

# **The effect of ergonomics on the design of Sterilization cabins as a three-dimensional advertising tools in light of the prevention of COVID-19**

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## **Abstract**

The spread of COVID-19 all over the world has led to a new international inclination in regards to decontamination, personal sterilization and implementation of new health care methods; and many fields of design have embraced this new tendency, especially the advertising field, whose main objective is to promote different enterprises.

As this current international crisis continues and with the spread of sterilization cabins worldwide; it has become possible to utilize these cabins as effective advertising tools. Sterilization cabins are characterized of being made of metals that don't interact with viruses or bacteria and are resistant to sterilizers. At the same time; sterilization cabins can be utilized in multifunction design, taking into consideration the ergonomic criteria and standards, as well as developing design solutions that fulfill the medical requirements and are acceptable to the society and users.

The problem of this research is based on the need to utilize sterilization cabins as 3D advertising tools which can achieve their promotional objective and attract the viewer; and at the same time they are structurally stable and designed according to the various ergonomic criteria.

Therefore; the research aims to develop a design structure for sterilization cabins as 3D advertising tools according to the ergonomics criteria. It consists of three aspects; the first studies the design standards for sterilization cabins in regards of shape and ergonomics, the second discusses visual contact obtained through sterilization cabins as 3D advertising; and the third tackles the process of designing sterilization cabins as 3D advertisements according to ergonomic standards.

## **Keywords:**

sterilization cabins – ergonomics – advertising cabins

## **Introduction**

The COVID-19 virus has appeared as an emergency health issue across the world, which spreads through touching contaminated surfaces, causing an international concern and interest in the prevention of this pandemic as much as possible. And as this pandemic continues to spread; it has become essential for the societies to take all measures to prevent contagion,

control the virus and limit its spread. Accordingly, new methods are sought to provide health care, such as sterilization cabins and personal hygiene tools.

As a result, to these unprecedented circumstances; the different fields of design are facing many challenges and are attempting to implement the new international tendency towards prevention of infection and personal sterilization.

On the other hand; the main objective of the advertising design is to promote the products and services of different enterprises; whether on local or international levels; so in order to productively fulfill its objective; advertising design has become one of the main fields which embrace the new inclination in regards to COVID-19 prevention.

Sterilization cabins are a potential tool that can be effectively adapted to comply with this new orientation in advertising, these metal cabins are characterized of being manufactured of materials that don't interact with viruses or bacteria and are not affected by the sterilization materials. More importantly; sterilization cabins can be utilized in multiple functional design, as long as the appropriate design and ergonomic solutions are provided to fulfill the medical requirements, comply with the ergonomic and medical standards; and be socially and culturally accepted.

Therefore; this research discusses the potentiality of utilizing the sterilization cabins as 3D advertisements that are structurally stable and are designed according to the ergonomic standards which are appropriate to the Egyptian society.

### **Objective**

The research aims to develop a design structure for sterilization cabins as 3D advertising tools according to ergonomic standards that are appropriate on the physical, psychological and environmental levels.

### **Problem**

The problem of this research comes from the need to create sterilization cabins which serve as 3D advertisements and can effectively promote their objective and attract the viewer to interact and respond; and at the same time; to be structurally stable and designed according to the multiple ergonomic standards.

### **1<sup>st</sup> aspect: the standards of shape and ergonomic in sterilization cabins design**

Sterilization cabins are mainly designed based on their function, thus; their design lacks the creativity and experience of the designers, yet; various enterprises should try to employ a specialized design, with the objective to attract the attention of their visitors; and earn their trust during the sterilization process at the beginning of their visit to the enterprise; or even if they were just passing through.

Therefore; this research attempts to identify the ergonomic standards that should be followed in the design of sterilization cabins. (Fig. (1) shows an example of sterilization cabins on an international level).



**Fig. (1): examples of sterilization cabins on the international level**

### **The ergonomic standards to design sterilization cabins**

These standards can be classified into two main categories:

#### **1- Height (ceiling)**

A sterilization cabin with a high fixed ceiling could be suitable for most categories of their users; while those with low height may cause an uncomfortable feeling or fatigue, they may also be inappropriate for a special category of users.

