



Design of a cordless hair dryer product

C. Rodríguez, O.D., de Cózar ^(a), F.J., Castillo ^(a), I., Ladrón de Guevara ^(a), E.B., Blázquez ^(a)

^(a) University of Malaga

Article Information

Keywords:

Design,
Dryer,
Cordless,
CAD

Corresponding author:

E. Beatriz Blázquez
Tel.: +34 951 952 282
e-mail: ebeatriz@uma.es
Address: Escuela de Ingenierías,
C/Doctor Ortiz Ramos, s/n, 29071,
Málaga (Spain)

Abstract

In a sector such as the hairdresser, technological progress has not occurred by leaps and bounds as we are used to in other areas of the industry.

The design and development of a cordless hair dryer, which is not only able to perform its primary function, but to satisfy some fundamental weaknesses that current dryers have, such as wiring weight and ergonomics, is presented in this article.

In the development of this design, CAD SolidWorks tool has been used, allowing 3D design of the different parts that make up the hair dryer thereby obtaining a Product Overview.

1. Introduction

Nowadays, there are some sectors of work in which technological progress is not so remarkable, for example hairdresser. Nevertheless, it should be taken into account and try to improve some products as industrial designers.

Therefore it is not surprising, that only a little line of dryers resolve our main problems, and provide something new with regard to the functionality and aesthetics.

The historical development of the hair dryer is a fascinating story of man to dominate technology, plastic materials and electricity. The dryer has come a long way and it has been an important device on the evolution of the care of the hair and style, as well as the development of the treatment and beauty products industry [1].

The first machine to dry hair appeared in France in 1890, in the classroom of its creator, Alexandre Godefroy [2].

First commercial dryers were bulky and heavy, manufactured devices of nickel plated or polished steel with a handle of oak, which made it difficult to handle. The development was initially slow, but the designers managed to evolve the dryer features, increased power.

The first dryer made in plastic, leaving behind the heavy shells, which reduced its management appears in 1930. The new models began to use more small induction motors, instead of bulky and noisy brush motors. These changes allowed much more elegant designs.

At the end of the 1970s, companies invest in safer dryers since the first designs were often dangerous because in contact with moisture they could cause short circuits, so it was considered a dangerous appliance.

In the 1990s, portable hair dryers produced more than 1500 Watts of heat. Improvements in the housing technology and the research of new insulating materials made possible a new generation of lightweight dryers.

Currently, there are different models of dryers, but if you look carefully its design and ergonomics have not changed. Nevertheless, they have increased in power and now, we can find up to 2000 Watts dryers.

2. Redesigning a hair dryer

The aim of this paper is to show the development of a styling product hair wireless. This device must be able not only to perform its main function, to dry hair, but meet all or almost all of the weaknesses that have current dryers, such as wiring, weight and ergonomics.

Brainstore is always the initial stage of any project and its importance is capital, since according to chose a proposition and develop it in others phases of the project.

We'll try to find the grip area to have a form that would take various positions dryer, that was ergonomic, taking into account the physical effort, since the professional will be performing repetitive movements that tend to cause injury as tendinitis, tenosynovitis, pedicondinitis, etc...that often occur in the area of the hand, wrist, shoulder and neck. Their frequency is increased if required the application of strong efforts or in forced positions in the extremities and work requiring exert pressure with the fingers, hands and arms. Finally, we look for a non conventional shape of hair dryers.

2.1. Design phase

The dryer consists of a body without handle, since it rests on the wrist (fig. 1), facilitating the clamping and reducing efforts that generate injury professionals. Due to the curved and ergonomic shape allows to hold in two different ways, and thus facilitate management, depending on the type of work that is being performed, i.e. you can take it according to fig.2 to mark hair and fig. 3 for a surface drying.



Fig. 1 Hair dryer

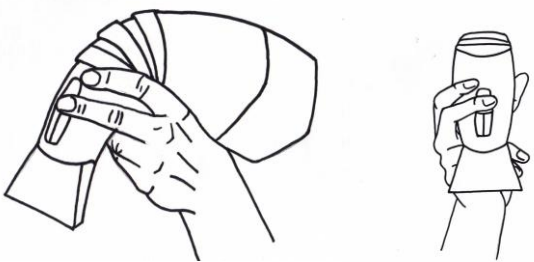


Fig. 2 Holding position number 1



Fig. 3 Holding position number 2

The dryer temperature can be control using a few buttons. Theirs changes are reflected in a digital display (fig.4), which also informs us of the temperature.



