Container train service provision and load factors

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Presentation structure

- Background
- Research objectives
- Survey methodology
- Survey results
- Scenario testing
- The loading gauge problem
- Potential for further investigation
Background

- Significant attention now devoted to rail
- Rail freight volumes have grown rapidly in Britain in last 10 years
- (Until 2008), port-based container market was major growth area:
  - Internationalisation of trade
  - Hinterland flows often suited to rail
  - Major container port expansion in next decade
  - Significant on-rail competition
- Little previous research on freight train load factors
Research objectives

- to identify the current level of service provision, both in terms of number of trains operated and container carrying capacity of these trains
- to examine the extent to which existing on-train capacity is utilised (i.e. load factors)
- to model the theoretical potential for carrying greater rail volumes without requiring additional train service provision
- to set out arguments relating to the challenges involved in achieving higher load factors and longer trains
From this....
....to this
Survey methodology

• Video-based survey
• No. of wagons, type of wagons, load factors
• Survey period: February – August 2007
• Sample size = 578 trains
• Equivalent to one week’s provision
• Wholly representative for:
  – Port
  – Rail freight operating company
  – Direction of flow
• Broadly representative of specific services between O-D pairs
Mean TEU capacity provided per train, by port and train operator

<table>
<thead>
<tr>
<th>Port</th>
<th>Freightliner</th>
<th>EWS</th>
<th>First GBRf</th>
<th>Fastline</th>
<th>All operators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Felixstowe</td>
<td>64.38</td>
<td>45.60</td>
<td>63.00</td>
<td>-</td>
<td>62.71</td>
</tr>
<tr>
<td>Southampton</td>
<td>62.61</td>
<td>47.22</td>
<td>-</td>
<td>-</td>
<td>57.93</td>
</tr>
<tr>
<td>Tilbury</td>
<td>58.00</td>
<td>39.20</td>
<td>-</td>
<td>-</td>
<td>54.24</td>
</tr>
<tr>
<td>Thamesport</td>
<td>64.17</td>
<td>-</td>
<td>-</td>
<td>54.00</td>
<td>61.63</td>
</tr>
<tr>
<td>Total</td>
<td>63.10</td>
<td>46.09</td>
<td>63.00</td>
<td>54.00</td>
<td>59.99</td>
</tr>
</tbody>
</table>
Mean TEU capacity utilisation per train, by port and direction of flow

<table>
<thead>
<tr>
<th>Port</th>
<th>Mean capacity utilisation per train (TEU carried as % of capacity)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Import</td>
</tr>
<tr>
<td>Felixstowe</td>
<td>81.82</td>
</tr>
<tr>
<td>Southampton</td>
<td>74.04</td>
</tr>
<tr>
<td>Tilbury</td>
<td>50.78</td>
</tr>
<tr>
<td>Thamesport</td>
<td>68.18</td>
</tr>
<tr>
<td>Total</td>
<td>75.07</td>
</tr>
</tbody>
</table>
Mean TEU capacity utilisation per train, by port and train operator

<table>
<thead>
<tr>
<th>Port</th>
<th>Freightliner</th>
<th>EWS</th>
<th>First GBRf</th>
<th>Fastline</th>
<th>All operators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Felixstowe</td>
<td>80.63</td>
<td>57.38</td>
<td>89.99</td>
<td>-</td>
<td>80.27</td>
</tr>
<tr>
<td>Southampton</td>
<td>67.09</td>
<td>65.83</td>
<td>-</td>
<td>-</td>
<td>66.73</td>
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<tr>
<td>Tilbury</td>
<td>58.01</td>
<td>41.34</td>
<td>-</td>
<td>-</td>
<td>54.67</td>
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<tr>
<td>Thamesport</td>
<td>80.35</td>
<td>-</td>
<td>-</td>
<td>54.07</td>
<td>73.78</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>73.40</strong></td>
<td><strong>61.69</strong></td>
<td><strong>89.99</strong></td>
<td><strong>54.07</strong></td>
<td><strong>72.20</strong></td>
</tr>
</tbody>
</table>
Scenario testing: 100% load factors