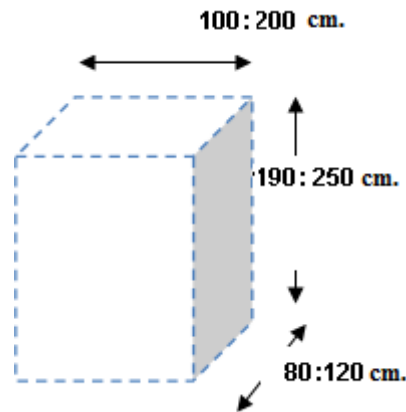
Thus; from an ideal ergonomic aspect, the cabin's ceiling should be separately adjustable in order to fit all physical features of its users and achieve a comfortable functional performance during the sterilization process. Therefore; it is recommended that the sterilization cabins are designed with adjustable heights.

#### **2- Internal space**

The international criteria for the dimensions of sterilization cabins recommend large width and depth of the internal cabin, but from an economic perspective; such dimensions may lead to an expensive selling price.

Therefore; the recommended dimensions for the internal space of the sterilization cabin; based on ergonomic standards and concepts; it states that the cabin width should be enough for one person to comfortably and safely pass through the cabin without touching any of its elements

or sterilization devises; Fig. (2) illustrates the ergonomic dimensions recommended for the sterilization cabin.



**Fig. (2): the ergonomic dimensions recommended for sterilization cabins**

### **2<sup>nd</sup> aspect: The visual communication through sterilization cabins as 3D advertising tool**

3D advertising depends on impressing the audience, by creating a kind of interaction between the advertisement and the viewer in an easily recognized and understood method. (Kariman Hamdy, 2015)

There are a number of artistic concepts specified for 3D advertisements; which can be summarized as follows:

- The 3D advertisement should include elements of excitement and attraction; in addition to aesthetic aspects, as well as a balanced design.
- The 3D advertisement should influence the viewer through its persuasive method of display; and by generating an interest and forming a desire. It is also important that the design has a dominant design element.
- The 3D advertisement should include the best methods of lighting, movement and effects, taking into consideration the relation and balance between the various design elements; as the advertisement should be designed as a wholesome unit.
- The 3D advertisement should include a new innovative idea, taking into consideration the place of display, the best utilization of space and the selected display angels; so that it would be visible from all directions.
- The 3D advertisement should include a distinguished execution and application which can clearly convey the vision of the designer and stimulate the senses of the viewer. (Doaa Elshahat, 2012)

### **3<sup>rd</sup> aspect: Design techniques for sterilization cabins as 3D advertisements according to the ergonomic criteria**

#### **1- An analytical study of some sterilization cabins examples**

1<sup>st</sup>: On the international level (Canovate disinfection tunnel):

a- The functional and constructional aspect

From the functional aspect; the Canovate system depends on the spraying method, when an individual enters the cabin, the sterilization system is automatically activated by a sensor. The

sanitizer is sprayed through holes in the walls and is turned into vapor which kills the microorganisms in all the places it contacts; without causing the person to get wet.

While from the constructional aspect; this system is constructed from aluminum sectors connected by metal connectors made from stainless steel; the lining is made with aluminum sheets and clear colored glass.

#### b- The ergonomic aspect

This system is distinct by its light weight and easy installation, it has a comfortable design with the dimensions of (100 cm width X 150 cm length X 240 cm height); its ergonomic design allows complete disinfection of the body and maximum sterilization.

#### c- The aspect of shape and advertising

The cabin isn't utilized as a 3D advertising tool; it also has no distinct design value.



**Fig. (3); Canovate disinfection tunnel**

1<sup>st</sup>: On the local level (sterilization cabin of the Ministry of military production):

#### a- The functional and constructional aspect

From the functional aspect; this cabin depends on the spraying method, it is equipped with 5 sprayers and an external sanitizer container. The cabin is equipped with a thermometer that measures the individual's temperature as soon as they enter the cabin, if it was higher than 38°C; an alarm goes off, if not; a green light appears and the disinfection process begins and continues for 1 ½ to 2 seconds.

