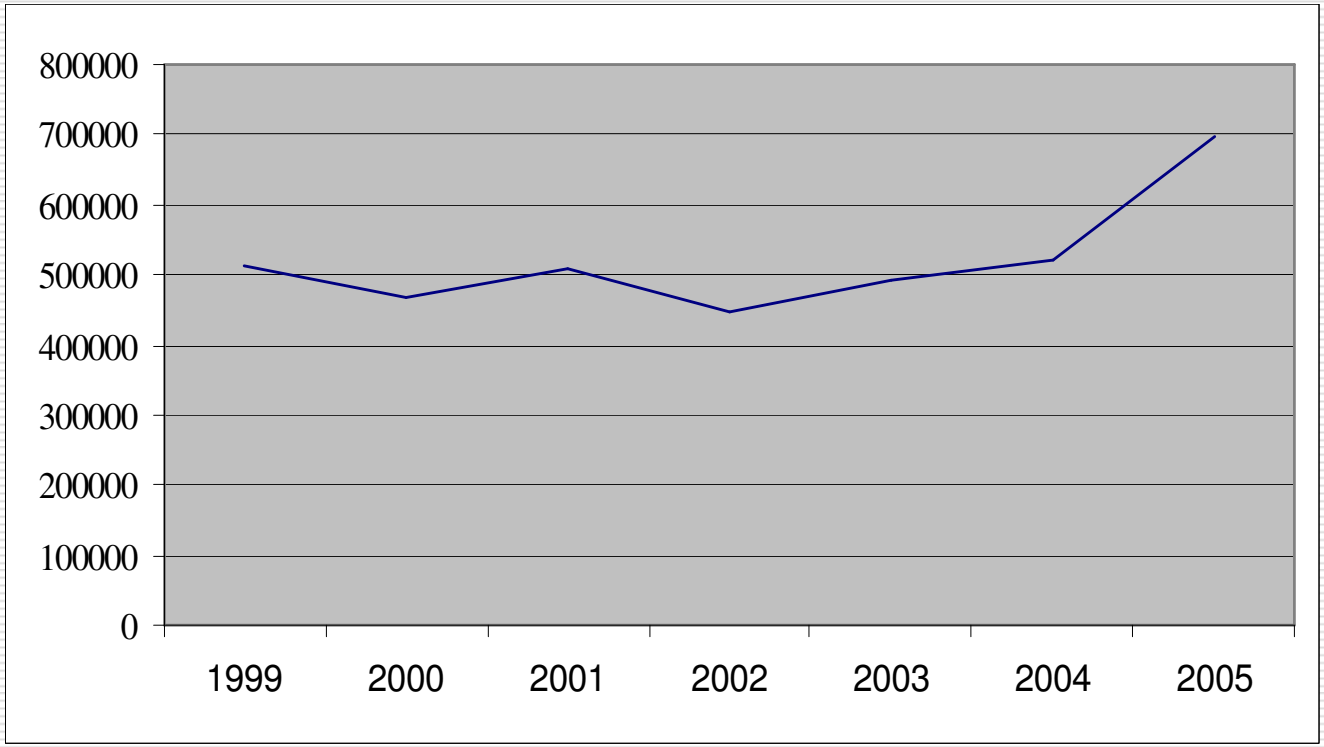
Who we are

Approved AAR Wheel Manufacturers

Mission - Support the WABL Committee and the Railroad Industry

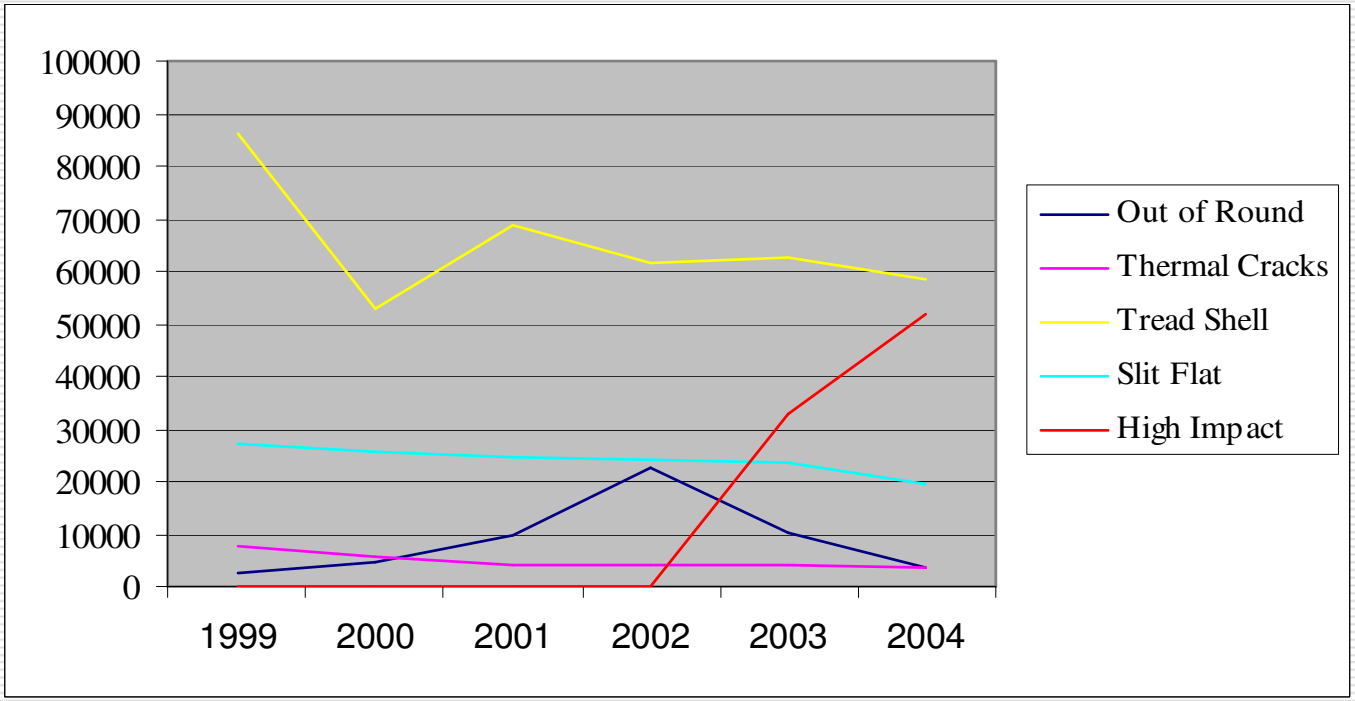
7 Year Trend for Wheel Removals



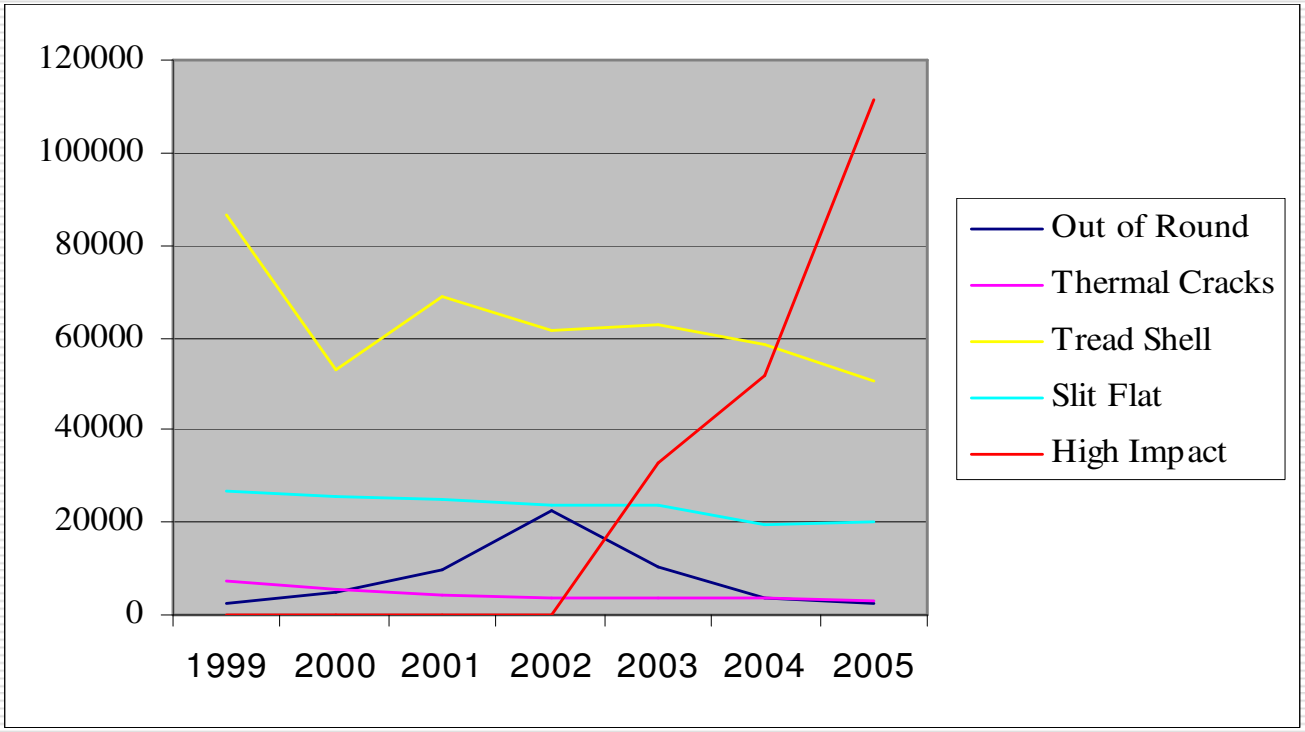
Reasons for Increase

- A. Increase in Traffic
- B. Change in Rules for Condemning Axles
- C. Increase in Usage of Why Made Code 65

