

TOOL TO AID PEOPLE WITH LIMITATIONS IN SUPERIOR MEMBERS IN THE PACKING OPENING

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Abstract. The inclusion has been debated as much in researches as in the development of public policies aimed at improving the quality of life of people with special needs. For people with physical limitations, simple tasks day-to-day become challenges. Thus, the objective of this study was to propose a product that would help people with temporary or permanent restriction on one of the upper limbs in the process of the opening of several types of packaging. This work was developed with a multidisciplinary group made up of students, professionals and teachers from diverse areas such as mechanical engineering, production, physical therapy, occupational therapy and designers. For product development, was used a methodology that has the following phases: problematization; Identification and recognition of the target public; Theoretical survey about identified problem; Concept phase/ creativity and development of virtual prototype. As a result, it was possible to develop a product prototype that makes use of an electromechanical system for assisting the user so practical, efficient and safe in the opening a wide range of packaging, as bottles, bags and cans of different sizes and weights.

Keywords: physical limitations, product development, packing opening.

1. INTRODUCTION

The inclusion has been debated as much in researches as in the development of public policies aimed at improving the quality of life of people with special needs. For people with physical limitations, simple tasks day-to-day become challenges, given that most objects and tools are designed for people who do not have such special needs, not having a base on a universal design that includes them.

According to Brazilian law established by Decree 3.298/99 art. 3 defines disability as "any loss or abnormality of structure or psychological function, physiological or anatomical who manages incapacity for work performance within the standard considered normal for humans." This decree also specifies the types of disabilities, among them the physical, that will be the focus of this study.

Physical disability is the complete or partial change of one or more segments of the human body, resulting in the impairment of physical function, appearing in the form of paraplegia, paraparesis, monoplegia, monoparesis, quadriplegia, tetraparesis, triplegia, tri paresia, hemiplegia, hemiparesis, amputation or member of absence, cerebral palsy, members with congenital or acquired deformities, except cosmetic deformities and those that do not cause difficulties for the performance of functions. Not having access (or limitations) to development of routine daily activities can generate a factor of marginalization and exclusion's risk social.

It is therefore necessary restore the inclusion of disabled people in society with a view to its limitations. In this, context, the development of new technologies to assist in the empowerment and social integration of people with special needs, is vitally important to society.

Thus, the development of a product with features that help people with partial or total upper limb motor disability, is inserted that context to solve the problems arising from the physical limitations and in order that these people can develop their routine activities easily and practice, making such a useful product for society, as a whole. In this regard the purpose of this article is to propose a prototype of a packaging opener that helps people with disabilities.

2. SOCIAL INCLUSION

Issues related to social inclusion for many centuries were set aside as a result of assignment to various causes, among which we can mention God's punishment. However, with the development of modern society, it began to consider the special needs are not properties or requirements of human beings, not born with them, but stem from a process of material production and social (FREIRE, 1998).

From this, a process of mutual adjustment, where it is up to the person with disabilities manifest themselves in relation to their wants and needs, and society, the implementation of the necessary adjustments and measures that it provide access and coexistence in the common area without segregation (ARANHA, 2001). Face of this quest for indistinctness of human beings, inclusion's alternatives began to be developed by society

From there, worldwide, as a consequence of evolution of the history of Universal Design, the issue of accessibility was presented, this has become present in the scope of the International Architecture for nearly 60 years (KOWALTOWKI; BERNARDI, 2005), however in Brazil this reality just happened with the development of specific laws and regulations, such as Law n. 7853/89, which defines the National Policy for Integration of Persons with Disabilities in multiple aspects (BRAZIL, 1989). Thus, various organs were developed with this approach, among them we can mention the special Secretariat for Human Rights (SHR), responsible for the implementation of public policies for the protection and promotion of human rights (BRAZIL, 2008).

The purpose of these institutions is to provide citizens who have temporary or permanent limitations, acceptable terms of accessibility, given that accessibility seeks to ensure the possibility of access, approach, use and handling of any environment or object. Report this concept to people with disabilities is also connected to the displacement factor and approach the object or location they want. It indicates the favorable status of a particular vehicle driver, which in this case is the individual himself within their individual abilities, to move around, getting around and reach the intended destination (LANCHOTI, 2006).

Accordingly, actions of social inclusion, with products that can allow these people minimize their limitations must be developed to help not being marginalized within society.

