

Diver Launch & Retrieval Apparatus

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Abstract

Adaptive divers tend to have a lower threshold of tolerance for scuba diving conditions that are outside of human control: wind, waves, and current. The reason for this is significant assistance is required to transfer adaptive divers between the dock, boat, and water which becomes dangerous in adverse conditions. The goal of this project is to design an apparatus that would ensure the safety of adaptive divers during the most dangerous aspects of a dive trip - transfers - to create access to diving in suboptimal conditions.

Introduction

3.1 Scuba Diving in Aquatic Therapy

❖ While aquatic therapy - physical therapy conducted in a pool setting - is a concept used as far back as Ancient Greece, only in recent years has diving become more prevalent as a form of therapy. Aquatic therapy is proven to be a very effective form of therapy to treat many medical conditions.

3.2 The Aquatic Therapy Industry

❖ Physical therapists are not the only ones riding the wave of aquatic therapy; multiple non-profit organizations have been founded to provide scuba diving opportunities for adaptive divers. The first to do so was the Handicapped Scuba Association (HSA) which was founded on June 22, 1981. Five years later HSA became an independent diver training and certifying agency with the tasks of determining the needs of handicapped divers and developing the techniques to help them dive successfully. HSA was the first agency to specialize not only in scuba diving, but in diving with the handicapped.

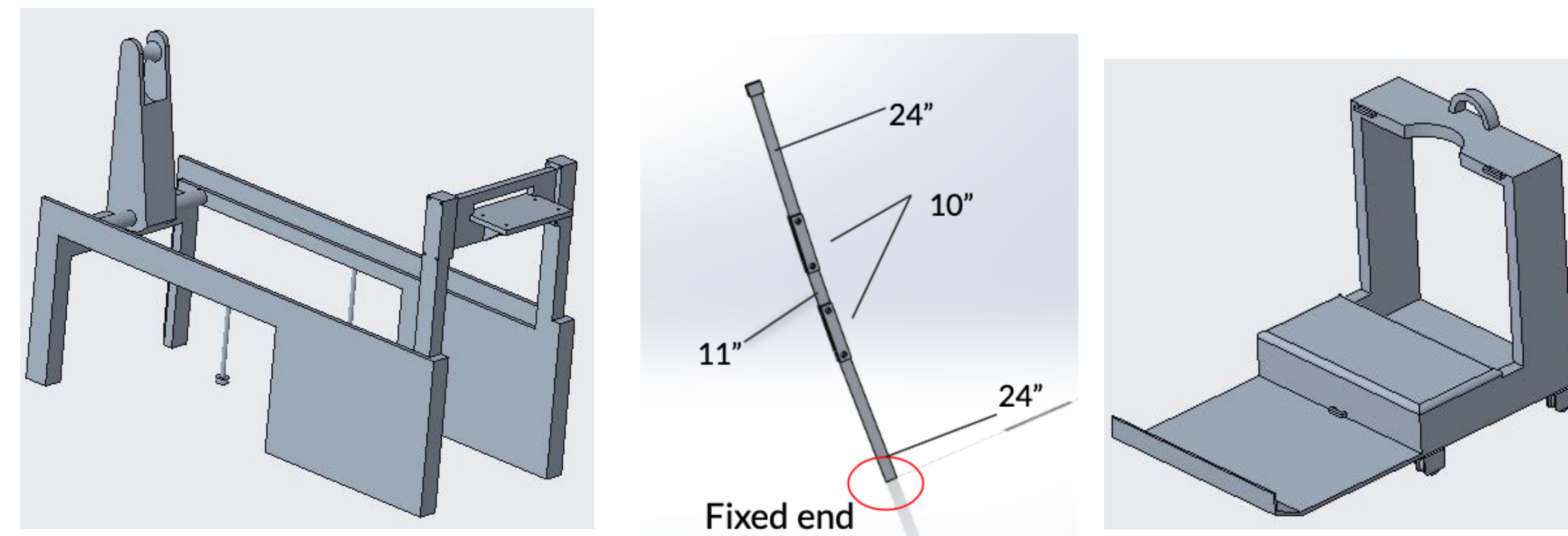
3.3 Related Technology

❖ Industry leaders have been creating techniques to ensure the safety of adaptive divers since 1986, but there is still much room for improvement. Dives are frequently cancelled due to inclement weather, robbing the handicapped of the wondrous experience and physical and social benefits of diving. This exclusion can be eradicated with an apparatus that can be easily affixed and removed from a boat and is unobtrusive to normal dive operations. Although there has been a large flux in the adaptive diving industry, no such apparatus exists. The most similar devices are a pool-side lift and a dive boat elevator, neither of which accomplish what we are trying to achieve.

Methods | Design | Analysis

The design process started with determining the best location on a dive boat for the apparatus to be affixed. The criteria we decided upon for the preferred location was relative stability, proximity to existing geometry for mounting purposes, and limiting the obstruction to normal dive operations. The main components of the apparatus were the rail carriage, chair, and mounting arms.

- The purpose of the rail carriage was to provide the platform from which the divers chair can be launched from and retrieved to once the dive is complete.
- The design of the chair is such to allow the diver to be completely geared up during launch and retrieval. The chair is mounted on four wheels, the width and height of which are such that they will pass along the grove in the rails on the carriage with slightly more than a clearance fit.
- The mounting arms are necessary in this project to provide stability to the rail system. The design should be collapsible to make it optimal for storage. Additionally, it will only be engaged when the lift is being used.



Results

After securing the winch and bow roller over Spring Break, construction was to be completed using welding equipment generously made available to us by Shake-a-Leg in Coconut Grove. However, Due to the COVID-19 pandemic, the group could not obtain construct the final product and obtain results.

Conclusion

- Once construction was complete, Rainbow Reef Dive shop was donating access to their boat during a regularly scheduled dive to install the apparatus along with providing a 200lb CPR dummy
- That would have helped us identify any obstructions or design flaws and make adjustments as necessary.
- The design developed is the simplest possible method of reducing the barriers between adaptive and able bodied divers. Therefore, the group believes it would have been
- Future modifications may include the ability to launch the diver outward from the boat under power for ease of operations and also to make the arms that extend from the gunwale removable so they are not damaged while traversing canals.

Acknowledgments

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References

- Meno, J. M. (2004). Therapeutic aquatics of Wyoming. Presented at the 2004 ATRI Conference in Chicago, IL.
- Sova, R. (2000). Aquatic exercise. Port Washington, WI: DSL, Ltd.
- Sova, R. (2002). Introduction to aquatic therapy and rehab. Port Washington, WI: DSL, Ltd.
- Wykle, M. O. (2004). Fluid yogaltese. Presented at the 2004 ATRI Conference in Chicago, IL.

