Outdoor kiosk design

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BSc. programme Industrieel Ontwerpen

September 2009

THE DESIGN OF AN OUTDOOR KIOSK

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UT/IO 23.02.2009-13.10.2009

This report is written within the scope of the BSc. course 'Bachelor Eindopdracht'.

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Pages: 48
Copies: 4

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September 2009

Abstract

This report is written within the scope of the final Bachelor assignment, which is executed at Envent. This Australian company is specialised in developing and designing interactive kiosks. The objective of this assignment is designing an outdoor kiosk. The target group is adults (age 18-55) and the design needs to be placed in Australia. Secondary objective is to design a wheelchair-friendly kiosk.

First step was to execute different researches, regarding the company, competition, and current products. Observations and interviews lead to different important factors. These are included in the List of Requirements and Wishes.

After researching, a brainstorm session to generate as much as possible ideas, was the next step. From this group of sketches five were chosen and designed with a bit more details. Two concepts were based on existing non-digital kiosks, one concept was based on street furniture, and two concept were based on existing busstops. In consultation with the company, two concepts were chosen; design A and design B. Design A is based on existing non-digital kiosks. Design B is based on a busstop.

Both designs are compared to the List of Requirements, in order to make a final decision. Also personal preferences of the company and designer are taken into account. In the end, design A was chosen as final design.

Design A is explained into detail. A first step was to collect important, tangible data, such as ergonomical values which are constrained by the laws. The material, stainless steel, is also chosen here, before presenting a more detailed design. Figures will display more insight on the reached ergonomical results, which except for one satisfy the requirements.

Next, the design will be discussed part by part. Simply said, the design can be divided into three large parts. Part for part the design is discussed. In addition, assembly is also discussed, as it is highly important this happens in the right order.

After this, the design is evaluated. It appears it does not fit all requirements. One ergonomical measurement is not met and also the weight of the total design is probably too heavy. A recommendation to use other materials is made. Also other recommendations are made, in order to improve the design.

As conclusion it can be said the assignment is carried out sufficiently. An interactive kiosk is designed and presented as a 3D CAD model. The unique selling points of this design are modularity, outdoor use, and accessibility.

Samenvatting

Dit verslag is geschreven in het kader van de Bachelor eindopdracht, welke uitgevoerd is bij Envent. Dit Australische bedrijf is gespecialiseerd in het ontwikkelen en ontwerpen van interactieve informatiezuilen (kiosk). Het doel van de opdracht is het ontwerpen van een outdoor kiosk voor de doelgroep volwassenen in Australië. Secundair doel van deze opdracht is het ontwerpen van een rolstoelvriendelijke informatiezuil.

Eerst zijn verschillende onderzoeken gedaan naar het bedrijf, de concurrenten en de huidige producten. Door middel van observaties en interviews zijn verschillende belangrijke feiten naar voren gekomen. Deze zijn allemaal verwerkt in een Programma van Eisen en Wensen.

Hierna kan er verder worden gegaan met brainstorm sessies, om zoveel mogelijk ideeën te genereren. Uit deze groep schetsen zijn er vijf gekozen die in iets meer detail uitgewerkt zijn. Hiervan zijn twee concepten gebaseerd op bestaande niet-digitale informatiezuilen, een concept op straatmeubilair en twee concepten op bestaande bushokjes. Samen met het bedrijf is dit uiteindelijk terug gebracht tot twee concepten, concept A en concept B. Concept A is gebaseerd op bestaande niet-digitale informatiezuilen. Concept B is gebaseerd op een bushokje.

Concept A en concept B zijn onderworpen aan het Programma van Eisen, om zo tot een keuze te komen. Ook zijn hierbij de persoonlijke voorkeuren van het bedrijf en de ontwerper meegenomen. Concept A is uiteindelijk gekozen als definitief ontwerp.

Concept A wordt tot in de details uitgelegd. Er wordt begonnen met het verzamelen van belangrijke concrete gegevens, zoals bijvoorbeeld ergonomische waarden die in de wet zijn vastgelegd. Ook wordt het materiaal, roestvrij staal, gekozen, voordat het gedetailleerd ontwerp wordt gepresenteerd. Afbeeldingen geven nog meer inzicht in de behaalde ergonomische resultaten, welke op een na allemaal voldoen aan de eisen.

Vervolgens wordt het ontwerp onderdeel voor onderdeel besproken. Het ontwerp is simpel gezegd op te delen in drie grote delen. Deel voor deel wordt besproken hoe het ontwerp in elkaar steekt. Ook de assemblage komt hier aan bod, omdat het van groot belang is dat dit op de juiste volgorde gebeurd.

Ook wordt het ontwerp geëvalueerd. Het blijkt hierbij niet aan alle eisen te voldoen. Een ergonomische waarde wordt niet gehaald en ook het gewicht van het gehele ontwerp is waarschijnlijk te zwaar. Een aanbeveling is het kiezen van een ander materiaal. Ook andere aanbevelingen worden gedaan, zodat het ontwerp verbeterd kan worden.

Als conclusie kan er gezegd worden dat aan de opdracht is voldaan. Er is een informatiezuil ontworpen en gepresenteerd als 3D CAD model. De unique selling points van het ontwerp zijn modulariteit, outdoor gebruik en de toegankelijkheid.

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Preface

This report is written as part of the bachelor assignment, the final assignment to graduate the Bachelor's degree in Industrial Design at the University of Twente.

It was my personal goal to execute this assignment abroad. After a long search I have met with Envent in Australia, and decided to execute my final assignment there.

Without help, support and advice, I would not have been able to execute this assignment. Therefore, I would like to thank the following persons and institutions.

First of all, I would like to thank Travel Active (Marjolein Breikers) and Australian Interships (Louise Webb and Alejandra Collado). Without these organisations I would not have found a company in Australia.

I would like to thank Justin Dean and Envent for giving me the opportunity to work with them. Also thanks to David Astone, James McIntyre and Peter Gordon for helping me out during my project.

I would also like to thank the involved lecturers at the University of Twente and my examination committee.

And last but not least, I would like to thank my family and friends for supporting me during this period.

Anke Renkens

Introduction

The final bachelor assignment is carried out at Envent; an Australian company focussing on kiosk design. The assignment was to design an outdoor kiosk and present it with CAD-drawings.

This report will start with a research phase. In this first chapter the company, product and assignment are described. Also, the first researches and observations are carried out and results can be found here.

The next chapter will elaborate on the requirements, which resulted from the previous chapter. The list of requirements and wishes will have great influence on the design.

The third chapter shows the first ideas, which resulted from brainstorming. Five of these were chosen and will be discussed to a more extend. Only two designs make it through and these will be extensively discussed in chapter 4. At the end of this chapter the final design is chosen.

The fifth chapter will point out some factors of influence for this final design. The design gains more details and will be finished here. The next chapter will show the measurements of the design, to demonstrate it fits the ergonomical requirements.

In chapter 7 the design is decribed part by part. All details will be mentioned, as well as how to assembly.

The final design is evaluated in chapter 8, explaining why the design satisfies the requirements and wishes, but also stating some recommendations.

In the ninth chapter there is a designers review, to express certain feelings the designer had regarding the design.

In the end, the report will be concluded with a brief conclusion.

.1 | ENVENT.

Envent is established in 2004 to offer personalized, high quality and affordable kiosk solutions to industry. Envent has since built a range of kiosks that satisfy different functions. Their first design, VSI, was tailored to suit the gaming industry (figure 01). This set the benchmark for future designs: modular kiosks with high quality finishes and use of stainless steel. Envent produces cutting edge solutions which are future proof, use an open ended design philosophy and timeless approach to styling. Envent aims to produce high quality, Australia engineering and aesthetically pleasing kiosks. The end result needs to be extremely visually appealing and cost effective. Envent acts as wholesaler to their clients; therefore, they can offer lower pricing and achieve a greater market penetration. Each kiosk is sold as a franchise.

figure 01 | VSI kiosk

The head office of Envent is located in Enmore, Sydney, Australia. This office includes a small workshop. In this workshop the kiosks are assembled, the parts are ordered in. There are three fulltime employees daily in the office: the managing director, the production manager and an (industrial) designer. A number of employees work part-time and on contract, when their expertise is requested.

Envent covers a wide range of industries by offering both turnkey/bespoke design services as well as end-to-end hardware/software solutions to specific markets. These include PathPoint Software for shopping centres and TouchCheck Software for self service hotels. Envent has many competitors in this market of interactive touch screen kiosk design and manufacturing; these include Abuzz, FMScanuGroup, Sprocket Design, Ordatronics, DISA Design, NeoProducts, and Datatrax in Australia. Figure 02 displays Envent's position in this market. Appendix A shows a collage with products produced by these competitors.

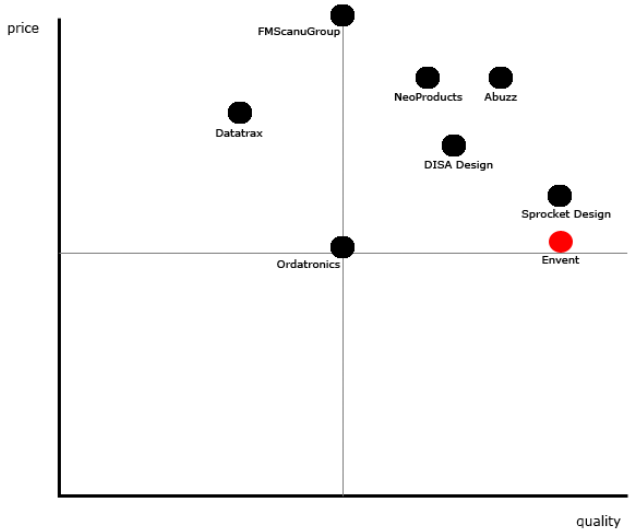


figure 02 | price quality matrix

Envent wants to project innovation, reliability, good design, and value for money. The iconic 'E' logo is a new device that will be seen on all kiosks produced by Envent from now on. Sleek styling

and clever use of ergonomics is also part of this brand identity. Aesthetics and design is the focus. Software development is not the main focus point, and hardware is usually not developed at Envent, but ordered in. Their innovation is found on the inside of the designs, by making them easy to produce, easy to assembly, and modular regarding the hardware that has to fit in. It is not so much about physical innovation (e.g. use of solar panels and other new technologies), because Envent is tied to the budget of their clients. The Envent kiosk range is price competitive and quick to market in order to win market share. Figure 03 displays the current kiosk productions of Envent.

Envent's designs are for all adults (age 18-55) looking for specific information about the environment the kiosk is installed in. This can be way finding, product ordering, store information, etcetera. The kiosks improve usability and are effective in finding information, whenever the user wants, all day long.

Figure 04 (next page) displays Kapferer's brand identity prism for Envent. Here must be noted that the relationship is regarding the clients, who actually buy the kiosk solutions from Envent and the reflection and self-image are regarding the users, who actually use the kiosks. Clients can be users; however, users will not be clients most of the time.

The physical attributes and qualities of Envent are visible in their high-end designs, the use of high quality material, the simplicity of the designs

figure 03 | Envent kiosks

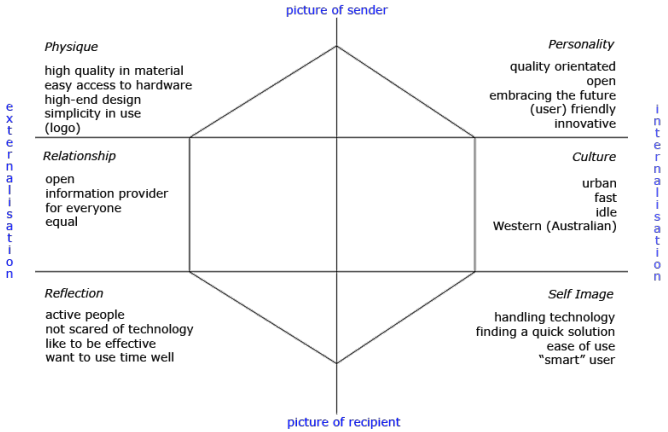


figure 04 | Kapferer identity prism: Envent

in use and the easy access to the hardware incorporated within the design. In addition, Envent will from now on include the company logo on all produced products. Envent's brand personality will show how the brand would act if it were human. Envent is quality orientated, open, embracing the future, (user) friendly and innovative. The culture Envent stems from is a fast culture, or even an idle culture. This culture will mostly be found in urban areas in the Western world. This culture wants information quick and easy, without having to 'waste' much energy in the search. Envent provides a solution. Envent has an open relationship with her clients. They provide information for everyone interested. It is an equal relationship with input and information streams to and from the client. The reflective image of Envent addresses active people, who are not scared of technology. They like to be effective and spend their time well, not losing much time searching for a solution. The self image promoted by Envent adds to this. Envent's kiosks make users feel "smart", because they can handle the technology and can find a quick solution. Users understand how user friendly and easy to use the products of Envent are. [01]

.2 KIOSKS.

