Trends and Issues in Container Transport

Larry Shughart, Global Lead for Transportation
TRF Annual Meeting, March 2012
Tampa, FL
WorleyParsons Company Overview

Infrastructure & Environment
- Rail
- Transport
- Environment
- Ports & Marine
- Terminals
- Water & Wastewater
- Buildings

Power
- Advanced Coal
- Coal
- Gas Turbine Based
- Power Plants
- Nuclear
- Renewable Energy
- Transmission Networks

Minerals & Metals
- Base Metals
- Coal
- Chemicals
- Ferrous Metals
- Alumina
- Aluminium
- Iron Ore
- Gas Cleaning

Hydrocarbons
- Upstream
  - Fixed Offshore Production Facilities
  - Floating & Deepwater Solutions
  - Offshore Pipelines & Subsea Systems
  - Onshore Pipelines & Receiving Terminals
  - Onshore Oil & Gas Production Facilities
  - Heavy Oil & Oil Sands
  - LNG
- Downstream
  - Refining & Petrochemicals
  - Sulphur Management
  - Specialty Chemicals

EcoNomics
148 Offices  I  44 Countries  I  37,000+ Personnel
“One-stop shop” approach using global expertise with local knowledge and experience available to support and deliver railway projects

**Infrastructure**
- Track
- Earthworks & Drainage
- Geotechnical & Hydrology
- Signalling & Communications
- Bridges & Structures
- Depots & Maintenance Facilities
- Tunnels
- Operations Modelling
- Approvals & Accreditation
- Intermodal Interfaces
- Cost Estimating & Risk Assessment
- Procurement

**Rolling Stock**
- Locomotives
- Wagons
- Passenger Cars
- Traction Power
- Asset Management

500+
Personnel with significant rail expertise

7
Centres of rail excellence

6
Continents
Example Rail Mega Projects

Fortescue Metals Group

FMG

- Capex US$3.3B+
- DFS FEED EPCM
- Australia Pilbara
- Iron Ore 45 Mtpa
- Pit to Port including 256km rail and port infrastructure
- World’s heaviest haul railway and in Guinness Book of Records
- Track constructed 18 months, the fastest schedule ever achieved in the Pilbara of WA

Hancock Prospecting

Roy Hill

- Capex US$10B
- BFS PMC
- Australia Pilbara
- Iron Ore 55 Mtpa
- Pit to Port including mine 340km rail and port infrastructure
- Greenfield sites
Example Rail Mega Projects

**Alpha Coal**
**Hancock Coal**
- Capex US$10B
- PMC IPMT
- Australia Queensland
- Coal 60 Mtpa
- Pit to Port including 500km rail and port infrastructure
- PMC for BFS and execution of the entire Pit to Port chain
- Greenfield site
- Approvals coordination

**Guajira Thermal Coal**
**MPX**
- Capex US$3B
- BFS PMC IPMT
- Colombia
- Coal 60,000 hectares coal bearing land
- Pit to Port including mine 150km rail and port infrastructure
- Greenfield sites
Intermodal and Ports

Experienced global team developed through working with shipping lines, port authorities, government transport ministries, rail entities, and global container logistics specialists.

Availability of global intermodal and ports expertise to provide input and advice during the design and implementation of intermodal services and terminals.

**Intermodal**
- Optimisation of intermodal business and planning of rail corridors for intermodal trains
- Implementation of inland container terminals
- Operational analysis of container handling processes in terminals

**Ports & Marine Terminals**
- Port and harbour master planning and operations
- Container and break bulk handling facilities design and implementation
- Dredging and reclamation advisory including approvals
- Environmental impact assessment, management, monitoring and approvals

120+ Years of accumulated experience

8 Centres of port excellence

6 Projects in continents
Cross Harbor Intermodal Program
Port Authority of NY/NJ

- CAPEX US$400M
- USA
- Rail / port interfaces
- Facility will be upgraded to maintain rail and cargo operations for the Port Jersey Cross Harbor Freight Program, and Tropicana.

Capacity Improvement
Port Metro Vancouver

- CAPEX US$2.5B
- Canada
- Complex project including rail, terminals and port
- PMC to coordinate work streams
- Engineering
- Environmental assessment and consultation
- Master transportation plan

New Doha Port
New Doha Port Steering Committee

- CAPEX US$7B
- Qatar
- Lead engineering design
- Master planning consultant
North America Intermodal Market

- North American railroads moved almost 15 million intermodal loads last year.

- Intermodal traffic in North America has grown almost 50% since 2001.

- In the U.S. intermodal trains average more than 140 containers per train and Western roads average more than 160 containers per train.

- In Canada intermodal train length often exceeds 4 kilometers.

- Pure domestic intermodal traffic represents 40% of the total intermodal volume in North America.

- More than 50% of truck traffic over 3000 kilometers has converted to intermodal rail.

