



NEARS SPRING CONFERENCE

“Harnessing Technology For Rail Efficiency” - Railcars



National Steel Car Limited

April 19, 2018



Our Company

- ✓ Founded in **1912**, celebrating over **100 years** of car building excellence
- ✓ Serving the North American and International railcar markets
- ✓ Largest, single-site railcar manufacturing plant in North America, employing over **2,000** team members
- ✓ **All Types of Freight Cars: 12** different car types / over **75** models
- ✓ Capacity to produce over **15,000** railcars annually
- ✓ **5** flexible production lines, **3** state of the art blast/paint/finishing lines
- ✓ Ongoing plant modernization
- ✓ Certified to AAR M-1003
- ✓ The only car builder certified to ISO 9001-2015 in North America



NSC Company Portfolio Freight / Tank Cars





North American Railcar Fleet (000's)

<u>Car Type</u>	<u># of Cars</u>	<u>% of Fleet</u>
Tank	415	26%
Covered Hopper	554	34%
Gondola	211	13%
Flatcars	196	12%
Open Top Hopper	135	8%
Boxcar	<u>108</u>	<u>7%</u>
TOTAL	1,619	100%

Average Age = 19.5 Years

40% are less than 286,000 lbs. GRL



Evolution of North American Railcar Fleet

1974 - Interchange cars built before this year have 40-year interchange life; 50 years after 1974

1980 - Staggers Act deregulates railroad industry

1993 - Deprescription of car-hire including "grandfathering" of Class III Boxcars

1995 - S-259 provides for uncontrolled interchange of 286,000 LB. GRL Railcars

2003 - M-976 requires new railcars to have truck, axle, ride performance and other components for 286K GRL

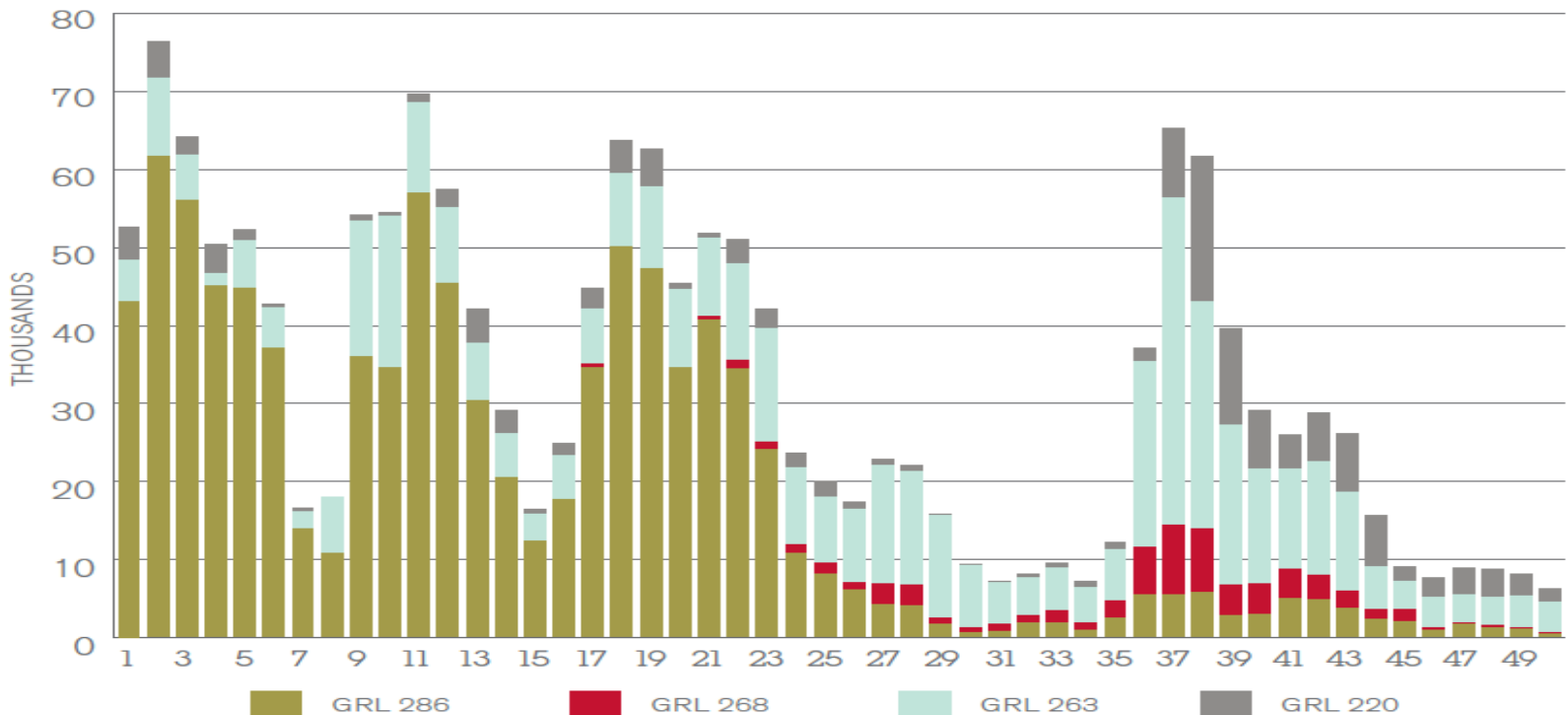
2015 - DOT 117 tank car required for handling class 3 flammable commodities; tiered schedule by commodity