Kiosks are a replacement of non-interactive information stands with paperwork (brochures, flyers) and also of persons with an information official task (figure 05). They all serve to provide people with help and information, to ease their experience when they for example go shopping or site-seeing. Interactive kiosks are regarded as cheaper for long-term use, as the electricity and maintenance costs are lower than the salary and paperwork costs, especially when the kiosk operates 24 hours a day, all week. Another important factor is time, because the machine works much faster than a human and in some cases is more accurate too. Many functions can be combined in the soft- and hardware, creating a multifunctional device.

figure 05 | 'old-fashioned' information stands

The first interactive kiosk was developed in 1977 at the University of Illinois by a pre-med student. This computer could find maps, bus schedules, courses and other relevant information for students and visitors on campus. There were waiting lines to try this new machine; around 30.000 users were counted in the first six weeks. In 1991 the first commercial kiosk was presented at a Computer Dealer's Exhibition (COMDEX), with an application to locate missing children. Rapid developments have taken place since. Currently there are many different types of kiosks: telekiosks (used for communication), financial service kiosks (multifunctional ATMs), photo kiosks (print digital

pictures), internet kiosks (public internet access), ticketing kiosks (self-service tickets and check-in), movie ticket kiosks (purchase movie tickets), vending kiosks (dispense certain objects like DVDs), visitor management and security kiosks (visitor check-in at businesses, schools, etcetera), and building directory and way finding kiosks (to find certain offices). [03]

Kiosks gained popularity over 'old-fashioned' directory listings and information stands. Because kiosks can offer multiple functionalities at the same time, they are perceived as more attractive. With different kinds of software the kiosk can for example also promote the surrounding shops and strengthen their relationships with their customers. By only changing the software, the kiosk can already address a completely different target group and purpose. Also, in some cases the kiosks are faster in use and instantly provide the user with the wanted information. So this one device can provide the client and user with multiple benefits at once. In addition, it is much easier to keep the displayed information up to date. This makes interactive kiosks a much better (long-term) solution. Updating paperwork and instructing employees with new information, time after time, is much more expensive. Also, in some cases the footprint (space required for placement) of the kiosk is smaller than the footprint of other options; yet another reason to favour the interactive kiosk. Adding to this, the kiosk is regarded modern and 'of this century', whilst for example information stands are 'old-fashioned'. Clients want to show progress, have a modern image, for these reasons they see the benefits of buying and using a kiosk over directory listings or extra personnel.

There are many different types and designs of kiosks. The earliest custom designs have become generally accepted and many kiosks now look alike, including the designs by Envent. At the moment there is less differentiation, only a few companies have created a different portfolio, for example by using vacuum forming in their production processes. For potential clients, important factors in choosing a certain kiosk, and the company designing and producing this machine, are the functionalities it provides and the aesthetical design. Some companies only work with certain materials, suppliers or have other conditions, which might cause design restrictions. Furthermore, signage is usually important attracting third parties and the accompanying financial benefits, making this possibility a high priority. A last important consideration is the available budget. Kiosks consist of software, hardware and an outer design, and are not cheap to develop. Custom designs will even cost more money, as will low production numbers. The decision for a certain design and design consultancy clearly depends on the requirements, wishes and budget of the client.

At this moment, Envent wants to develop an outdoor kiosk, which is new in their portfolio. There are a few existing custom outdoor kiosks, developed by competitors of Envent. These can not be found in Sydney and are not produced in series. At first glance, an outdoor kiosk design will not show major differences from indoor kiosks. Also, the manner in which the client chooses a design (consultancy) will not be different. However, an outdoor kiosk will provide a number of advantages. These advantages might make it more interesting to invest in them:

- The outdoor kiosks will be waterproof and dustproof (IP 65 rated), so suitable for almost all locations.
- The outdoor kiosks will be suited for 24 hours a day usage, personnel for 24 hours will be more expensive.
- The outdoor kiosks will be suited for unattended use and will be vandalism-proof, making them suitable for almost all locations.

.3 | ASSIGNMENT.

Electronic and mobile commerce are becoming the norm in many industries. Envent wants to be innovative by bringing these new technologies to public domain by the external kiosk application. Informational and transactional possibilities have to be attained by using the kiosk. The kiosk will be installed in public areas (e.g. malls, parks); this means the kiosk should be weatherproof and should also be accessible for tourists. In addition, the kiosk has to be recognizable as an Envent brand product. Modularity is essential to introduce additional functionality.

The objective of this bachelor assignment is to design an external kiosk. This kiosk has to be recognizable as an Envent brand product; therefore, it is important to understand and research Envent as a brand. The kiosk has to be according the standards of Envent and contain the usual hardware (see next paragraph and Appendix B). The kiosk has to contain at least two functions (information output and self service payment) and has to be modular in order to add functionalities. In addition, surroundings and users have to be analysed to incorporate their needs. At the end of 12 weeks, a visual 3D model ready for prototyping should be accomplished. Focus will be on the physical design of a kiosk. Secondary objective is to try to design a wheelchair friendly kiosk, which might result in a less stereotypical kiosk. This could mean an adaptable design in for example height.

The design stage will be preceded by a stage of analysis, in order to form a list of requirements subject to the design. Data from previous designed kiosks might be very helpful in this phase. Empirical research (case studies/surveys) are combined with desk research (already existing information) when analysing the surroundings and target group.

With the results from the stage of analysis, a list of requirements will be created. The design concepts and final design have to comply with this list of requirements. The final design will be detailed and a visual 3D model will be made.

Numerous design concepts will result from brainstorming and ideas will be formed during the research phases. These ideas will not be very detailed, but from these ideas a small number (3-5) will be chosen to be more developed. These concepts will be clearer and will also include more developed thoughts on functionalities and technical aspects (e.g. material, mounting). One of these concepts will be chosen as final design.

The detailed (final) design will include information and/or recommendations about the materials to use, functionalities/units, and if possible within the timeframe, information about the costs and production. The result will be a CAD-model in SolidWorks, in first instance this will be a visual model, if possible as production-ready as possible. This visual model might also be presented to the target group to hear their opinions on it.

.4 | STANDARDS.

The assignment is to design an outdoor kiosk for Envent. This kiosk not only has to comply with the image Envent wants to market, but also needs to reflect the standards Envent works with in order to create quality. Accordingly, the critical success factors are costs, speed to market and quality. Generally, Envent works with a design brief. This brief is discussed with the client and states under which conditions Envent wants to produce the design. For this particular assignment, the designer has the ability to insert own preferences, mainly in the physical design. Envent did provide a design brief (appendix B) that lists their standards; however, this document will act as a guideline. It provides a little more insight in Envent's kiosk design process. Alternations to this design brief are possible.

Envent is an Australian based company; therefore, all their manufacturing, assembly and testing will strictly adhere to Australian Standards. All suppliers and subcontractors are specifically chosen based on their ability to follow these quality procedures and work instructions according to international ISO 9000 series for quality assurance. All final products will be certified with a C-Tick certification and a certificate provided to the client through the Australian Communications and Media Authority (ACMA) is mandatory for any new kiosk design entering the Australian marketplace. The referred Australian Standards are related to design for access and mobility, user access of automatic teller machines (ATMs), and safety of information technology equipment. These documents are studied and relevant requirements, even if not specifically addressed to kiosk design, are listed in appendix C. A number of these requirements must and will be included in the outdoor kiosk design.

It is impossible to ignore human dimensions, especially when designing for a broad audience. All kiosks by Envent comply with the Australian Standards regarding design for access and mobility, meaning all their designs are accessible by standing persons and persons seated in a wheelchair. Especially this last group of users requires a different set of needs, as their dimensions do not match with the mean in any normal curve regarding ergonomics. [02] However, a large deal of accessibility has to do with the actual location where the kiosk will be installed. Clearance, circulation space, clear signage, tactile indicators and other instructions have a high priority, although are not part of this assignment to design an outdoor kiosk.

The simplest function an outdoor kiosk can have is the touch screen input device. Apart from a 'tough touch' touch screen, a 17" monitor, an embedded PC, ventilation, 1 W standard speakers and a sound system are regarded standard hardware as well. A lot of hardware components are optional, much used optional components are a keyboard with trackball, a hybrid card reader, a thermal printer and signage or second monitors for commercial reasons. A lot less used optional hardware components are a camera, a finger scanner, coin or note transaction units, proximity sensors and handsets.

.5 SURROUNDINGS.

The outdoor kiosk will be installed in public, outdoor, areas; for example at street corners near attractions, near parks and beaches, in front of malls or bus/train stations, on university campuses, and so on. Each kiosk can have different software and hardware, which means that their functionality might change depending on the location, differentiating them all. However, the most important feature all these kiosks will provide their users with is information about the surrounding environment. This makes the kiosk a replacement for a person, a traditional non-interactive information stand, a directory listing or a lot of paperwork in the form of maps, flyers, and brochures. Furthermore, users do not have to look up all the information at home before they leave, but will be able to do this right at the spot. In the end, this kiosk will save them time and money.

Because the kiosk will be installed outdoors, the kiosk has to withstand the Australian weather. Australia has different climates; there are times of droughts and rains, there are windy days and tropical days, there is a desert climate and also a maritime or oceanic climate. This results in an IP 65 rating, meaning the kiosk has to be water- and dust proof. Next to this, the design also has to be resistant of high temperatures and sunlight. For 2008, the highest temperature measured in Sydney was a little below 40°C and the amount of sunshine is an average 7,1 hours per day. The South of Australia receives less sunshine and the North of Australia receives even more sunshine hours. The coldest temperatures are measured at night and can drop to a few degrees below zero. [04] This indicates that the kiosk, and the hardware

in it, might warm up or cool down; however, they still have to be able to function in these types of weather.

The design does not only have to withstand the weather, it is also exposed to vandalism, as the areas are public. The kiosks are placed at popular locations, meaning many people of all ages will pass them. During daytime this might even be every single minute. However, this will not only be during day time, but might also be during night time. This will be local people from the same area, but will also be tourists visiting the area for the first time. This will be children, teenagers, adults, elderly persons or persons of all ages with certain handicaps. Also animals might be able to have access to this site. In general, the outdoor kiosk will be installed in areas where there is a fairly high chance of vandalism, especially after business hours. As already mentioned, a lot of people pass the kiosk. All these persons can be in another mood or state of mind, they can be angry, in a hurry, happy, drunk, sad, stressed, in a holiday mood, surprised, annoyed, feeling sick, etcetera. Emotions cause different reactions to the kiosk, someone might not know how to properly use the kiosk, but someone else might try to abuse the kiosk on purpose. In addition, touch screen kiosks also seem to be a nice pass-time for some people. For this reason the kiosk design needs to be as vandalism-proof as possible. When designing, this must be taken into account.

It is also very important that the kiosk will not be an obstruction to either pathway or line of sight. In addition, to be accessible for users in a wheelchair, there needs to be enough circulation space and clearance. It is also important that the slope will not be very steep and the area right in front of the kiosk needs to be flattened, clear and have a slip-resistant finishing for safety. The best location for the kiosk to be installed is thus on an one-levelled, clear, wide pathway or on a small plaza. However, here must be noted that it is not part of this assignment to make decisions about suitable instalment locations. Though, each location can be very different and the kiosk should provide as much support as possible for her users, in all locations. The kiosk can be installed near a park or beach, so subject to small (sand) particles or even drops of water, but the kiosk can also be installed in a very urban area and subject to traffic noises and fumes or dirt disposal by pedestrians. The kiosk design must be able to withstand all of this, as it should not be harmed by the environment and visa versa. This has to be taken into account when designing.

In addition, each venue is different. There might be a lot of light, so (extra) illumination is not necessary. But will there also be enough light at night time? If this is not the case, light should be added to the design; however too much light at night might make users feel very unsafe. Exactly the same is true for noise levels and the volume of sound produced by the kiosk. This too has to be taken into account when designing.

For the kiosk to work there needs to be a power and network supply. This either has to come from below, like in lamp posts, or channelled from a nearby supply, for example from inside a building. Local councils have to approve of the kiosk installation, in order to obtain permission for this power supply. To make this installation more attractive to councils, the kiosks will have the opportunity for placement of advertising by a third party. The kiosk software will be updated through local networks and wireless connectivity. This will be provided in the same way as the power will be provided.

.6 KIOSK OBSERVATION.

By observing current kiosk solutions in their environments and by interviewing a number of users and 'watchers' of these specific kiosks (appendix D), more information is gathered. Although these kiosks might not have exactly the

same functionalities as an outdoor kiosk, this is worthy information about the perception of the kiosk by the surrounding environment.

The first two kiosks were observed in shopping centres, their main function is that of the directory listing. The most striking result was that the kiosk does not get noticed at all, employees from surrounding facilities are answering questions all day, while the kiosk would be able to do the same. Here, the surroundings would like to see a more noticeable kiosk, to make the kiosk and its use clearer to the audience. Whenever there is a handset with the kiosk, the given response is that the phone is used a lot; however, a lot of calls get hanged up upon. This might show that the kiosk is vulnerable for vandalism, as this indicates people use the kiosk for 'random fun' as well.

The third kiosk is also observed in a shopping centre; however, the installed software was very different. This showed that whenever there is 'interesting software', in this case the user could collect membership points by using the kiosk and win prizes, the kiosk also gets more used. This indicates that specific software might encourage people to use the kiosk and is therefore of importance. Also, this particular kiosk did look like it was much used; a dirty screen, dusty corners and sticky left-overs on the metalwork. Kiosks should be easy to clean, in order to support the clients to keep their kiosk clean and attractive.