3. METHODOLOGICAL PROCEEDINGS

The method of this study was developed during the presentation of a multidisciplinary course in product design where the main objective is to create products to help people with any limitations. Thus, this work deals with the propose of an instrument to help people with limitations in the upper limbs to open various types of packaging in their own day-to-day.

To this was followed by the following steps:

(i) Brainstorming: in order to decide the product that would be developed, the group met and then have submitted initial ideas for products that could be developed.

(ii) Problemization / knowledge of the target audience: With the chosen product "instrument to help people with difficulties in the upper limbs" was then studied the problemization around that product. It was found that the inclusion has been widely discussed in various branches of researches so that we can improve the quality of life of people with special needs (PSN's). Like most instruments of the day-to-day are designed for people who do not have such special needs, thought about developing a product that helps people with difficulties in the upper limbs to open various types of packaging.

(iii) Research: After the decision the product and the public that would be englobed, began to perform research about similar products, types of product packaging, articles, etc. In addition, sought to know about the product's target audience their needs, through interviews, questionnaires and observation in real situations, using video tools.

(iv) Definition of product requirements: After the search of existing similar products in the market and the real needs of the target audience began to define the requirements that would be adopted in the product by means brainstorming.

(v) The validation Technique 1: After defining the project requirements was referred to technical validation where crew and target audience identified if the product really makes a difference in their day-to-day, and identified possible improvements to the product.

(vi) Defining the most appropriate alternative: with the validation team and the target audience and the suggested improvements was chosen the most appropriate alternative to the product.

(vii) Detailing the product: With the best alternative begun to make the product prototype design using a graphical modeling tool, SolidWorks®.

(viii) Technical validation 2: the prototype of the project underwent a new technical validation with the team and the target audience.

(ix) Development of virtual prototype: a virtual prototype was prepared for the product developed.

Figure 1 depicts the flowchart of the steps of the methodology used in this work:

