

## **Abstract**

### **Title:**

Analysis of dynamic strength of friction knots used in military climbing

### **Objectives:**

The aim of this work is to determine the resulting impact force generated by selected friction systems at different values of the fall factor. To calculate what maximum values of auxiliary Reep cord length and maximum load weight can be achieved without system failure. Determine the correlation between the magnitude of the impact force and the slip length.

### **Methods:**

This thesis describes an experiment in which the resulting impact force acting on a friction system at different drop factors was determined. A 6mm Reep cord and an 11mm rope and friction knots used in military climbing techniques were selected for analysis. Testing was carried out in a polygon on a drop tower. Each of the friction knots was subjected to 5 tests at the same fall factor. The individual knots were statistically compared with each other in terms of impact force and slip. Using direct proportionality, the maximum possible values of the auxiliary Reep cord length and the weight of the load were determined. A correlation analysis was used to establish a correlation between impact force and slip.

### **Results:**

It was found that at all measured values of the fall factor, the Twist prusik achieved the lowest values of the resulting impact force and thus damped the fall most significantly. At the same time, the longest average slip lengths were measured for the Twist prusik and the shortest for the Blake node. The maximum values of auxiliary Reep cord length and load weight for the Twist prusik were the highest compared to the other self-locking systems. The correlation between the magnitude of impact force and slip length was not confirmed.

### **Keywords:**

military climbing, friction knot, impact force, fall factor, slip, fall