The Green Freighter Project

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Content

- The Green Freighter project
- Effects of the use of hydrogen
- Hydrogen in freighter aircraft
The Green Freighter project

Full project title

Design investigations

of environmentally friendly

and cost effective

freighters with unconventional configuration
The Green Freighter project

Short-range aircraft variants matrix

<table>
<thead>
<tr>
<th></th>
<th>Jet</th>
<th>Propeller</th>
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</thead>
<tbody>
<tr>
<td>Kerosene</td>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td>Hydrogen</td>
<td><img src="image3" alt="Diagram" /></td>
<td><img src="image4" alt="Diagram" /></td>
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</tbody>
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Effects of the use of hydrogen

Internal tank position alternatives
Effects of the use of hydrogen

Size, mass, energy consumption

LH2: ≈ + 15 % MOEW; + 5 % MTOW
LH2: ≈ + 5 % Energy consumption

3.6 m
Effects of the use of hydrogen

Performance

![Graph comparing LH₂ and Kerosene performance](image)
Effects of the use of hydrogen

Emissions

LH2: No CO$_2$

LH2: $\approx$ 90 % less NO$_x$
Freighter aircraft enabling hydrogen

Increasingly interesting market segment

- Cargo volume forecasts: plus $\approx 6\%$ p.a.
  - World annual air cargo volume is expected to triple by 2025
  - World freighter aircraft fleet is expected to almost double by 2025

- Need and market for new and dedicated freighter aircraft
Greater freedom in design

- Greater psychological acceptance of unmanned operation and the use of hydrogen as fuel
- Largely reduced environmental control system (ECS)
- Infrastructure: More than 50% of world air cargo is transported between less than 20 hubs
Greater freedom in design

- Less problems in case of blended wing body configurations
  - cabin pressurization,
  - accelerations during roll maneuvers,
  - no outside-view,
  - evacuation,
  - ...

Hydrogen in freighter aircraft

Unmanned operation

⇒ New potential fuel storage volume
⇒ Smaller/no fuselage stretch
⇒ Less mass and performance penalty
Hydrogen in freighter aircraft

Unconventional configurations
Hydrogen in freighter aircraft

- “Safe handling of hydrogen is no longer a problem in the industrial and commercial area”
- Enough maturity to get (back) into demonstration
- Create confidence for investors
Thank you for your attention

For further information see
http://GF.ProfScholz.de