

CRASH
SAVERS **VR**

Simple Simulator

How to Use Guide

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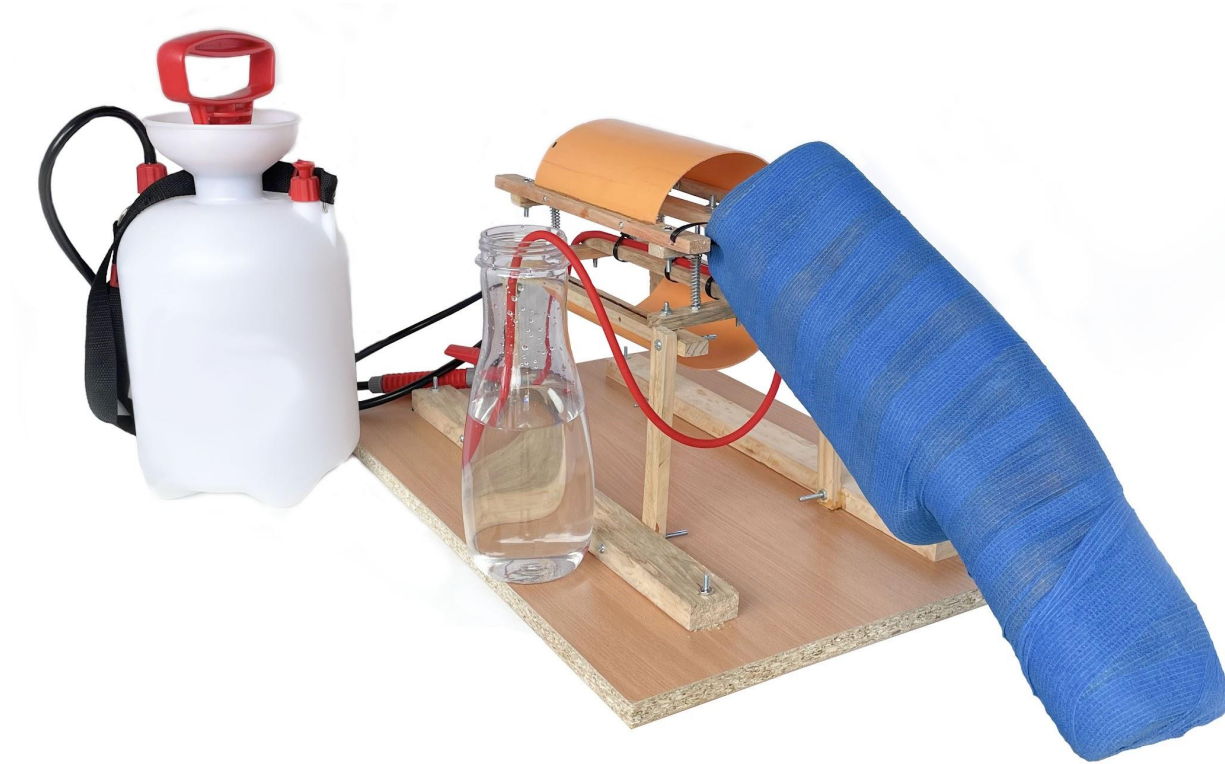
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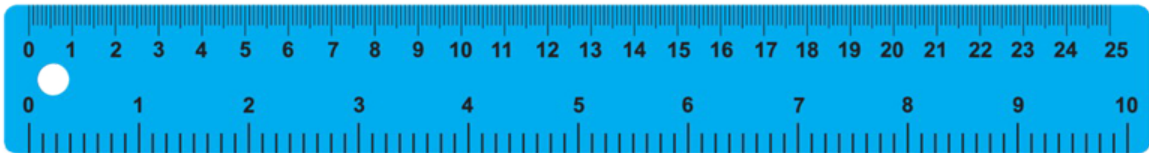
1.0 - How to calibrate the system



1.1 - Materials

After building the simulator we recommend the user to calibrate the system. To carry out this process, the following materials are needed: string, sphygmomanometer, ruler and tape.





1.2 - How to calibrate the system

Step 1

After building the Tourniquet Simulator, use the ruler to measure the distance from the lower platform to the upper platform, the distance between both must be 4 centimeters. Repeat this process for the four corners.



