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EcoNomics™

Trends and Issues in Container Transport

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





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WorleyParsons Company Overview



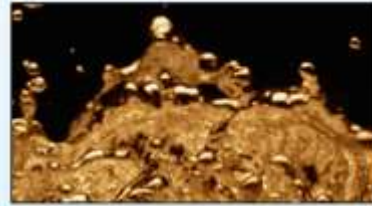
Infrastructure & Environment

Rail
Transport
Environment
Ports & Marine
Terminals
Water & Wastewater
Buildings



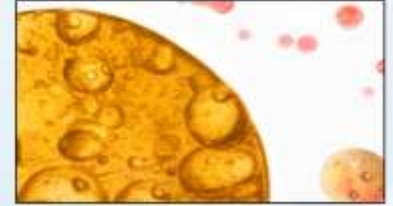
Power

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



Global Reach



Railway Capability

“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

Rail expertise on

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

Projects in

6

continents

Intermodal and Port Experience

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 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



- ▶ 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



- ▶ 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

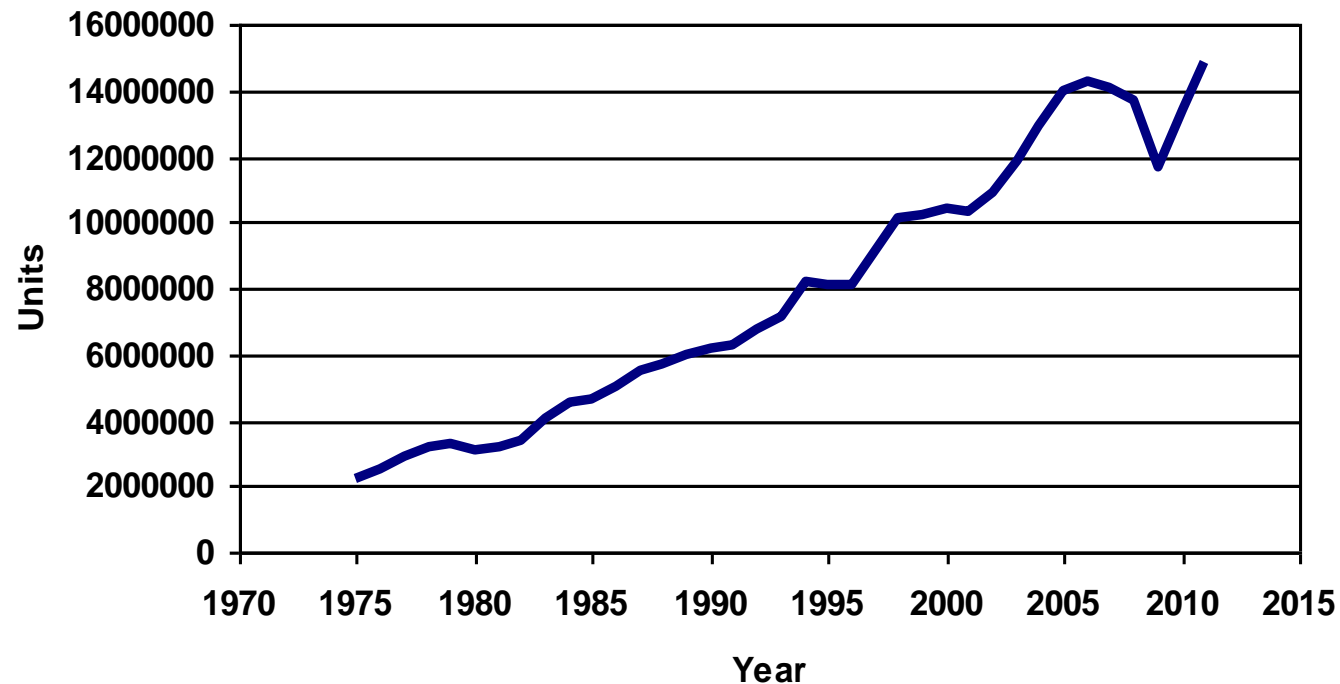


- ▶ Growth in intermodal traffic in North America has been driven by four key factors:
 - **Growth in containerized imports**
 - ◆ About 60 percent of rail intermodal traffic consists of merchandise imports and exports that interchange between ship and rail at U.S. container ports; the remaining 40 percent 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

