Articulated Crutch

The union of numerous experiences with design has generated a new level of simplicity, well being and efficiency in affordable assistive products.

Co-creation Method

*Products **co-created through hundreds of hours** of effort, bringing **together users and professionals** from different areas.*

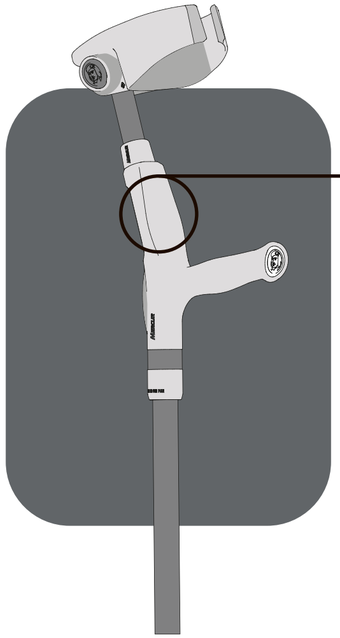
*We heard people to **understand their expectations** from the crutch and how it might better serve their **daily needs**.*
Conversation circles were held to get to know the the users context toward sensations, experiences, needs and difficulties.

We brought everyone together to be part of the development process.

Creation Process

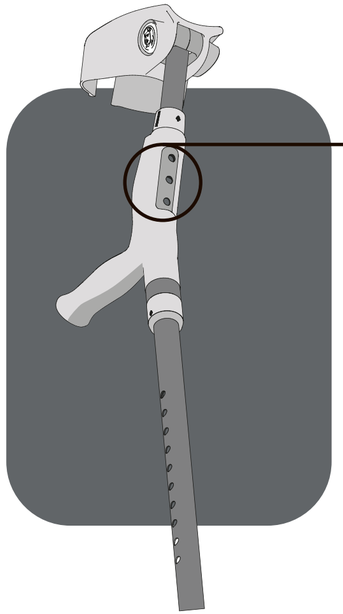
Products that need different solutions must be thought as individually problems.

Based on user feedback regarding the use of similar products on the market, it was possible to identify the issues and develop a product that better addresses daily needs.



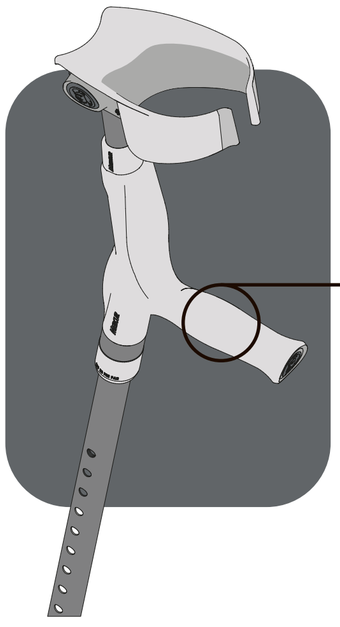
Forearm Support

A design that reduces pressure on the forearm can ensure comfort and safety both during the use of the crutch and while at rest.



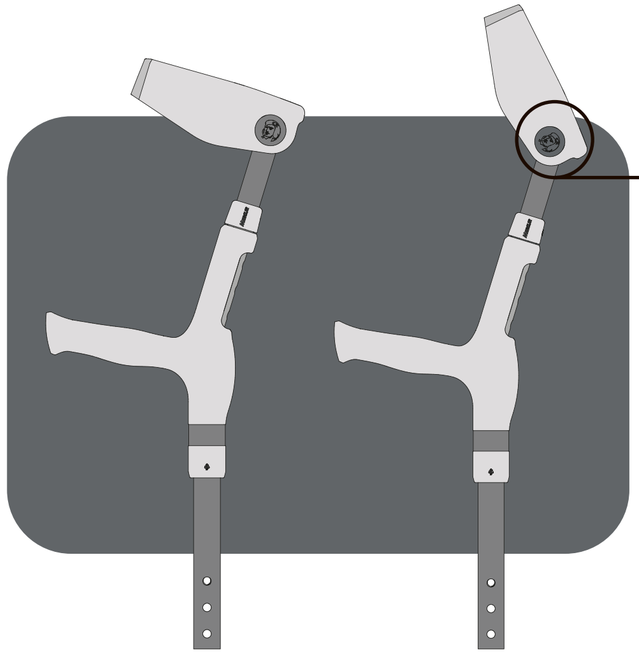
Adjustment

A three-level upper adjustment, along with the height-adjustable lower section, can allow a better adaptation to the user's anatomy.



Palm pressure

A ergonomic shape can allow a better distribution of palm pressure, providing a safer and more comfortable support.