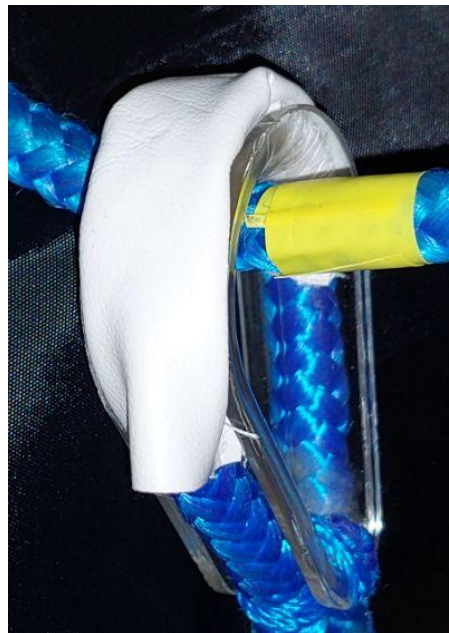
Step 2

The second step is to place the sphygmomanometer around the orange pvc tube and set it to 20mmHg.



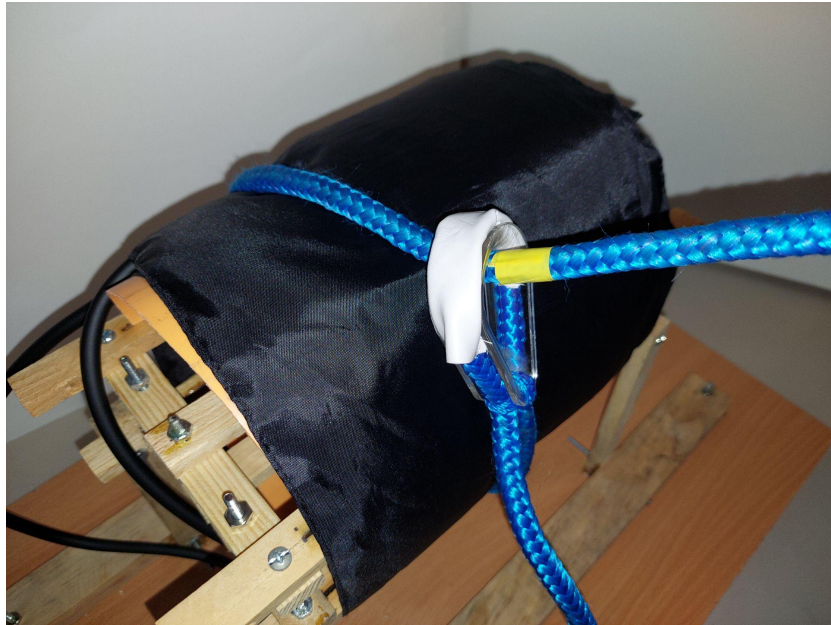
Step 3

A knot is made in the rope in which the tip can pass through as shown in the following picture. Then place the rope on the sphygmomanometer that was placed earlier around the orange tube.



Step 4

With a tape, mark the position where the rope and the knot intersect when the rope rounds the system, taking in consideration that no pressure should be applied on the system.



Step 5

Using the tourniquet apply pressure and with the sphygmomanometer measure the pressure until it reaches between 80mmHg-100mmHg.



