

Design of a Mobile Support for Physically Challenged People, Adapted to Home Environment

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Abstract

In this paper we will present a design solution for a mobile support that will allow physically challenged people to move about inside homes or institutions in a safe way. This design is based on new applications from existing materials and production technology, with a very high human interface in line with the sustainable philosophy and being able to age with grace. We would be fully satisfied with a positive response from the users who are choosing our design, and with a product that have a high acceptance level.

Keywords: Design, integration, mobility, support, humanize, furniture, attractive, safety, sustainability.

1 Introduction

We believe that a very good way to counter ageism would be to design not only functional, safe, economical and long lasting products for our elderly, it is also important to show that we care about and respect them by giving them utensils that are beautiful. There is no good excuse for not applying the same requirement for the user/owner satisfaction, as is normally placed on commercial consumer products, i.e. in addition to fulfil functional requirements, they should also be attractive and beautiful and to create a positive affection/relationship with the user.

There are a tremendous amount of things specially designed for elderly that might or might not substitute the ordinary range of products they are supposed to replace. Many of them are so ugly and odd looking that they are put away and never being used.

2 Background

The population in the western world is getting older and healthier. The effects of an aging body reflects in the need of resources in the health care sector, the budget bursts, and the over work illnesses are increasing and affecting the quality of the health care service. To counter this it is necessary to develop products that will make older people being more independent. One of such a product is the walking support, in this paper called Rollator.

The safety always must be the main feature in any product, but also the emotional and affective impact on the users can play a significant role in the process of acceptance. The more complex and technical a product looks like, the higher is the mental mountain that has to be climbed.

Even a simple feature function like a handbrake can create confusions: “what is a brake, when do I use it and how do I use it?” It is an increasing part of the geriatric population today who are suffering from Alzheimer’s Disease and who are having to face the above problems daily.

In the case of the Alzheimer’s Disease, one very important thing is to encourage them to do exercises like walking; this will also make the person taking initiative to social interaction.

Another and a more common problem among ageing people is balance disorders. This is causing most of the accidents that involve falls. The costs for this was 4,8 billion Swedish crowners in 2006. Immobility will have a very negative effect on any person, taking into account that this group of people are disposed to suffer from a multiple range of problems like post-stroke symptoms, hearing problems, partial or total loss of sight, weaker muscles and arthritis can be disastrous for the individual.

In most cases where walking support products are used, it is important to simplify technical functions. For example in the case of people suffering from Dementia, the decline in cognitive function due to damage or disease in the brain, the individuals can not remember instructions like: “-when A happen you have to do B.”

The effect of having problems with the balance causes the person to avoid situations like standing up or walking. This tends to make them passive and unwilling to move about and creates a domino effect with other negative symptoms like degenerating muscles, stiff joints, bad circulation, etc. and above all, those symptoms will cause other problems like depression and deteriorating social skills. Both of the latest mentioned symptoms gives relatives and staff at institutions a much harder and heavier work load to deal with.

To counter the negative effects and encourage people affected to move about and improve the circulation, the bowl movements and other important things that are conditioning the body, several products have been developed and marketed mainly in Northern Europe and North America.

Today we can see an increasing demand of walking aids not only in the traditional markets but also in other parts of the world like the rest of Europe and Japan. The needs and the demands are of course global.

One type of support is marketed under the name “Rollator”. It is used in order to give mobility to people with restricted walking ability. This is a high quality product with a good reputation among the users. Wherever you can find people that would get a better quality of life by using a walking support, you will find a demand for this kind of product. Unfortunately, in most developing countries the economic situation does not make it possible to spend this sort of money on people with that kind of needs, having to choose between food and other primary things like medicine there is not much of a choice.

The use of rollators is increasing, but the models you can find on the market are designed as a very “machine” looking apparatus with a mixed use for both interior and exterior situations and there is no design that blends into a normal living environment giving you a feeling of a home product and matching the rest of the home.

It was because of this miss-match of home interior look and the very machine looking support of the existing rollators that we got the idea of being able to improve on the design using for this category of people, more accepted materials and make it look like just another piece of furniture.

