ThorCon Molten Salt Reactor (TMSR-500) Technology for Indonesia

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Two 500 MW ThorCon liquid fission power plants
Prototype Built In A Hull, Pretested, Towed To Indonesia, Settled Shoreside, And Powered Up. A 174x67m Complete 500 MWe Power Plant
Each 557 MWt Power Module Has An Active And A Cooldown Can
ThorCon Employs Three Salt Loops

47.7% thermal efficiency @ 20°C

46.4% thermal efficiency @ 30°C
Replaceable Can Unit Housed Within Cold Wall

- Reactor Pot contains the graphite moderator with channels for molten salt flow
- Freeze valve melt drains salt to drain tank
- Cold wall absorbs heat radiated from drain tank
- Cold wall is cooled by natural water circulation
Cold Wall Is Cooled By Natural Convection To Condenser In Cooling Pond
Next Step Is A Pre-fission Test Plant
ThorCon Recent Actions Include:

- System simulations show Fukushima like accidents do no harm
- Design and simulations by top Korean ship safety firm show ThorConIsle can handle a North Atlantic storm and aircraft engine strike. Seismic analysis started.
- GAIN project (ANL): Salt properties measurement begun
- GAIN project (ANL): Electro-chemical sensors for in-situ redox, salt level, and plutonium concentration is underway
- Indonesian P3Tek study to validate ThorCon claims for safety, cost, and supply chain completed
  - Recommendation to be sent to the Indonesian president
Thorcon Fukushima Response:

- Earthquake sensors
  - initiate fuelsalt drain
  - drop shutdown rods (SCRAM)
  - fission stops
- Then, all power and primary cooling path lost
- Reactor in safe state with fuelsalt in passively cooled drain tank.
- Fuelsalt temperature max 750°C
- Worse - instant SBO max 850°C
- Worst - SBO+triple shutdown rod fail 1000°C w/ 0.5% creep damage
ThorCon Hull Towed Through North Atlantic Storm Seas Accepts 1 g Forces

Draught at Tow Condition

<table>
<thead>
<tr>
<th>Length</th>
<th>Width</th>
<th>Depth</th>
<th>Draught</th>
<th>Hull Weight</th>
<th>Total Equipment Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>174 m</td>
<td>65 m</td>
<td>33 m</td>
<td>13.3 m (Stern)</td>
<td>12.1 m (midship)</td>
<td>11.0 m (Bow)</td>
</tr>
</tbody>
</table>

Material Properties (Nominal Values)

<table>
<thead>
<tr>
<th>Material</th>
<th>Yield Strength</th>
<th>Elastic Modulus</th>
<th>Poisson’s Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild Steel</td>
<td>235 MPa</td>
<td>205.8 GPa</td>
<td>0.3</td>
</tr>
<tr>
<td>AH36</td>
<td>355 MPa</td>
<td>205.8 GPa</td>
<td>0.3</td>
</tr>
</tbody>
</table>
Scenario: 8 t Aircraft Engine Strikes Sand-filled Sandwich Wall At 200 m/s

- Max penetration 200 mm
- Max inner wall deflection 300 mm
- No effect on
  - Silo (which surrounds)
  - Cold wall (which is around)
  - Can (which contains)
  - Primary loop containing radioactive fuelsalt

Initial impact speed: 
\[ V_0 = 200 \text{ m/s} \]
In Summary, ThorCon Is Moving On The Winding Path Forward

http://thorconpower.com/