

William W. Hay Lecture

Managing the Interchange of Freight Cars Among North American Railroads

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Managing the Interchange of Freight Cars Among North American Railroads

- **Outline**

- Origin of freight car interchange system in North America
- Benefits and disadvantage of interchange
- AAR Interchange Rules
- Handling exceptions to the Interchange Rules

Origin of Freight Car Interchange System in North America

- Before railroads, heavy cargo could only travel long distances economically by canals, rivers, or ocean voyages
 - Roads were not suitable for heavy cargo
 - Before Erie Canal of 1825, grain from Midwest to East had to go by river to New Orleans, then by ship (mountains). *But*,
 - Freezing in winter interrupted canal and river travel
- First railroads were very short and intended to haul freight to individual cities for local consumption or transfer to water
- Railroads meeting at one location were often not connected
- Shipments moving from one railroad to another had to “break bulk” – be unloaded from first railroad’s freight car, hauled a short distance, and then reloaded into the second railroad’s car

Origin of Freight Car Interchange System in North America

- Breaking bulk was costly, wasted time, and risked damage or pilferage
- Obvious answer: Transfer loaded cars from first railroad to the second road
- Impediments to interchange (moving cars between railroads):
 - Different track gauges; 53% of track was 4' 8-1/2" gauge in 1861 but 47% ranged from 4' 9" to 6' 0"
 - Different couplers at different heights
 - How to track foreign cars and pay car owners for their use
 - How to handle repairs to cars not on home road

Origin of Freight Car Interchange System in North America

- Incompatible track gauges had impeded freight shipment during the Civil War, providing an incentive to find a solution
- Private car lines (cars not owned by railroads) were established to provide cars for interline shipments over specified routes
- Many railroads started to convert other gauges to standard gauge (4' 8-1/2") around 1870
- Southern roads converted from 5' 0" to 4' 8-1/2" on June 1, 1886
- Master Car Builders Association was formed September 1867 to formulate rules and procedures to handle repairs to foreign cars and develop standards to make cars compatible

Origin of Freight Car Interchange System in North America

- MCB eventually evolved into the Safety and Operations Division of Association of American Railroads (AAR)
- Over the past 154 years, MCB and AAR established a series of standards to make components interchangeable and ensure strength adequate for the harsh railroad operating environment:
 - Coupler height
 - Link-and-pin couplers; later standard knuckle couplers
 - Axle sizes with different weight capacities
 - Journal boxes and journal bearings
 - Air brake components and brake system performance

Benefits and Disadvantage of Interchange

- Benefits of Freight Car Interchange Standards
 - Eliminates need to break bulk where different railroads meet
 - Ensures all cars in a train have compatible braking and coupling systems
 - Ensures cars have acceptable level of strength to support their load and survive operating environment
 - Common system to repair cars and bill for car use and repair
- Disadvantage
 - Improvements not compatible with existing equipment are very difficult to implement. Use of air brakes and knuckle couplers were forced by federal government in 1890s and 1900s. But doing so made much heavier and longer trains possible. US railroads then diverged from rest of world.

Railroading Was a Very Dangerous Industry Before Knuckle Couplers and Air Brakes



AAR Interchange Rules

- The Interchange Rules are maintained and revised as necessary by technical committees of the AAR.
- Committee members represent railroads, private car owners, car and component manufacturers, and shippers.
- All freight railroads and owners of interchange freight cars must subscribe to and be governed by the Interchange Rules.
- FRA Freight Car Safety Standards (based on I.R.) also apply
- Basic principles of the Interchange Rules:
 - Railroads responsible for condition of all cars on their lines
 - Car owners are responsible for, and chargeable with, repairs to their cars caused by ordinary wear and tear in fair service
 - Handling line is responsible for damage caused by unfair usage

This Would Qualify as Unfair Usage; Handling Line Is Responsible for Car Damage



AAR Interchange Rules

- Basic principles of the Interchange Rules (continued):
 - Individual rules require compliance with other AAR standards and specifications
 - Railroads must accept cars offered in interchange that comply with Interchange Rules and referenced standards but can refuse cars that do not comply
- Basic structure of individual rules in I.R. Field Manual:
 - A. Wear Limits, Gaging, Cause for Renewal (When are repairs necessary?)
 - B. Correct Repairs (What repairs should be made?)
 - C. Recondition Requirements (If reconditioned components can be applied, what requirements must they meet?)