While from the constructional aspect; this system is constructed from aluminum sectors connected by metal connectors made from stainless steel; lining is made with white acrylic sheets and clear glass.

#### b- The ergonomic aspect

This system is characterized with its light weight and easy installation; it has a comfortable design with the dimensions of (90 cm width X 120 cm length X 240 cm height); the ergonomic design allows a full disinfection of the body during the sterilization process inside the cabin.

c- The aspect of shape and advertising

The cabin isn't utilized as a 3D advertising, although it displays the logo of the Ministry of Military Production, also; the design has no specific design value.



Fig. (4); Sterilization cabin of the Ministry of Military production

## 2- A practical study to design sterilization cabins as 3D advertisement in light of ergonomic standards

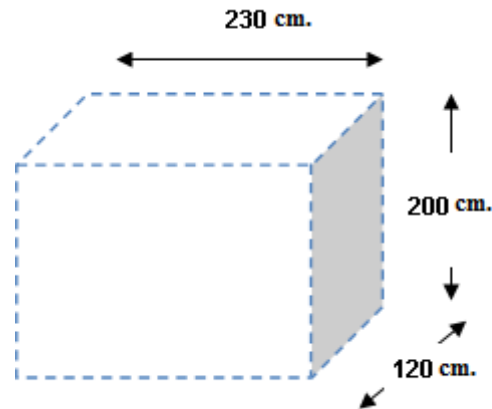
### a- The general idea from a functional aspect

From a functional aspect; the objective of the proposed sterilization cabin is to disinfect the user's whole body, so it was designed in the shape of a tunnel gate, its sterilization system consists of 8 sprayers which are controlled by thermal sensors. The sensors activate the sprayers as soon as a person enters the cabin; the sterilization process continues until the person gets out of the other side of the cabin. This technique provides a complete disinfection for the person from head to heels, taking into consideration that the sanitizer used in the process is safe for human beings, inflammable and certified by the WHO.

### b- The ergonomic study of the design

By applying the ergonomic standards and criteria; the proposed cabin was designed with a wide that is sufficient for one person to comfortably and safely pass through the cabin without touching its structure or sanitation devices; in addition to a height and depth which can

accommodate the full disinfection process. Fig. (5) shows the ergonomic dimensions of the proposed cabin.