- Scenario 1: existing service provision; no change to number of wagons per train or mix of wagon types
- Scenario 2: existing number of wagons per train, but all have standard 3 TEU capacity
- Scenario 3: all services operating with 24 standard 3 TEU wagons (i.e. train capacity of 72 TEU)
Annual rail volumes (in thousand TEU) at each port under each scenario
Key findings

• Considerable variability in train capacity provision and utilisation – much spare capacity
• Many factors encourage ‘inefficiency’
• Internal to rail industry:
  – Train trailing weight and length limits
  – Loading gauge restrictions: lack of W10 network
• External:
  – supply chain (e.g. low volumes, imbalanced flows, seasonal variability)
  – policy (e.g. government grants; gauge enhancement funding)
• Need to consider wider picture to achieve gains
## Incidence of high cube containers on rail (by port and route type)

<table>
<thead>
<tr>
<th>From port</th>
<th>% of departures using W10 cleared routes</th>
<th>High cube containers (in TEU) as % of total TEU on:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>All routes</td>
</tr>
<tr>
<td>Felixstowe</td>
<td>73</td>
<td>31.1</td>
</tr>
<tr>
<td>Southampton</td>
<td>0</td>
<td>26.9</td>
</tr>
<tr>
<td>Tilbury</td>
<td>71</td>
<td>16.4</td>
</tr>
<tr>
<td>Thamesport</td>
<td>0</td>
<td>16.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>39</strong></td>
<td><strong>27.2</strong></td>
</tr>
</tbody>
</table>
Effects on efficiency of carriage of high cube containers by rail

• Some evidence that efficiency suffers on non-gauge-cleared routes:
  – Train capacity higher at Felixstowe than Southampton
  – Average load factor higher at Felixstowe than Southampton
  – Inclusion of Tilbury and Thamesport gives more mixed picture
  – Other factors may be responsible for differences, e.g.:
    • Train operator mix
    • Port throughput and container flow requirements
    • Small sample size (Tilbury and Thamesport)
Wagon utilisation on Freightliner services on non-cleared routes (by port, both directions)

<table>
<thead>
<tr>
<th>Port</th>
<th>No. of observations</th>
<th>% wagon utilisation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Standard</td>
</tr>
<tr>
<td>Felixstowe</td>
<td>32</td>
<td>84.8</td>
</tr>
<tr>
<td>Southampton</td>
<td>158</td>
<td>62.9</td>
</tr>
<tr>
<td>Tilbury</td>
<td>10</td>
<td>66.5</td>
</tr>
<tr>
<td>Thamesport</td>
<td>29</td>
<td>76.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>229</strong></td>
<td><strong>67.9</strong></td>
</tr>
</tbody>
</table>
Planned gauge enhancements

• Series of route upgrades planned by 2014, with funding from various sources:
  – Transport Innovation Fund (TIF)
  – Strategic Freight Network (SFN)
  – Network Rail funds
  – Third parties (e.g. ports, regional development bodies)
• Further route upgrades are planned to follow
• What will be the impacts on current service provision?
Percentage of services in ‘before’ and ‘after’ scenarios using W10 gauge-cleared corridors

<table>
<thead>
<tr>
<th>Port</th>
<th>% of departures per week with W10 gauge clearance</th>
<th>With ‘committed’ and ‘planned’ schemes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current</td>
<td></td>
</tr>
<tr>
<td>Felixstowe</td>
<td>73</td>
<td>96</td>
</tr>
<tr>
<td>Southampton</td>
<td>0</td>
<td>71</td>
</tr>
<tr>
<td>Tilbury</td>
<td>71</td>
<td>71</td>
</tr>
<tr>
<td>Thamesport</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Seaforth</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>39</strong></td>
<td><strong>77</strong></td>
</tr>
</tbody>
</table>
Gauge enhancement: summary

• Committed schemes will have major impact on network capability for high cube containers to/from ports
• Significant gaps will still exist:
  – Southampton - Yorkshire
  – Tilbury - Yorkshire (direct)
  – Thamesport - all destinations
• Remaining concerns:
  – Diversionary routes
  – Future growth in service provision (e.g. new ports, new inland terminals)
Scope for further investigation

- **Rail operations:**
  - Further disaggregated analysis of TEU provision and capacity utilisation
  - Rolling stock options

- **Broader policy implications:**
  - Rail network capacity constraints and enhancements
  - Carbon emissions
  - Links with business (e.g. CSR)