3 Philosophy and goals

One of the main objectives that we were aiming for was to create a design that would make people’s perception, emotions and cognitive reaction of the rollator to be similar as that of a mobile piece of furniture. Enabling them to move about in their homes safer and with the possibility of transporting things with a lesser risk of dropping or spilling. As an extra plus it could serve as a table beside the favourite armchair and being used as a bedside table in the same time as it would give support when going to bed or out of the bed.

In Sweden products like rollators are prescribed through the health care system that also supports and finances the rollators to the physically challenged people who need it. This could mean that the product we designed with the added features would come under the prescribed products category.

Another very important function is the brakes. When starting up a project like this and facing a product that has been on the market for a couple of decades there are features that you would have problems altering too much or remove completely in a new design. People tend to be rather conservative when it comes to drastic changes in an established product with a very specific function, and even more so if this product must have a high safety profile, a fool proof handling and have to be approved by authorities in the health care sector.

Is it possible to take away the brakes as they look, replacing them with another system? How should it work? Is it possible to make it intuitive or slow down the wheel movements reducing the risk of having accidents caused by the speed of the existing wheel solution?

When it comes to materials. Today, when the human effects on the environment start to surface on a grand scale, it is very important to implement changes in traditional material and process thinking.

Our philosophy and goal is therefore to find less harming and better way to produce this new concept and use sustainable materials well recognized and tested in other areas, for example bamboo and cane, they are both fast growing, strong, biodegradable and they grow abundantly in developing countries.

4 Method

The method we used was what is called “*the design process*”, there are many *Design Methods* with multiple sub methods that usually can be mixed and matched in different constellations. For our design task we choose to explore as many possibilities, and after wards having a close look at the eventual constrains. The second strand of action should be to create possible scenarios and solutions that would add qualities or significantly improve the existing product.

The first thing we did was to write our self a brief that was based on our philosophy and the aims we wanted to reach.

We took a close look at the market, to find out the state-of-the-art and what kind of solutions technical solutions and what type materials was being used.

After this came literature searching and hours on the internet to establish a documentation consisting of articles, notes and pictures on the subject.

From what we could see most of the rollators was very look alike, just like they had been developed in the same research and development department where there was a lot of surplus aluminium tubes and leftovers of bicycle handbrakes.

When all the basic research was done, we arranged a meeting with Dolomite AB, in Anderstorp a small community in south Sweden. Dolomite is a subsidiary of Invacare Corporation, and is the world leader in rollators. We were very well received and we are still getting some good advices and following ups from our first contacts.

Dolomite has more than 20 years of experience in making mobile supports for walking and their advice and their positive attitude have certainly helped us a lot, reaching the right solutions in the technical, marketing and the end users area.

They gave us one of their rollator, a model for outside use. From this we could then obtain the adequate measurement and do some experiment like handling exercises, how it was performing beside an armchair when looking at TV, how it was fitting in beside a bed, kitchen tables, the work in the kitchen and other performance tasks that are common in a home.

Following those studies, we started sketching and modelling. To be able to evaluate ideas in this phase of a design work it is very important to make quantities to be able to compare and mix different ideas or parts of an idea with another.

After several of this scale models were made, and the conceptual sketches for the presentations were selected, we contacted experts in the different areas of geriatric and health care science for an evaluation of our ideas.

Since three years we have, at Department of Management and Engineering, already collaboration with the Occupational Therapy students and teachers at the Faculty of Health Science, in the department of Social Welfare Studies. This was a real advantage that we now could benefit from. We set up meetings and discussed the material we had produced so far, from those meetings we got many and valuable comments, and advise that we could apply to the second step of the design development.

Even though the different experts in the areas not always agree in details about what are the right or wrong we could still obtain a generic idea and draw a conclusion from what had been filtering through. The comments gave us rather good understanding of how to proceed with the further development and from this material we were able to fine tune the product concept into a digital prototypes.