Articulation

The articulation system provides support for the crutch on the forearm, making it easier to use in situations where hands-free functionality is required, such as climbing stairs with a handrail, opening doors, or serving oneself at a restaurant.

Tests

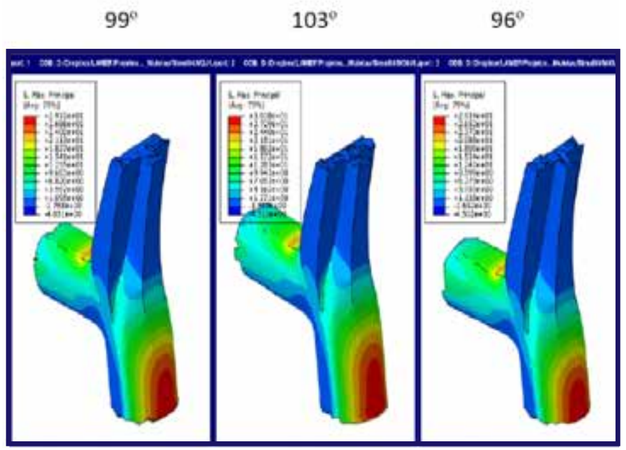
Certifying laboratories were used to validate every detail to ensure responsible **innovation.**

Previous laboratory tests were performed with the current crutch at **3 different cable angles,** in order to find out which one has **less energy loss** by the user.

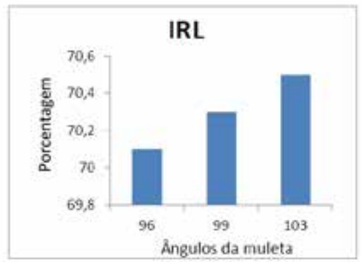
Results

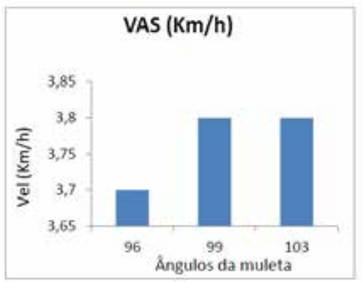
The result obtained was that the 99 º angle is the most appropriate for the development of the piece.

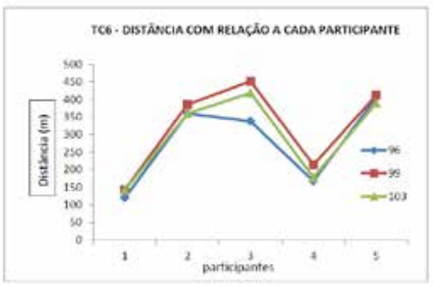
After some analysis, the handle's ergonomics have been adjusted for **right and left-handers.** The first model developed was prototyped and the **hand pressure analysis** was performed in the laboratory. The pressure compared to the existing model was relieved.



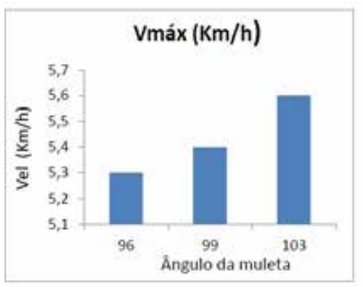
Material	Tensão de escoamento (MPa)
Polipropileno	19-45
PPS	94
Nylon-6/EA5/MMA-MA	30-51
PEEK	90







96° Maiores valores para Cardio
99° Menores valores para MMSS, MMII e Cardio
103° Maiores valores para MMSS e MMII



New Tip and the invisible problem

During the various conversations we had, we realized that one of the most critical issues for those using a crutch is the fall. Rainy days, slippery floors, create panic in these people.

We talked to users about what happens in these situations. And part of the problem could be caused by a discret piece of the crutch, which has a vital role in this issue, the tip.

*The final result was the new Articulated Tip from Mercur, Made of **natural rubber**, has in its composition silica of **vegetable** origin, **generated by rice husk ash**, which makes it about **60% renewable** and meets the company's direction of **prioritizing renewable** inputs in its products.*

Inspiration in the tyre cavities to avoid slipping on wet floors

Development

Several shapes were tested in order to combine the best grip with ease mold extraction.

Taking advantage of the rubber factory's expertise, a compound with good grip and wear resistance was developed.

The design, moreover, needed to provide strength for users to feel really safe.