- Conversion of truck traffic to intermodal rail in shorter haul lanes is growing rapidly with improving service and compelling economics.
Characteristics of the North American Intermodal Model

- Long distances - the average length of haul for an intermodal move is over 2500 kilometers
- Heavy volumes - almost 1 million containers per month
- High density - approximately 95% of intermodal traffic moves in lanes over 1200 kilometers
- Double Stack clearances in key corridors dramatically improve economics
- Commodity mix - high volumes of consumer goods conducive for container transport, and high international volumes
- Infrastructure - intermodal network built on the back of a strong freight rail network
- Relatively small passenger volumes to compete for capacity
- Management focus - railroads and trucking companies in North America have shifted from viewing intermodal as a niche market to viewing intermodal as a growth engine
Evolution of the North American Intermodal Market

- Railroads began offering Trailer service (TOFC) in the late 1950s
  - Terminals were small and non-mechanized
  - Intermodal traffic moved with general freight trains
- Container service (COFC) followed and grew with the increased use of marine containers
- Rapid increase in global trade accelerated COFC service growth during 1980s
- Double stack economics led to significant volumes of truck traffic conversion to rail
- Infrastructure constraints are now limiting intermodal growth
  - Terminals are at or near capacity
  - Low clearances limit double stack network reach
  - Single track areas limit train length and result in delays
Growth in intermodal traffic in North America has been driven by four key factors:

- **Growth in containerized imports**
  - About 60 percent of rail intermodal traffic consists of merchandise imports and exports that interchange between ship and rail at U.S. container ports; the remaining 40 percent of rail intermodal traffic is domestic (Source: AAR).

- **Double stack economics**
  - With 1,600 kilometer length of haul, costs are 25% lower than standard intermodal and 60% lower than truck (Source: University of Denver)

- **Shared equipment ownership**
  - Intermodal equipment pools have improved utilization and reduced costs

- **Improved service and market reach**
  - Railroads have recognized intermodal as more than a niche and are investing accordingly
Intermodal Volume Growth in North America has been Steady

Annual Intermodal Volumes

Source: AAR and IANA
81 Cities in the US with intermodal terminals
Some cities have multiple terminals
Canada and Mexico have 19 intermodal terminals
In the 1990s there were more than 300 Intermodal Terminals
  - Many low volume (<20,000 lifts/year) terminals were closed
  - Shift to large integrated logistics intermodal facilities like BNSF’s Joliet facility and UP’s Global 3 facility
Double Stack clearance is expanding
New modern terminals are being added to the network
Intermodal represents 22% of Rail Revenue in North America

Source: IANA and AAR
Several Factors Will Continue to Drive Intermodal Growth in North America

- Increasing fuel costs will make rail more affordable than truck
- Deteriorating highway system makes intermodal a more reliable alternative
- Driver shortages and HOS rules will limit truck capacity
- Railroads are upgrading intermodal infrastructure
  - Western Railroads are adding more double tracking on transcontinental routes
  - Eastern Railroads are expanding double stack clearances beyond traditional West-East lanes
  - Terminal expansion includes the introduction of high efficiency terminals
Norfolk Southern and CSX are Expanding Double Stack Clearances in the East

Source: Norfolk Southern and CSX
For a 1,600 kilometer length of haul, Intermodal costs are significantly lower than truck costs and vary based on the type of intermodal service.

- Trailer on 89’ Railcar: 55%
- Container on 89’ Railcar: 53%
- Double Stack Railcar: 41%

Source: Dave DeBoer, University of Denver
Economics of Truck Versus Intermodal are Changing
### Intermodal capacity = \( f \) (axle load, articulation, double stack)

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Container Tonnes</th>
<th>Wagon Tonnes</th>
<th>Tonnes / Axle</th>
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</table>
Estimated Benefits of Intermodal

➢ Safety
  
  5,722 Highway Fatalities Avoided

➢ Economics
  
  12.5 Billion Gallons of Fuel Savings

➢ Sustainability
  
  139 Million Tons of CO2 Emissions Reductions

➢ Livability
  
  2.3 Billion Travel Hours Saved

➢ Impact on Infrastructure
  
  214 Billion Kilometers of Truck Traffic Avoided

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Estimated Benefits from 2013 through 2035 based on capturing 50% of the rail intermodal market at distances greater than 500 miles
## State of Intermodalism Around the World

<table>
<thead>
<tr>
<th>Country</th>
<th>Track Length (km)</th>
<th>Population per km</th>
<th>Intermodal Volume per Year*</th>
<th>Intermodal Loads per km of Track</th>
<th>GDP per Capita (USD)**</th>
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<td>United States</td>
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* Estimates, in millions of TEUs 2011 Source: AAR, CONCOR, Transnet, Journal of Commerce  
** 2010 est. Source: CIA World Factbook