

# Designing First Aid Box Based on Material Aspects for Sport Facilities

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**Abstract:** Sports infrastructure is a place to working out. In doing so, people need to pay attention in safety and security measures because sports activities are vulnerable against accidents and injuries. The location in this case study is in GOR Saparua, where first aid is unavailable so visitors are find difficulty for searching help to treat victims and those who need help. The purpose of this research is to make people who regularly visit the sport infrastructure in helping each other easier, increasing amenities, and anticipating serious injuries in sport facilities. This research is using qualitative research method in which supported by data collection technique like observation, interview, documentation, literature review, and comparative analysis. This research would produce a well-being public amenities in the shape of a first aid. This first aid amenities that is going to buildbased on the material aspect. The materials would have advantages if it is applied to outdoor room. Moreover, the strength and durability of the materials woulddetermined the quality of the product and this product would satisfy the need of sport facilities visitors.

**Keywords:**Facility, Product, First Aid, Sport.

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## 1. Introduction

Sports facilities and infrastructure are places for doing sports activities which consist of fields, along with sports buildings which include equipment to support growth that is good for both spiritual and physical.

Sport facilities in sportsplex or sport complex for example, has a variety of facilities in it. A sportsplex is a multisport facility that may include indoor or outdoor spaces or a combination of the two. Sportsplexes can be owned by a public entity or a private entity, partnership, or corporation. Typically, sportsplexes have softball fields, soccer fields (both indoor and outdoor), roller-hockey rinks, basketball courts, volleyball courts, and various other recreation facilities or a combination of these (Gil Fried, 2005: 100).

To advance the facilities that are available at sport facilities, visitors and athletic safety are also needed to be considered. One product that can be developed is first aid box as a first aid treatment for injured people while doing sports activities. Injuries are part of athletic participation, and many of these injuries are intially treated by untrained personnel due to lack of health care providers on the athletic field (Jack Ransone & Lisa R. Dunn-Bennet, 1999: 267). This first aid box is a health care facility which contains the equipment and the medicines that help sport facilities in performing first aid. For example, bandages, antiseptic, and others.

First aid box that will be made are placed in an indoor or outdoor areas, so the material aspects of the product are noteworthy because changes in weather or air humidity can affect the strength of the product. The materials applied to this first aid box must have certain advantages, such as water resistance, heat resistance, and have a strength to accommodate the load inside, so that the product is not easily damaged.

Innovations that can be developed and applied to this first aid box are the materials that are resistant to all forms of weather changes, as well as the placement of these first aid boxes. Specialized equipment and material should always be located near the sites of potential accidents and in the first aid room. Transporting the equipment from a central location such as an occupational health service facility to the site of the accident may take too long (Jeanne Stellman, 1998: 14.6)

## 2. Literature Review

### 2.1. Sport Infrastructure Facilities

Sports infrastructure facilities are a permanent form, both inside and outside, for example gymnasium, game field, swimming pool, and others. Sports infrastructure facilities are supporting resources which consist of all types of buildings or without buildings used for sports equipment (Wirjasanto 1984: 154).

### 2.2. First Aid Box

First aid box is a product that gives a first aid treatment for people who has an illness, accident, or injury in a place that is far from the reach of hospitals, health centers, or other health facilities. The problem of distance and the lack of medical personnel, equipment and medicine is what makes first aid as a first injury response and very important in everyday life to anticipate more serious injuries or illnesses because no one knows when and where the danger comes.

First aid box is useful for giving medical facilities, and emergency treatment for victims before they get a complete help that will be given by a doctor or other medical personnel who is not there at the location of an incident.

## 2.3. Material

### 1. Galvanized Plate

Corrosion has its roots in the environment. With the limitation and impediment of corrosion, corrosion protection relieves the environment in a number of ways and becomes a decisive measure for environmental protection. Yes, one can say "corrosion protection is environmental protection."

The protection of steel against corrosion by means of hot-dip galvanizing or the duplex method is particularly effective, lasts for decades, and is efficient in comparison to other methods. Moreover, it is a convenient corrosion-protection method since the reduction in corrosion does not only impede the loss of steel as a material, but contributes to the saving of resources and the avoidance of waste. After its utilization, steel or hot-dip galvanized steel is 100% recyclable. The recycling of material is an important contribution to environmental protection. (Peter Maaß & Peter Peißker, 2011: 16)

Galvanized finishes are increasingly seen in AESS applications. It is important to remember that in the view of the steel industry galvanizing was not intended as a finish but as a preventive measure against corrosion. The speckled gray finish will be varying from batch to batch even within the same manufacturer, also as a function of the application technique and the style, size, and shape of the member to which it is being applied.

