

# Variable Swim Resistance via RipTune

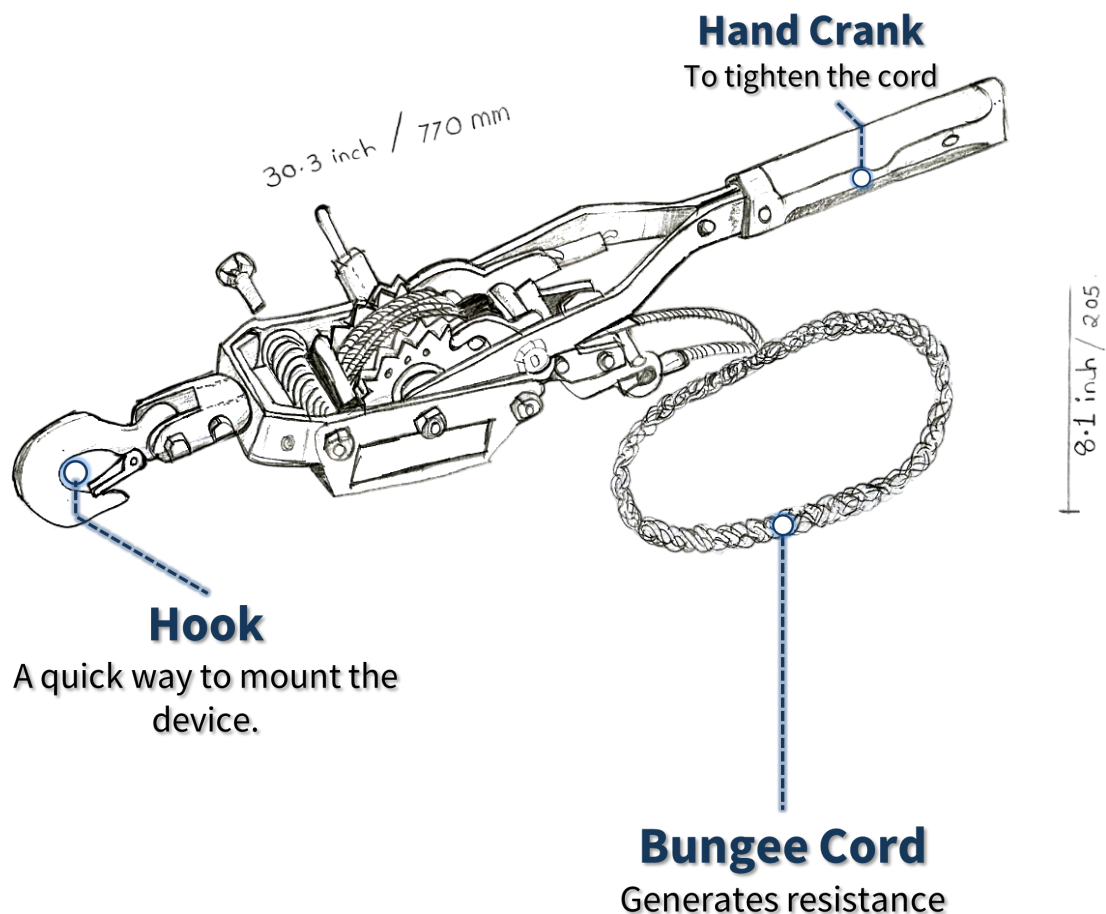
## Background

**(The Context)** Competitive swimmers often use resistance equipment to train explosiveness. Current resistance training equipment offers limited variability and restricts individualized training capabilities.

**(The Need)** The High Performance swim team at MSSAC requires **resistance training equipment** that allows for **incremental adjustment of resistance** while remaining **safe, portable, and compatible with competitive swimming environments**.

## The Proposed Design

RipTune is a come-along winch system that clips to swimmers starting blocks, allowing swimmers to create adjustable resistance tailored to their needs.



## Key Decisions

Using a **come-along winch** system instead of having to mount and fix it to a pool deck, using a **bungee cord** rather than a steel cord for flexibility, and a **carabiner attachment** to mount the system.

## Key Design Objectives

**Functionality:** The design should have at least 5 integrated levels between 95 and 210N.

**Usability:** The time taken to switch between resistance levels should be less than 15 seconds.

**Usability (II):** The design must be comfortable for users.

**Safety:** There shall be no electrical components in the design.

**Portability:** The design needs at least two dimensions smaller than 13 x 13 x 11 inches.

**Portability (II):** The design should have an unloaded weight of 10kg or less.

## Outcomes from Testing

### Resistance Offered

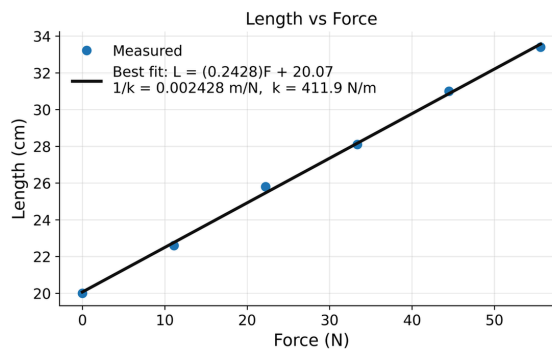
0 - 824 N (continuous)

### Spring Constant

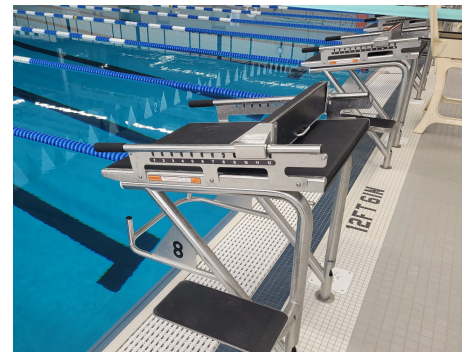
412 N/m

### Average Setup Time

7.87 s (below 15 seconds)



How the spring constant was determined.



Where the device will be mounted.

## Evaluation and Next Steps

The physical prototype could **undergo further development** as it is limited by a one-way spooling mechanism due to **prototyping constraints**. Upgrading to a two-way winch in the final product would improve the ease of decreasing resistance.

Additionally, due to limitations with community contact, the proposed solution has **not yet been validated** with the MSSAC team. The most important aspects of the design that need to be validated to determine next steps are how much the device gets **tangled** or **caught** between swimmers' feet.

However, our team is confident to **recommend this design** as an **improvement** to the current methods used to add resistance to training, after testing and iterating upon reference designs.