MODERNIZING THE RAIL INDUSTRY

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My great grandfather said that had he asked his customers what they really needed, they would have said a faster horse.

– William Ford Jr, Executive Chairman
Ford Motor Company
The Changing Competitive Environment
The near-term environment is favorable to rail as:

**Infrastructure condition**
- Maintenance deficits
- Urban congestion in key markets

**Labor market dynamics**
- Increasing regulations
- Continued retention & attraction issues

**Supply chain orientation**
- Rail has strong retail client relationships
- Opportunity for more differentiation beyond simply distance
But...Trucking continues to push for expanded size/weight limits and is seeing a rapid evolution in technology...

**Truck efficiency initiatives**

- **Increased weight limits**: 91K lbs GVW already in some states; 100K lbs GVW might become federal standard within 10 years
- **Increased length limits**: 60’ containers in limited use in Canada, so bound to come here
- **Truck platooning and autonomous vehicles**: Legislation enacted or considered in 34 states over past 5 years; active testing underway in several cities; state DOTs likely will lead adoption & establish regulations
- **Environmental**: Government funding actively pursuing higher fuel efficiency: SuperTruck, Automation, SmartWay looking to double truck fuel efficiency

**Infrastructure funding solutions**

- **Fuel tax increase in 2018?** Perhaps in trade for increased weight limits on 3-axle trailers?
- **Privatization and tolling possible** within 5-10 years to fund infrastructure may provide the platform for autonomous truck implementation
...No similar governmental levers promoting rail efficiency:

Recent & Projected Rail Changes

• Rail safety:
  – PTC deadlines approaching but operations far from stable. Huge cost to railroads
  – Safety Management System (SMS) approach more like airlines coming

• Crew size:
  – FRA two-person crew size regulation has been withdrawn.

• Environmental:
  – Tier 4 was a set back for rail
  – No further regs as yet for locomotives, but California is looking at a Tier 5 and talking about zero emissions (e.g., electrics)

• Commercial regulation:
  – Rate challenges are difficult, no-win for regulators; expect continued pushing for reciprocal switching to open up competition rather than overt rate regulation

• Rail mergers:
  – As logistics gets smarter, national network may be needed for cost/ market reach.
  – Reciprocal switching regs could open the door
Railroads must reduce assets and employment levels to compete with driverless trucks.

Train crew costs can’t go to zero due to en route work events. Railroads will have to look at fuel cost, asset utilization & labor productivity in mechanical & engineering functions for additional cost reductions.

Source: ATRI 2015 Report, STB 2015 R-1s, Oliver Wyman analysis
Railroad Evolution Requirements
Seven ways to improve the railroad industry’s competitive position

Fuel Costs

Organization

Automation

Maintenance Costs

Asset Utilization

Disintermediation

Capacity Utilization
Solutions: Technological advances in the railroad industry

**Automation**
- Driverless trains
- Yard robots to bleed and inspect cars
- Drones for track inspection
- Automated train dispatching
- Predictive failure analysis for equipment repairs

**Fuel Costs**
- Change in fuels
  - Natural gas
  - Electricity
- Fuel efficiency
  - Capture regenerative braking energy
  - Battery technology to level power demand
- Lighter weight equipment

**Maintenance Costs**
- Longer lived materials
- Better engineering
- Better predictive failure analysis
- Elimination of wayside signalling
- Fewer grade crossings
Railroads must reignite their stalled productivity improvement momentum

In 2015, Class I railroads produced:

- 169% of the revenue ton-miles produced in 1990
- …while using:
  - 141% of the locomotives
  - 130% of the freight train-miles
  - 85% of the GTMs per horsepower hour
  - 80% of the GTMs per horsepower
  - 78% of the route miles

Index US Railroad Productivity, 1990-2015

Source: AAR, "Analysis of Class I Railroads", and Oliver Wyman analysis.
Solutions: Tighter management practices and tools

**Asset Utilization**
- Reduce dwell times
  - Less origin / destination dwell time
  - Better interchange management
- Shorter, more frequent trains
  - Fewer intermediate handlings
  - Shorter dwell between trains
- Better equipment reliability

**Capacity Utilization**
- Reservation systems
- Dynamic pricing to fill out trains
- Higher train density on the network
Solutions: Structural changes to the industry

**Disintermediation**
1. Better control of door-to-door service and costs
2. Extended reach
   - Alliances
   - Acquisitions
3. Logistics perspective vs. modal niche carrier

**Organization**
1. Reduction of G&A expenses
   - Push responsibility lower in the organization
2. Matrix management
   - Account management
   - Product management
3. Balance ROIC vs. OR
Reengineered target markets: Germany’s railways are growing due to strong market innovation

**Traffic Growth in a Decade**
Change in revenue ton-km, 2015 versus 2006

- USA: -2%
- Germany: 7%

- Germany is a large mature market where rail freight is rapidly evolving: 230 competing freight railways
- Growth is driven by new market offers & operational models that are service intensive & asset efficient
- Growth has occurred using less locomotives and rolling stock

Sources: AAR Analysis of Class I Railroads, Railway Association of Canada Rail Trends, German Railway Market Analysis, UIC database, Oliver Wyman analysis

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Auto carload rail example: Service and market
The service offer is port to Stockholm for next morning delivery at 6 am for 15-20 carloads of autos

A Comparison to the US

<table>
<thead>
<tr>
<th>Destination</th>
<th>Stockholm</th>
<th>Pittsburgh</th>
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<tbody>
<tr>
<td>Market size</td>
<td>1.5M</td>
<td>2.6M</td>
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<tr>
<td>Distance from port</td>
<td>383 miles</td>
<td>360 miles</td>
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<tr>
<td>Average train speed</td>
<td>45 mph</td>
<td>35-40 mph</td>
</tr>
<tr>
<td>Time moving in train</td>
<td>8.5 hours</td>
<td>10 hours</td>
</tr>
</tbody>
</table>
Auto carload rail example: Destination ramp

- Over 40,000 units per year
- 3 tracks and approx 2.5 ac
- Spot to pick up – 5 hours
- Located on commuter line with 15 minute headways

Highly dependable rail service combined with client reservations requires a very small auto ramp
Auto carload rail example: The service plan
The auto block moves on regular carload trains with a full cycle every two days

**Service Plan**

- Load in block as per reservation
- Local to main yard midday
- 2 carload trains with block swap in hump yard
- Local train set out loads at 6 am
- Local train pick up empties at 11 am
- 2 carload trains back to origin yard in the evening

Photo source: D. Lehlbach
Auto carload rail example: Summary
Supply chain transparency facilitates small volumes with high service levels and less than half of the normal rolling stock

Summary
• <400 mile haul
• 48-hour car cycle
• 40,000 units on 2.5 acres
• Small tightly controlled car fleet
• Next morning delivery
• Capacity reserved daily in advance
• Very tightly managed supply chain

Photo source: D. Lehlbach
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