AAR Interchange Rules

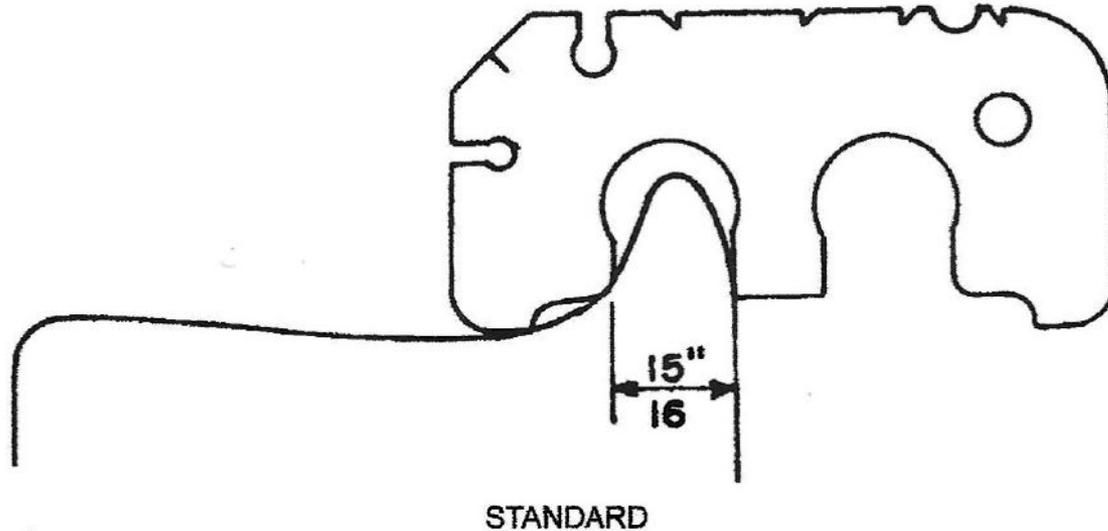
- Basic structure of individual rules in Field Manual (continued):
 - D. Welding Requirements (What weld repair, if any, is OK?)
 - E. General Information (Clarifies repair requirements)
 - F. Billing Repair Data Requirements (Information that must be provided to car owner in repair bill)
- Office Manual includes costs to be charged for labor to perform repair (most repair operations have standard hours to perform them and a standard hourly wage rate) and for material used.
- For most material used in repairs (wheels, couplers, fasteners, brake shoes, etc., etc.) there are standard costs for new, second hand, and reconditioned items.

Gage Used to Identify Thin Wheel Flange Defect (Why Made) Code 80

RULE 41

STEEL WHEEL DEFECTS—OWNER'S RESPONSIBILITY

1. Condemnable at Any Time
 - a. Thin flange Why Made 60: $1\frac{5}{16}$ inch thick or less. Apply gage as follows:



AAR Interchange Rules

- Little work is performed on components at car repair shop; the components are usually exchanged for material on hand and removed components sent elsewhere for reconditioning (wheel, axle & bearing sets; couplers; air brake valves).
- Car owner is charged for difference in value between removed and applied parts
 - Example: NS inspects a CSX car and finds cracked coupler knuckle. NS replaces knuckle and sends repair bill to CSX. ($\$135.35 - 8.69 + 16.51 = \143.17) CSX must pay the bill.
- AAR serves as clearinghouse for repair bills; repair facility submits repair bill to AAR, which passes it on to car owner
- Net difference in billing between two roads is paid monthly.
- AAR periodically audits repair shops for repair procedures and accurate billing

Handling Exceptions to Interchange Rules

- Interchange Rules do not prevent railroads and car owners from reaching agreement among themselves to operate equipment not complying with all AAR standards or to charge different amounts for repairs
 - Example: 125-ton trucks used on most articulated double-stack cars are not approved for unrestricted interchange because of wheel loading, but most railroads agree to handle them based on satisfactory performance in service
- If car owner believes repair bill is improper, he can appeal to AAR Arbitration and Rules Committee. Signatories to Interchange Agreement accept Arbitration rulings as final.
- If AAR finds that a railroad has been submitting fraudulent repair bills, all billing from that shop-or even the entire railroad- can be forfeited for some period of time

Double-Stack Car Identified As Having 125-Ton Trucks



Conclusions

- Railroads enabled heavy cargo to be moved efficiently over routes where water transport was not feasible
- Railroads later replaced most canals and much river shipment
- Transportation by rail would be hopelessly inefficient if railroads could not exchange freight cars regardless of owner
- Interchange shipment started to expand shortly after Civil War
- Standards and procedures established by the Master Car Builders Association, and later the AAR, made interchange possible on a large scale
- AAR Interchange Rules are the basis of freight car interchange in North America