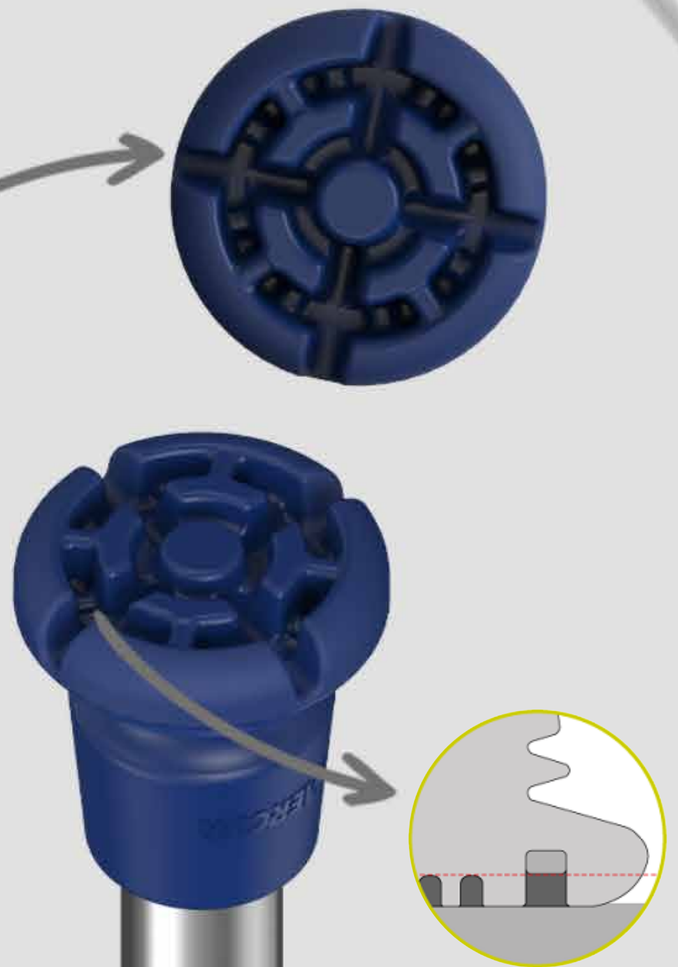
Below is a link to the specific video about the tips. (Just turn on subtitles with simultaneous translation into English on Youtube.)

https://www.youtube.com/watch?v=B04j7LV_Qww

*One of the **biggest fears** of an injured or elderly person **is to fall.***

*For these reasons, a **special rubber compound** was developed for this product, with greater adhesion to different types of floors. Laboratory tests were carried out to assess its performance, **increasing safety.***

*Paths for **water drainage.***



***Flexibility:** while the user strides, the base stays in contact with the ground, increasing safety and stability.*

***Replacement indicators:** signal the correct time to replace the tip.*

360º View

Be seen by everyone around you and ***walk safely at any time of day.***

The Articulated Crutch has a ***360° reflective tape*** *that provides peace of mind when walking at night.*

Humanization with colors

*Each product's mission is to make **life easier and better for everyone.** Showing that through it we will **gain quality of life.***

*We have seen the need for people to make their products more **humanized**. In addition to the more distinctive shapes, the materials, finishes and **colors transform the product.***

*We wanted to show that despite the difficulties, **people want to feel happy, comfortable and beautiful.***

Every little detail matters

*Small details that make the difference. Many users feel **embarrassed** walk into rooms because of the **noise** normal crutches make.*

*The **adjustable bottom ring** is a threaded piece that the user can tighten whenever possible to ensure **greater firmness and reduce noise.***

Improving life every step

Thinking about the user means considering ***every step they take****. In many everyday situations, there is a* ***need to rest crutches*** *on flat surfaces such as walls or tables to perform tasks like eating.*

To address this, in addition to the articulation system that provides hands-free functionality*, a stable support is required to keep the crutch stationary on these surfaces,* ***preventing it from rolling*** *to the side or falling over.*

Freedom is everything

The articulated arm support allows it to be fitted to the body, ***allowing freedom of movement for simple actions****, such as opening a door,* ***without losing safety****, keeping the crutch close to the user.*

*In discussions with users about a possible fall, it was found that i****t is better to fall freely*** *without anything attached to the arms, in order to avoid more serious injuries. The opening and fitting force were designed to support only the weight of the product,* ***releasing quickly in the event of a fall.***

We have ***increased the contact area*** *and* ***smoothed the surface****, allowing the forearm to fit better,* ***reducing pressure points*** *and discomfort both when walking and at rest.*

Built like a tank

*One of the requirements of the briefing was that this product should be **robust enough to withstand heavier users** and that it should convey this robustness in its design so that people feel safer using it.*

*After **numerous resistance tests**, we achieved a final result that **reflects robustness in its design**. We used a **combination of PP and long-fiber talc** in the injected components to improve the strength and durability of the parts. In addition, we incorporated a **thick rib at the rear**, which significantly increased the load-bearing capacity, providing greater **stability and safety for users.***