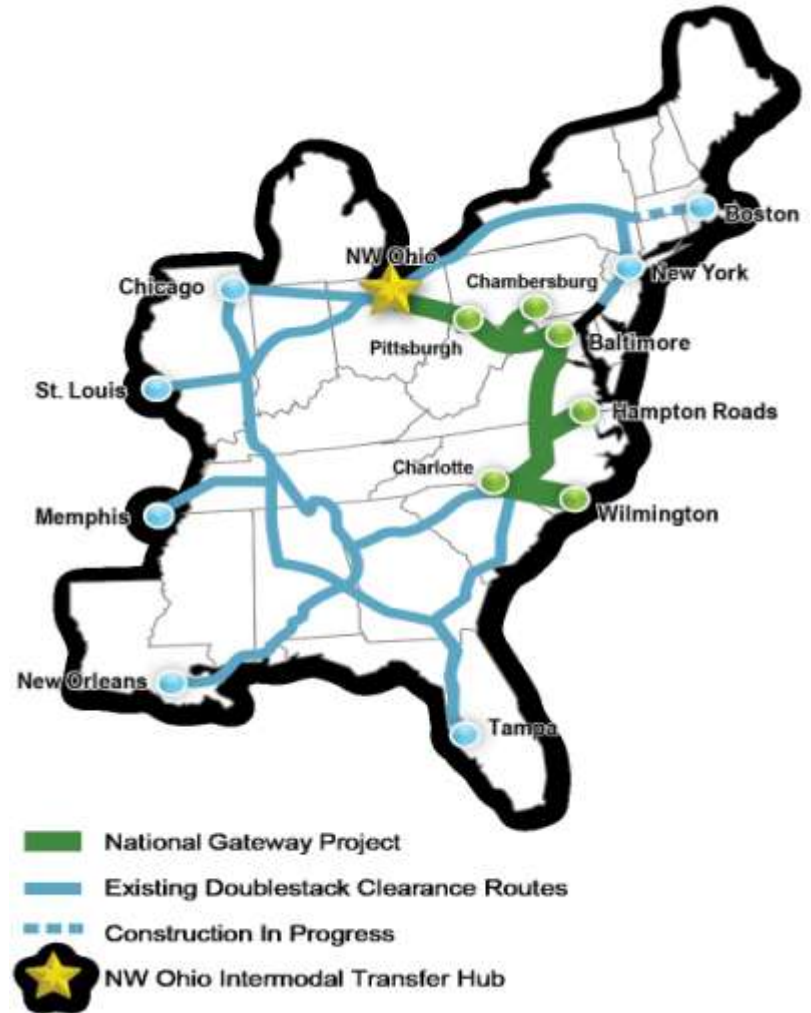
- ▶ Increasing fuel costs will make rail more affordable than truck
- ▶ Deteriorating highway system makes intermodal a more reliable alternative
- ▶ Driver shortages and HOS rules will limit truck capacity
- ▶ Railroads are upgrading intermodal infrastructure
 - Western Railroads are adding more double 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



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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




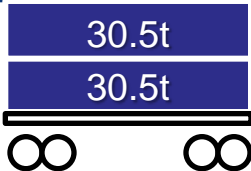
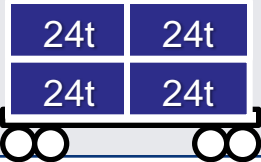
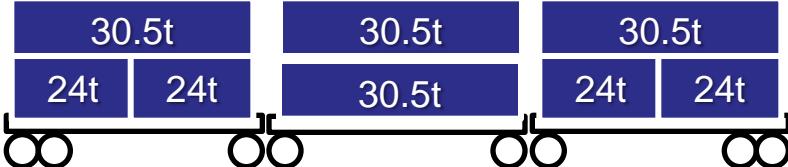


Economics of Truck Versus Intermodal are Changing





Intermodal capacity = f (axle load, articulation, double stack)

Configuration	Container Tonnes	Wagon Tonnes	Tonnes / Axle
	48	24	18
	61	27	22
	96	27	31
	61	25	22
	96	25	30
	61 78	23 24	42 34



➤ 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





Country	Track Length (km)	Population per km	Intermodal Volume per Year*	Intermodal Loads per km of Track	GDP per Capita (USD)**
United States	226,427	1,379	23.8	105.1	\$47,200
China	91,000	14,722	1.6	17.6	\$7,600
Canada	72,912	605	5.0	68.6	\$39,400
South Africa	24,487	2,066	0.7	28.6	\$10,700
India	64,215	18,846	3.0	36.7	\$3,500
Russia	128,000	1,117	0.5	3.9	\$15,900
Australia	41,461	548	1.2	28.9	\$41,000

* Estimates, in millions of TEUs 2011 Source: AAR, CONCOR, Transnet, Journal of Commerce

** 2010 est. Source: CIA World Factbook



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Thank you

