Expeditionary Ladder Kit

Arianna Arias, Sara Carmona, Ruben Rodriguez
Project Lead: Dennis How, Oceans Dept. UCSB Graduate Student Mentor: Emily Levin
NAVFAC EXWC, Expeditionary Department in Partnership with University of California Santa Barbara

About the UCT's & Our Mission

The Navy has two Underwater Construction Teams (UCTs) that deploy divers to work on oceanic facilities on different types of platforms such as piers, wharfs, and vessels. Because the team transitions in and out of water, a ladder is required to assist the divers in their deployment and recovery. Unfortunately, this technology does not adequately meet expeditionary needs. To help improve this technology and rectify these problems, the design team's objective is to design a naval ladder kit that is modular with an easy set up process.

UTC construction site in Diego Garcia

UCT Diver being helped out of water

Design Requirements

- Compatibility, Strength, and Adaptability
- Improve outdated equipment
- Easy to transport and ladder is stored in Roto Model Harding Case
  - Less "man-power" needed for set up
  - Can be transferred to different locations using Tricon Containers

User Interviews

Members of the Underwater Construction Team that currently use a welded 30 foot ladder and commercial products were interviewed to generate ideas for design, and learn about diving requirements and opinions. This ensures the ladder kit will be effective and fulfill the user's needs.

Design Matrix for Research and Inspiration

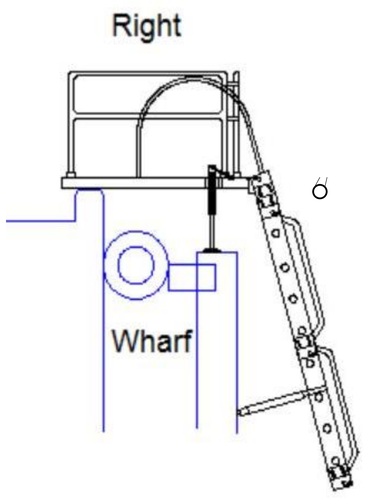
Components	30 ft.	extension	telescoping	Multi-master	XTEND
Weight cap.	✓	?	✗	✗	✗
Safety	✓	✗	✓	✗	✗
Weight	✗	✓	?	✗	✓
Modular	✗	?	?	?	✗
Installation	✗	✗	?	✗	✗

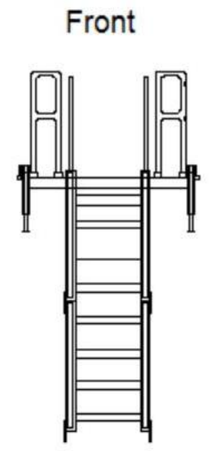
✓ Meets Expectations ✗ Needs Improvement ? Desired Concept

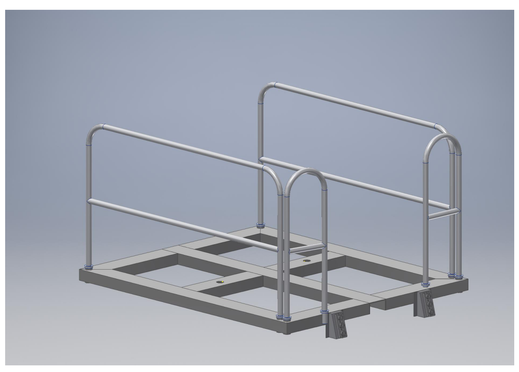
Final Design

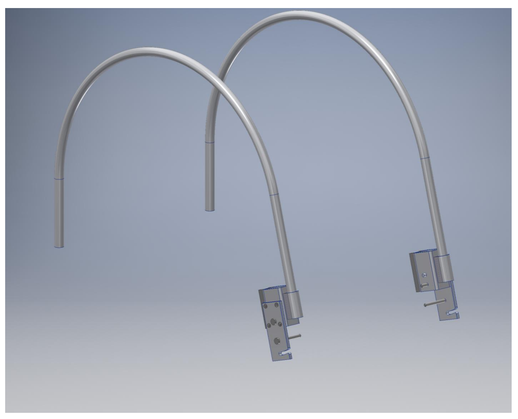
After brainstorming and selecting components the design team composed a final design with the following features:

- 15° angle adjustment from vertical incline
- 4 ½ ft. sections of ladder with attached connectors
- 6 ½ X 5 ½ sqft. platform
- Jack Levelers for support of platform
- Tie downs to ensure security
- Wheels for easy mobility
- Welded handrails for sections
- Materials: durability and weight ratio are the most significant factors considered in material choice
  - 6061 Aluminum for ladder sections
  - Stainless Steel platform with nonskid perforated sheet
- Zinc-plated sacrificial anode to resist corrosion

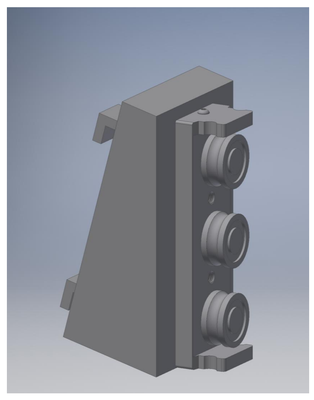


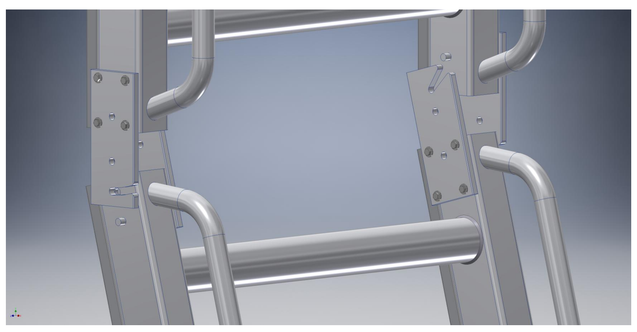


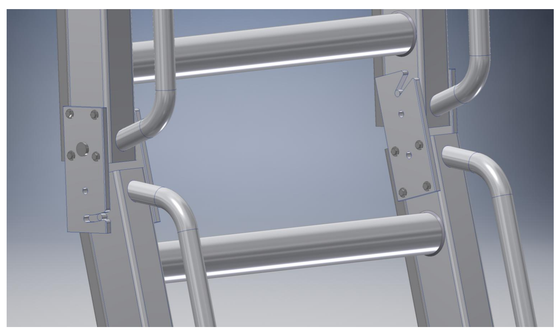




Detailed components of ladder







References

- OSHA Safety Standards
- McMaster Manual
- Seabee Underwater Construction Team
- Mechanics of Materials, E. Russell Johnston, Jr., Ferdinand P. Beer

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