2004 Effect of High Impact Usage

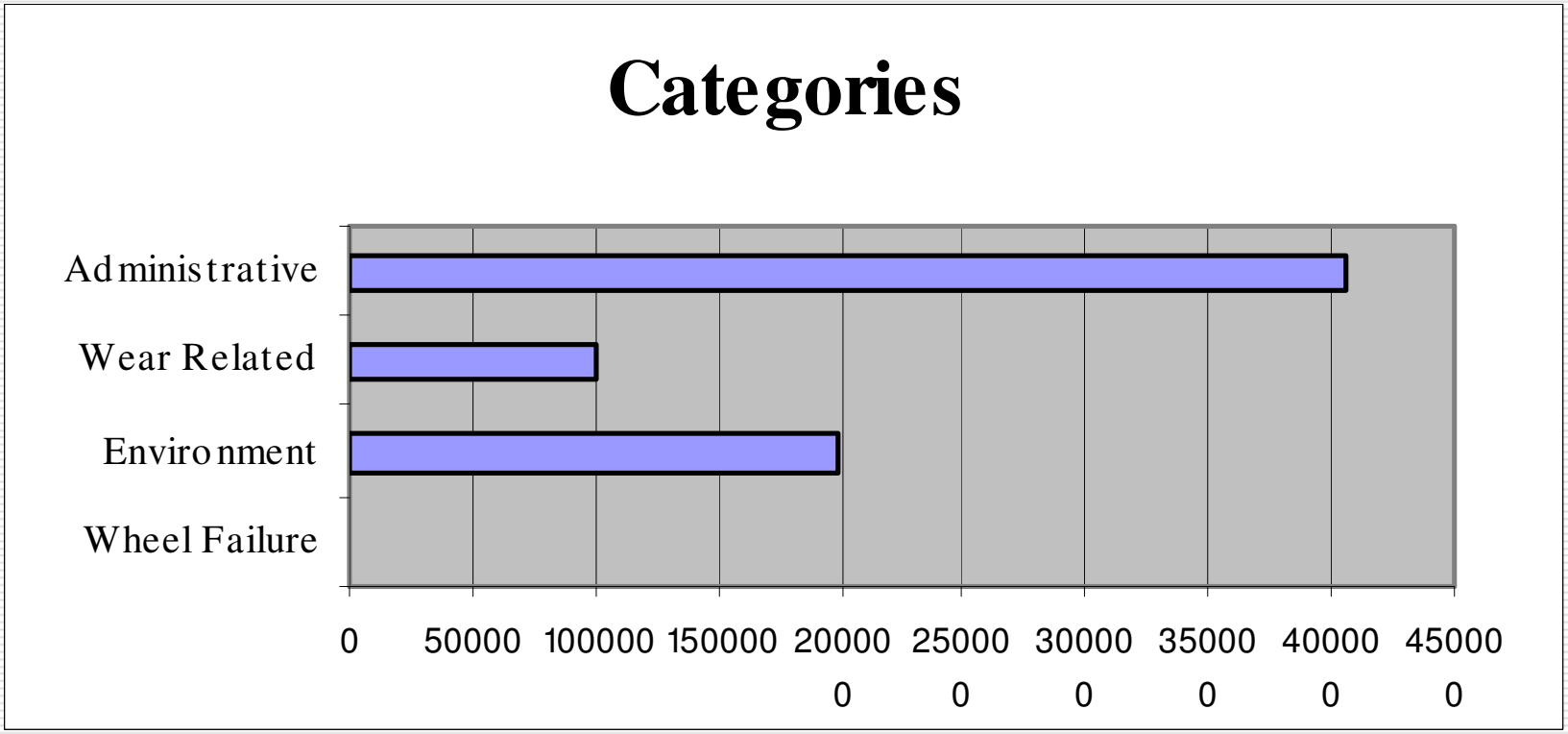


2005 Effect of High Impact Usage

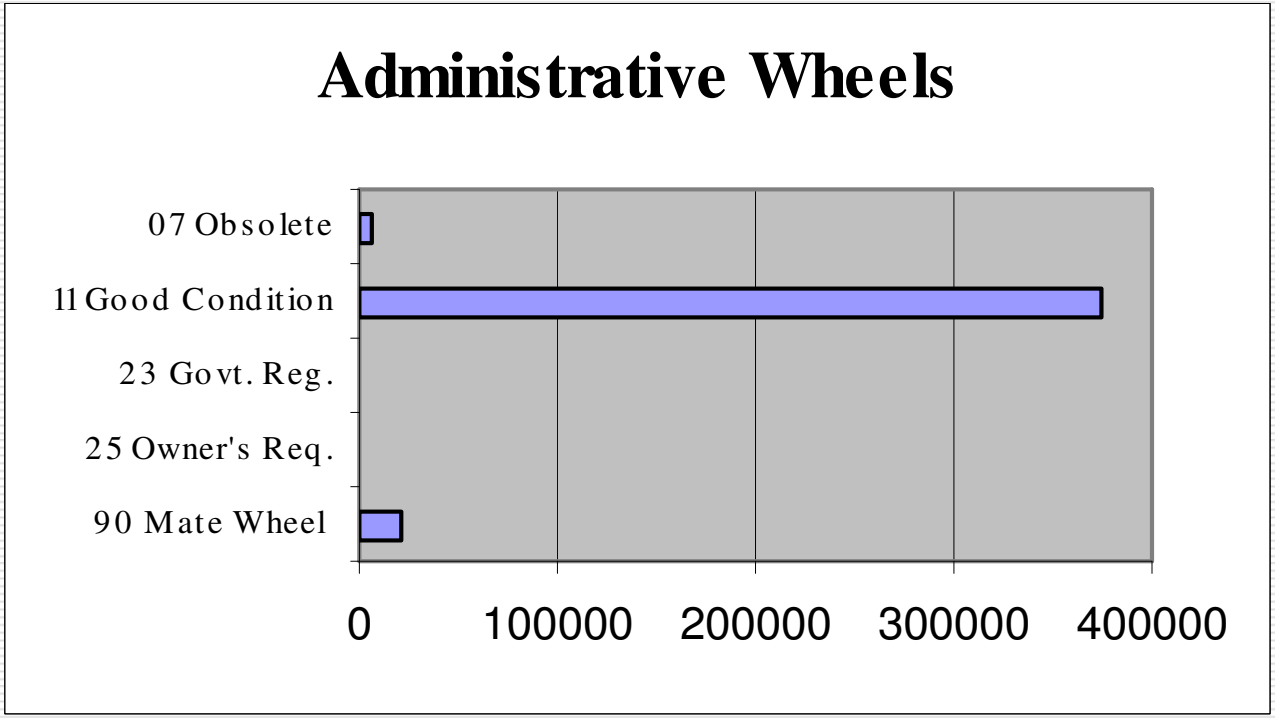


7 Year Trend for Thin Flange and High Flange

WHEEL REMOVAL CATEGORIES



