Desalinating Ocean Water for Emergency Relief with a Wave-Powered Reverse Osmosis System

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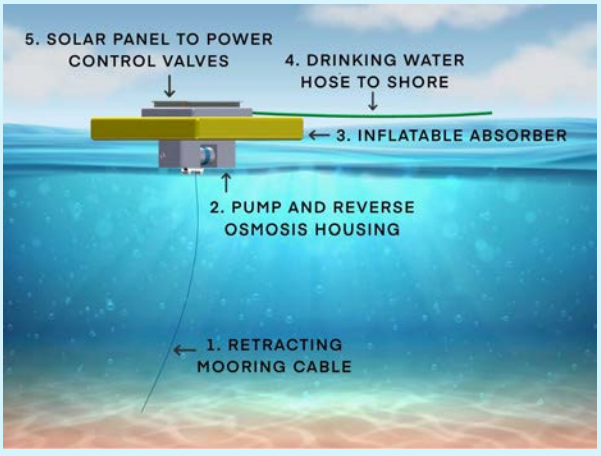
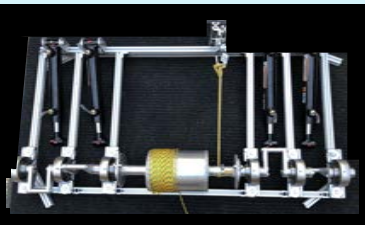


Objective:

- Alleviate water insecurity in remote coastal communities
- Utilize CAD, FEA, test-stand prototyping
- Build a theoretical model to maximize efficiency and convenience of a wave-powered desalination system

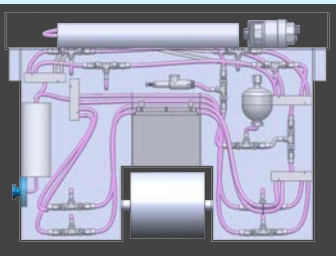
Relevance:

- 70% of Earth is covered by undrinkable water
- Easy access to seawater on coastlines



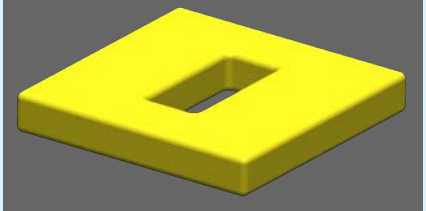
Rotary Pump:

A **four cylinder pump** loaded by a mooring drum drawing power from wave energy. The pumps are pressurized to **800 psi** for successful reverse osmosis. A static analysis was performed in ANSYS to ensure the components do not fail.



Hydraulic Circuit:

Compact piping system to house **reverse osmosis** filter, pressure relief valves, and accumulator. A complete CAD model to demonstrate concept and size.



Absorber:

Inflatable design allows for **compact** shipping and **quick** deployment. Custom shape provides rigid connection to pump housing and **captures wave energy**. Manufacturability and cost estimates confirmed by supplier source.

Impact:

- Can meet demand for 40 people by desalinating ~590 liters of seawater daily
- System powered through renewable energy (solar and wave energy)
- Easily transported and deployed in areas without heavy machinery
- Freshwater production volume matches the system volume (900L) every 1.5 days