



ROW-RO glove specifically designed
Francesca Raimondi

ROW-RO

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Row-ro glove, closure system

Team work:
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Miriam Ronchi, Artist, Product Designer
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Ulker Aral, Service Designer

Row-Ro is a custom made half-open glove which is specifically designed for Rosina, a thirty-one years old girl who has an incomplete tetraplegia which does not permit her to close her fingers, thus making it impossible to grab objects.

She is currently using a gym object that allows her to continue her passion for rowing but that causes her pain and does not offer a natural grip.

After the co-design session the project focused on finding a solution to help Rosina proceed in her rowing activities in an efficient way paying attention on comfort and on the touch feeling. The product consists of a partially open glove in neoprene with rigid supports in PLA, 3d printed, which offer support to the wrist involving the thumb and part of the palm below the little finger.



ARM 3D SCAN durin a codesign session

The closing system includes two orthogonal velcro strips, at the ends of which there are two rings to simplify gripping.

One of the bands turning around the wrist allows the closure of the glove while the other, sewn on the upper part of the phalanges, offers the possibility of closing the fingers around an object. On the upper part of the fingers two PLA stripes, 3d printed, accompany the folding. The final product can be obtained through two digital fabrication technologies: laser cutting and 3D printing. Both the rigid parts and those in neoprene are obtained from a flat surface then sewn or modeled according to different needs.

TARGET.

Call for needs

Rosina

31 years old

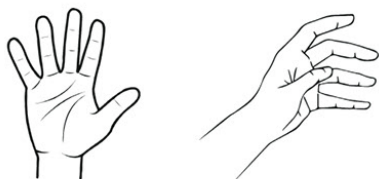
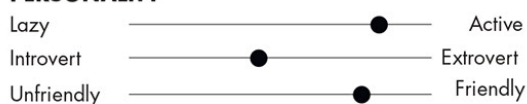


Sport activities helps Rosina a lot to face all the tetraplegia's problems. The main need to focus on is to give her a specific product that fits her body and necessities, allowing her to continue rowing.

INCOMPLETE TETRAPLEGIA

Mobility and flexibility difficulties of the fingers.
Limited movement of the hands in daily life activities.

PERSONALITY



NEEDS

Product for rowing
Comfortable
Customized

INTERESTS

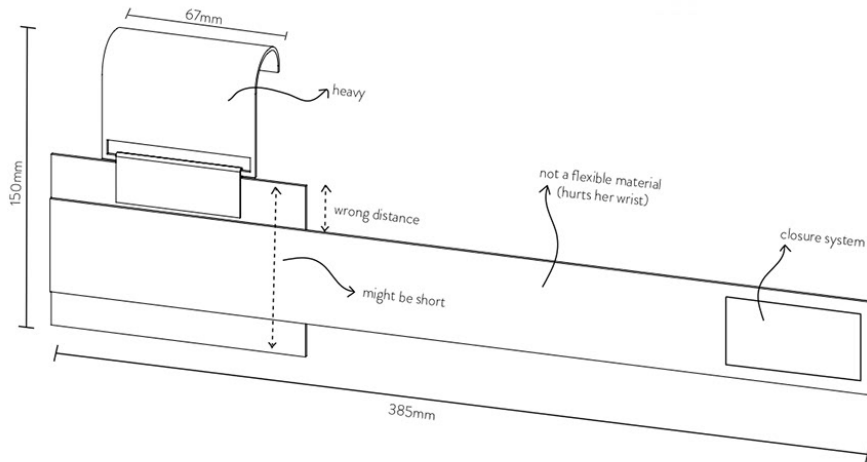
Rowing
Table Tennis
Drawing
Graphic design
Wood working

ANALYZING.

What she currently uses



The object is a wrist brace with a rigid plastic hook designed to help people during the gym activities. It's normally used to weightlift and the cost on the market is fifteen euros each.



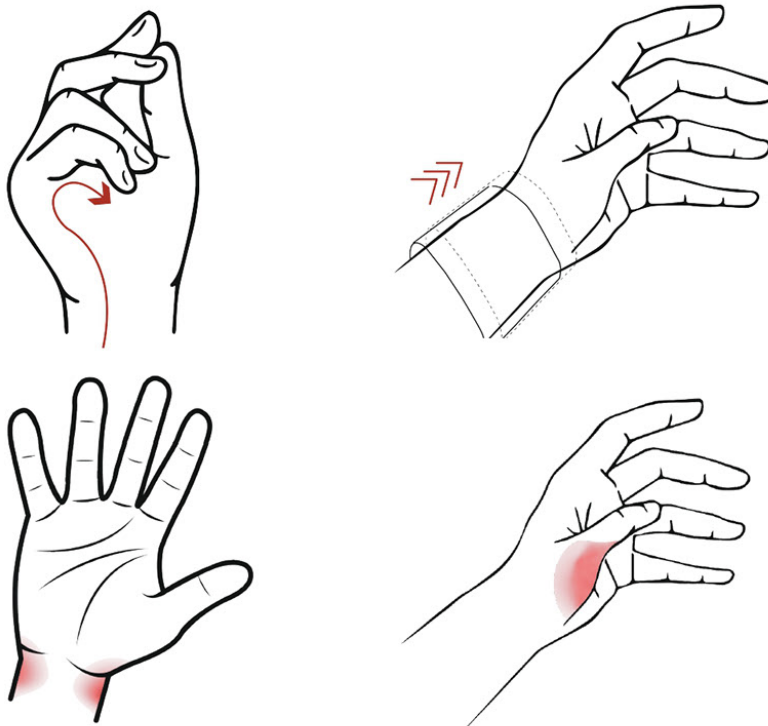
ADVANTAGES

- Cheap
- Rigid
- Easy to produce

DISADVANTAGES

- Heavy
- Uncomfortable
- Hard to wear
- Hard to close
- Painful
- No material touch
- Not using fingers

Problems and pain



The deep analysis of the current product gives us the possibility to identify the main problems always also thanks to the codesign process with Rosina.