Achieving a high-quality coating requires that the surface be free of grease, dirt and scale of iron or steel before galvanizing. When the clean steel component is dipped into the molten zinc (approx. 450 ° C) a series of zinc-iron alloy layers are formed by a metallurgical reaction between the iron and the zinc. When the reaction is complete there is no demarcation between steel and zinc but a gradual transition through the series of alloy layers, which provides the metallurgical bond. This helps to make the galvanized finish highly durable, as it cannot easily be chipped away. The thickness of the coating is determined by the thickness of the steel. This is important to remember when specifying thinner elements in areas of wear. The galvanized coating can be made thicker by roughening the steel, thereby creating more surface areas for the metallurgical reaction to take place.

Galvanized coatings protect steel in three ways:

- The zinc weathers at a very slow rate, giving a long and predictable life.
- The coating corrodes preferentially, thus providing sacrificial protection to small areas of steel exposed through drilling, cutting or accidental damage.
- If the damaged area is larger, sacrificial protection prevents sideways creep, which can undermine the adjacent coated area.

(Terri Meyer Boake, 2012: 108)

### 2. Stainless Steel

The word 'steel' means that the material is iron-based, while the adjective 'stainless' implies absence of staining, rusting, or corroding in environments where normal steels are susceptible (for instance, in relatively pure, dry air). In order for steels to be stainless, at least about 11wt% of chromium must be alloyed to the base material. At this Cr level, an adherent, self-heating chromium oxide can form on or at the steel surface in relatively benign environments. However, to stave off pitting and rusting in more hostile environments (say, in moist atmospheres or polluted environments) or in the presence of elements like carbon, higher Cr contents and other alloying element (Mo, Ni, *e.g.*) must be added. In addition to being corrosion-resistant, stainless steels also do not discolor in a normal atmospheric environment. The crown of the Chrysler building, which was made of an austenitic stainless steel (tradename Nirosta), still shines nowadays, although the building was completed in the year 1930 and is located near the seaside. Stainless steels also outperform ordinary steels on high-temperature mechanical properties. Stainless steels are much better in terms of fire resistance and retention of strength and stiffness at elevated temperatures compared with carbon steels. (Joseph K. L. L., Chan H. S., Kin H. L., 2012: 3).

### 3. Acrylic

Acrylic material has a transparent clear character like glass. However, both of them have several different characteristics. If the thickness is added, the transparent nature of acrylic is more constant than the thickness of the glass and the transparency of it is reduced. Acrylic is far more elastic than glass that is more brittle, so technically acrylic is more resistant to the shock of water pressure. In addition, the glass is easily mossy while acrylic is not. Another difference is acrylic is much lighter than glass and also the manufacture of acrylic is far more flexible, easy and harmless. (Swasty, 2010: 25)

**Table 1.** Characteristics of Acrylic

1.	Advantages	Lightweight, easy to get, fancy colors are available, able to accommodate a heavy load, waterproof, can be designed into various shapes, corrosion resistant, chemical resistant, and lower production costs.
2.	Deficiency	Easy to scratch, quickly dull, does not resistance to fire, easily damaged at low temperatures.
3.	Price	Start from economical to medium cost.
4.	Treatment	Easy.
5.	Finishing	Does not require finishing.

### 3. Research Method

Approach technique is a method that is used in this research and design process of this product. The research approach technique with qualitative research methods is using data collection techniques based on the observation in GOR Saparua as the case study, so that an idea can be formed to offer a solution for the problems that has been occurred.

#### 3.1. The Data Collection Technique

For qualitative study titles, researchers may state a question or use literary words, such as metaphors or analogies. Qualitative titles include several components: the central phenomenon (or concept) being examined, the participants and the site at which the study will occur. In addition, a qualitative title might include the type of qualitative research being used, such as ethnography or grounded theory. Qualitative titles do not suggest a comparison of groups or a relationship among variables. Instead, they explore one idea (the central phenomenon) for an in depth understanding. (John Creswell, 2011: 144).