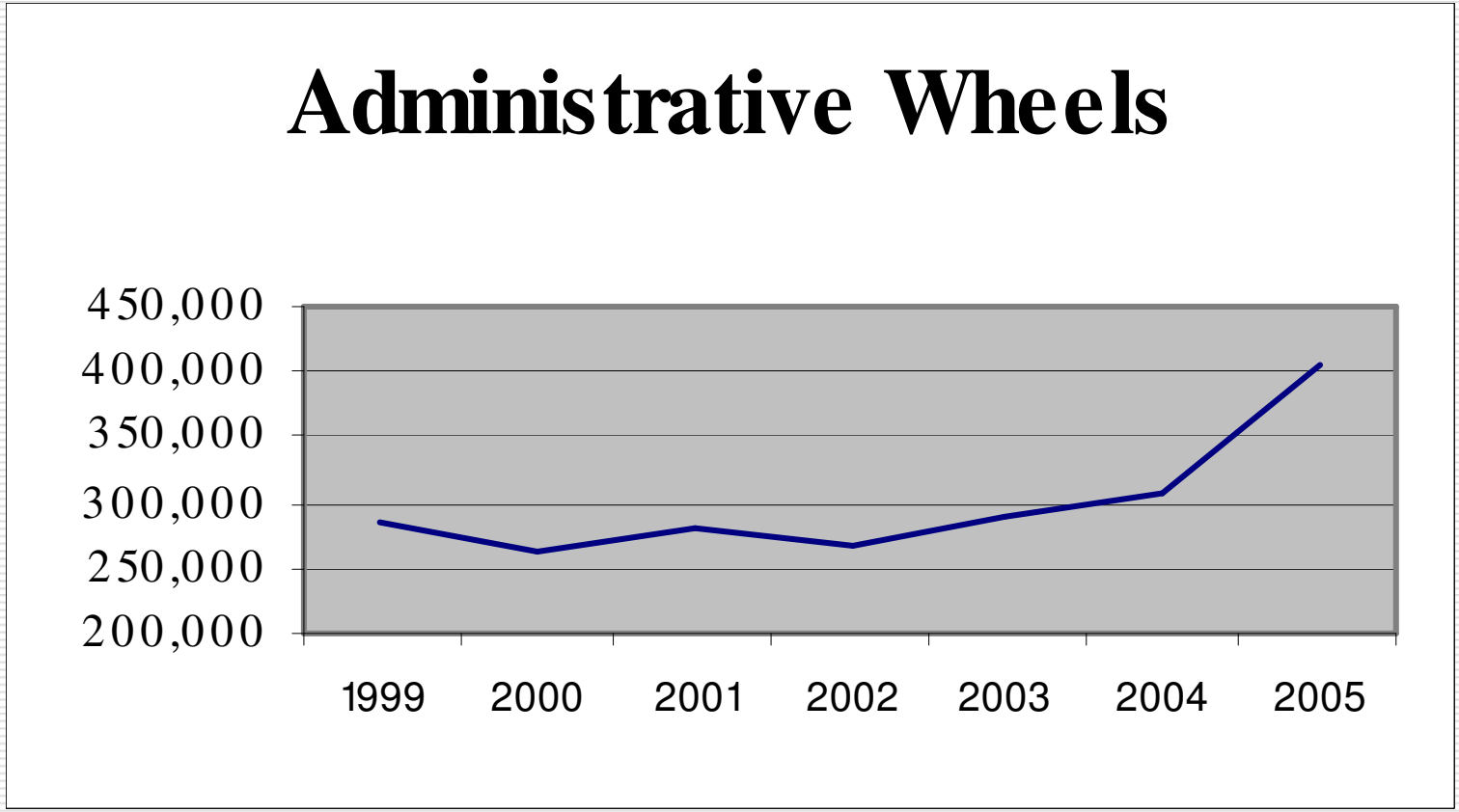
Administrative



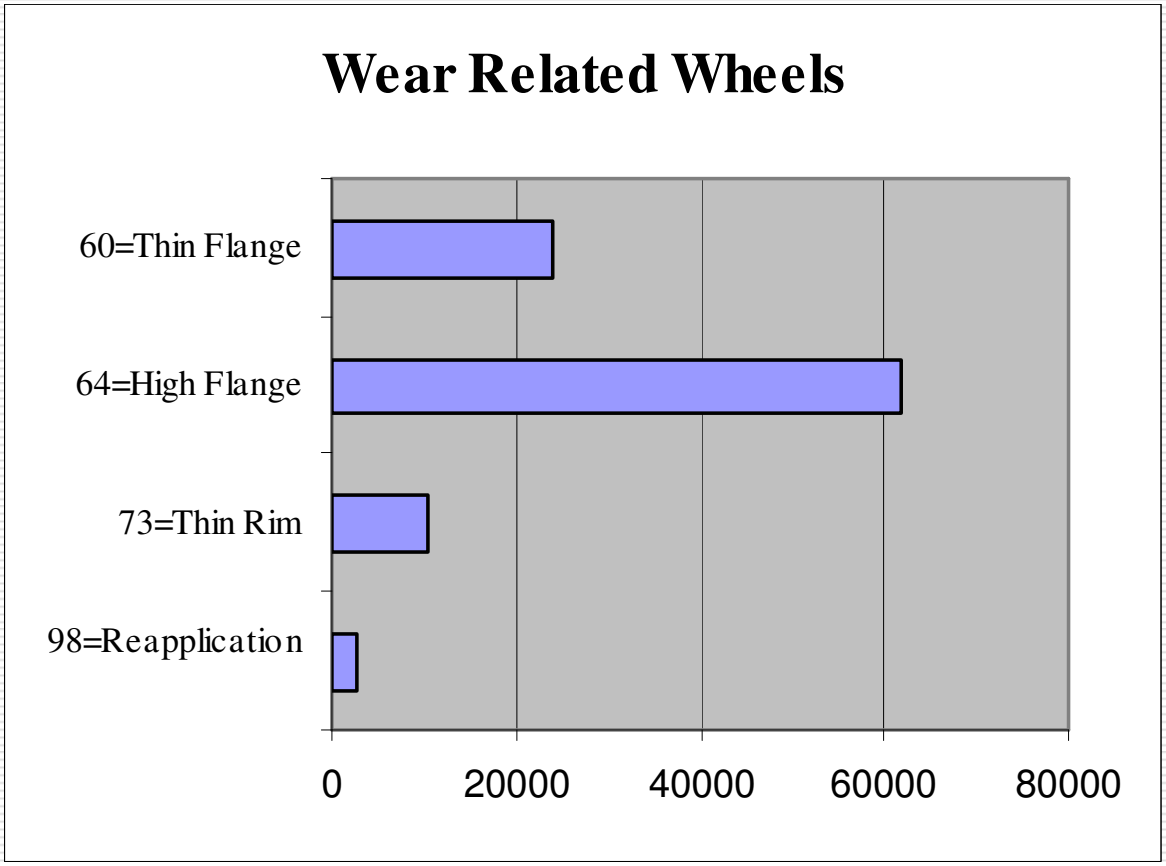
Unusual Trends

- **Why Made Code 11 Removals have increased 175,000 during the past three years.**