Three main areas are involved linked with pain and uncomfortable feelings: the bottom part after the little finger, the thumb area and the wrist where the object during the activity slips away.

NEEDS & GOALS.

Project purpose

LIGHT

Reduce the **weight** using light materials

COMFORTABLE

Redesign the **shape**

EASY TO WEAR

Find the right **closure** system

EASY TO CLOSE

Avoid the **sliding** increasing the length

STABLE

Place the **rigid** parts in the correct position

UNPAINFUL

Leave **the palm of the hand opened**

ALLOW TO TOUCH THE SURFACE

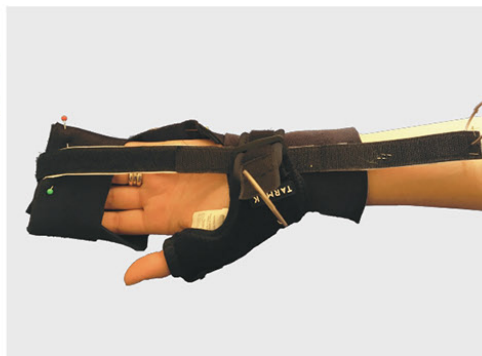
Block the fingers in the right position

HELPING TO BEND THE FINGERS

PROTOTYPING.

Hacking brace

PHASE A



We started hacking a thumb brace bought in a well-known shop for sport articles. The idea was to enhance the possibilities of the gym object, that Rosina is using now, adding different parts. First of all we decide to stretch the surface over the wrist in order to avoid slipping and give more comfort during the rowing activity. We use principally neoprene for the glove surface and velcro strips with pla rings to offer a simpler solution for the closure system.

PHASE B

Rigid support parts



The phase B of the process regarded the aim to reproduce the rigid part studied before during the hacking of the thumb brace. In order to define everything in line with open source world, we start modeling and 3d printing flat surfaces able, with right dimensions, to be thermoformed around the thumb and the bottom part of the little finger.

The pictures show different attempts and the final result obtained directly with Rosina.

PHASE C

Assembling the half-open brace



The group tried several combinations of flat neoprene surface before being able to give birth to the final half-open brace.

The need to prototype different shapes starts from the difficult to define the right way to bend the fabric over the hand and the wrist.

In fact, last pictures show the tension of testing directly everything designed and thought during two workshop weeks with Rosina.

ROW-RO.

Custom made half-open brace



The project consists of a partially open brace in neoprene with rigid supports in PLA, 3d printed, which offer support to the wrist involving the thumb and part of the palm below the little finger.

The closing system includes two orthogonal velcro strips, at the ends of which there are two rings to simplify gripping.

One of the bands turning around the wrist allows the closure of the brace while the other, sewn on the upper part of the phalanges, offers the possibility of closing the fingers around an object. On the upper part of the fingers two PLA stripes, 3d printed, accompany the folding.

Testing the brace during the training



The final product can be obtained through two digital fabrication technologies: laser cutting and 3D printing. Both the rigid parts and those in neoprene are obtained from a flat surface then sewn or modeled according to different needs.

Ph: Natasha Rossetti

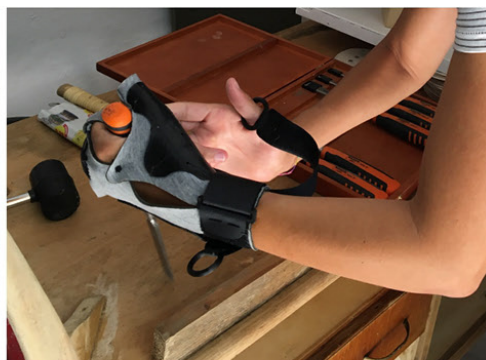
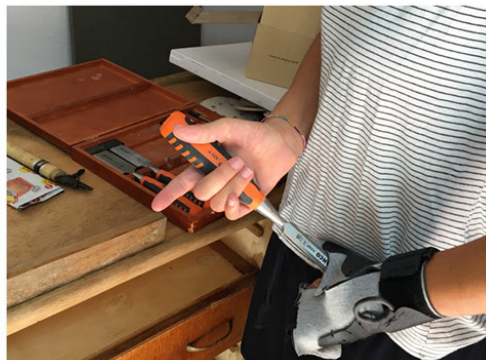


All the pictures regard the first attempt to use the product in the gym to verify the traction resistance of the brace. We identify some little problems easily resolvable. First of all the need to elongate the velcro strip which is responsible for closing the hand; change the material of the rigid parts over the phalanges because during the training it causes pain and finally adding another fixing point for the velcro strip.

Ph: Natasha Rossetti

NEXT.

New applications for the brace



The final step of the development till now is trying to use the same brace also for using specific tools. Rosina is a carpenter and after the incomplete tetraplegia she stopped her job activity. The brace, designed specifically for rowing, has the potential to be modified in some of its parts to be usable in this field.