The fourth observed kiosk also demonstrates the importance of (specific) software. This is a straight-forward kiosk, only printing numbered tickets; the user collects a ticket, waits until the printed number is called out and goes to the respective desk. This is a very effective and time saving use of the kiosk.

The fifth kiosk had again another function, which might be less similar to functionalities of an outdoor kiosk. The observed group of kiosks serve as a digital check-in counter; the users swipe their driver's license at a specially designed unit and confirm their identity by also signing with their autographs using the stylus and touch screen, in order to enter the area. Because this particular kiosk differs very much from the imagined functionalities of the outdoor kiosk, which should be accessible for all, this was a very brief observation.

The last observed kiosk is also quite different from an outdoor kiosk: a DVD renting kiosk. In this particular DVD store the kiosks are much used. In some franchises the kiosks even replaced all human staff members. The users like to use the machines and find it extremely easy to use them. It saves time and money and provides customers from the DVD store with more advantages (e.g. more privacy, all day and night access) and therefore benefits the store with more profit. Furthermore, the users and clients compliment the ease of use of the kiosk. All (web-based) contents can be updated from one central computer, so the kiosk owner does really control the contents.

Overall, these are the recommendations retrieved during the observations:

> It must be clear the kiosk is there and for what use
> Kiosk (and software) must be easy to use and easy to explain to new users (self-explanatory)
> It must be easy to update and control the software
> The kiosk must not be easily vandalised
> It must be easy to solve minor problems (e.g. to restart the kiosk if necessary)
> Users (and clients) need to know where to turn in case the kiosk does not work correctly
> Kiosks have to fit the purpose and surroundings, stand out but fit in as well
> The kiosk must not block the passageways or hinder pedestrian access
> The kiosk must not block or obstruct the line of sight to the surroundings (e.g. traffic, shops)

> Maybe the kiosk can be integrated with other street furniture

.7 USER OBSERVATION.

The kiosk does not restrict anyone from using its functionalities, although it is not designed to cater everyone. Especially (young) children, users with certain handicaps (e.g. visually impaired) and elderly might be excluded from the targeted user group; however, this does not mean they do not attempt to use the kiosk.

Again, observation and interviewing (appendix D) have provided many answers about the user perspective. The observed kiosks are not exactly the same as an outdoor kiosk, but as a number of them are also located in public areas, they come relatively close to it. At the moment there unfortunately are no outdoor kiosks which can be observed.

From the observation is learned that indeed many different people, from different cultures, social layers, ages, and so on, (try to) use the kiosk. Some will use the kiosk for fun, some will use the actual functionalities the kiosk provides, and others seem a little afraid to use the kiosk technology at all. Here must be noticed that most persons that seriously attempt to use the kiosk are from within the target group of adults from age 18 until age 55. This target group is used to new technologies as such; therefore, have less trouble using this device (figure 06).

figure 06 | Compass kiosk (wayfinder) in use

Very few users had negative comments about the design of the kiosk. In contrast with previous results, almost all persons responded to notice the kiosk right away. This is clearly because all of them where already looking for some way of support, when entering the surroundings of the machine. Most complaints were about the software, which is not included in this assignment. It seems that as long as the users can find what they are looking for, they do not really care about the physical design of the kiosk. They do not expect more than what meets their eye, only if they have seen and used other kiosk designs before. For this same reason, users do have comments on the software, because the specific software is actually why they used the kiosk in the first place (e.g. to locate a certain store or to redeem membership points).

It is obvious that the most used functionality is the touch screen itself. A basic kiosk will not even need additional functionalities. However, other functionalities can add more ease to the user experience. The handset for example is much used to receive assistance. Next to this device, an optional keyboard with trackball might be much easier to use than the touch screen keyboard; however, only few users noticed this. A receipt printer might also come in handy to print the found information or route, although none of the users actually thought of this device. This is probably also because people can not imagine what is possible at all, since technology improves rather fast these days. A couple of other recommendations retrieved from the users regarding the physical appearance:
> Appearance must be clear and clean

> Functionalities must be clear (immediately clear how to use the kiosk)
> The kiosk must be differentiated from the environment (kiosk gets noticed and used)
> Bright colours and rounded edges are regarded more attractive
> Enough light to see functionalities at all times
> Privacy is appreciated in some cases (e.g. privacy screens)
> Adapted to visually and hearing impaired (voice activation and audio response)

.8 MATERIALS AND MANUFACTURING.

Most kiosks are manufactured in stainless steel or aluminium with powder coated enclosures. Few kiosks are designed in very organic forms, using vacuum forming and made out of plastics. As the look and feel of this last material does not fit the image and identity of Envent, this material will not be considered. Because this kiosk will be placed outdoors, the materials from lamp posts are also considered: cast iron and ductile iron.

Stainless steel is a term for corrosion resistant alloy steels containing chromium. All these steels have a high resistance to corrosion, because of the thin film it forms on the surface. This is a self repairing layer when oxygen is present. Low alloyed grades resist corrosion in atmospheric conditions. Highly alloyed grades resist corrosion in most acids, in alkaline solutions, and in chloride bearing environments, high temperatures or pressures will not affect this. It depends on the alloy grade which temperatures it can resist, but maintenance of high strength at very high temperatures is possible. Some stainless steels can be heat treated to create very high strength components. Stainless steel is easily processed; it can be cut, welded, formed, machined and fabricated readily. In addition, many surface finishes are available and cleaning and maintaining is very simple. Stainless steel is durable, low on maintenance, can reduce material thickness, weight and costs. It is often the least expensive choice in a life cycle cost comparison. [05]

Aluminium is also a corrosion resistant metal, due to a thin layer of aluminium oxide forming when exposed to air. It is also strong, lightweight, and long lasting. Pure aluminium has a low tensile strength; however, this strength is increased by alloying elements and tempering. Whereas steel becomes brittle at low temperatures, aluminium retains toughness. Its density is approximately one third of that of steel and it is three times as thermally-conductive. Aluminium is produced from ore or from recycled aluminium, indicating that it is recyclable and environmentally sustainable material. It can be cast, rolled, drawn or extruded. Machinability and plasticity are ideal for cutting, bending, roll forming, hammering, spinning, forging and drawing. It can be bored, milled, and turned, and for joining riveting, welding, soldering and brazing is possible. In addition, many types of finishing are possible: polishing, embossing, sand blasting, wire brushing, anodising, painting, or coating. It has a number of key advantages over steel: a higher strength to weight ratio, greater design flexibility, more durability in harsh environments, and a lower life cycle cost. [06]

The original cast iron, grey cast iron, is an iron alloy with high carbon content, relatively easy and inexpensive to make. It is one of the oldest cast ferrous products and named after its grey fractured surface, which occurs because the graphitic flakes deflect a passing crack and initiate countless new cracks as the material breaks. It has a lower tensile strength and ductility than modern engineered irons. Its brittleness is one of the characteristics, but its resistance to wear, corrosion resistance, hardness, strength, low melting point, good fluidity, castability, resistance to deformation, and modulus of elasticity are characteristics too. The performance of this type of iron in applications involving sliding surfaces is excellent. There is very

little or none shrinkage in grey cast iron. Grey iron has a good machinability, but machining problems as hard edges, reduced tool life, and inability to obtain a smooth surface are encountered. Cracks are easily initiated, and the tensile strength and shock resistance is less than steel. Ductile iron, or also called nodular iron, has mainly the same characteristics; however, is a more flexible and elastic type of iron, due to its nodular graphite inclusions. Both types of iron are mainly used in industrial surroundings. Above characteristics make both types of iron less favourable for this outdoor kiosk design. [07]

Powder coating is a surface finish technique, a type of dry coating. It is usually applied electrostatically and under heat it flows and forms a hard finish. This is usually tougher than a conventional paint layer. Powder coating is generally used for coating of metals, but can now also be applied to other materials, like MDF. There are two types of powder coating, via thermosetting or via thermoplastics. In the latter one, the powder will not react with other chemical groups. When this happens, molecular weight increases and performance properties are improved. The most common way to apply a powder coat is by spraying it on the metal objects with an electrostatic gun. Then the object is heated, causing the powder to melt into an uniform film, which will form a hard coating when cooled. It is also possible to first heat the object and then spray the powder onto this hot object. Powder coating can be removed by abrasive blasting or with specific chemicals, chemicals like thinner and acetone are not effective. [08]

In order to push the costs down, Envent has the following processes available for manufacturing:
- 1.2/2/3/10 mm mild steel laser cutting, folding, punching, and welding
- 10 mm toughened glass water jet cutting
- Aluminium extrusion, design and manufacturing
- Powder coating of all mild steel components
- Electro polishing of parts for anti corrosion properties

.9 STAKEHOLDERS.

Different stakeholders are involved with this outdoor kiosk design. Each stakeholder has interests in the design for different reasons. The stakeholders and their interests are listed in table 01 (next page); the numbers refer to the specific questions from which these stakeholders resulted (appendix E).

For the design of a new kiosk, it is important to understand the relationships between the different stakeholders. The client approaches Envent (designer) to create a new design. The client has a particular view on the to be designed product, as well as the designers, who might have a different view. Priority is to discuss these views and ideas, in order to create one clear view. The designers have to satisfy to the clients wishes, but also have the opportunity to show the client their possibilities. In addition, they have to consult (local) councils to learn about the current legislation in order to process this into the design.

Of course there are many more stakeholders. The sales department, for example, needs to make sure everything will be profitable. They will need to have meetings with suppliers, manufacturers, packaging departments, distributors, installers, recyclers, removal services, and other third parties, who all want to make as much profit as possible. However, all of the above should still add to the design, it is not simply about chosing the cheapest options.

Furthermore, the users and all other people who will be in contact with the design, can not be forgotten. The target group and different groups of personnel are very important, as they need to be comfortable with the design. This group can basically 'make or break' the design. So the designers will also need to talk to them in order to satisfy their needs regarding the product that will be designed.

Stakeholder	Interests	*Question nr.*
Envent/designer	Image, creating future proof design, satisfy client and target market, profit	*1*
Sales	Image, market share, profit	*2*
Suppliers	Profit	*3*
Manufacturer	Effective manufacturing, profit	*4*
Packaging	Best use of material, profit	*5*
Distributor	Effective way of transport, profit	*6*
Installer	Effective way to install, profit	*7, 8*
Local councils	Image, no obstruction, safety	*8, 9, 10*
3rd party	Image, nice design, profit	*11, 18*
Service personnel	Effective maintenance, profit, safety	*12, 17*
Cleaning personnel	Effective cleaning, profit, safety	*13*
Clients	Image, satisfy target market, ease of maintenance, profit	*8, 14, 15, 16*
Target group/users	Effective use, nice design, image, safety	*19*
All people/non-target group	No obstruction, nice design, safety	*20*
Neighbours/non-target group	No obstruction, nice design, safety, environmental friendly	*21*
Removal services	Effective removal, profit	*22*
Recycler	Effective recycling, profit	*23*

table 01 | stakeholders

Also, the non target group can be of importance. As the design is not especially developed for them, it is a public design and should not bother or hinder them in any way.

Concluding, this means that the different stakeholders will all need contact during the design process, to achieve the best result (design) possible. In general, there are two groups:
1. focussed on the design
2. focussed on profit

The first group is about creating the framework; the design needs to satisfy these needs. It is about being creative and exploring this framework. The second group is more about the handling of the design; however, some data needs to be available during the design process. This group cares a bit less about the design (but does influence the design) and more about the profitability.

Another conclusion is that even though there are many stakeholders involved, certain interests have priority above others. For example effectiveness has a high priority, but in different fields (manufacturing, maintenance, etcetera). Profit, image and safety are also of importance, as they are mentioned quite a number of times in table 01. The goal of the final design will be to satisfy as many interests as possible, with a preference for satisfying the above mentioned interests which have a higher priority.

.1 RESEARCH.

The research has provided much information about the preferred design by Envent, the surrounding environment and the target group. This information will be used as input in order to create an overview of the desired requirements. In addition, the opinion of the designer is included in this overview as well. The design will have to comply with this overview. This list should provide some clearity about the design freedom in this project.

.2 OBSERVATIONS.

There are a few test objectives that have resulted from the observations in the research phase of this assignment. Unfortunately, some of these objectives can only be tested with a prototype and in a test setting, nevertheless they will be mentioned here as they might have a slight effect on the actual requirements. The objectives that can be tested are included in the next paragraph.

> Be accessible/approachable
- People must not be hesitant to touch and use the kiosk
- People must not stare at it for longer than 90 seconds before usage

> Easy to use
- Users must understand how to use the kiosk without any help
- Users must understand how to use the kiosk functionalities within 90 seconds

> Safe to use
- Users must not get harmed during and/or due to their use of the kiosk
- Users must not experience pain during/ due to their use of the kiosk
- Epilepsy and other seizures must not be triggered by the use of the kiosk

> Be recognisable
- 50% of the passing people must notice the kiosk in the surroundings

In addition, the actual software design is not included in this assignment, so these functionalities will also not be tested within the scope of this assignment. This information also resulted from the observations and will only be mentioned here to present a complete view on the considered design requirements.