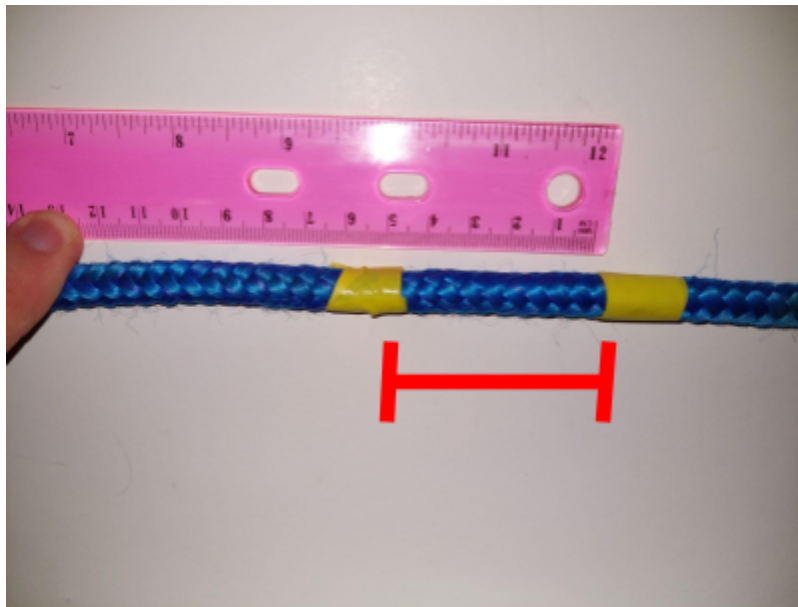
Step 6

Measure again using the rope with the tourniquet already applied as seen in the picture below. Place another piece of tape in the second distance.



Step 7

Measure with a ruler the distance between the two tape marks. This measurement must be from the end of the first mark to the beginning of the second as in the picture below.



Step 8

Depending on the spring that is available to the user, review the recommendations section. The distance must be equal to or similar to that placed in the following table:

Diameter of the Spring (mm)	Distance between the marks in the rope (cm)
7	11
8	8
11	6
15	3

Where the diameter of the spring is in millimeters and the distance of the spring is in centimeters. If the measurement according to its spring is the same or similar, the mechanism is ready for use.

1.3 - Special recommendations

In the next section the user will find recommendations that will facilitate the construction of the simulator. These recommendations are intended to give different alternatives to the user of certain pieces that may be different in different areas. As well as adding a calibration section which will make it easier for the user to prepare the simulator for its proper use.

2.0 - How to find the right spring

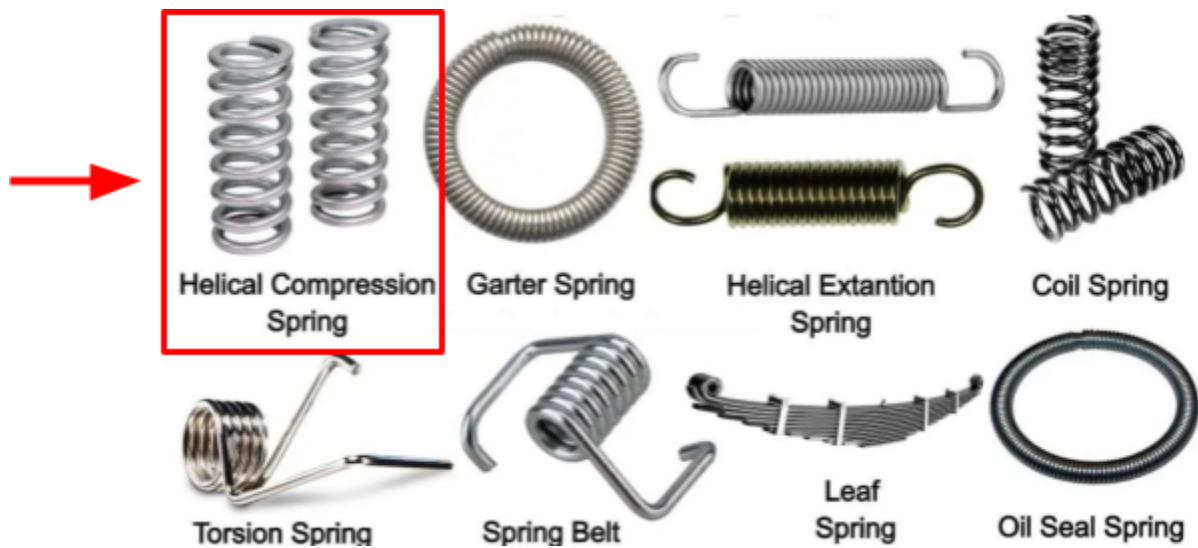
The springs are useful elements in the presented system since their purpose is to allow the movement of the mechanism and exert resistance. Therefore, it is important to have the right spring that allows such movement, but depending on a single type of spring is not ideal due to the different conditions in which the user can present himself, for example depending on a single supplier.