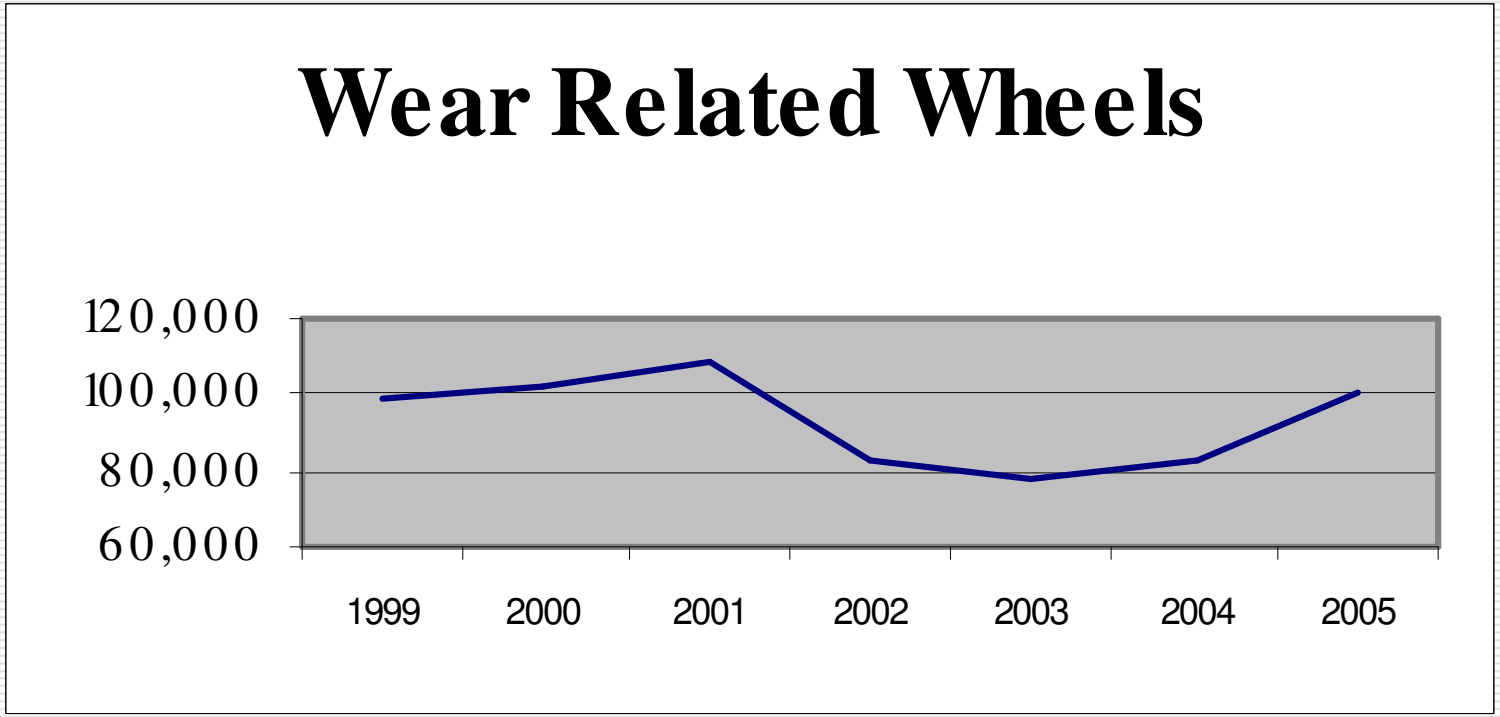
7 Year Trend – Administrative Wheels



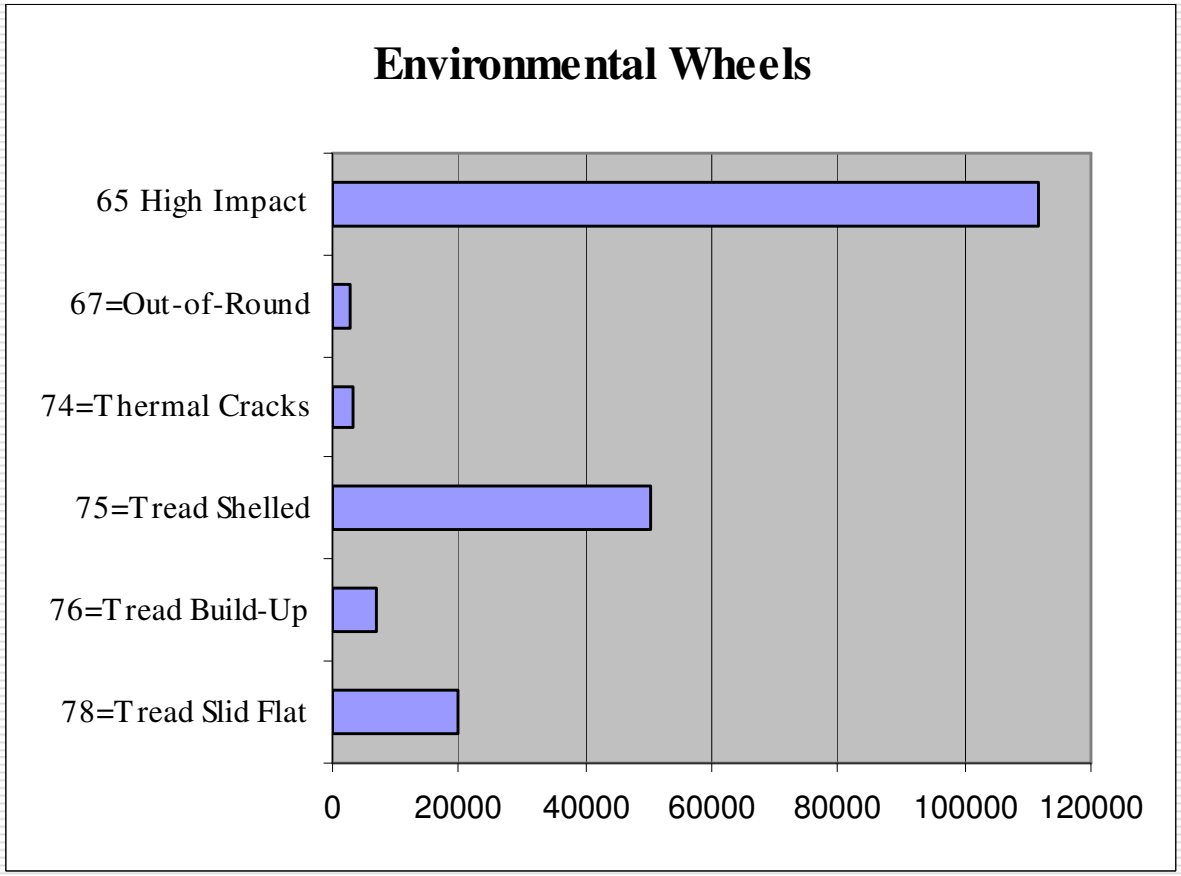
Wear Related



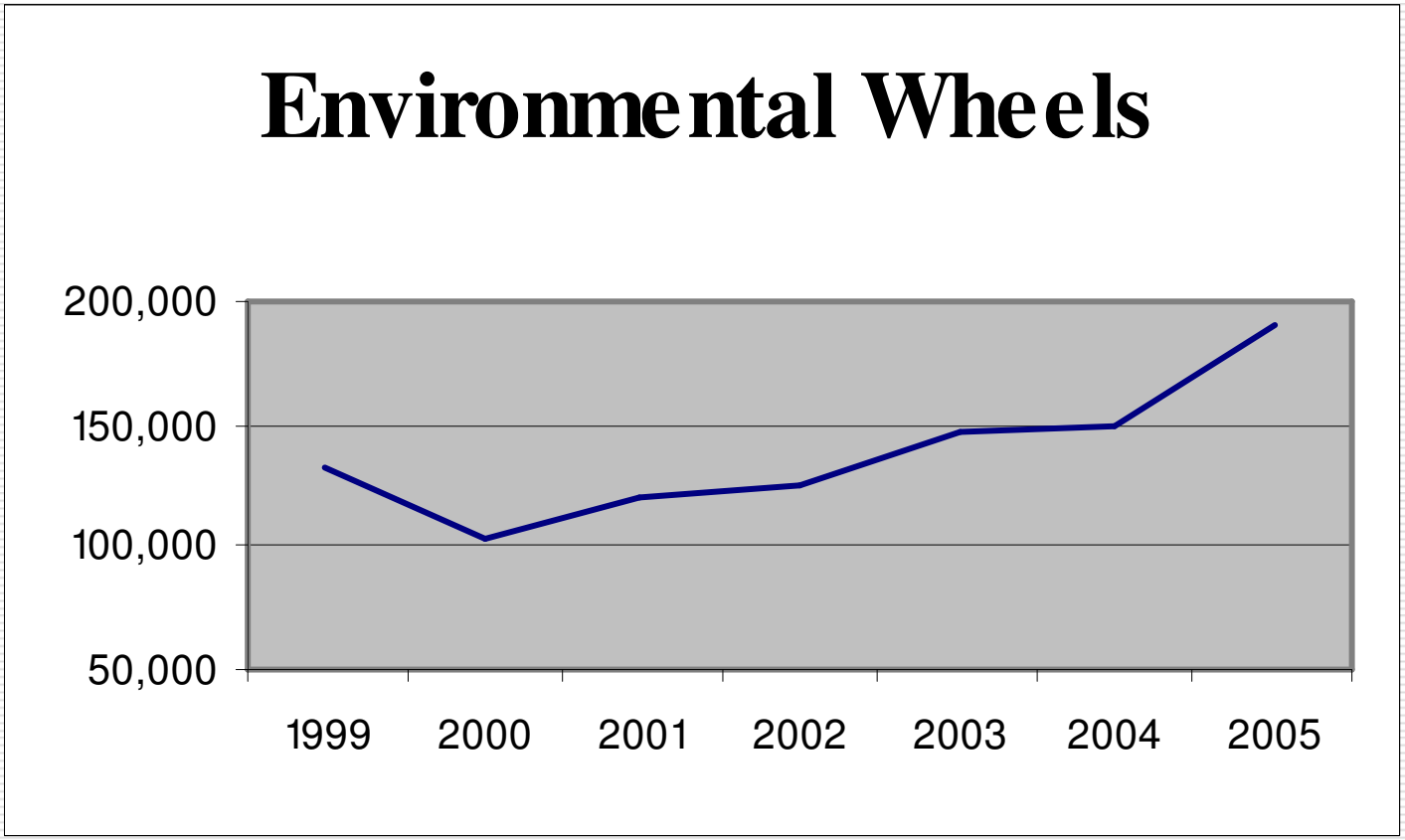
7 Year Trend – Wear Related Wheels



Environmental



7 Year Trend- Environmental Wheels

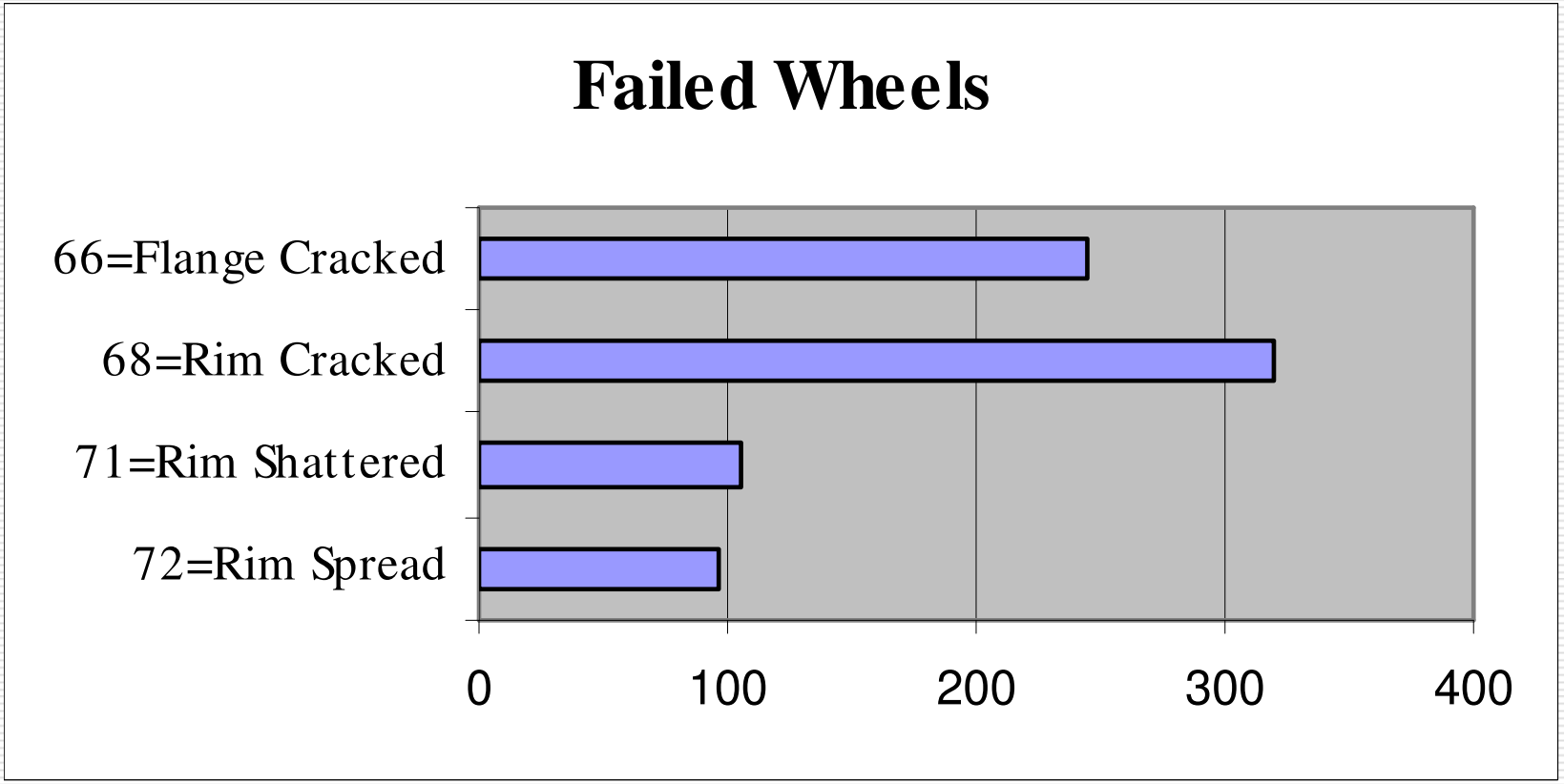


Spalling

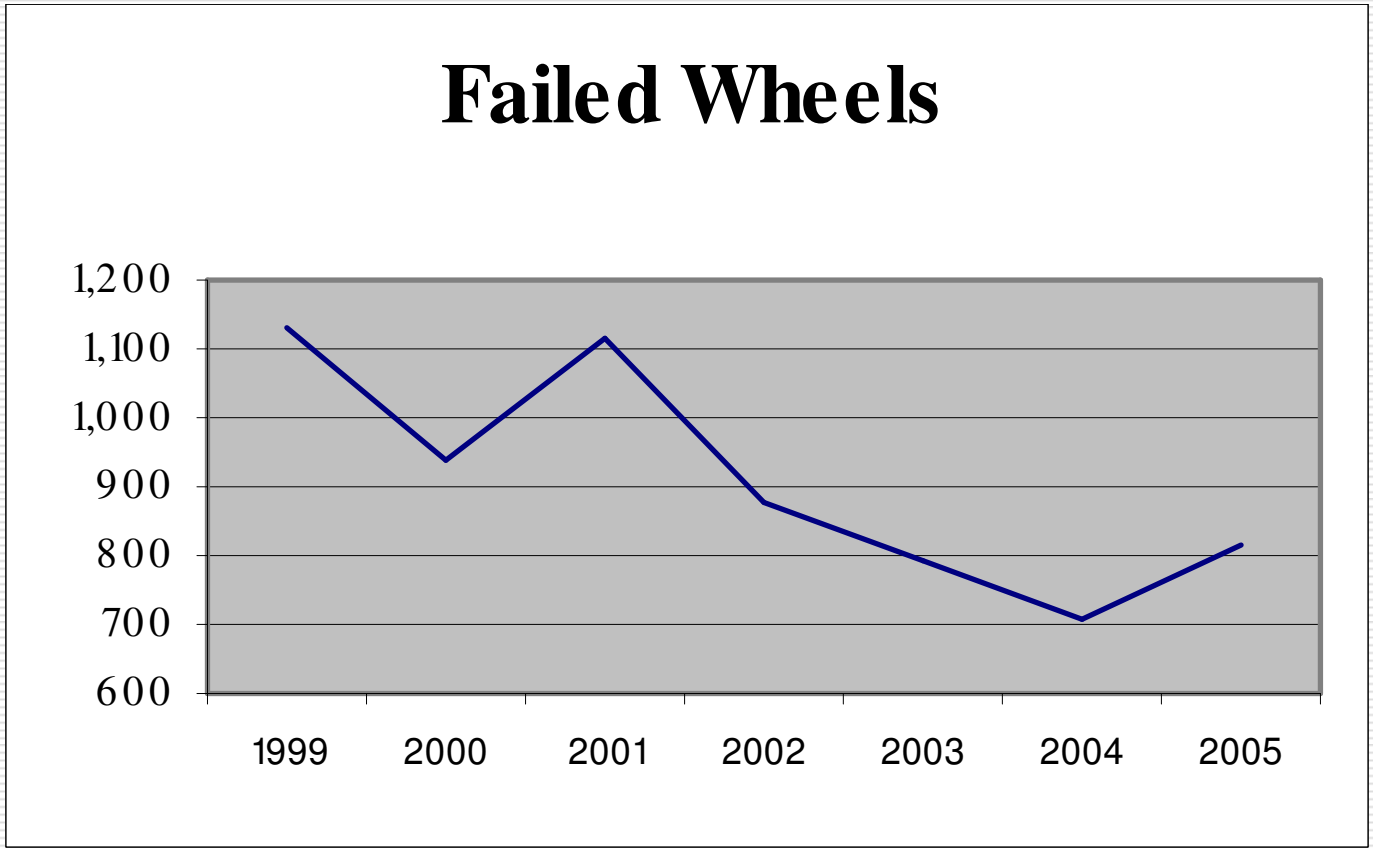
- Spalling starts when a thin localized layer of tread metal is transformed to martensite. The martensite, being very hard and brittle, forms cracks that propagate into the non-transformed material. These cracks turn and grow in fatigue roughly parallel to the tread. When these cracks link together material vacates the tread leaving a pitted surface.