In this phase the main consideration was to investigate the different facts surrounding the end users situation, the different tasks a product of this sort should be able to perform, the user's perception and interaction when presented and using the product. The last mentioned was our main objectives and that we were particularly interested in, due to the fact that existing designs did not seem to have taking emotions and affections in to account. This is a rather normal thing that is happening in technical environment where construction and production details are the things that comes in the first place. Not many engineers are trained in psychology or know very much about cognitive science, affection or emotions.

It is of course much easier to estimate and measure the physical needs than even coming close to an approximate when it comes to the psychological needs, for example what are the emotional stimulus that should be in place and how to design a rollator that will create a positive affection.

Next step was to introduce our concept, to be evaluated by production experts. We contacted two of the best producers of products made in laminated wood. It is a very high-tech area with a natural material, not one piece is the other alike and the staff has to be very skilled.

We have had lots of encouraging words from all our supporters and advisers, especially from Dolomite, because of this we intend to follow up the work producing some prototypes for a pilot test.

About the brakes and the wheels, we are still developing and testing different options and combinations. The reason for trying several kinds of system, is that we from the very beginning had our doubts about the combination of old people and brakes. Elderly usually have slower reactions and this in combination with weaker muscles can be disastrous and even fatal in some situations.

Because of this we thought it would be better to try to replace the existing braking systems with an arrangement where we could slow down the speed, and by doing so, giving the user a better control over the performance and giving them a feeling of being in charge of the handling.

Depending on the users capability and preferences we could combine different option and combinations of possible brake systems, respective adjustable friction pads. We are going to test the different brake and speed limitations on the actual users. This has to be carefully done, testing them on a wide range of people with different capabilities, i.e. physical, psychological and mental status

In December last year Kenneth Bringzén traveled to Brazil to visit production facilities that have been experimenting in technologies using bambo. We are convinced that bamboo as a material is a good alternative to wood. It is the strongest and fastest growing plant on the planet and its unique properties and possibilities are important factors that could replace the slow growing wood from trees and in this way decrease the speed of deforestation. Besides the above mentioned it would also create job opportunities in countries where the bamboo grows and this will have a positive effect on those countries economy and infrastructure. This will of course also be applicable to materials like rattan.

The future choice of materials will certainly take into account, those sorts of factors like we have mentioned, promoting the development of technologies in line with the new philosophy of sustainability, is an attempt to provide the best outcomes for the human and

natural environments both now and into the future. It relates to the continuity of economic, social, institutional and environmental aspects of human society.

AIDIMA's designer/researcher is going to have a closer look at the roll of the rollator in the Mediterranean countries and cultures to be able to adapt the design of the product towards their likings.

5 Results

The new product is adapted to the domestic environment and blends in with the other interior artefacts with its furniture looking design. As well as supporting a person that have mobility problems; it can also be used as a mobile piece of furniture like a sideboard or bed side table.

This will make those items unnecessary as they could be replaced by this new product that will serve the same function when its so needed, as well as in between those functions, is being used for its mane purpose as a walking support.

The design has a furniture character, humanizing the product away from the very technical machine look of today. As pointed out in the objectives, a very important part of this work was to de-mystify a very much needed product and by this increase the acceptance mood vice the users.

The brake and friction pads results will be ready for presentation at the 13Th International Conference on Thinking.

6 Key Conclusions

The key conclusions are that when designing products for a specific category, like physically challenged people, you must take into account the human factors like integration of the object, so it will not be perceived as made for this category.

Rather try to make it acceptable for everyone and that way designing for all of us.

Choosing the sustainability as a key factor in our project, we are sure that the final product will have a higher profile and acceptance among people in the technical as well as the institutional fields.

Acknowledgements

This project has been developed at the Division of Machine Design at Department of Management and Engineering Development at the University of Linköping Sweden, headed by designer Kenneth Bringzén and Carmen Biel Sanchis a researcher from AIDIMA, the Furniture, Wood and Packaging Technological Institute, Valencia, Spain and Julian Cuesta Illana a graduating student from the Polytechnic University of Valencia, Spain.

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