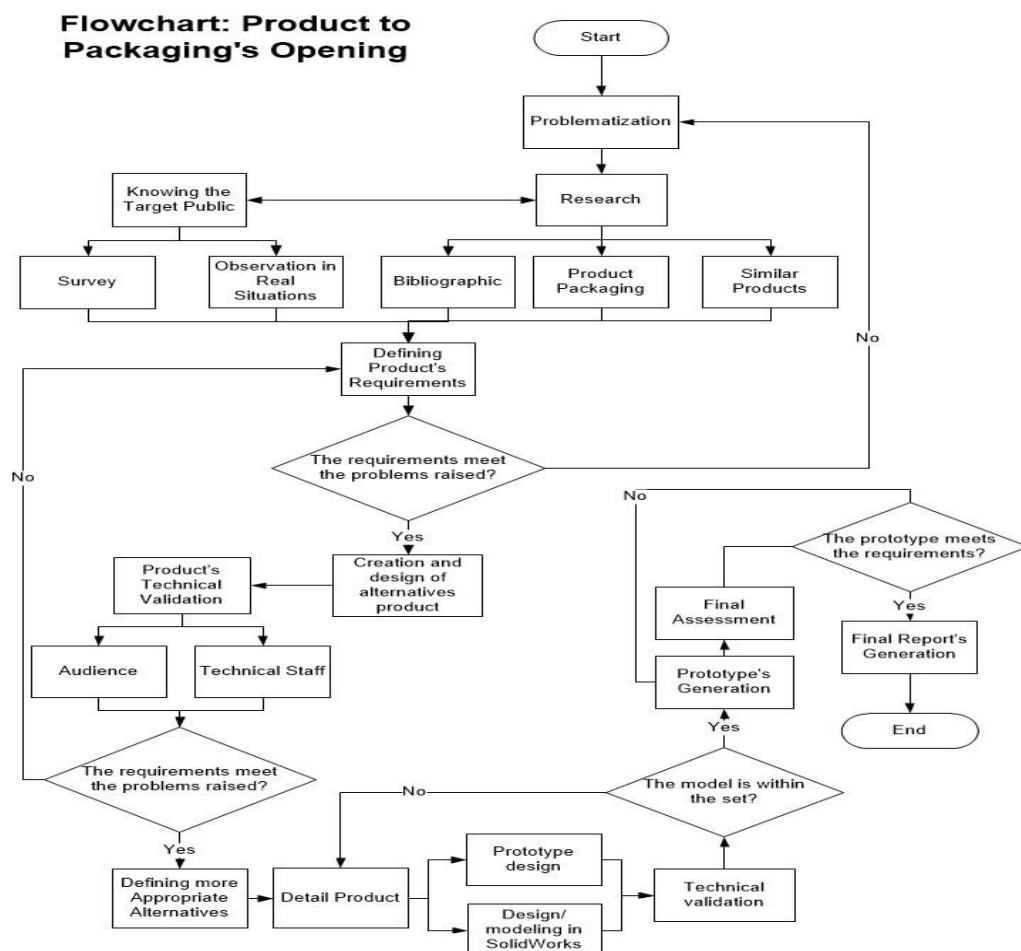


Figure 1. Methodology's Flowchart
Source: Developed by the authors

After development product's proposal , research along the main patent registration platforms of Brazil and the world was made, thereby analyzing the existence of similar patents to the Packaging Fixer, they used the INPI platforms (National Institute of Industrial Property) of LATIPAT and Espacenet. The INPI Base it is the database relating to patents were developed in Brazil. The LATIPAT administers the patents of Spain and Latin America. Espacenet already has patents from more than 90 countries, including the United States, China, Japan, South Korea and Germany.

The methodology used in this study is available from the INPI through tutorial and is divided into three parts. Thus, searching the INPI basis, the following search filters were used, as described in Table 1.1.

Contain filter	Keywords	included In	Patent Number Found
All the words	Fixer Packaging	title	3
All the words	Fixer Packaging	Abstract	9
All the words	Fixer Packaging	title	0
All the words	Fixer Packaging	Abstract	19
All the words	Temporary limitation	title	0
All the words	Temporary limitation	Abstract	4
Total			35

Table 1.1: Search Results in the INPI's Base

After examination of the patents, it was found that the 35 patents, three patents are found in more than one search, where a patent appears three times in the search results and two appear twice. Thus, the number of patents is reduced to 31 patents. Patents found were recorded between the years 1989-2007, these revealed that no patent is directly related to the product that was developed in this work.

Applying the methodology in the LATIPAT Base, the same terms defined in Table 1.1 were used in Spanish. Furthermore, it was adopted the term "Cierre Packaging" in the search, the term "temporary limitation" has been translated as "Limitación Temporal" so, Table 1.2 presents the following search results.

Keywords in the title	Keywords in the title or abstract	Patent Number Found
Cierre Packaging	-----	11
Cierre Packaging	Limitación Temporal	0
Limitación Temporal	-----	0
Limitación Temporal	Cierre Packaging	0
Total		11

Table 1.2: Search Results in LATIPAT's Base

In this research found that patents were recorded between the years 2000 to 2012, however, after detailed analysis of the patents found, it was found that these also are not directly related to Packaging Fixer developed in this work, finally, the research was done in platform of the European Patent Office (EPO).

Thus, the terms "Fixer Packaging" and "Fastener Package" have been translated into German as "Fastener Verpackung" and "Temporary Limitation" was translated as "Vorübergehende Beschränkung". Already in French, the two aforementioned terms were translated as "Fermeture emballage" and the third term as "La limitation temporaire". Finally, the search results are presented in Table 1.3.

language Adopted	Keywords in the Title	Keywords in title or summary	Patent Number Found
English	Fastener Packaging	-----	171
English	Fastener Packaging	Temporary Limitation	0
English	Fixer Packaging	-----	3
English	Fixer Packaging	Temporary Limitation	0
English	Temporary Limitation	-----	5
English	Temporary Limitation	Fastener Packaging	0
English	Temporary Limitation	Fixer Packaging	0
German	Fastener Verpackung	-----	0
German	Fastener Verpackung	Vorübergehende Beschränkung	0
German	Vorübergehende	-----	0

	Beschränkung		
German	Vorübergehende Beschränkung	Fastener Verpackung	0
French	Fermeture emballage	-----	2
French	Fermeture emballage	La limitation temporaire	0
French	La limitation temporaire	-----	0
French	La limitation temporaire	Fermeture emballage	0
Total			181

Table 1.3: Search Results in Espacenet Base

After survey, it was found that 179 were recorded in English, no patent records in German and two patents were registered in French. Moreover, it was not identified any patent relating to the terms "packaging fixer" or "fixer package" with the term "temporary restriction" either in English, German and French. Thus, analyzing the existing patent sample mode, they identified some patents that do not have abstract and abstracts available, patents are also not related to the product. Finally, after research in INPI platforms, the LATIPAT and *Espacenet* can be concluded that the results found, the product developed is unprecedented and subject to patent, therefore, were not identified that meet the requirements raised in this paper.