> Display information
- The touch screen must display information at all times
- Must display a 'start' or 'standby' screen or the requested information

> Provide search function to find information
- The search function must be clearly displayed every 10 seconds
- Exception when there is a 'standby'-mode including proximity sensor

.3 REQUIREMENTS.

The requirements that are testable will be mentioned here. They are categorised and again their function is to find the freedom and restrictions the designer has to work with.

Requirement 1: standard hardware
The following components should fit in the design. The supplier of each component is mentioned too.
- Contain 17" Zytronic touch screen (AUO)
  340 x 414 x 6 mm
  JEA technologies
- Contain 17" LCD panel
  354 x 415 x 60 mm
  JEA technologies
- Contain PC (ECN - 171BSEC - R13/PM16G/ 512MB)
  2150 x 1260 x 620 mm
  Soanar Electronic Component Solutions

- Contain speakers (1 Watt)
  430 x 310 x 150 mm
  Jaycar
- Contain ventilation (2 x 60 mm fans)
  600 x 600 x 250 mm
  Jaycar
- Contain sound system (amplifier 1.5 Watt)
  870 x 1070 x 350 mm
  Group 3 Enterprise
- Contain card reader (Hybrid Manual Insert)
  760 x 1080 x 118 mm
  Magtek
- Contain 42" LCD screen for advertising
  1087 x 608 x 127 mm
  JEA technologies
- Contain power supplies
  1250 x 620 x 350 mm
  1010 x 980 x 340 mm
  supplier unknown
- Contain 24V refrigeration unit
  dimensions and supplier are unknown

Requirement 2: other components
There will be a few other components involved, which are not already specified on the previous list of components.
- Make use of wireless connectivity
- Site provides outlets for power and data as requested
- Contain 210 x 300 mm 'desk' or printer

Requirement 3: modularity
With modularity is meant that the components are separately removable/exchangable and that there is room for possible expansion with more components.
- Be modular in software
- Be modular in hardware
- Hardware-area must have a modular design
- Room for different hardware combinations
- Clear design on the inside of hardware-area

Requirement 4: aesthetical appeal and user friendliness/experience
What should the design look like and how should users feel when they are using the kiosk, what is the frame within which the design needs to fit. Results from the observations are used as well.
- Total design must be a stylish design
- Total design must be a simple design
- Total design must be a clean design
- Total design must be future proof
- Functionalities must be close to each other
- Must provide a small workplace to put notes, drinks, etcetera
- Users must feel comfortable when using the design
- Users must feel safe when using the design
- Must have optimal angle of display for view ability
- Provide privacy (e.g. screens, clear 'waiting area', body blocks the display)
- Must have contrasting colours to be visual
- Must provide lighting (>160 lx) to clearly see application(s)

Requirement 5: laws and regulations
There are some laws and standards which will influence the design.
- Be according to Australian Standards for Access and Mobility (appendix B)
- Be according to Australian Standards for ATMs (appendix B)
- All components must have C-tick and/or be CE rated
- Components according to the standards regarding electronics

Requirement 6: safety
The design should be as safe as possible.
- All components must be earthed
- All components must be securely fastened
- All components must test positive under full loads tests
- No sharp edges

- All service areas must be locked away
- Contain clear marking on the inside design
- Contain neat wiring
- Total design must weight 200 kg or less

Requirement 7: surroundings and environment
The design should fit but stand out in the surroundings and the environment should not get harmed.
- Have an easy adjustable aesthetic design
- Must have clear signage on the design
- No sharp edges
- Leaves no waste
- Must contain waste bin to collect waste in case of an installed printer
- Does not harm or destroy surrounding environment
- Contain no harmful substances (e.g. chemicals)

Requirement 8: materials
The materials have to have certain properties and need to withstand certain situations.
- Be water proof
- Be dust proof
- Must be IP 65 rated
- Must be non-corrosive
- Consist of durable material
- Resist high temperatures (60°)
- Contain cooling system
- Must have hard wearing finishes
- Must have high quality finishes

Requirement 9: maintenance and vandalism
The design should be easy to maintain and should not be an easy target for vandalism.
- Consist of durable material
- Must be cleanable by normal detergents
- Consists of a minimum of (small) angles
- All components must be tested under full loads
- Contain 'tough touch' touch screen
- All access doors must be lockable
- All hardware must be locked away
- Must have hard wearing finishes

Requirement 10: Envent
The kiosk should fit in with the current line, style and price range Envent is carrying.
- Must fit Envent brand identity
- Must be cost effective
- Must be quick to market
- Maximum cost of AU$ 25.000,-- (including all optional hardware)

Requirement 11: construction, instalment, maintenance, and recycling
The elements that are important regarding the processes before and after actual usage of the kiosk.
- Use of standardised Envent components and suppliers
- Use of regular techniques used by Envent
- One kiosk must be assembled within 16 hours
- One kiosk must be installable on site within 8 hours
- Kiosks must be stackable for transportation
- Hardware-areas must be easily opened by service personnel
- Service personnel must be able to open the hardware-areas with a key
- Hardware-areas must be opened with one hand
- Contain clear design inside the hardware-areas
- All hardware must be removable
- Withstand daily service access
- One kiosk must be removable within 8 hours
- 50% of the material of one kiosk must be recyclable

Requirement 12: lifecycle
The design has to depreciate over multiple years.
- Have a lifecycle of 5 years with 24h usage

The requirements provide little freedom, as a lot of equipment is compulsory and also ergonomical features are established by the law. It will be a challenge working with this; however, design-wise this will be very interesting.

.4 WISHES.

There also are a few wishes, if there is time left within this assignment, the designer can take a look at these wishes and try to incorporate them into the design.

Wish 1: hardware
Additional hardware to provide the user with extra functions.
- Contain printer (VKP80II 80mm thermal)
  140 x 208 x 152 mm
  POS POS

Wish 2: user friendly
Create a more user friendly experience and provide more functions for a broader target group (e.g. visually disabled).
- Have voice activation
- Have audio output
- Contain induction loop
- Contain separate keyboard with trackball
- Have materials of constant temperature
- Have soft materials

Wish 3: energy/environment
Be more environmental friendly.
- Use of proximity sensor to cut energy usage

Wish 4: audience
Be attractive to a bigger audience and thus creating a bigger group of users.
- Add appealing features for the non target group
- Create a broader target group

Wish 5: innovation
Using innovations to stand out and to increase the market share.
- Use of new technologies
- Create more functionality

Wish 6: response of functionalities
Improving the functionalities.
- Faster in use than old-fashioned solutions
  (directory listing)

Most wishes are focused on making the design more accessible and approachable for different target groups. Because the initial design should already attract a large target group, attracting a broader target group will really be a wish.

With all the gathered information it is possible to come up with numerous designs for an outdoor interactive kiosk. In appendix F some of these ideas are displayed. The sketches resulted from brainstorm sessions by the designer. All of these are small and non-detailed sketches. Some of these ideas might be unrealistic and might not comply with the list of requirements formulated in the previous chapter. However, it is important to capture as many ideas as possible, and for this reason all ideas are sketched.

From these 44 ideas, 5 are chosen by Envent and the designer. Shape and looks were an important factor in choosing these 5 designs. In addition, a little attention was paid to manufacturability. These designs will be briefly discussed.

DESIGN 1 (figure 07) & DESIGN 2 (figure 08)
As these two designs are almost alike, they will be discussed together. The shape is based on a T-form. Currently, there are some old fashioned directory listings with this shape as well; they seem to function very well. In this way it is also possible to even incorporate more touch screens or more advertisement. The difference is created by the clearance underneath the kiosk element. For wheelchair users this clearance can be of importance. This makes design 2 more favourable over design 1.

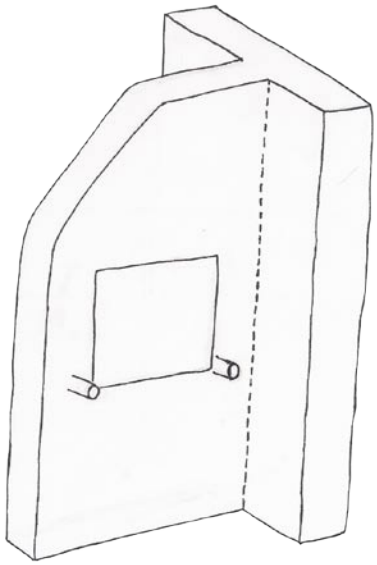


figure 07 | design 1

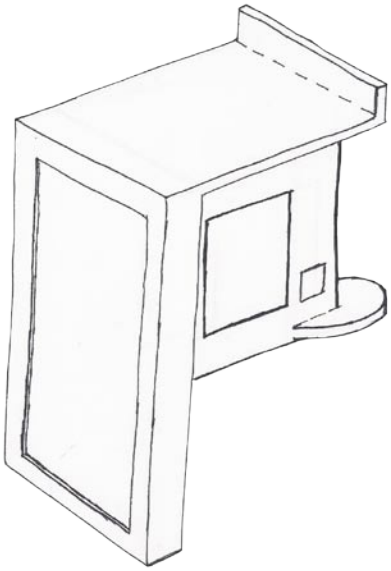


figure 08 | design 2

DESIGN 3 (figure 09)

This design is based on a picture taken in the middle of the Central Business District (CBD) of Sydney. Suddenly, there were nicely designed seats placed in the streets. This resulted in the idea of combining street furniture with the kiosk. Unfortunately, this results in less room for advertisement, while advertisement is important for the placement approval. In addition, the footprint of the kiosk gets a lot bigger when adding a furniture-element, this might be unwanted.

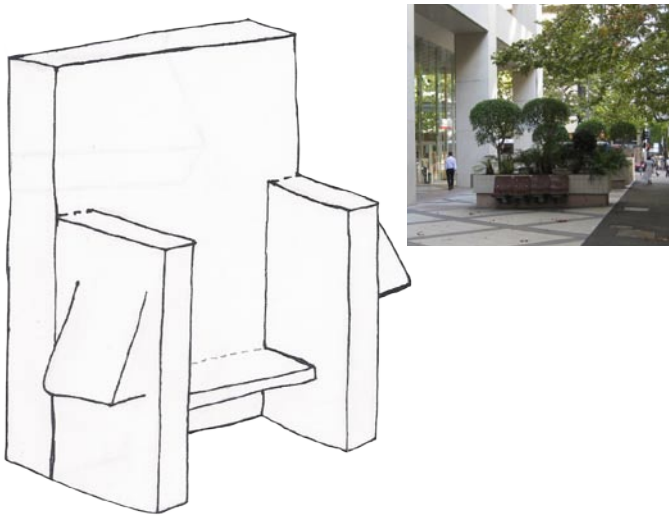


figure 09 | design 3 and inspiration

DESIGN 4 (figure 10) & 5 (figure 11)

Design 4 and 5 also look alike, so will be discussed together. Both designs are based on a bus stop and have a roof. This might be very useful when it is raining. This also creates more space for touch screens and advertising. However, this also means a larger construction and possibly more obstruction (sight is blocked). In design 4, one of the walls is not 'complete'; this might be dangerous, especially for children running and playing around in the streets. If they do not notice the 'hanging' kiosk-part of the construction, they might hurt themselves. Adding to this is the fact that the kiosk should be accessible for wheelchair users. This means there has to be enough room in front of the kiosk between the two 'walls' for a wheelchair user to comfortably turn around, resulting in an even larger overall construction.

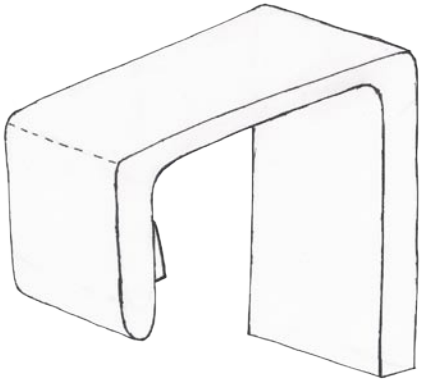


figure 10 | design 4

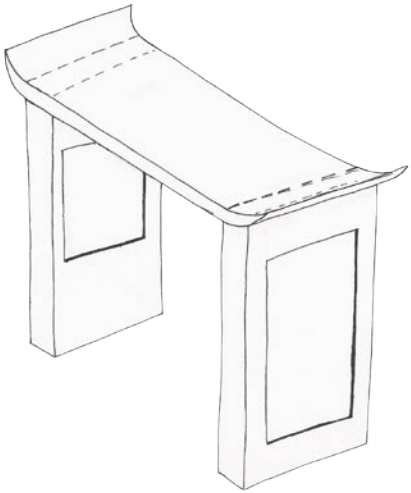


figure 11 | design 5

Appendix G provides some additional sketches of each of these 5 ideas.

