

## **Compressive Rope** **A Novel Replacement for Fast Ropes and other Ropes Used for Climbing/Descending** **and Other Applications**

### **Problem Addressed**

Special forces routinely use standard type ropes or “fast ropes” for climbing and/or descending to or from helicopters, buildings, cliffs, etc. The high levels of friction that can be generated between the hands, arms, upper body, thighs and legs and the rope in controlling the rate of descent is an unavoidable hazard for this type of rope system. In addition there are problems in descending in conditions of rain, snow and wind creating uncertainties in the rate of descent due to a slippery, swinging rope. Any grease or oil present on the rope, hands or body also complicate the effective use of these ropes. These problems can result in injuries such as rope burns, fractured bones, twisted ankles, and internal injuries.

### **Technology Solution**



Figure 1. Radially Compressive Rope

To address the need for a better fast rope, the Naval Air Warfare Center at Patuxent River developed the Radially Compressive Rope Assembly, which has the potential of revolutionizing rope technology that is used for the descent of personnel from helicopters and other vehicles or structures. For conventional ropes, the level of friction generated between a person and the rope is the basis for controlling rate of descent or providing the ability to climb the rope. For the Radially Compressible Rope Assembly, a tighter grip does not translate into the creation of larger amounts of friction, but rather a greater indent in the rope, providing a greater hand holding block.

### **Highlights of the Radially Compressive Rope**

Instead of varying the grip to modulate the amount of friction for controlling descent rate of a person, varying grip modulates the amount of compression or indent of the rope (See Figure 2). This translates into:

- Lower injury rates from friction burns,
- Better control of the speed of descent by a person,
- Provide a rope system that permits extremely rapid engagement, descent, and disengagement of the user, allowing multiple users to descend in a relatively short period of time,
- Provide a more sure grip even in wet, snow, sea, oily or other adverse conditions, and
- Provide a method to modify the rope assembly’s weight to accommodate the various wind conditions at rope deployment locations – thereby enabling the rope to hang vertically without motion – thus providing additional safety to roping operations.



Figure 2. Squeezing by hand compresses rope minimizing need of friction.

## ***Market Opportunities***

Potential market areas would include:

- Military – Special forces and Coast Guard Rescuers for descending from helicopters and other structures.
- Law enforcement related personnel such as SWAT teams, FBI, etc.
- Fire fighters.
- Recreational climbing enthusiasts.
- School gyms
- Obstacle and rope courses
- Playgrounds.
- Other rope containing products that may benefit from the compressibility feature such as rope ladders, lowering ropes, repelling ropes, etc. Carabiners or other rope fasteners could be modified to take advantage of the compressibility feature.
- Tow ropes, securing ropes that may benefit by using specially designed fasteners, hooks, etc. that can easily be adjusted to desired positions on the rope.



**Figure 3. Radially compressive rope hanging next to a standard climbing rope.**

## ***Stage of Development***

Prototype compressive ropes have been constructed and tested at the Naval Air Warfare Center, Patuxent River, MD. Modifications and improvements to this original design are currently in process. Though the compressive rope assembly is moderately more expensive than existing fast ropes, the greatly increased amount of control and more safe operation, will justify its higher cost. The development of various types of rope attachments, fasteners and accessories that take advantage of the compressibility feature, could expand market use into other rope market areas such as tow ropes, safety harnesses, other types of lowering systems.

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