4. RESULTS

The developed system was designed from a collective construction and participation in all meetings of one of the research volunteers with suggestions and group discussions. The creativity of brainstorming technique was used the most, followed by sketches and drawings set of validation using various packages for usability testing and adjust fast. Figures 2 and 3 show the outline of the design and original idea of the main idea, respectively, first sketches of the group before the end of product design.

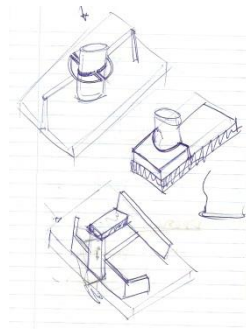


Figure 2. Sketch the initial idea

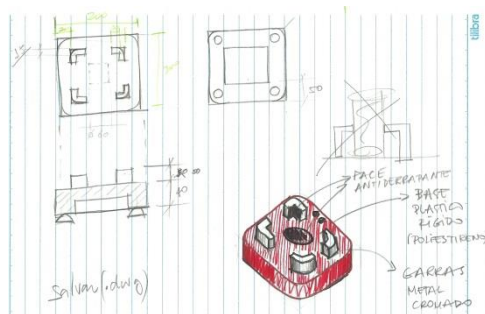


Figure 3. Sketch the main idea

The final product was designed following a mandrel system, where the actuate a button, the four bars close and open at its base by setting various types of packaging for example circular, square or rectangular. The product has large suction cups that attach on any smooth surface (sink, table, etc.) and is powered by electrical energy as shown in Figures 4, 5 and 6. The operation allow the adaptation of different types of tools. Thus is possible attach accessories, in addition, the equipment may be used in drilling activities, milling, threading, etc., thus becoming a universal machine. Depending on the position of the spindle, the boring can be horizontal or vertical, in the case of the developed product, the goal is packaging attachment to the user.

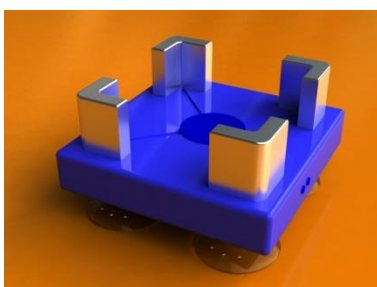


Figure 4. Open System

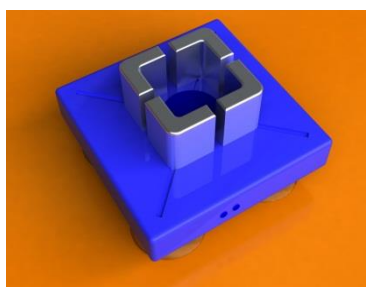


Figure 5. Closed system

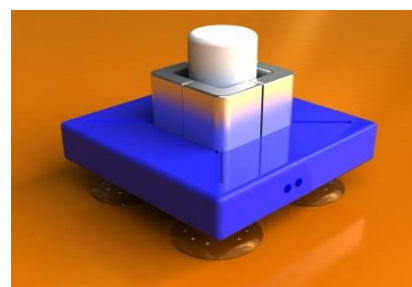


Figure 6. System fixing the packaging

The developed product arises from the concept of simplicity and practicality, elements identified by researchers. After conducting of the experiment with volunteers was proven that the requirement to be achieved, is more framed in fixing the packaging on the surface than properly in the opening. According to the observations, it was found that if it were possible to fix the packaging in a safe and reliable table, you could open a range of types of packages with only one hand.

Through the adaptation of a mechanism that has the first industrial purpose can develop means to provide accessibility to users who present temporary or permanent limitation in one of his superiors members as well through the interaction of researchers from different areas was possible the development a prototype that meets the needs of the aforementioned group of users. This research was limited to draw the virtual modeling, but new studies may be developed for testing and application of the product, in addition, the development of new mechanisms is encouraged to perform the same purpose to be further made a comparative between models and possibly merging the various methods that are developed.

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