Envent shows a preference for designs 1 & 2 and 4 & 5. The first two designs (1 & 2) are preferred because of their adaptability, many optional design and hardware features can be added. Though, they would like to see a roof incorporated in the design,

in order to keep the kiosk and hardware protected and to provide a shelter from the weather to the users. The other two designs (4 & 5) are preferred because of the roof and the familiar shape they have. There are also many possibilities for large screen advertisement, which might make the instalment approval process easier. Design 3 is not preferred, because the focus in this design seems to be less on the kiosk and more on the street furniture. Envent's purpose is to focus on the interactive outdoor kiosk functionalities.

The designer prefers design 2. This design is most accessible by all possible users (within the target group). Furthermore, this design shows many possibilities for additional advertisement, touch screens and other optional hardware components. Also very important is the size of this kiosk, this design will less likely block lines of sights or obstruct views, which is considered an advantage over design 4 and 5.

For the above reasons, design 3 is not further developed. Design 1 & 2 will from now on be named design A and design 4 & 5 will from now on be called design B.

As stated in the second chapter, there is not that much freedom in designing. Looking at the requirements, the ergonomical features became the starting point. This means that the touch screen should be placed at an appropriate height and from there the design will evolve. As the location of the displays becomes clearer, the location of the hardware becomes clearer too. It is convenient if the hardware is quite close to the screens, as they have to be connected. With this in mind, design A and B are redesigned with more attention to details.

First of all, different (top view) configurations of the two concept designs are made. These can be found in appendix H, together with some more detailed sketches of these configurations. Figure 12 displays a general impression of design A and figure 13 displays a general impression of design B. Both designs consist of a roof, as this was requested by Envent. There is room for at least one touch screen and one advertisement screen. Design A also contains a desk, while design B does not. The footprint of design B is bigger, as it has two posts. This also creates a semi-closed surrounding, while design A is open. At this moment design A has more rounded edges and design B has more sharp edges. The rounded edges will make manufacturing more difficult, but will also make the design appeal more friendly.

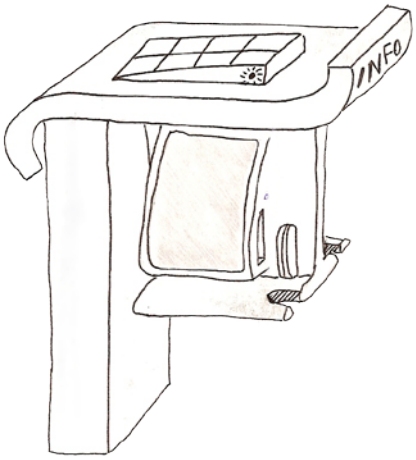


figure 12 | design A

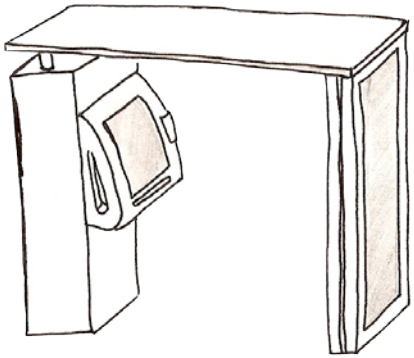


figure 13 | design B

Design A and B differ in multiple features; however, at the first glance they are both in respect to the stakeholders' priorities: effectiveness, profit and safety. In addition, they fit the requirements, though not equally. For example, the footprint of design B will be bigger than design A's footprint (figure 14, next page). A smaller footprint is preferred, but has design A more advantages? Design B will provide more shelter to the user, because of larger roofing. But design A can easily contain a desk, without intruding on the available space. Both provide enough room for expansion and advertisement, and both designs have familiar shapes. On the other hand, design B's construction in larger, will this be a disadvantage? Because of the two pillars, design B might also be a more stable construction and might also be more vandalism-proof. But the larger construction will also cause

more obstruction of sights, although this also depends on placement.

Appendix I shows the advantages and disadvantages of these designs regarding the list of requirements. Not all requirements can be precisely answered at this stage in the design process, in these cases it will be stated whether this will probably be possible to achieve or not. Table 02 (also next pages) shows the requirements in which design A and B particularly differ.

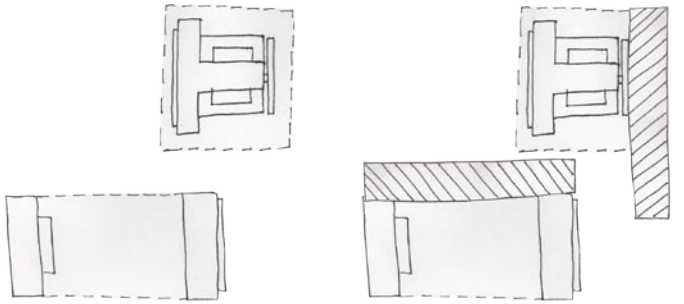


figure 14 | footprint

Req.	**Complies, because:**	**Preferred design**
2 other components	Both designs will be able to satisfy this need. However, first ideas of design B do not include a desk. Design B does have a slight disadvantage, because a desk might make the enclosure even smaller, which could form a problem with wheelchair clearance. The desk will have to be 210 x 300 mm and the preferred wheelchair clearance is 1704 mm. Depending on the exact position of the desk, this can lead to a width of almost 2000 mm between the two posts. This will result in a very large construction, while design A has infinite wheelchair clearance as it is initially not surrounded by walls.	A
4 aesthetical appeal and user friendliness / experience	It is very difficult to express how the design will be received by the audience. It is also not yet possible to suggest whether users would feel comfortable or safe using the design. Both designs will in a way fulfil having privacy, the user's body will block part of the kiosk and the construction is not open at all four sides. The design can also be placed in such way to create even more privacy. Because design B is a more enclosed design (users have to 'step inside') it might possibly easier satisfy privacy needs. Or at least the user might feel like having more privacy. It is very much preferred to satisfy this requirement, because this would improve either design. Design B is slightly preferred because it might provide more privacy.	B

table 02 | advantages and disadvantages of design A and B

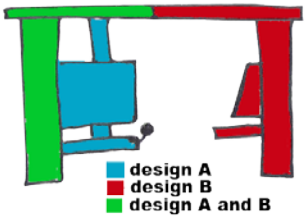
Req.	Complies, because:	Preferred design
5 laws and regulation	There is no way in escaping the law. Both designs will comply with these requirements. If they do not, the designs need to be adjusted. However, because design B is a more enclosed kiosk, wheelchair clearance might become a problem easier. To make a 180° turn, at least 174 cm space is required. Design A will more easily have this free space, so will less likely need adjustments. For this reason design A might be able to more easily satisfy this requirement.	A
6 safety	Safety is very important; therefore all requirements regarding safety will have to be met. However, it is possible to indicate that design A might be lighter in weight. Although design B 'consists' of more 'air' and open space, the overall construction of this design is larger and therefore probably heavier than the construction of design A. Design B might be about 1,5x heavier than design A.  	A
7 surroundings and environment	Because the location of the designs might change, it is difficult to say which design will fit the best. Both designs will be able to change in their aesthetic design. It might however be an advantage that design A is a less large construction than design B, resulting in a less obstructive design and therefore more fitting the possible locations. On the contrary, as design B is a larger construction it might be better recognised from greater distances and in open areas, which can be an advantage too. Design A will again be able to blend in high-traffic areas easier. Both designs will not form any or will form as less as possible danger to the environment by not leaving waste, not consisting of harmful substances and by not hurting users or other people (or animals) in the environment. Design A has a slight preference, because it is more important that the design does not provide obstruction than whether it is recognisable from far away distances.	A

table 02 (continued) | advantages and disadvantages of design A and B

Req.	Complies, because:	Preferred design
10 Envent	It is difficult to say whether the designs completely fit the existing Envent brand. However, both designs are chosen by Envent. This does not immediately mean that the designs fit the brand, but as Envent is in charge of their own brand identity this indicates the requirement is satisfied by both designs. However, at the moment Envent's kiosks look more like design A than design B. They consist of one pillar, unlike design B, which consists of two pillars. At this moment it is very difficult to exactly calculate the costs. It can be indicated that design B will be more expensive as it is a larger construction and therefore might use more material and might also take more work hours to assembly/ install (hardware components are alike in both designs).	A
11 construction, instalment, maintenance, and recycling	Both designs will be designed in order to be as easy as possible in assembly, construction, and instalment. However, because design A is a smaller overall construction, this design will possibly be easier and faster constructed. Another advantage might be that the whole of design A can be transported to the instalment site, while design B might be transported in pieces and must be build up at the site. Design A might also be transported in pieces, but design B can not be transported in one piece, this takes up too much unnecessary space (a lot of air will be packed). Design B might also be heavier as it consists of more components. At this stage it is not possible to make a distinction between the designs regarding the stated time requirements. In both designs the hardware will be located inside the design, within a lockable area. These areas will be easily accessible and neatly designed. Both designs must comply with this requirement; it is very much preferred to satisfy this requirement. In both designs it will be made possible to easily access these service areas. Design A has a slight preference because of its smaller appearance.	A

table 02 (continued) | advantages and disadvantages of design A and B

There could be a lot of small differences between design A and design B. Generally, both designs could be well adapted to the requirements. Table 02 shows a slight preference for design A. Fortunately, Envent and the designer agree on this. They also have a more feeling with this design. The design comes across more friendlier and will have a number of advantages.

.1 ERGONOMICS.

The Australian Standards regarding Access and Mobility and Automatic Teller Machines (Appendix C) and the book 'Human Dimensions & Interior Space' have provided more insight regarding the ergonomics of the outdoor kiosk design. Ergonomics are an important feature in order to improve the user experience and the user comfort. Also, ergonomics help to improve the accessibility, particularly of importance to address a broad target group. In this case the design must also suit the ergonomics of wheelchair users, while also agreeing with the ergonomics of a standing user. With the help of the above named literature, some guidelines could be formulated and will be mentioned here:

Regarding the touch screen:
- Controls that need to be touched should be between 900-1250 mm above floor level
- Operative components should be between 500-1200 mm above floor level
- Collective view is between 1227-1709 mm above floor level from 1830 mm distance to the object
- The user interface should be between 685-1370 mm above floor level

Regarding the (optional) functionalities:
- A public phone, dial, coin slot or head set should not be more than 1219 mm above floor level
- Ticket or coin feed point should be between 800-900 mm above floor level

Regarding the accessibility:
- Operating mechanisms should be operable with one hand and should not require grasping, pinching or twisting of the wrist
- Shelves should at least be 737 mm (measured from the underside lower part of the shelf) above floor level
- Any handrails should be 813-864 mm (measured from the top of the handrail) above floor level
- Grabrails should have an outside diameter between 30-40 mm or a sectional shape within these limits, the exposed edges and corners should have a radius of at least 5 mm, the grabrail and fasteners should withstand 1100 N applied at any position and in any direction, clearance between a grabrail and the adjacent wall surface should be between 50-60 mm, clearance above the top of the grabrail should be at least 600 mm, the grabrails should be fixed so that there is no obstruction along the top 270° of the rail, grabrails should not rotate
- Wheelchair users have a forward reach between 380-1120 mm and a side reach between 230-1350 mm, the zone of common reach with standing persons is 700-1200 mm
- Minimum clearance between the legs or other fixtures beneath a worktop should at least be 800 mm
- A minimum clearance beneath a worktop should be 650 mm at the front side to 230 mm near the back side of the worktop

Regarding the safety:
- Fasteners should be secured as to withstand mechanical stresses occurring in normal use

Regarding the lighting:
- Maintenance illuminance should be at least 160 lx for the message areas, in-built local lighting has to prevent any reflections of light sources or flashed luminaire parts in the display, there should not be any direct glare to the eyes of the users
- There should be an illuminated region in front of the kiosk to enable users to read messages other than the display, maintenance illuminance should be at least 160 lx and provided in a

horizontal plane at the bottom of the installation zone, extending 400 mm from the fascia, best provided by in-built local lighting
- Recommended minimum level of maintenance illumination for a general display is 200-300 lx

In addition, expertise of Envent has indicated that 1000 mm is the favoured height (from floor level) to position the bottom of a touch screen. An angle of 27-30° of the touch screen (formed with a vertical line) is indicated as an ideal viewing angle.

There is one guideline which in advance can not be fulfilled, because there will be too many different users. This guideline is regarding the general rule for optimum viewing. This rule indicates that a sight line from the bottom of the display to the eye of the viewer should form an angle of 30-33° with the standard horizontal line of sight. Figure 15 will demonstrate this guideline. There will be too many different persons with different heights involved in the use of this kiosk, which results in this guideline not being answered; users might have to look up or bend down to create this angle for optimum viewing. Because standing persons usually are more flexible in their movements than persons seated in a wheelchair, it is more likely that they would have to bend down for a better view. Tall persons might have to tilt their head about 30 degrees downwards to create an optimum viewing position, which is a reasonal bend angle.

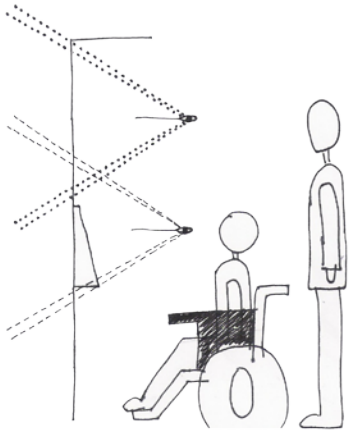


figure 15 | optimum viewing guideline

.2 MATERIALS.