Thermal Mechanical Shelling

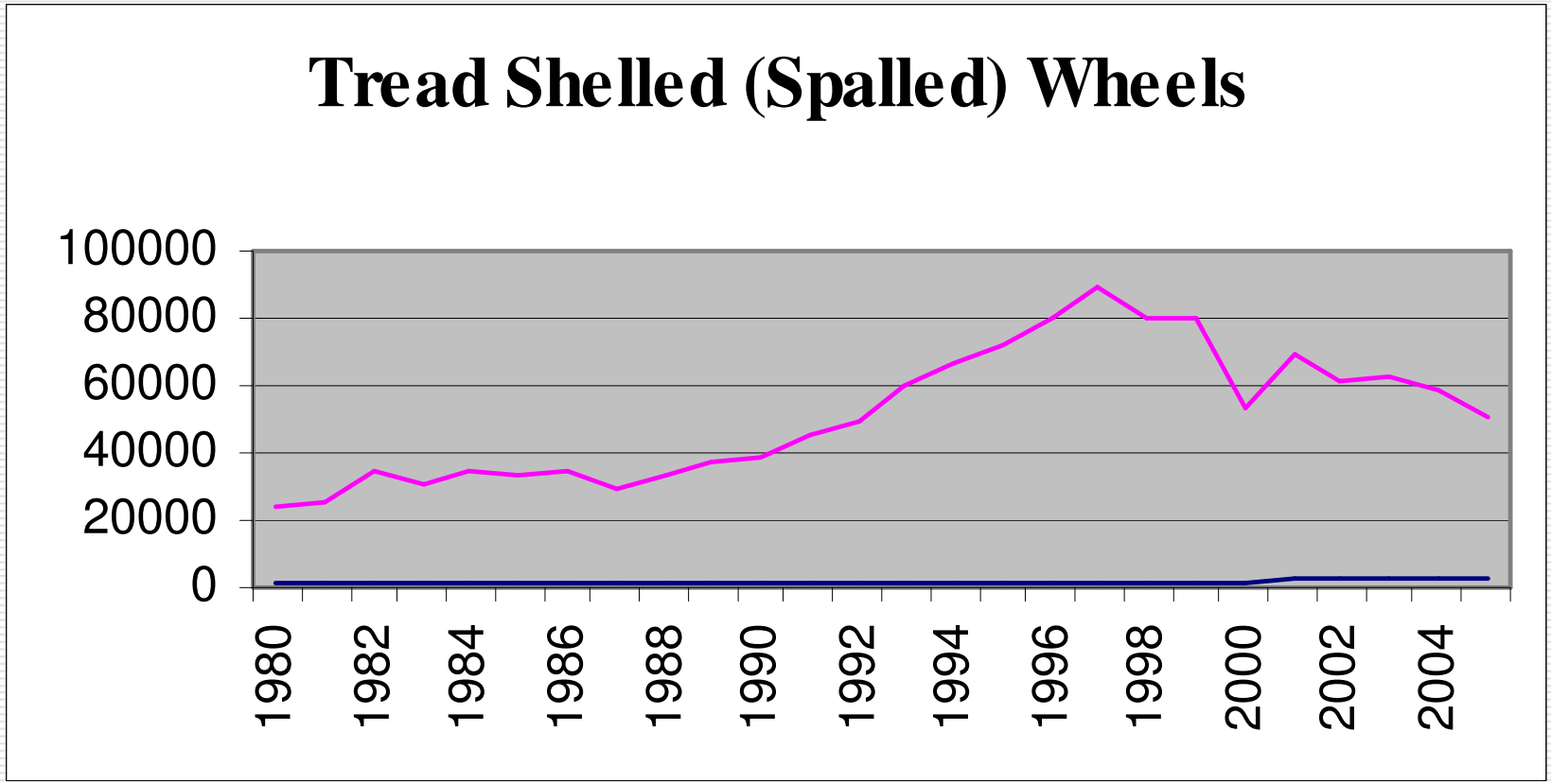
Failed Wheels



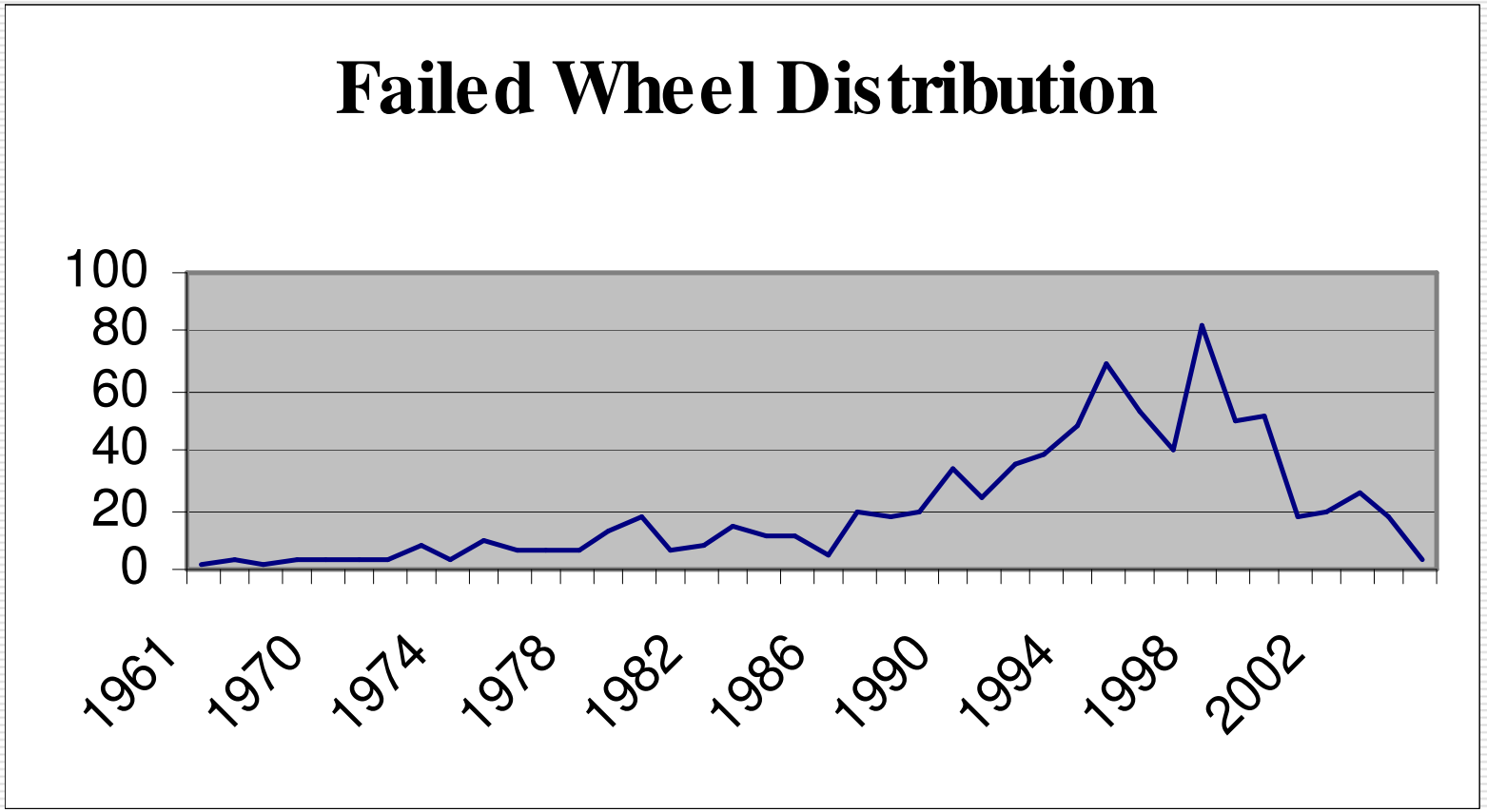
7 Year Trend – Failed Wheels



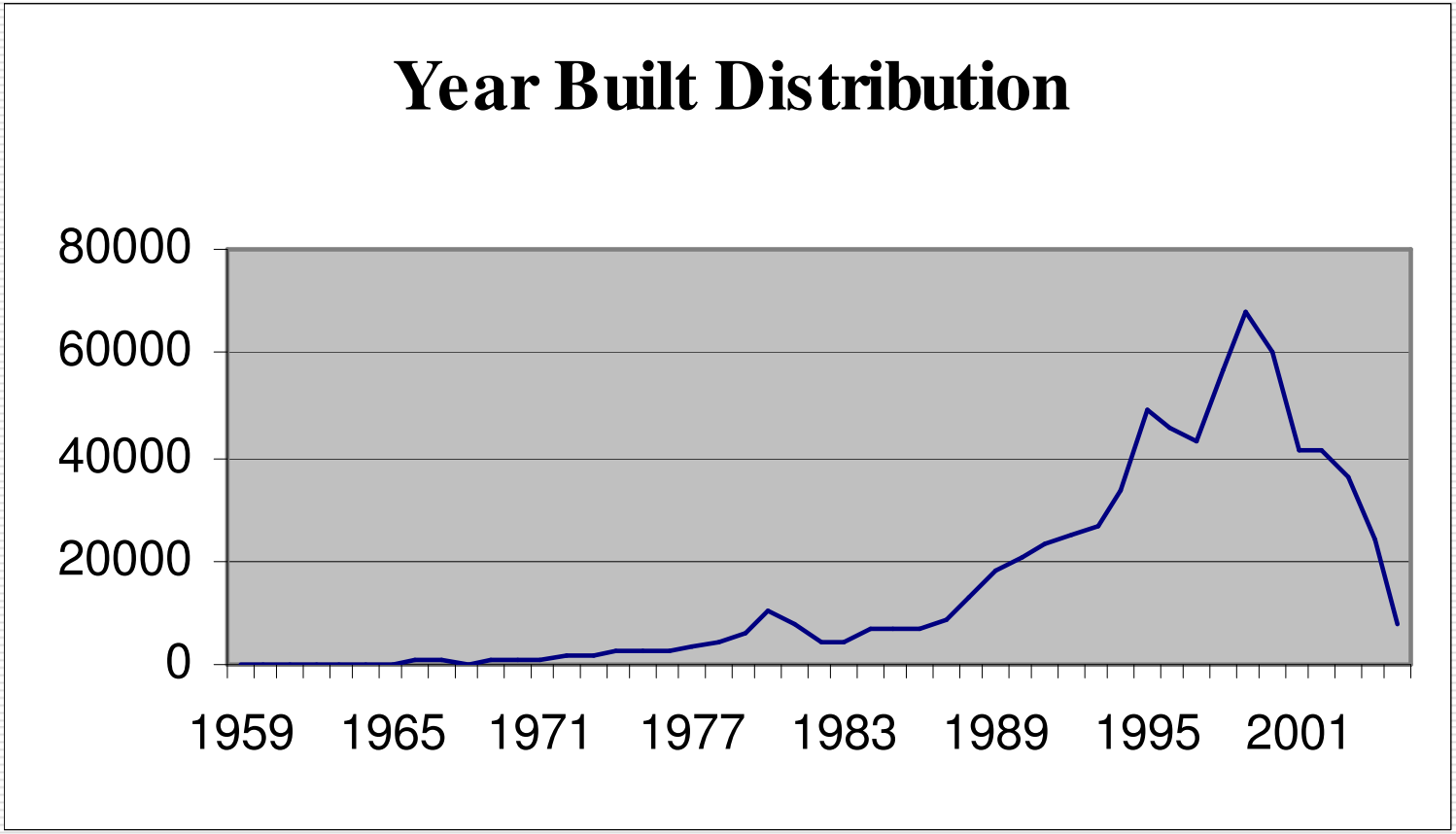
26-Year Trend
Shell/Spall Wheels



Distribution of Failed Wheels by Year



Wheel Removals by Year Manufactured



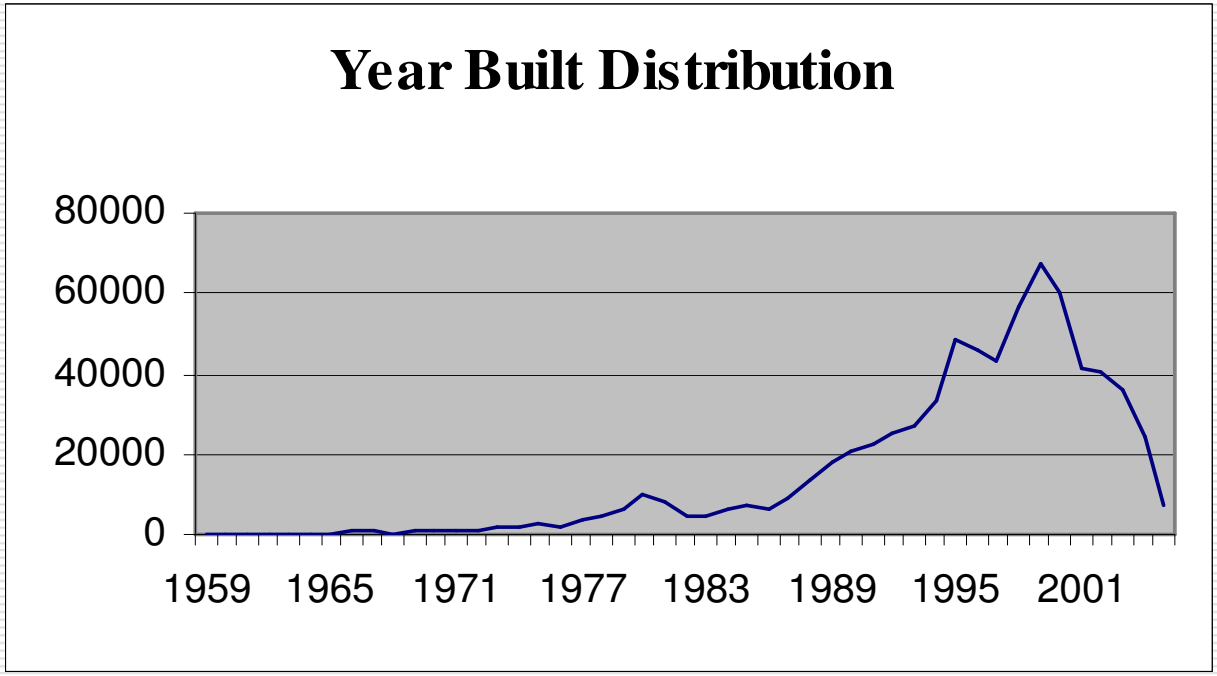
Average Wheel Life/Category

- Administrative 9.8 Years
- Wear Related 11.0 Years
- Environmental 8.8 Years
- Wheel Failure 12.2 Years

Average Wheel Life/Car Type

Type of Car	Wheel Life, Years
Box	12.5
Gondola	8.5
Hopper	9.5
Covered Hopper	12.6
Tank	12.5
Flat	7.8
Articulated	4.5

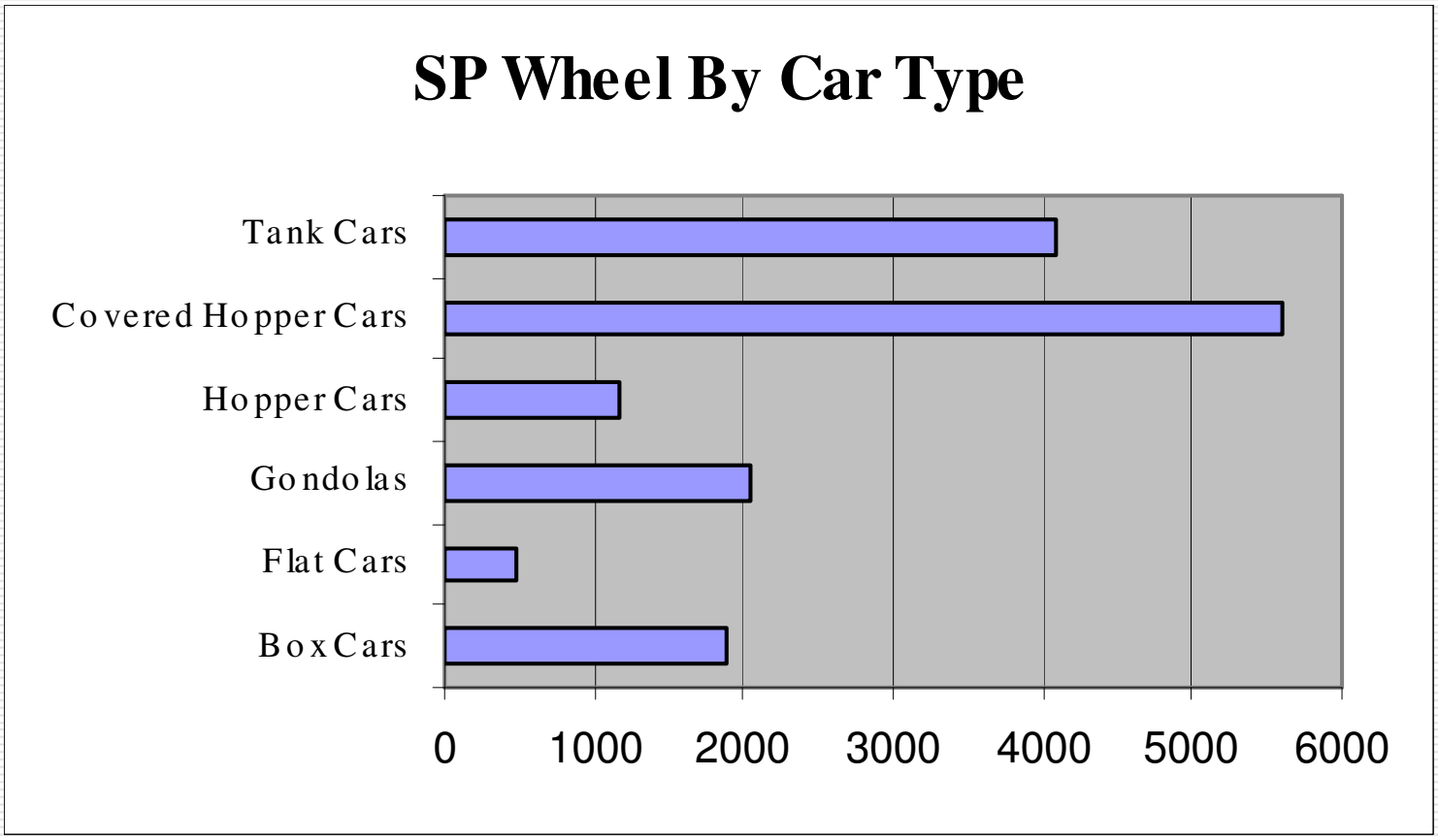
Wheel Removals by Year Manufactured



Distribution of Wheel Types