Despite Recent Years of Robust New Car Deliveries, Fleet is Aging:

FIGURE 6 // NORTH AMERICAN FREIGHT CAR FLEET

//////////////////// NUMBER OF CARS BY AGE AND GRL //////////////////////

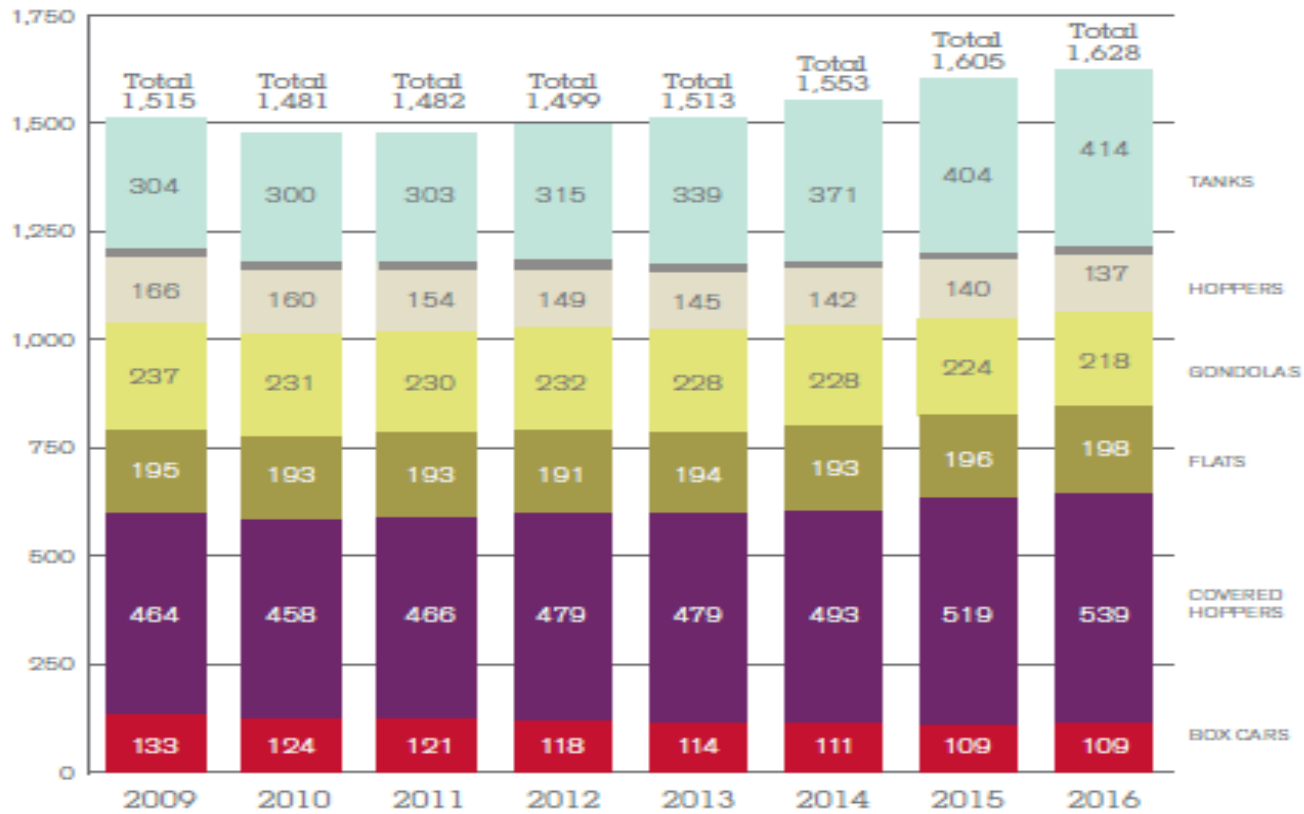




Counts at Year-End

FIGURE 3 // NORTH AMERICAN FREIGHT CAR FLEET, BY CAR TYPE

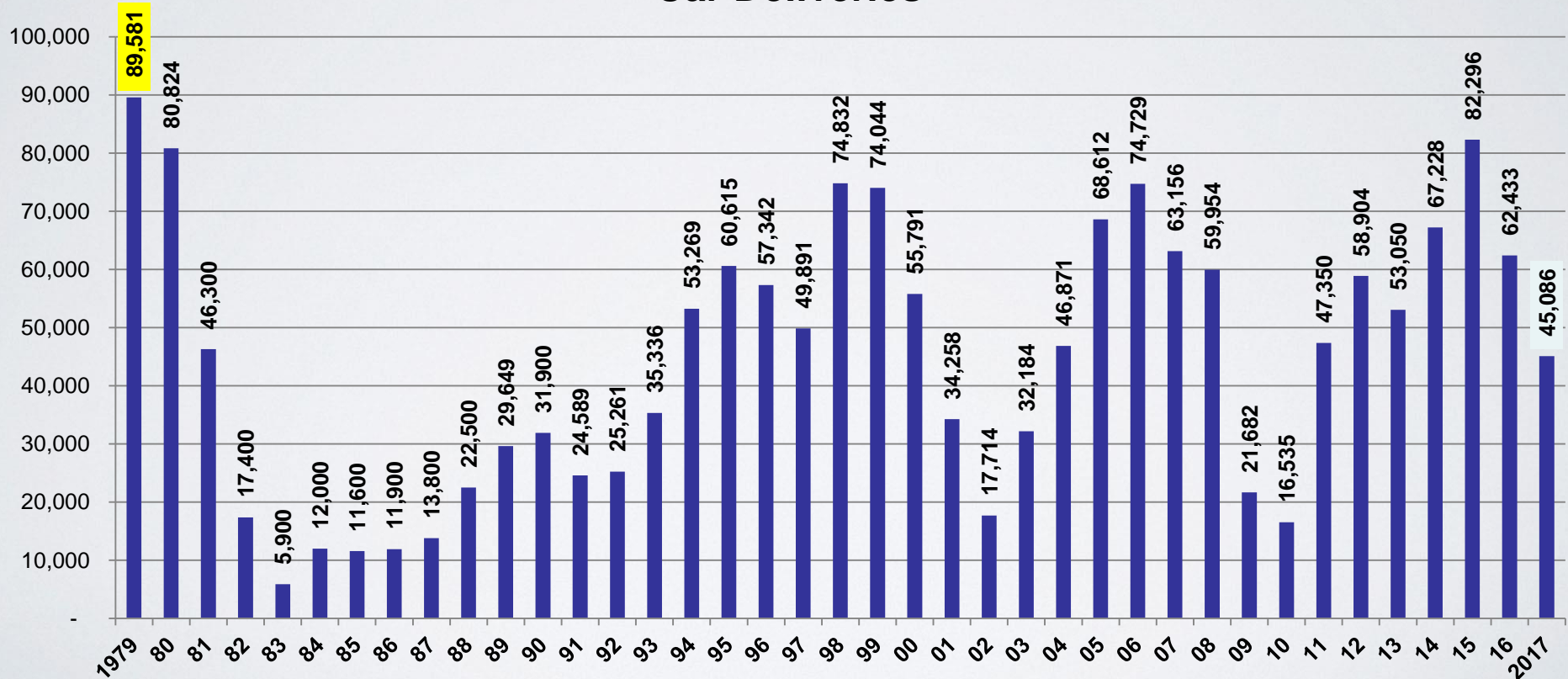
////////// COUNTS AT YEAR-END AND SHOWN IN THOUSANDS //////////





Car deliveries since the 1979 record year:

Car Deliveries





Grain Covered Hopper Cars



- ✓ Traditional grain hopper cars were four hopper arrangements
- ✓ Between 4000 and 4800 CF
- ✓ 263 GRL
- ✓ Longer over the pulling faces of couplers

- ✓ Modern grain hopper cars are three hopper arrangements
- ✓ Capacities greater than 5400 CF
- ✓ 286 GRL
- ✓ Shorter over the pulling face of couplers



Cement / Sand Covered Hopper Cars



- ✓ Small cube hoppers traditionally used to move cement
- ✓ Recently Frac Sand is the common commodity

- ✓ New small cube hoppers are through sill designs
- ✓ Volumes over 3200 CF
- ✓ Lower light weights
- ✓ Increase in carrying capacity



Autoracks



- ✓ Traditional Autoracks either constructed as bi-level or tri-level cars
- ✓ Typically have radial or rave doors

- ✓ Modern Autoracks designed to be convertible between bi-level or tri-level
- ✓ Gives versatility to car owners
- ✓ Different door designs manufactured from composites
- ✓ Reduces weight/ eases operation