As mentioned before (page 16), there are a number of materials which are suitable for this design. For the outdoor kiosk design stainless steel is the number one choice. It is strong enough, vandalism-proof (scratch resistant, thick material), the look and feel is timeless, simple and clean, many finishings can be applied, it is fairly easy to process and value for money. Envent also has most experience working with stainless steel, which makes this material preferred over the other materials. Aluminium might eventually be used in the design as well; however, more research is requested in order to make this decision. For now all parts will be made from stainless steel. This also means the roof will be made of steel. One of the previous design ideas was to make the roof out of glass. This roof would still protect the kiosk and hardware and provide shelter for the users, and would also let the (sun)light through to create a more open feeling. However, besides being difficult to manufacture, the glass is vulnerable to vandalism and dirt. Especially the dirt (e.g. bird faeces) will effect the overall perception of the kiosk in a negative way. Also, the glass needs protection and support, usually by combining it with materials like steel. This will effect the physique but will also effect the costs. For these reasons stainless steel will also be

used for the roof.

.3 DETAILED DESIGN.

The sketch of the design A (figure 12 and 16) served as a foundation, this sketch and design needed to be detailled and eventually a 3D CAD model had to be constructed. The first step was converting the sketch into a very simple CAD-blockmodel. The design was divided into three parts: the advertisement-post (red), kiosk-part (blue), and the roof (green) (figure 16). In order to be able to reach the hardware of the kiosk, which is located inside, doors will be necessary; therefore, each screen will be located in a door.

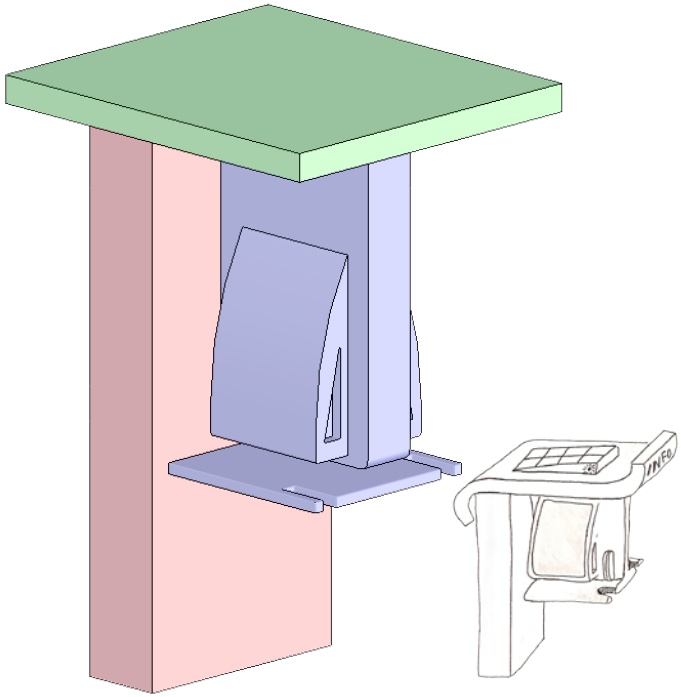


figure 16 | simple blockmodel

The simple blockmodel had to be adapted, in order to satisfy stated ergonomics and with regards to the manufacturing process of stainless steel. Figure 17 will show the definite blockmodel, the differences and details will be discussed on the next pages.

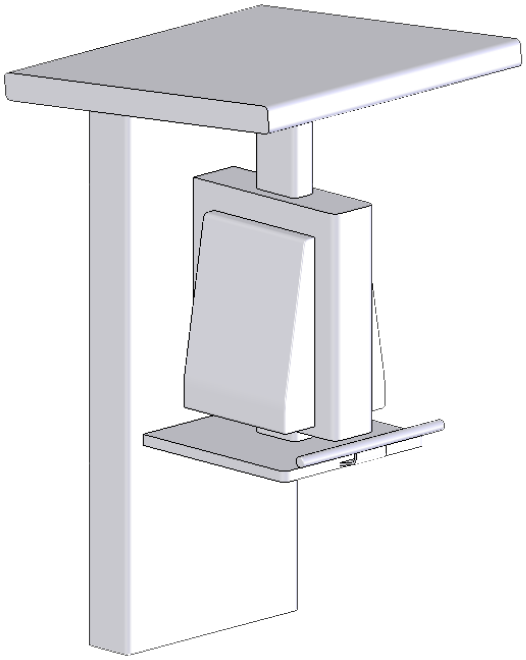


figure 17 | final blockmodel

The main difference is that the final model is slimmer and the edges are rounded. The structure is also a bit more open. These changes are made based on the interviews: roundings and less obstruction are preferred by the users. Unfortunately, the roof could not be rounded as in the sketch ('wave' shape). Due to the choice of material and the manufacturing processes, this would be too difficult and too expensive. At the same time it might cause problems on the back, where the advertisement screen is located. As there will be a door which needs to be opened, in the sketch the roof will block the top of the door.

Another difference in the kiosk part is the door in which the touch screens will be mounted. The screens need to be mounted on a flat surface; however, it is not preferred to loose the rounded shape. This resulted in a slightly different shape, less rounded but manufacturable and less expensive.

The integrated grabrail and handrail also dissappeared. These features can not be manufactured in any type of sheetmetal in a cost-effective way and might not resist the forces. Another factor is that they both do not satisfy the Australian Standards. The new seperate grabrail does fulfill this standard. It is within the stated heights and will resist the forces that will be used on it. It also adds a new interesting feature to the physical design and fits with the roundings.

Next to this, the roof is now placed on a slope. This is to direct rain and other dirt to the back side. This is to keep the water and dirt from falling into the user-area. Also the main frame of the kiosk-part and the desk are placed on a slope (1°), however in the other direction. This is for the same reason, to protect the screens and keep visibility high.

The roof will cast a shadow on the screens and hereby might increase visibility in (day)light, as there will be less reflection from the screens. Because the touch screens are basically blocked from the sun from multiple sides, sun can only reach them via the front or one of the sides. Figure 18 will show when the sun will not effect the visibility. It is not possible to link a time to these positions, as time will be different in winter or summer and even in different parts of Australia. Standing persons might cast a shadow on the screen with their own bodies; however, seated persons can not. A solution for this is placing the kiosk with regards to the orbit of the sun, in order to increase optimum visibility.

Another difference is regarding some decoration. In first instance the door also contained a decorative part, as seen in figure 19. By closing the door a nice figure would be seen on one of the sides of the kiosk. However, this made assemblying very complicated. The decision has been made that in this case the decoration was less important than effective assemblying.

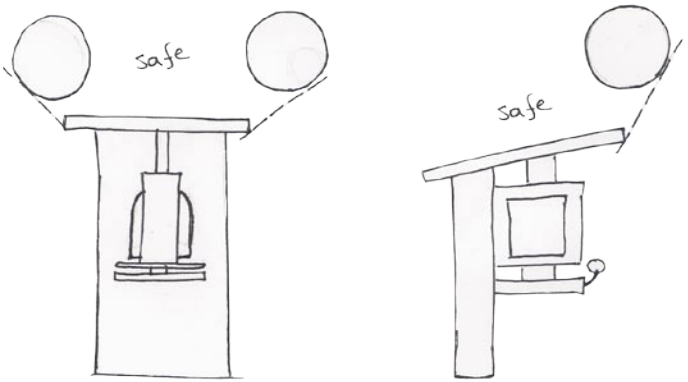


figure 18 | shadow casting

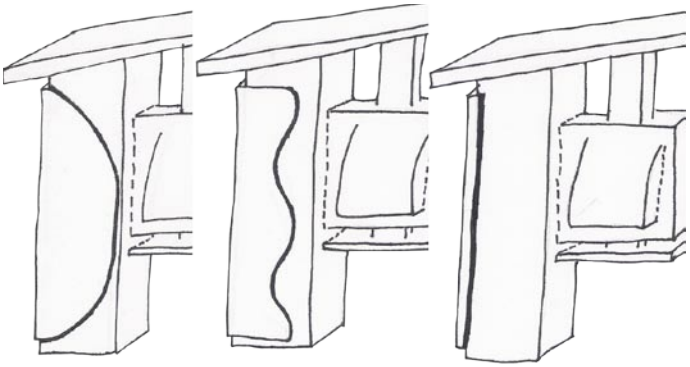


figure 19 | door detail

A last big difference can not be seen in the models, but because of the choice of material, some of the corners are separate and need to be welded on. This will be displayed in the discussion of each part.

.1 MEASUREMENTS.

As mentioned before, the ergonomics of the design are of importance. Figure 20a and figure 20b (next page) will show the final dimensions. Here can be seen that the dimensions fit the Australian Standards

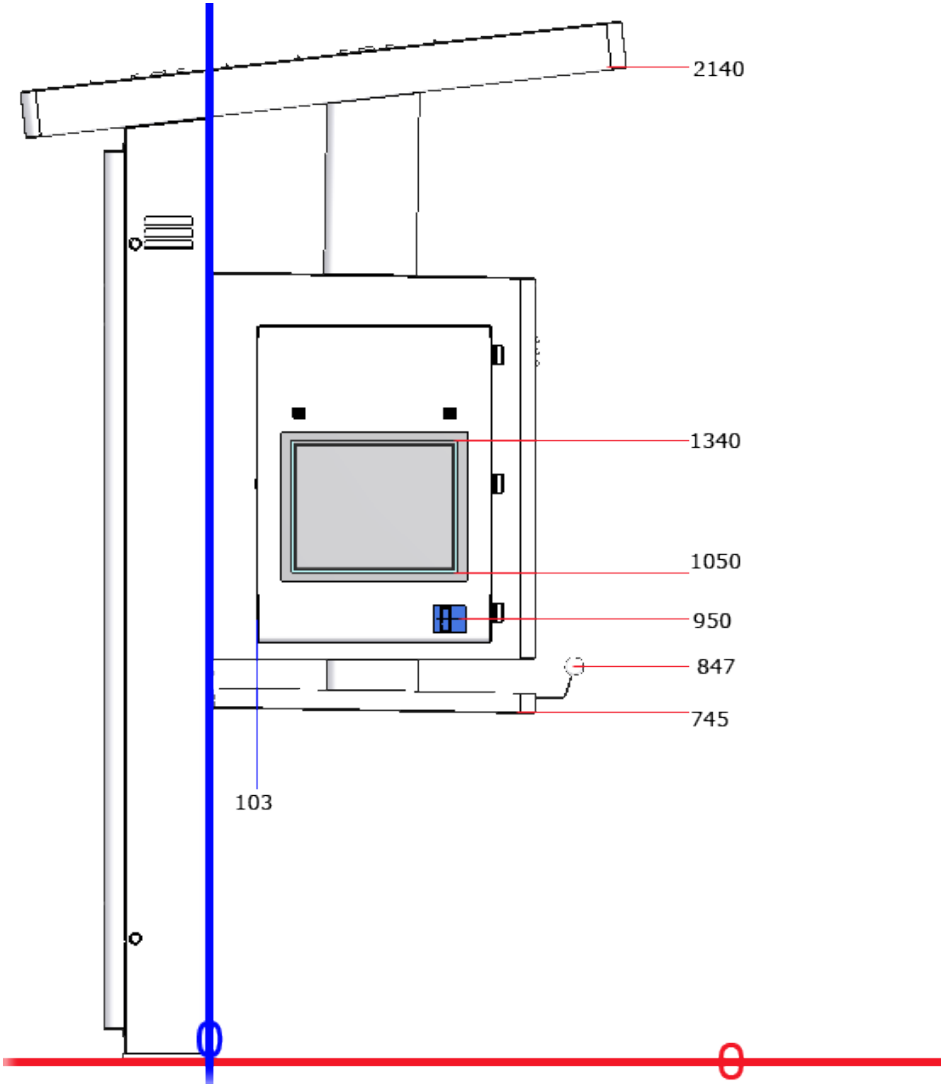


figure 20a | design with measurements

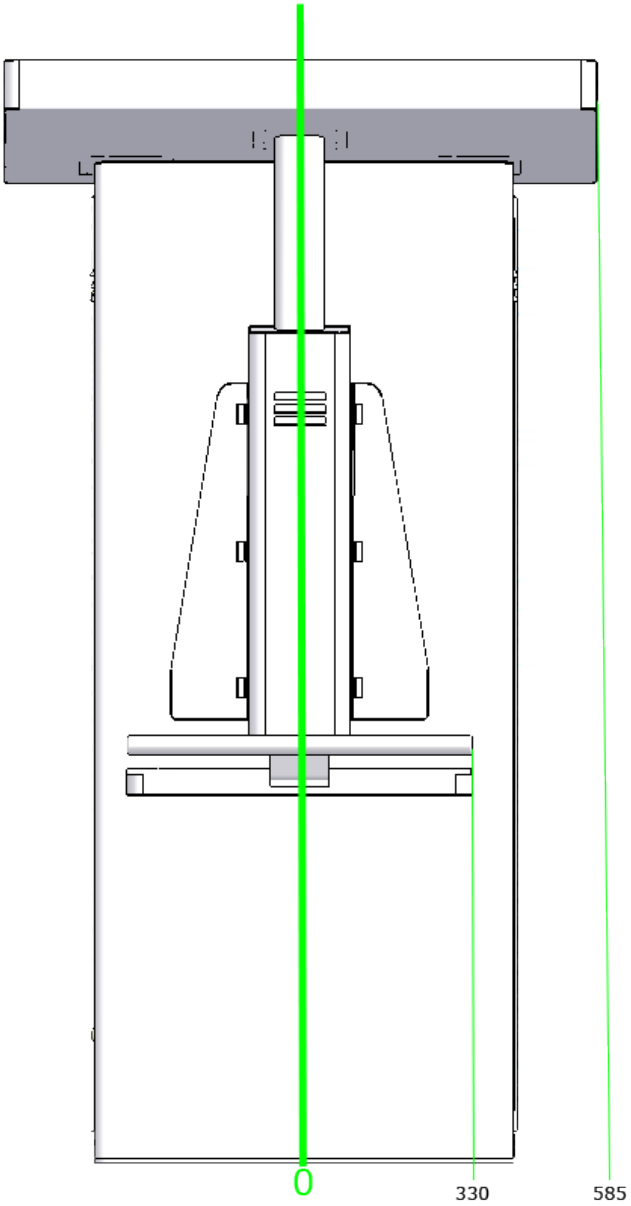


figure 20b | design with measurements

The final design as seen on the previous page exists of standard components and specially designed components. For each part of the kiosk the specially designed components will be described.

