

CHAPTER 12

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SUBMERGED WATER STABILITY AND EXERCISE AID

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INTRODUCTION

The water exercise aid was designed for an aquatic therapy class. It was designed to allow patients with various types of disabilities to exercise in the pool with stability, comfort and confidence. Water exercises provide a good workout, especially when the exercises are used for rehabilitation. The tendency of the body to float in the water alleviates stress on the joints. When in use, the apparatus sinks in the water and rests on the floor of the pool. The main component is a seat surrounded on three sides by a system of rails. This seat has a back support. It may be rotated to allow the back of the seat to be used as an additional support while the user is in a standing position. The height of the seat may also be adjusted to accommodate users of different sizes. The system of rails surrounding the chair contains various heights and is designed to aid in a number of stretching exercises. Furthermore, these rails provide support to the user, serve as anchoring locations for resistive bands, and allow up to four simultaneous users.

SUMMARY OF IMPACT

This device can be beneficial to anyone when used as a water exercise aid. It can be used for support, for stretching exercises, or as a circuit trainer in conjunction with resistance bands to provide a workout for virtually any muscle group. The device adds an element to water exercise that previously was unavailable. The device allows unstable or frightened patients to move away from the wall of the pool and into the water, therefore allowing a full range of motion and complete interaction with the class. The device allows performance of water exercises that were previously unavailable or difficult to complete. The design allows for the completion of many different activities while using



Figure 12.1. The Water Exercise Aid.

the same apparatus. These activities include stretching, muscle toning, and muscle strengthening.

TECHNICAL DESCRIPTION

The basic material used for the device was 2-inch diameter PVC, because it is commonly available and satisfies the basic requirements. It is light and inexpensive compared to other materials. Holes were drilled into the pipes to allow water to enter. This makes the sinking of the device very simple, and the addition of extra weights is unnecessary. The platform at the base allows for additional weight and stability. Standing on the platform eliminates tipping and sliding. Finally, the system of rails provides a support for people while

stretching. These rails can also be used as anchors for resistance bands.

The seat was constructed with 1.5-inch PVC and is designed to rotate. This enables the seat to face forward but also be rotated to face backward when not in use. Therefore the backrest of the seat may serve as an additional support when standing. The seat itself was mounted on a support that extends vertically from the base, which is composed of two pipes. One pipe is inside the other. The height of the seat is adjustable between 18 and 26 inches from the base of the platform. The inner pipe is able to move freely within the outer pipe to allow for height adjustment. The system is fixed in place by a 3/8-inch steel pin inserted through holes in both the inner and outer pipes. Even though the fixture for the seat is very strong, it was calculated that the chair would still deflect .164 inches given a weight of 300 pounds. This is a small deflection and deemed acceptable for this version of the device; however, future versions will include additional support for the seat.

Ballet-style bars were placed on three sides of the device. The two sides opposite each other include bars at six, 18 and 36 inches. The third side, opposite the chair, has bars at 12 and 30 inches. The bars were placed at these different heights to provide more options for the type of stretching

exercises that may be performed. Different exercises work well with different heights, and placing bars at various levels allows more variety. The bars also act as a place to position resistance bands. The bands can be looped around the bars and used by patients for muscle strengthening exercises.

Both the bars and the seat were attached to the base of the device. The base was covered with flat platforms that were constructed from PVC sheets. The flat PVC platforms were placed along the outer edge of the ballet bars and on the seat. The sections next to the bars are 19 inches wide and provide a place for people to stand. The portion in front of the seat is approximately 35 inches deep, which allows enough room for a person to lean against the backrest of the chair and still remain on the platform. The platforms combined together act as a safety feature preventing the user from getting a foot caught between the tubing that composes base itself. Furthermore, the platforms stabilize the entire device in two ways. First, the added weight of the platforms helps add stability. Second, when the user is standing on a platform, the added weight is transferred as a downward force to the ground. Generally, one person on the platform is enough to prevent the device from sliding at all. Increasing the number of people using the platform increases the stability of the device as well. The cost of parts was approximately \$500.

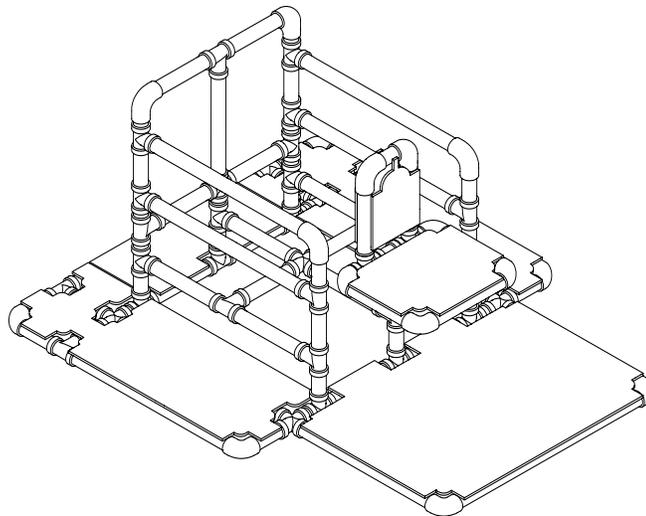


Figure 12.2. Mechanical Drawing of Device.