Fig. 4 Digital Screen

In the case, there are two air inlets (fig. 5), one for the cooling of the battery and another for air intake, that

which happened by the resistance to its heating are provided. These inputs have an area equivalent to the dryer section, to ensure an effective flow. A removable filter, to clean has been placed them and prevent the entrance of particles that could obstruct the passage of the air.



Fig. 5 Air intake

If there is an obstruction in the protection grille or the air outlet, the dryer from overheating may occur, but to prevent it we have design an internal protection (thermal switch) that can be automatic activated. Also, this design allows the extraction of these filters, by clicking on the two side buttons, which separate the base of the dryer of the main body (fig. 6).



Fig. 6 Removal of filters button

The material selected for the covering (polyamide 6) allows to be colored and it can offer different colors, aside from the typical black color of these appliances [3].

On other hand, insulating inner protective tube is made of a fire-retardant material. This special material is able to support high temperatures without warping or overheating.

It will also include a concentrator nozzle (fig. 7) for directing the flow of air over a certain point and dry small areas of hair, especially when using curlers.



Fig. 7 Hair dryer concentrator

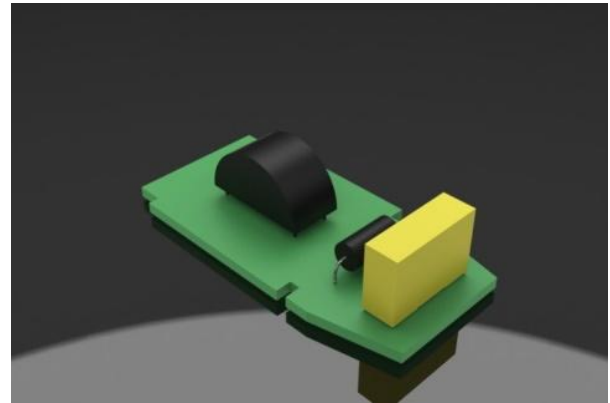


Fig. 10 Electronic PCB

2.2. Technical phase. Effective and not efficient, why?

After trying to join the required technology and searching for a completely innovative and ergonomic hair dryer design, it evolved to get what they wanted. Here are the elements that allow us to achieve an effective but not efficient wireless dryer by technical constraints [4,5].

Main internal parts of the dryer are:

- 1) Motor model MAXON MOTORS - 110048 - MOTOR, 16 mm, 12VDC, fig.8.

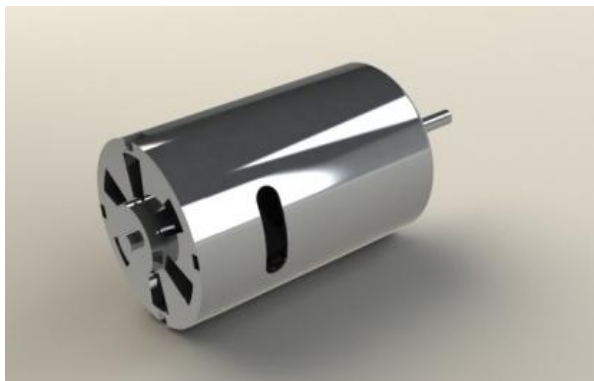


Fig. 8 Motor

- 2) Turbine, axial, thermoplastic, fig 9.

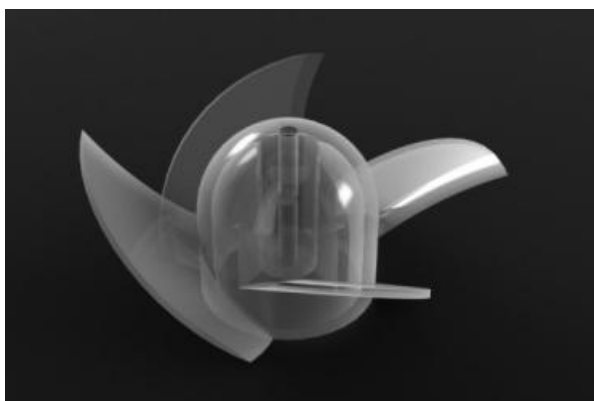


Fig. 9 Turbine

- 3) Electronic Board for the speed selector and push of cold air, fig 10.