.1 ADVERTISEMENT-POST.

The advertisement-post consists of two large parts: the door and the post.

The door is displayed in figure 21 and consists of 4 designed parts, shown on the left.

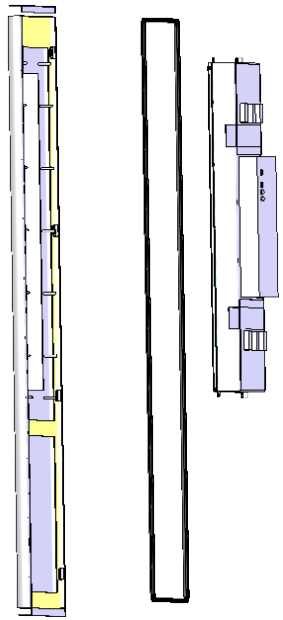


figure 21 | advertisement-post door

The top and bottom need to be welded to the door, and the inner doorpanel (yellow in figure 21) will also be welded into the door. This panel will increase the strength of the door and the hinges will be mounted on this part as well.

On the right side in figure 21 the standard components are displayed. The 42” LCD monitor will be protected by 10.0 mm thick toughened glass; different rubber tapes (1.5 mm and 5.0 mm) will be used to keep them in place. This will be mounted into the door with the use of studs and nuts. This makes the monitor easy to replace. To shut the door properly, a standard rubber sealing will be used. This sealing will perfectly fit on the inside flanges of the door. It will waterproof the door when closed. It will also prevent direct contact of the metal parts of the door and the post.

The post consists of 7 specially design parts, demonstrated in figure 22.

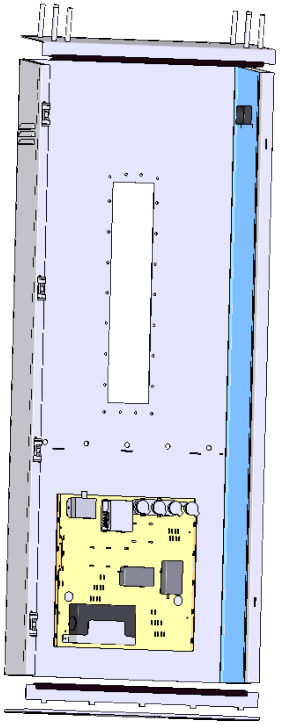


figure 22 | advertisement-post post

Again the top and bottom (three parts in this case) need to be welded to the post. The top plate has studs which will later connect to the roof. The

bottom exists of an extra thickened baseplate, this is why it is made out of two parts. There is standard rubber tape around the top and bottom flanges, to waterproof the door when closed.

Inside the post there are two similar constructions to support waterproofing (blue in figure 22). These plates close of a small area on both sides of the post. If in any case water will go through the louvers, the water can not go into the complete machine, as these plates and deflectors block the inside. Water can only run down on the inside and can only leave through small holes in the baseplate, so it can not harm the internal functions.
These plates have studs to mount the fans on. Just below the holes for the fans, a small deflector plate is welded (on the other side of the plate, can not be seen in figure 22), to prevent spatting water from going in.

These plates are not identical, because one side of the post contains conceiled hinges and the other side contains the locks, resulting in slightly different folds. So each inside plate is particularly made for one side of the post and needs to be welded into the right side.

The hardware plate (yellow in figure 22) is also a standard component and will be mounted to the post (studs and nuts). The hardware will be strapped to this plate with plastic bands. These makes it easy to remove the bands, hardware and the replace or move the hardware combinations.

By connecting the hinges from the door and the post the advertisement-post will be complete. The kiosk will be anchored into the ground, with the use of cement. First power and data connections need to be constructed. In order to get them inside the kiosk, the 10.0 mm baseplate has two holes. The baseplate itself will be mounted to the foundation with the use of studs, nuts and welding.

.2 KIOSK-PART.

The kiosk-part consists of three large parts: the desk, the kiosk, and the doors.

All parts of the desk are specially designed for this design. Figure 23 shows this part.

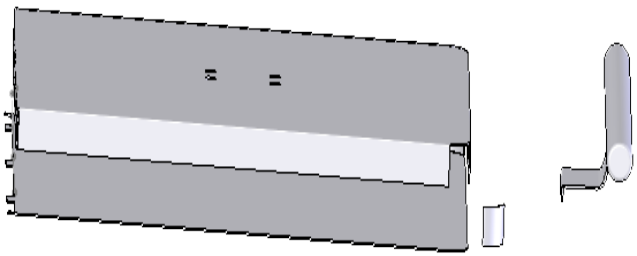


figure 23 | kiosk-part desk

The desk basically only needs to be welded together. the tabs and holes are used for reference with the other parts. The corners need to be seperately welded to the desk even as the grabrail. The grabrail also consist of two parts which are welded together. It is however important to keep in mind that there is a particular order in which the complete kiosk has to be assembled (will be discussed later in this report).

Figure 24 displays the kiosk, which is also designed for this particular design. Large part of this kiosk can be made out of one piece of steel. Again the corners can not, so need to be welded onto this part. The top is also made out of a seperate part. Inside the kiosk is a divider which will be welded to the top plate. Onto this divider two hardware plates (yellow in figure 24) will be mounted. As the divider does not reach to the bottom of the kiosk, a mini keyboard can be stored here, which might come in handy during maintenance. The hardware plates will be the same hardware plates as used in the advertisement-post. The kiosk also has an extra plate and deflector (pink in figure 24) to create a waterproofing area. This is also the same principle as in the advertisement-post, except with different measurements. Again the holes are used for referencing with the other parts. In this case this also means there is room for cables to go through the kiosk into the advertisement-post. There is a rubber sealing around the flanges for accurate closing of the doors and waterproofing.

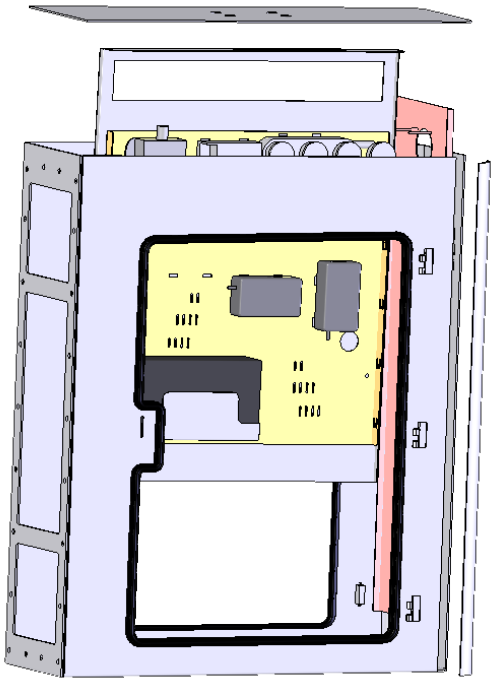


figure 24 | kiosk-part kiosk

The kiosk-part also consists of two doors. Only one will be discussed here, as they are exactly the same but opposite. Figure 25 (next page) shows one of the doors.

The door is specially designed and can be made out of one piece. The speakers will be mounted to a standardised plate which will be mounted to the door (studs and nuts). This also goes for the credit card reader and the touch screen with monitors. Again this 17” monitor is kept in the right place regarding the touch screens by rubber tapes. All

this hardware can be easily replaced. The hinges are click-on hinges, so will be easily connected to the doors.

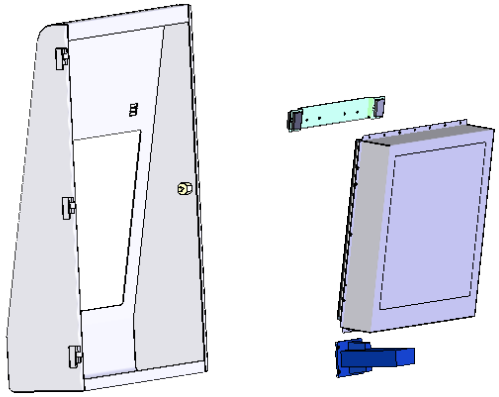


figure 25 | kiosk-part door

By connecting the hinges from the doors and the kiosk, they will fit together. The desk will be connected through a tube. The connecting tube will be bought and a top (with studs) and bottom (with holes) need to be welded onto these. In this way the desk can be connected to the kiosk and later on another connecting tube is used to connect the kiosk to the roof.

.3 ROOF.

The roof is also particularly designed for this kiosk. Figure 26 shows the roof.

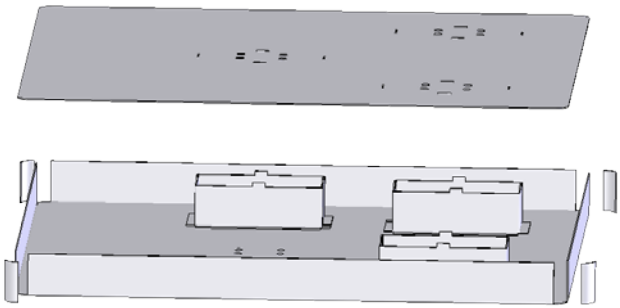


figure 26 | roof

The roof could not be made out of one piece, so all corners need to be welded to it. Inside the roof are support tubes, to increase the strength of the roof. Because of the total weight the roof needs to be hollow. The tabs help placing the top plate, which can then be welded upon the roof. Through the holes in the bottom the roof and the kiosk-part will be connected (studs, nuts, welding).

.4 ASSEMBLY.

Most parts need to be welded and many parts have studs in order to connect parts. The order of mounting is important to build the kiosk. After creating the foundation for the kiosk and supplying the power and data, the order is as follows:

HARDWARE SHELF
1 the bracket to hold the pc has to be attached to the hardware plate with use of welding or very small bolts and nuts
2 use straps or very small bolts and nuts to attach the required hardware to the different hardware plates

PART 1 ADVERTISEMENT-POST - post
1 mount the baseplate to the foundation with bolts and nuts
2 weld the locks and cams into the post
3 weld the hinges into the post
4 weld the deflectors onto the waterproof plates, before welding onto the post
5 weld the top and bottom to the post and glue the rubber sealing
6 weld the complete post (created in steps 2-5) to the baseplate

PART 1 ADVERTISEMENT-POST - door
7 mount the hinges into the inside panel with bolts and nuts
8 weld the inside panel to the door
9 weld bottom and top plates to the door
10 attach the rubber sealing to the door
11 connect the post and door with the hinges

12 use the rubber tapes to stick the glassand part 42” monitor in the right position.
13 mount the monitor (created in step 12), fans and hardware plate with use of studs and nuts to the right places

PART 2 KIOSK-PART
1 click the hinges into the door and kiosk
2 glue the rubber sealing to the kiosk
3 weld the locks and cams into the door
4 use the rubber tapes to stick the touch screen and 17” monitor in the right position
5 mount the monitor (created in step 3) in the door with use of studs and nuts
6 use bolts and nuts to mount the speakers to the speaker plate
7 mount the creditcard reader and the speakerplate (created in step 6) with studs and nuts to the door
8 weld the deflector onto the waterproofing plate
9 mount the fan to the waterproofing plate
10 weld the waterproof plate (create in step 8-9) into the kiosk
11 weld the corners to the kiosk
12 weld the upper connecting tube together
13 connect bottom of this tube with the top plate of the kiosk with the use of studs and nuts
14 weld the divider to this top plate
15 weldthe lower connecting tube together
16 connect the bottom of this tube to the desk with the use of studs and nuts
17 weld the desk’s corners and desk’s bottom plate to the desk
18 weld grabrail together before welding onto the desk
19 connect the complete bottom part (create in step 16-18) onto the kiosk with use of welding, studs and nuts
20 connect the complete the top part (created in step 13-14) onto the kiosk with the use of welding, studs and nuts
21 mount the hardware plates onto the divider with the use of studs and nuts
22 connect the frame and doors with the hinges
23 put the mini keyboard inside the kiosk

CONNECT POST AND KIOSK
1 use the tabs and holes on the kiosk-part to position it correctly regarding the advertisement-post, use welding, bolts and nuts to connect both parts

PART 3 ROOF
1 weld the corners onto the roof
2 with use of the studs and holes weld the roof onto the complete post and kiosk
3 weld the support tubes into the roof
4 weld the top plate onto the roof and support tubes

Not all of this is to be done on the spot. Seperate parts will be delivered to the instalment location. Everything will be put together there. For example the kiosk could come in one part, or in the three described parts (advertisement-post, kiosk-part, roof) or maybe even the advertisement-post door and kiosk desk can be transported separately.