**Fig. (5): the ergonomic dimensions of the proposed sterilization cabin**

c- Proposed design ideas to utilize sterilization cabins as 3D advertisements

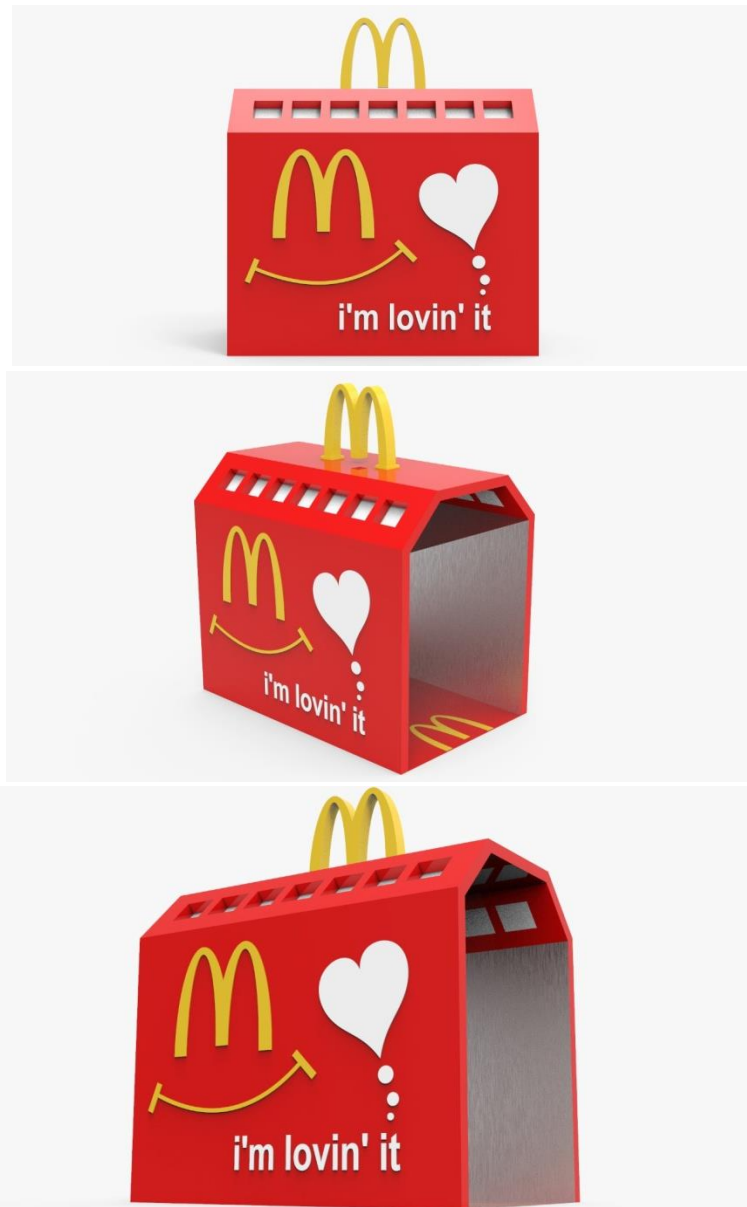
**1<sup>st</sup> idea: McDonald's "Happy Meal" box: Happy Sterilization**

As children are very familiar with the red box of McDonalds happy meal; the proposed idea is to design the sterilization cabin in the shape of the happy meal box, and name it with the same style "Happy Sterilization" to encourage the children to enter the cabin.

This design can be put at the entrance of McDonalds restaurants to achieve its promotional and functional prospect; they can also be put in public areas, such as parks and playgrounds as a different style of 3D advertisements which perform a functional and social purpose.



**Fig. (6): deriving the design idea from the "Happy Meal" box**



**Fig. (7): the proposed sterilization cabin “Happy Sterilization”**

### **2<sup>nd</sup> idea: National Bank of Egypt – NBE: Be Safe**

The National Bank of Egypt is one of the largest and most influential banks.

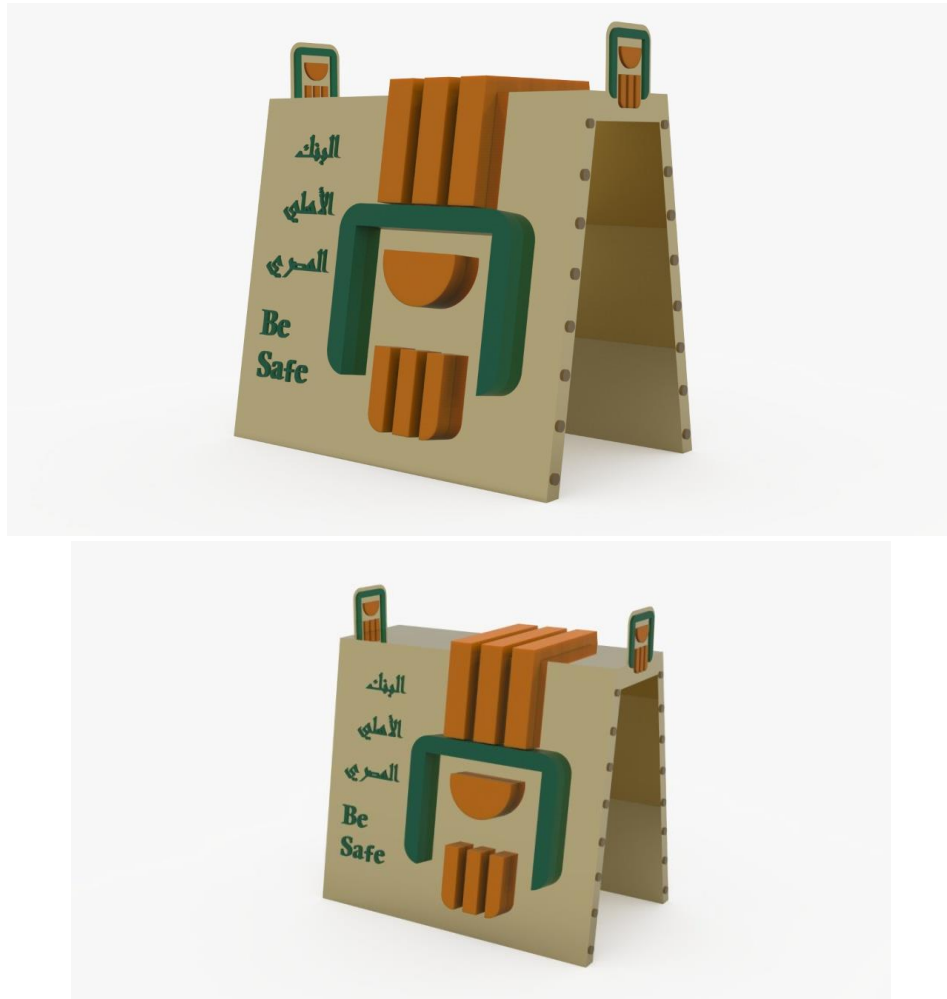
It is the first bank to print paper money in Egypt; and its establishment was an important step in the Egyptian economy progress.