Box Cars



- ✓ Older box cars still in use are 50' Plate "C" cars
- ✓ Not suitable for transporting high value commodities
- ✓ Lack interior cleanliness and sufficient loading height



- ✓ New box cars are Plate "F"
- ✓ Designed/manufactured with high value commodities in mind
- ✓ Smooth interiors reduce damage to product
- ✓ Greater interior heights

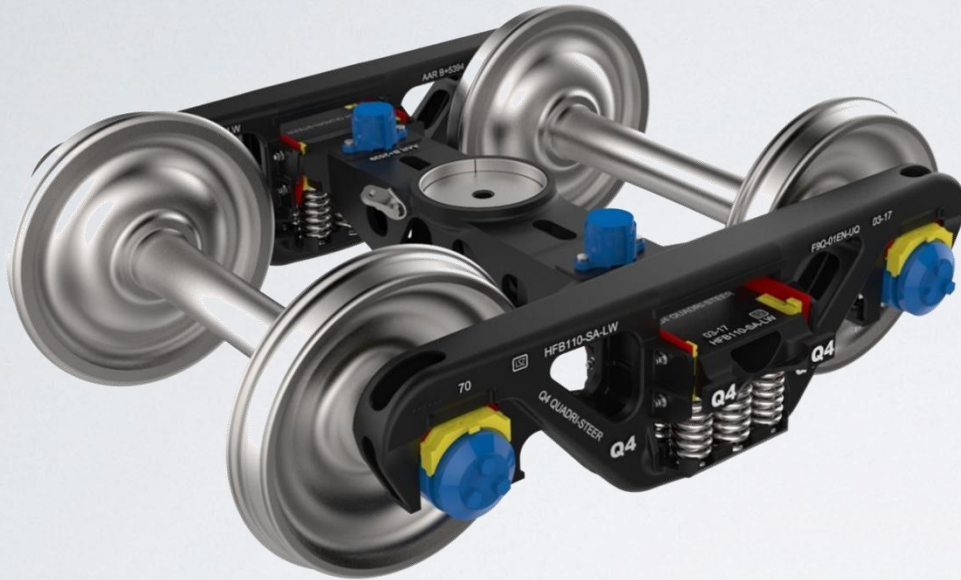
Tank Cars



- ✓ DOT 111 tank cars manufactured with 7/16" shells on jacketed cars and 1/2" shells on unjacketed cars
- ✓ Full height head shields not required
- ✓ No longer approved for transportation of flammable liquids

- ✓ DOT 117 tank cars designed for transportation of flammable liquids
- ✓ 9/16" shells, jackets, full head shields and thermal protection
- ✓ Top fittings protection
- ✓ Disengaging BOV handles

Trucks – M-976



- ✓ Prior to 2002 followed M-965 performance specifications
- ✓ Three piece trucks, constant damping, roller side bearings and standard bearing adaptors
- ✓ 2002 AAR released M-976 specification
- ✓ Raised minimum performance standards for trucks applied to new cars built to S-286
- ✓ Continued to update the specification
- ✓ Special designation (M-976-LH) for trucks that meet loaded hunting criterion



S-286 - Truck Components



- ✓ Constant contact side bearings stay in contact with the body bolster wear plate at all times
- ✓ Better control of car body roll
- ✓ Damping forces against truck hunting
- ✓ Restrict the trucks ability to steer
- ✓ M-976 truck approvals done with constant contact side bearings

- ✓ 2002 Standard S-286 adopted for free/unrestricted interchange of 286 GRL freight cars
- ✓ Required new cars be equipped with M-976 trucks/constant contact side bearings
- ✓ Cars previously equipped with roller type side bearings
 - ✓ Bearings set up with gap between roller and body bolster wear plate
 - ✓ Restrict the car body from rolling excessively
 - ✓ Allow the truck to steer





Freight Car Improvements

Over a number of years the AAR and industry has introduced several changes to the standards and regulations:

- ✓ Empty / Load sensor valves – Reduced braking ratios for empty cars
- ✓ Single sided pipe brackets and aluminium valve portions introduced in the late 1990's early 2000's
- ✓ Electronically Controlled Pneumatic (ECP) Brakes
- ✓ Higher buff / draft loads for stub sill vs. through sill cars (500,000 lbs vs. 350,000 lbs)
- ✓ Purpose designed cars for specific commodities
- ✓ 3 Million mile draft sills on tank cars
- ✓ S-2044 Safety Appliances introduced in 2014 improving new car safety
- ✓ Higher payload, lighter & shorter cars
- ✓ 286K GRL provides 9% weight payload advantage over 263K GRL