As already mentioned in Chapter 2, not all functionalities or requirements can be thoroughly evaluated, as time did not allow manufacturing of an actual prototype. Also, as the software and hardware is not specifically developed, assumptions had to be made. With this in mind, the design will be evaluated against the previously stated functionalities, requirements and wishes.

.1 REQUIREMENTS.

Requirement 1: standard hardware
All required components will be used; however, at this stage there is no standard refrigeration unit. Refrigeration units are not used before, existing units are far too large to fit this design. If a special refrigeration unit has to be designed, this will raise the costs. There is confidence in finding a suitable 'standard' unit. It is important to find a suitable refrigeration unit to cool down the hardware.

Requirement 2: other components
There is a desk; however, the size might be preceived as smaller, as it is partly underneath the kioskdoors. There are also opportunities to implement a printer, for example in the advertisement-post at the same height as the creditcard reader.

Requirement 3: modularity
Without doubt the software can be replaced. The hardware can also be removed and replaced, as long as the cabling will be long enough to strap the hardware to the hardware shelf. This shelf is an easy design to keep all hardware in a neat position and provide an overview to service personnel. If necessary the shelf can be made smaller or bigger.

Requirement 4: aesthetical appeal and user friendliness/experience
It is very hard to score the design on aesthetical appeal, as this is an opinion. A testpanel is asked, and they find the design appealing. The functionalities are located close to each other and there is a small workplace. In order to add to comfortability, the grabrails should provide more comfort. The advertisement-post helps with providing privacy, as well as the users body will partly block the display. As explained earlier, the optimal angle of display of viewability is related to human factors and might not be optimal for all users. Colour use will be adapted to having enough contrast to be visible. At the moment there is no extra lighting, as the software should be able to provide enough lighting. This also has something to do with placement, which requires more information.

Requirement 5: laws and regulation
All standards are met, except that the creditcard reader is not located between 800-900 mm above the floor level. It had to be located slightly above this, with the feeding point at 950 mm. This could be a problem to a part of the target group, namely the wheelchair bound persons who can not easily reach this high.

Requirement 6: safety
All components will be safely installed according to the safety guidelines. They will also be out of reach for users and only reachable by the (maintenance) personnel.

The exact weight of the design is not available. As some components are fairly heavy and it is completely made of stainless steel, the total weight might will probably be heavier than 200 kg. The density of stainless steel is 7900 kg/m^3. If this is calculated with the needed straightforward, square sheetmetal, this will result in 420 kg steel. Of course, not 100% of these square plates is used, but it is not likely that more than 50% is unused,

as the plates are used as efficiently as possible. In addition, the components will be heavy too, especially the monitors. This means that it is quite possible that this requirement will not be met. A suggestion is to use the much lighter aluminium on the inside structures. However, this might also not solve this problem already.

Requirement 7: surroundings and environment
The design is easily adjustable, because it can be finished in different colours. However, it is not meant to be painted every other week. Signage can be integrated in the paint finishing and applied to almost all surfaces. There is no wastebin, because it first instance there is also no printer. The kiosk will not harm the environment; however, the surroundings need to be suitable for placement and a solid foundation has to be build, which might slightly effect the surroundings.

Requirement 8: materials
The materials will all be suitable for outdoor use in this design.

Requirement 9: maintenance and vandalism
The design is made out of durable material and can be easily cleaned. The design is vandalism proof; however, this could not be tested in real-life surroundings as there is no prototype or test setting. The used materials suggest there will not be a vandalism problem.

Requirement 10: Envent
The design fits the company. It uses the same materials as Envent usually does and has to same look and feel as previous design (a bit angular and a familiar shape).

The design could cost around the maximum costs; however specific client requirements and wishes might change this. The general design will very likely cost around AU$ 25,000. The needed kilos of stainless steel will probably not cost more than AU$ 1,000. However, labour and hardware costs will be very high. Almost all parts need a particular treatment, being very costly. This will add up to around AU$ 25,000.

Requirement 11: construction, instalment, maintenance, and recycling
The kiosk does contain a minimum number of components, namely the components Envent definitely wants in the design. Choices are based on the suppliers and techniques Envent already uses. The hardware can be easily reached and maintained. Experience suggests it will withstand daily use. At the moment it is not clear whether the time-based requirements will be met; however, they are estimated with a marge. It is unlikely if the actual results will be far off.

Requirement 12: lifecycle
This is expected, although could not be tested within the time span of this assignment. However, all hardware can be exchanged and even complete parts can be replaced. This higly increases the lifecycle. Experience suggests that the requirement is met.

.2 WISHES.

Wish 1: hardware
Wish 2: user friendly
Wish 3: energy/environment
Wish 4: audience
Wish 5: innovation
Wish 6: response of functionalities
There is room to incorporate some of the wishes. In first instance none of the wishes are included in the final design and CAD model.

.3 RECOMMENDATIONS.

- It is very important to find a refrigeration unit that will fit the design. This unit will control the inside temperature, which is important for the safety and functioning of the kiosk.
- The kiosk doors are kind of hard to open, as

there is a small space to fit your hand, with the key into the lock. A solution can be opening the doors up, with the use of struts. Hinges will then be located on the top side of the door. This new constructions cost more. Another option is to open the doors to the other side, but in order to open them up to about 90° the complete kiosk frame has to resize. This can be done by adding an extra 30 mm; however, the doors will then not be centered. This does change how the kiosk design is experience. This alternative design can be seen in figure 27.

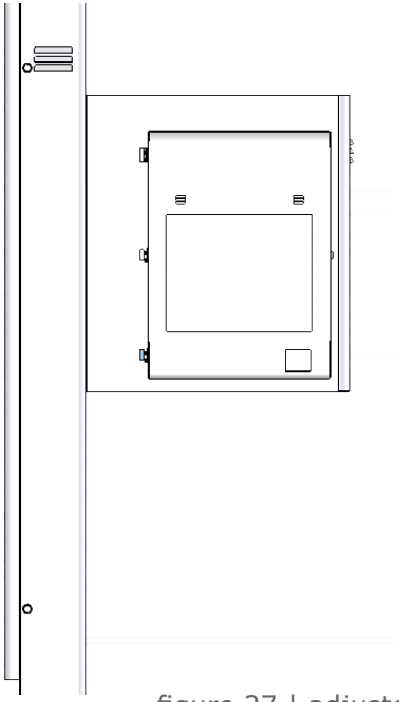


figure 27 | adjusted design

- It would be much saver to use compressed locks, as they will be more waterproof and more vandalism proof. At this point the sealing has to go around the locks, so they are not visible from the outside (advertisement-post especially).
- It would be much easier to manufacture, and thus more cost-effective, if the corners would be less rounded. Due to the large radius, the corners need to be separately welded onto frames. With the available techniques, corners will always have a certain smoothness, so it will not harm humans. In this case the designer was not willing to give up this element, especially as results from the observations suggested rounded corners. It does give another look and feel to the design.
- The use of aluminium for the inside constructions, which are not subject to vandalism as only service personnel will be able to reach them. This will make the total design lighter in weight.
- Solar panels can be easily installed on the roof and their power generation can be of a good use. More research is needed in order to incorporate this. The use of solar panels can have advantages, especially with the Australian weather.
- In order to be sure of the clearance around the kiosk, a seperate 'pedestal' can be designed. This might improve the access by wheelchair users, but will also increase costs and might decrease interest because of the very large footprint.

For multiple reasons the design did not turn out to be as sketched. Concessions had to be made and some of them will be highlighted and discussed from the designers point of view.

A very obvious change is the more static and less dynamic final design. It is a straightforward design, with less curves. The curves gave the design a certain flow, dynamical expression and also gave a more friendlier look and feel to the design. It would make the kiosk more approachable and stand out more in the surroundings. The curved roof especially added to this. Although it is much easier and cheaper to manufacture straightforward shapes, from a designer's viewpoint, more curves should be added to the final design.

A good adaption was opening up the design, adding the connecting tubes. This makes the design more friendly and open to public. Also adding the grabrail to the desk improves the design. More people will be attracted now, as they can use (e.g. lean on, hang their bags to) the grabrail.

In addition, the credit card reader moved places and is now located in a much more logical area, below the touch screen. It used to be located on the side. This makes it use much clearer, safer, and easier to use.

From a design viewpoint this design does fit the company better than for example the design based on a busstop (design B). Design B does not fit Envent's portfolio, as it really is a large construction. Like none of the previous designs, it has two posts and a large roof. This will also lead to more obstruction and might make it more difficult to receive permission to install this particular design. Design A has a much smaller footprint and higher adaptability; therefore, there should be less problems with placing design A on the streets.

The design complies with the Australian Standards, in order to be wheelchair-friendly. This was a big deal to the designer. On the one hand it is easy to design for this group, as there are a lot of rules and regulations which specifically state the measurements. On the other hand, it is difficult to find overlapping measurements, so standing persons could have an optimum viewing and using as well. The designer would like to see an application in the software, to make sure that the seated users will not have to reach all the way to the top of the screen. This can be easily prevented by shifting the complete user interface of the software downwards (or upwards in case of standing persons).

Conclusion

The objective of this assignment was to design an outdoor kiosk for Envent. The kiosk had to be recognizable as 'Envent', had to be according certain standards, had to contain at least two functions with an option to expand, had to be modular in hardware, and had to be wheelchair friendly. A CADmodel, ready for production, had to be the endresult. Figure 28 demonstrates this end result between previous Envent kiosks.

The actual endresult is indeed a CAD model, ready for production. CAD-drawings can be found in appendix J. However, before manufacturing a prototype, the made recommendations have to be thoroughly researched.

The end result is an outdoor kiosk with two main functions: the touch screen providing information and a creditcard reader for payments. It is easy to add functionalities and to maintain and service the kiosk. The kiosk is waterproof and dustproof. The aesthetics fit the Envent brand and are positively received by a testpanel. The kiosk satisfies the legal Australian Standards. In addition, it is a design for standing persons but also a wheelchair-friendly design.

The unique selling points of the design will be modularity of hardware, outdoor use and accessibility.

figure 28 | Envent line

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Reference list

BOOKS AND ARTICLES

[01] Kapferer, Jean-Noel, *The New Strategic Brand Management: Creating and Sustaining Brand Equity Long Term*, Kogan Page Ltd, 2008

[02] Panero, Julius, and Zelnik, Martin, *Human Dimensions & Interior Space: A Source Book of Reference Standards*, Watson-Guptill Publications, 1979

LECTURE NOTES

Gommer, Fennemiek, lecture notes Design Management (A), *Introduction Brand Management*, 2008

Stevens, Jacques, lecture notes Sources of Innovation, *Innovative Technology But… What About Design?*, 2008

INTERNET

[03] *Interactive kiosk – Wikipedia, the free encyclopedia*, retrieved March 2009, http://en.wikipedia.org/wiki/Interactive_kiosk

[04] *The Recent Climate - Summaries and Diagnostics*, retrieved March 2009, http://www.bom.gov.au/climate/current/index.shtml

[05] *ASSDA – Home*, retrieved March 2009, http://www.assda.asn.au/index.php

[06] *Capral Ltd*, retrieved March 2009, http://www.capral.com.au/

[07] *Gray Iron Info*, retrieved March 2009, http://www.ironcasting.org/Gray%20Iron%20-%20A%20Unique%20Material.htm

[07] *Cast iron – Wikipedia, the free encyclopedia*, retrieved March 2009, http://en.wikipedia.org/wiki/Cast_iron

[07] *Ductile iron – Wikipedia, the free encyclopedia*, retrieved March 2009, http://en.wikipedia.org/wiki/Ductile_iron

[08] *Powder coating – Wikipedia, the free encyclopedia*, retrieved March 2009, http://en.wikipedia.org/wiki/Powder_coating

AUSTRALIAN STANDARDS

AS/ACIF S040:2001

AS 1428.1-2001, Design for access and mobility, Part 1: General requirements for access – New building work

AS 1428.2-1992, Design for access and mobility, Part 2: Enhanced and additional requirements – Buildings and facilities

AS/NZS 1428.4:2002, Design for access and mobility, Part 4: Tactile indicators

AS 3769-1990, Automatic teller machines – User access

AS/NZS 60950.1:2003, Information technology equipment - Safety, Part 1: General requirements (IEC 60950-1:2001, MOD)