Energy Efficient Safe SHIp OPERAtion

Progress of ‘Identification of ships and risk analysis of relevant marine accidents’

WP1, Task 1.2

Koimtzoglou A., Louzis K., Eliopoulou E., Ventikos N.P.

PMC and Invited Partners Meeting, N.J.V. ATHENS PLAZA Hotel, 16 & 17 Jan 2014
Table of Contents

• Database
  Focus on Container vessels & Passenger vessels

• Screening process → Accidents of interest

• Results
  Descriptive analysis
  Percentiles - Fleet
  Fleet Rates

• Conclusions
Database inclusion criteria

- Ship Types: Container, Cruise, Ro-Pax, Pax
- GT ≥ 400 gt
- Built Date ≥ 1/1980
- Accident Date ≥ 1/1990 – 11/2013
- Heavy weather conditions

384 accidents collected
Database

Data Fields

– Ship Details (Name, Type, GT...)
– Ship Dimensions (L, B, D...)
– Machinery (Installed power, service speed...)
– Accident Details (Date, location, type...)
Accidents of interest

Initial exclusion criteria for accidents

- Hull/Machinery damage
- Fire and explosion
- Extreme weather conditions (e.g. hurricanes)
- Moored ships
- Tug assistance
- Inevitable contacts with floating objects

275 accidents excluded
Accidents of interest

• Further analysis of accidents
  – Based on accident reports for details
  – Exclusion of accidents related to human error

• Further exclusions
  – High Speed Crafts (Fr > 0.5)
  – Not serious accidents

42 more accidents were excluded
Accidents of interest

• Example of included accident:
  Container Ship – SANDY RICKMERS – 4/2/2013
  In collision with MT RYSTRAUM in the Kiel Canal in strong winds

• Example of excluded accident:
  RoPax ferry - SUPERFAST VII – 31/1/2008
  Struck the breakwater whilst berthing with tug assistance in heavy weather
Screening Process

Phase I: 384 accidents

Phase II: 109 accidents

Phase III: 67 accidents
Descriptive analysis

Ship Type

- Container Ship: 13%
- Cruise Ship: 15%
- Passenger Ship: 5%
- RoPax: 67%

Progress of ‘Identification of ships and risk analysis of relevant marine accidents’

16 & 17 Jan 2014
Descriptive analysis

<table>
<thead>
<tr>
<th>Location Type</th>
<th>Accidents</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restricted Waters</td>
<td>5</td>
<td>7.5</td>
</tr>
<tr>
<td>In Port</td>
<td>62</td>
<td>92.5</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Accident Type:

- Grounding: 28%
- Collision: 20%
- Contact: 52%
## Percentiles - Fleet

### Container Ship

<table>
<thead>
<tr>
<th></th>
<th>LOA</th>
<th>TEU</th>
<th>DWT</th>
<th>MCR Power [kW]</th>
</tr>
</thead>
<tbody>
<tr>
<td>75th Percentile</td>
<td>275.10</td>
<td>4469</td>
<td>61428</td>
<td>40720</td>
</tr>
<tr>
<td>Lower Bound</td>
<td>261.30</td>
<td>4022</td>
<td>55285</td>
<td>36648</td>
</tr>
<tr>
<td>Upper Bound</td>
<td>288.90</td>
<td>4916</td>
<td>67571</td>
<td>44792</td>
</tr>
<tr>
<td>MSC LORENA (IMO: 9320403)</td>
<td>275.00</td>
<td>4870</td>
<td>59587</td>
<td>39952</td>
</tr>
<tr>
<td>Divergence</td>
<td>-0.04%</td>
<td>8.97%</td>
<td>-3.00%</td>
<td>-1.89%</td>
</tr>
</tbody>
</table>

### RoPax

<table>
<thead>
<tr>
<th></th>
<th>LOA</th>
<th>GRT</th>
<th>DWT</th>
<th>MCR Power [kW]</th>
</tr>
</thead>
<tbody>
<tr>
<td>75th Percentile</td>
<td>179.70</td>
<td>28138</td>
<td>5493</td>
<td>23040</td>
</tr>
<tr>
<td>Lower Bound</td>
<td>170.70</td>
<td>25324</td>
<td>4944</td>
<td>20736</td>
</tr>
<tr>
<td>Upper Bound</td>
<td>188.70</td>
<td>30952</td>
<td>6042</td>
<td>25344</td>
</tr>
<tr>
<td>KAITAKI (IMO: 9107942)</td>
<td>181.60</td>
<td>22365</td>
<td>5794</td>
<td>23040</td>
</tr>
<tr>
<td>Divergence</td>
<td>1.06%</td>
<td>-20.52%</td>
<td>5.48%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
Percentiles - Fleet

Container Ships

Sample (Acc.) – Fleet (2013)

PARTICI
DWT = 41974 t
TEU = 3534
MCR = 35998 kW

Sample (Acc.) – Fleet (2013)
Cruise Ships

**THOMSON DREAM**

- GRT = 54763 gt
- Length = 243 m
- MCR = 23796 kW

Percentiles - Fleet

---

Sample (Acc.) – Fleet (2013)

16 & 17 Jan 2014

Progress of
‘Identification of ships and risk analysis of relevant marine accidents’
Percentiles - Fleet

RoPax Ships

ROSELLA
GRT = 16879 gt
Length = 136 m
MCR = 17652 kW

Sample (Acc.) – Fleet (2013)

50th Percentile
## Fleet Rates

### Fleet-At-Risk Selection Criteria

<table>
<thead>
<tr>
<th>Container</th>
<th>Cruise &amp; RoPax</th>
</tr>
</thead>
<tbody>
<tr>
<td>IACS Class</td>
<td>GT ≥ 1000 gt</td>
</tr>
<tr>
<td>Period: 1990-2012</td>
<td>LOA ≥ 80 m</td>
</tr>
<tr>
<td>Built ≥ 1982</td>
<td></td>
</tr>
<tr>
<td>IACS Class</td>
<td></td>
</tr>
<tr>
<td>Period: 1994 - 2010</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Contiopt project Source: GOALDS project*

### Frequencies

<table>
<thead>
<tr>
<th></th>
<th>Container</th>
<th>Cruise</th>
<th>RoPax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fleet-At-Risk</td>
<td>54992</td>
<td>2641</td>
<td>5528</td>
</tr>
<tr>
<td>Valid Accidents</td>
<td>8</td>
<td>9</td>
<td>20</td>
</tr>
<tr>
<td>Rates</td>
<td>1.45E-04</td>
<td>3.41E-03</td>
<td>3.62E-03</td>
</tr>
</tbody>
</table>

*Progress of ‘Identification of ships and risk analysis of relevant marine accidents’*
Conclusions

• Contacts are the most frequent accidents of interest

• The median of the ships in the accident related sample seems to be larger compared to the median of the (current: 2013) fleet

• Container ships up to 5000 TEU (e.g. feeders) are more at risk than larger vessels of this type

• Calculated frequencies indicate a real problem