The data collection techniques in this research are:

- a. Observation
- b. Interview
- c. Documentation
- d. Literature Review

### 4. Discussion

#### 4.1. Analysis of Material Aspects

There are several considerations in choosing the best material, these considerations are:

**Table 2.** Analysis of Material Aspects

No.	MaterialAspects	Information
1.	Properties and Characteristics	The properties and characteristics of material are the properties if the material is given stimulation which will determine the strength of the product.
2.	Price	The price of a material must suitable with the quality of the product. High or low material prices can affect the production expenditure of a product.
3.	Availability	The availability of material can affect the production process, for example whether or not the material is easy to get.
4.	Aesthetic	The aesthetic value of a material is an important thing that can give attraction to the product.

#### 4.2. Terms of Reference

##### 1. Design Considerations

- a. Resistant to hot and cold weather or to weather changes because the product will be exposed to direct sunlight, wind or rain.
- b. Strong, not brittle, and sturdy so that the product can have many medicines and medical equipment in it because this first aid box has a larger size.
- c. Durable and does not break quickly, so it can be minimized the cost of repairs or maintenance.
- d. Corrosion resistant.
- e. The first aid box can protect the inside of it so that the medicines and the medical equipment are not exposed to direct sunlight.

##### 2. Design Limits

- a. The first aid box has a large size so it cannot be carried anywhere.
- b. The first aid box in this research is located in Bandung sports facilities.

##### 3. User Target

- a. Visitors in sports facilities in Bandung.
- b. Men or women.
- c. Teenagers to adults.

#### 4.3 SWOT Analysis

##### 1. Strength

This product has a strength based on the material aspects that is being used. The material of it has an

advantage such as corrosion resistance, weather resistance, and sturdy which makes this product durable. This first aid box has an innovation that other first aid box does not have. The medicine storage and the medical equipment also have a large space to accommodate more products inside the first aid box.

## 2. Weakness

The disadvantage of this product is that the production cost is quite expensive because the material that we are using is a superior material with a large size compared to other first aid box. Other than that, this product cannot be carried anywhere.

## 3. Opportunity

This product has the opportunity to offer the latest innovations from the first aid box design and also to give visitors the opportunity to treat injuries so that they can reduce and anticipate more serious injuries

## 4. Threat

Threats that will occur are damage caused by certain factors. Such as a damage to the system, or damage due to human negligence.

## 4.4 Mood Board

Mood board is an arrangement of images to describe an activities, materials, previous products, habits, or even colors that can convey the purpose of making this product in sport facilities. Here are the following images that show the correlation about the product in this research:



Figure 1. Color Chart

## 4.5 Image Chart

Image chart is a grouping of the product images which will be made according to the characteristics of the product, design considerations and needs. There are four

groups of the product, geometric shapes, organic shapes, modern concept, and traditional concept, each of it has the same characteristics from the shape, to the concept of it. This image chart helps to get the best decision about the concept and the shape with a circle that will show where this product is going to be.

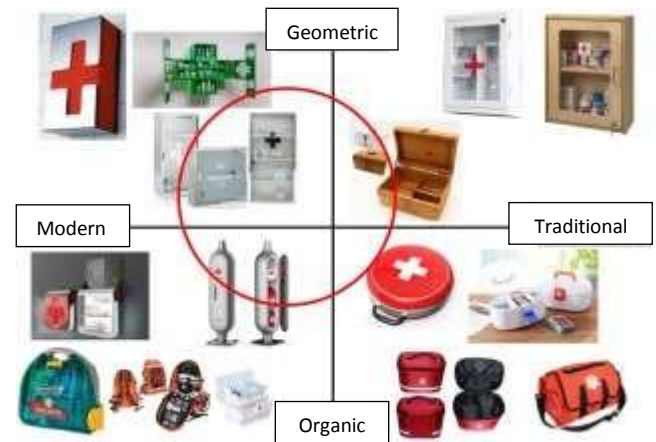


Figure 2. Color Chart

Based on the analysis of the image chart, this first aid kit has a modern and geometric design. The material used can also support this modern concept, such as the use of the artificial materials. Artificial materials have certain advantages that natural materials do not have, because natural materials have some disadvantages with weather changes. Modern impressions of artificial material are also more suitable, while geometric is taken from the shape of the first aid kit.