Therefore, different tests of springs that can be used were made, according to the measurements presented by the simulator. The springs on which the tests were performed have a length of 15 cm. Therefore, the differential element is the diameter of each spring. By performing multiple tests it was possible to determine that the range of springs necessary to use the simulator is 7-15mm. Although the springs found in this

range are useful in the mechanism, it is recommended to use the 8mm springs as they facilitate the use of the mechanism.

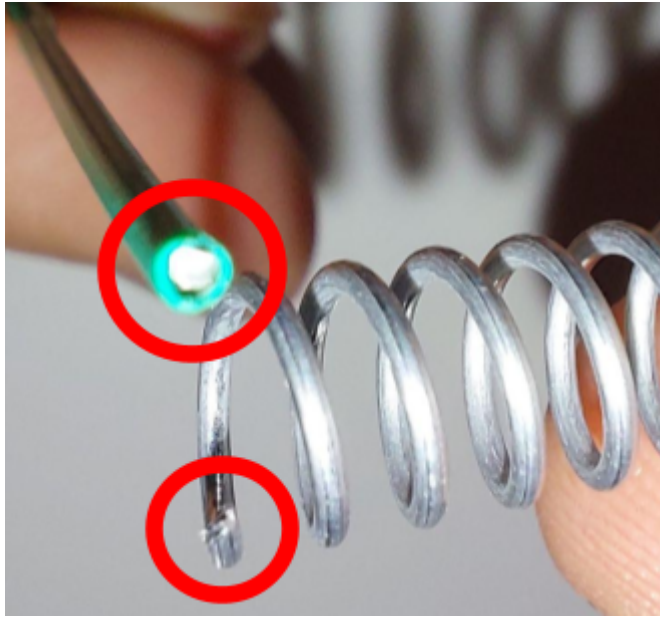
2.1 - Recommendations

1. An important step in the process of selecting the right spring is understanding the type that you are looking for. In the picture below you can find an image of different types of springs that you can use to visually compare the one that you are looking for. For the construction of this simulator you need to find a spring that looks similar to the **Helical Compression Spring**, no other type will fulfill the needs of this mechanism.



Types of Springs (Sabhadiya, 2021)

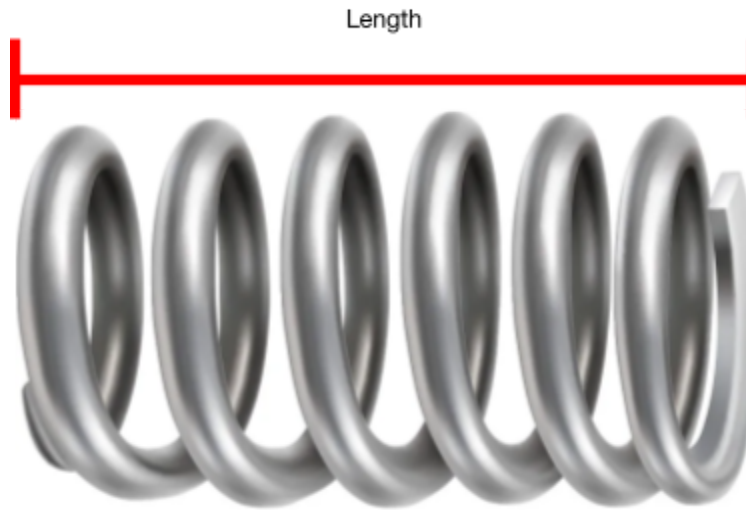
2. Another important thing to notice when selecting the spring is the wire diameter. This might be difficult to measure, but an easy reference to compare it with is by using a large paper clip. The diameter of the wire should not be larger than the one in the clip as shown in the picture below.



3. The diameter of the spring needs to be between 7 mm and 15 mm, this will guarantee that the proposed mechanism will work. The only thing that you need to take in consideration after selecting your springs' diameter is that you need to make the calibration process after this.



4. The length of the Spring has to be 5 cm.



References

Sabhadiya, J. (2021, July 15). *10 Different Types of Springs | Mechanical Spring*.

Engineering Choice. Retrieved October 22, 2022, from

<https://www.engineeringchoice.com/what-is-spring-and-types-of-spring/>