4) Spiral thread, NiCr 40, resistance, incorporates a thermal limiter and insulating mica plate, a mineral that can be used to high levels of heat, fig 11. At the end of the cable, there is a connection with the circuit that controls the power supply. Bimetallic Strip



Fig. 11 Insulating Mica plate

- 5) Thermal insulate, fig 12.

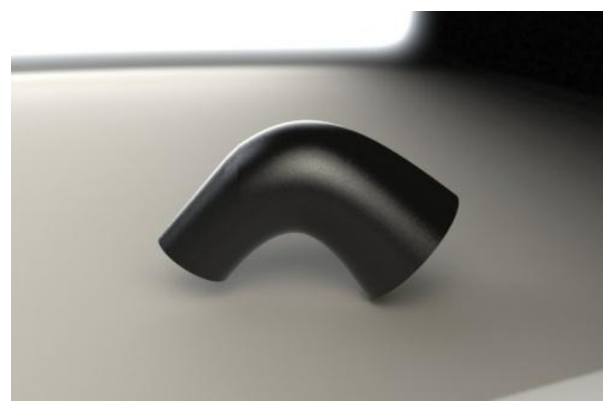


Fig. 12 Internal thermal insulation

- 6) Motor support, fig 13-14.

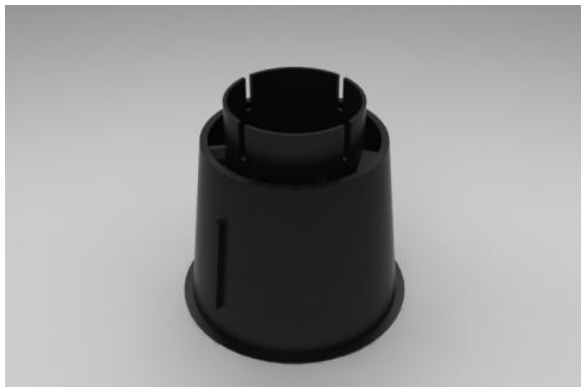


Fig. 13 Motor support



Fig. 14 Mounting motor and turbine

Regardless of the appearance of our dryer if it was clear that it should be able to contain a series of elements in its structure in order to be really functional. Since our aesthetic choice would go very much in consonance with the technological reality that would make it applicable now not only in economic terms, but constructive and manufacturability. However, after our research and the time spent to solve our biggest drawback, we were aware that could be a hair dryer wireless based on the technology that exists today, so we could say that it is a "conceptual design of a wireless styling product". But this doesn't mean that future technologies will permit to carry out a design real and feasible for this type of hair dryers

And that is why we are committed to a technology that the company Witricity is developing, based on a system of wireless charging of electrical appliances. An idea that is not new but that gradually is becoming more popular, and that could represent the future for many portable devices.

The company has already presented a prototype of such a system in the recent TED which was held in Oxford, United Kingdom, and according to Eric Giler, CEO of Witricity, there will be many more devices apart from mobile and televisions that can be loaded wirelessly. According to Giler, the system could finally replace our boots cables million and in addition could also avoid the use of disposable batteries.

3. Conclusion

First of all, it has been taken into account that consumers will be satisfied with the designed products.

Hair dryer design improve upon existing design in the area related to the users health, and also introduced a new cordless design. Nevertheless, the research results show as, at this time with the existing technologies this design can not be produced. In particular issues related to power requeriments storage in such small packege.

References

- [1] <http://www.muyinteresante.es/>
- [2] k. Kirkland. The big blow-dryer boom. Beauty Store Business, 2004.
- [3] Mikel P Groover. Fundamentos de manufactura moderna. Materiales, procesos y sistemas. Pearson/Prentice, 1997.
- [4] C. Nuñez, A. Roca, J. Jorba. Comportamiento mecánico de los materiales. Volumen 1: conceptos fundamentales. Ed. Universidad de Barcelona, 2012.
- [5] M. J. Moran, Howard N Shapiro, Fundamentos de termodinámica técnica. Ed. Reverte, 2004.
- [6] F. Weston Sears, A. Lewis Ford, R. A. Freedman. Física universitaria: con física moderna, Vol 2. Ed. Pearson, 2005.