## 4.6 Blocking System

Blocking system is grouping and placement of elements in the product so that the user will know where to get what they need easily.

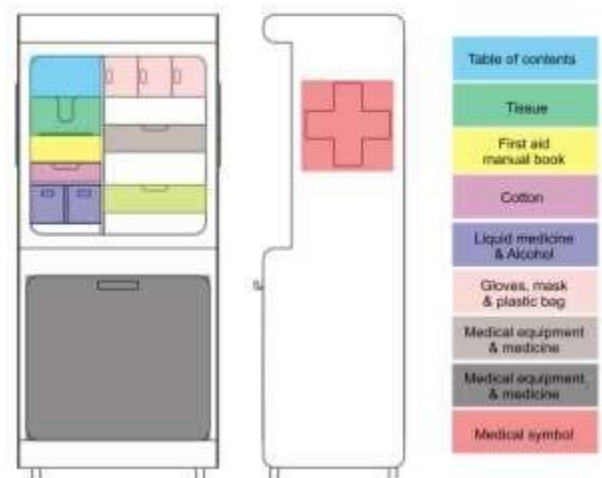


Figure 3. Blocking System

## 4.7 Color Chart

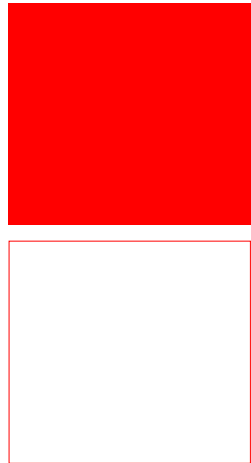




Figure 4. Color Chart

The choice of colors on the product greatly affects the attractiveness to the visitors. Color can be the identity of the product. With the right color, the product will be easily known or known to visitors. In this design, the colors that will be applied to the product are red and white which symbolize medical colors. The following are the meanings or meanings of the colors that will be explained in the following table:

Table 3. Color Psychology

Colors	Meaning
	<ul style="list-style-type: none"> <li>Excitement</li> <li>Love</li> <li>Danger</li> <li>Power</li> <li>Energy</li> <li>Desire</li> <li>Strength</li> </ul>
	<ul style="list-style-type: none"> <li>Cleanliness</li> <li>Faith</li> <li>Purity</li> <li>Safety</li> <li>Sterility</li> <li>Simplicity</li> </ul>

## 5 Results

The material that is used is a galvanized plate as a basic material of the first aid box and stainless steel inside of it. Acrylic is used as a door. Stainless steel inside the product is strong, corrosion resistance, does not react with chemicals, resistance to weather changes, not easily cracked or scratched, and sterile. The use of acrylic material is because this material does not break easily and also lightweight. Acrylic is coated with sunblaststicker to defend and avoid the inside from direct sunlight. The use of galvanized plate material is because it is corrosion resistance, strong, and economical. The medical logo is affixed usingsticker on the right and left side of the first aid box, and the word “first aid kit” on the front.



Figure 5. 3D Rendering of the Final Product



Figure 6. Details of the Product



Figure 7. Details of the Product from the front.

## 6 Conclusion

This research and design of this first aid product is to advance sport facilities in order to help and rescue the visitors, athletes, and other people who got injured while doing sports activities.

Sometimes accidents or injuries are encountered while exercising, and the unavailability of facilities that can provide safety and security to visitors like first aid box makes it difficult for visitors to get the help they need, so the problem must be solved.

In addition to being able to complete the design, first aid products are needed to have a strength, which is resistant to

weather changes because the product will be placed at certain point in outdoor areas, so the material selection can affects the quality of the product in order to last long.

Based on the results and the discussion of this research and design of first aid box at sport facilities, the conclusion is that health care product like first aid box is designed to improve the facilities and safety for the visitors of sport arena based on material aspects. The use of the right material on the product will provide durability so that it is not easily damaged. Proper material selection and finishing can also provide a better appearance, the first aid box is designed using several considerations in material, visual, system and ergonomic aspects so that the product can be more attractive, innovative, and can provide comfort and safety to the user. The selection of materials based on the material technique of it, which is the character of the material when it was given stimulation or load, and it can affects the durability of the material.

The materials used in this design are galvanized plate, stainless steel inside the product, and acrylic as a door. The acrylic is coated with sun blast sticker to avoid the inside and protect it from direct sunlight.

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