As the logo of the bank promotes the concept of providing safety, the advertising idea of the proposed sterilization cabin is to connect between the concepts of safe banking in dealing with NBE; and to stay safe by using the disinfection system of the proposed cabin.

The proposed design used the bank logo; and abstracted the cabin gate in a pyramid-shaped tunnel to emphasize the Egyptian identity.

This cabin can be put at the entrance of the bank branches all over Egypt, to fulfill its promotional and functional objectives.





**Fig. (8): the proposed “be safe” sterilization cabin**

### **3<sup>rd</sup> idea: Cheetos popcorn cup**

This advertising idea is based on the new product “Cheetos popcorn”; this product is widely popular in Egypt, on the other hand; popcorn is a beloved snack that is linked with cinemas, therefore; the proposed cabin is designed in the shape of a popcorn cup with the logo of Cheetos and a film strip printed on it.

The advertising idea is based on promoting the possibility of practicing a normal life; and going to the movies; when following the safety precautions and getting disinfected in the proposed sterilization cabin.

This cabin can be put at the entrance of the different cinemas all over Egypt; to fulfill its advertising and functional objectives.



**Fig. (9): the proposed sterilization cabin**

## Conclusions

- 1- The COVID-19 current crisis has led to developing new methods to provide personal health care; including using sterilization cabins. These cabins fulfill their objective when designed according to appropriate design and ergonomic solutions that fulfill the medical requirements and is acceptable by the society and culture.
- 2- The current trend in designing sterilization cabins is mainly based on its function and lacks an artistic prospect, which requires a design for these cabins that depends on the creativity of the designer, in order to attract visitors and gain their trust during their visit to the establishment.
- 3- Ergonomic standards must be implemented in the design of sterilization cabins to avoid causing any disturbance to the users during the sterilization process. From an ideal ergonomic prospect; the ceiling of the cabin should be at a large fixed height to fit various physical features of different users, because the low height can cause a feeling of discomfort or fatigue; or might be inappropriate at all to a specific users' category.
- 4- The design of the sterilization cabin as a 3D advertising must have a number of visual communication properties which can make it a successful advertising tool that have a special effect on its viewer and user.
- 5- From the functional aspect; the design of the sterilization cabin must ensure a full disinfection of the user whole body to eliminate the virus that might exist on their clothes or shoes, thus; the function of the proposed cabin is based on applying a full sterilization process on the body from head to heels.

6- The proposed cabin has a sterilization system that is activated as soon as a person enters the cabin; and continues working until they exit from the other side, using a sanitizer that is safe to humans and authorized by WHO.

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