Wheel Type	HT-CP	NHT-CP	HT-SP	NHT-SP
AAR Raw	91.7%	5.7%	.7%	1.8%
AAR Accel.	92.1%	6.2%	0. 6%	1.1%

Distribution of SP Wheels



RWMEC Recommendations

- Already Implemented
  - Accelerate removal of straight plate wheels
  - Proposal to accelerate earlier removal of Non-Heat Treated Curve Plate Wheels
  - Improving their wheel marking procedures

RWMEC Recommendations

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

Comparisons

- Removals for 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

- Articulated cars have many unique characteristics.
- The wheels wear out faster.
- They have the most wheels removed for High Flange.

Comparisons

- Covered Hopper Cars have the most wheels for all causes.
- Tank cars and covered hopper cars have the most wheel removals for Why Made Code 78, Slid Flat.

Comparisons

- The primary reasons for wheel removals from flat cars:
  - Why Made 64, High Flange
  - Why Made 65, High Impact
  - Why Made 75, Tread shelled

Comparisons

- Tank cars have the second highest wheel removals for Why Made 74, Thermal Cracks.

Comparisons

- Gondolas, Hoppers and Box Cars have a similar pattern. The most frequent causes for removal for these car types are:
  - Why Made 65, High Impact
  - Why Made 64, High Flange
  - Why Made 60, Thin Flange

Thanks

- RWMEC thanks the AAR for providing 2005 wheel repair data for this analysis and report.
- RWMEC thanks the Railway Supply Institute and MARTS for the opportunity to present this information at the 2006 RSI conference.

Questions