**Introduction**

- Design brief
  - 1000 people
  - Deployable

- Research
  - Existing solutions
  - Regulations
Sizing

• Total area required: 500m\(^2\) (1.9 tennis courts)
• Existing lifeboat waterplane area: 48m\(^2\)
• Existing davit limitations:
  • Length - 15m
  • Beam - 4m
  • Deadweight - 25T
• Design must expand
Inflatable Components Investigated

- Drop-stitch was identified
- Developed by the US Navy
- Provides a flat, rigid structure
How thick will it need to be?

- Force per person = 736N
- Buoyancy force from drop-stitch per person = 780N
- At 150mm thick, drop-stitch would be positively buoyant
- Wrinkling = force/pressure = 6cm x 6cm
How many gas cylinders?

• Inflatable
  • Thickness – 150mm
  • Area – 500m$^2$
  • Volume – 75m$^3$
  • Pressure – 30 psi

• Composite high pressure cylinders
  • 6 x 89L Cylinders – 5000 psi
  • Cylinder dimensions:
    • Length – 1.44m
    • Diameter – 0.35m
Will it fit in the pre-defined hull envelope?

• Packing ratio of 5.8:1 (inflated volume : rolled up volume) [iRocker]
• 20% margin added (4.8:1)
• Rolled up volume of 14.8m$^3$, or a diameter of 0.74m at 30m long
THE DESIGN
Key Features – Central Hull
Key Features – Expansions
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Central lifeboat
50 people + crew

Expansion shell

Secondary expansion
425 people

Primary expansion
100 people
Key Features – Expansion Shell & Hinge

- Expansion Shell & Hinge
- Carbon fibre outer shell
- Fully enclosed sub compartment (waterproof)
- Drop stitch material is wrapped around a shaft
- Ball and socket joint, which allows vertical motion
Key Features – Hydraulic Rams
Key Features – Inflatable Walls

3 inflatable inner tubes
Key Features – Access Ramps
Resistance and Propulsion

- Resistance calculated
  - Air and skin friction
  - Wave making resistance assumed to be negligible (low speeds)

- Required engine power
  - Mechanical efficiency 85%
  - 20% margin added for auxiliaries
Summary
Thank you for listening
Any Questions?