EXECUTIVE SUMMARY

This report is the result from a 23 week long design project which was done in cooperation with Pellikaan Timing. Pellikaan Timing is a one-man business originating from Utrecht. Company owner Hubert Pellikaan has been creating his own designs for mechanical watches and sells them through multiple retailers spread around the Netherlands since the birth of the company in 2009.

The goal of the project was to design a mechanical watch that provides a new direction for the current product portfolio of Pellikaan Timing. In order to create a competitive advantage and a signature timepiece, the design has an innovation in functionality.

The report illustrates the process of the project and can be divided into four sections. The first section gives an introduction to the mechanical watch industry with an explanation of its raison d’etre, an overview of what makes a mechanical watch and insights into the current market state. Information about Pellikaan Timing is given in this first section as well.

The second section of the report dives into the design process. This section embodies the fuzzy front end. A context mapping session as well as multiple initial ideas for the product are presented. Furthermore, the aesthetics of the watch are explored. The conclusion from this section was to design a modular watch. Through the use of a simple button, the watch owner is be able to easily switch components of the watch to create a new look.

In the third and final section of the report, the results from the first and second section are taken and molded into a final design. The development of the engineering phase is discussed. Additionally, the aesthetics of the design are presented through multiple renders.

The report closes with a marketing and launch plan for the product and company. Together with the general recommendations, this last section is meant as an advise the company owner can take as a guideline for future developments.
# TABLE OF CONTENTS

## WATCH INDUSTRY

- Watch components: 5
- History: 6
- Basis: 8
- Movement: 9
- Complication: 10
- Categorisation: 11
- Trends: 14
- Switzerland: 17
- Market analysis: 18

## PELLIKAAN TIMING

- Stakeholders: 21
- history: 21
- 5 P's: 22
- Company strategy: 24
- Competitors: 26

## WATCH FUNCTIONALITY

- Context mapping: 29
- One Idea a day: 33
- Statement of requirements: 36
- Design Direction: 38
- Technical innovation: 40

## AESTHETICS

- Lifestyle: 45
- Design language: 46
- Aesthetics: 48
- Dial & hands: 50
- Three concepts: 51
- Two concepts: 52
- Final design: 53

## ENGINEERING

- Starting point: 57
- Engineering research: 58
- Mechanisms: 60
- Solidworks case: 62
- Solidworks bezel: 66
- Production: 68

## FINAL PRODUCT

- Pellikaan Timing Stingray: 73
- Bezel designs: 76
- Packaging: 77

## MARKETING

- Core values: 79
- Launch strategy: 81
- Conclusion: 82
- Recommendations: 82
- References: 83
WATCH INDUSTRY
WATCH COMPONENTS

A number of terms will be used in this report in reference to different parts of the watch. The overview on the right clarifies which terms are used to signify different parts. Most mechanical watches have the same components as the watch that is presented in the overview.

The centrepiece of the watch is the case. The case functions as the housing to which all the other components are connected. Two components are particularly of importance and will be referred to many times throughout the report. These are the lugs and the bezel. The lugs are the section of the case to which the leather of metal strap is connected. The bezel is a ring that is attached to the case and serves a decorative as well as an informative function.

In most cases, the bezel is used as an extra ring of markers to show time. These markers usually signify the 15, 30, 45 and 60 minute mark. Other functionalities of the bezel will be discussed in the chapter 'Categorisation.'
It was around 6000 years ago that people first started measuring time, using the position of the sun in the sky. The light from the sun would fall on a long narrow and vertical object. The shadow this object created would point towards markings on the horizontal surface around the object. These markings corresponded with hours of the day. The oldest versions of these vertical objects were obelisks that the Egyptians built in 2100 BC. The Egyptians were also the ones that divided the day and night in 12 parts, creating the 24 hour system we still use till this day.

The downside of these sundials, is that they needed sunlight to work. This created the need to track time without sunlight and this resulted in the invention of the water clock. The oldest water clock was found in the tomb of Amenhotep I, who was buried around 1500 BC. The water clock essentially was a bucket with a small hole at the bottom. The bucket would be filled with water which leaked out of the small hole, slowly lowering the water level. Markings inside the bucket would indicate when an hour had past.

This system was used for nearly 3000 years, slowly evolving over time. The accuracy was improved by regulating the pressure and making the flow of water more constant. Also bells, moving puppets and mechanical singing birds were added to make the clocks more interesting. Astronomers also started adding models of the solar system that rotated as days went by. Astronomy was one of the strong drivers to increase the accuracy of clocks. The more accurate the clocks were, the more accurately astronomers could track stars and planets.

The next big step in the evolution of the clock happened in the fourteenth century. Weights were used as a power source in collaboration with a gear system that released the energy of the weights in small steps. This gear system was called the escapement and completely replaced the water clock system. As the weight lowered, connected gears would move the hour hand around the dial accordingly. Each time the weights reached the bottom, they had to be lifted back to the top by hand.

At the end of the same century, the weights got replaced with springs which allowed the size of the clocks to decrease. Before this development, water clocks were the size of complete buildings. The evolution continued as clocks became smaller and accuracy increased. In 1577 an astronomer
needed accurate clocks to track stars. Jost Burgi invented the minute hand and the hour got divided in 4 quarters.

Halfway through the seventeenth century, another important development occurred. A pendulum was used to precisely regulate the steps with which the escapement released the energy of the spring. Galileo Galilei was the first person to come with the idea to use a pendulum and spend a lot of time to study the motion and timing in relation to the length of the pendulum.

However, Christiaan Huygens, a Dutch scientist, was actually the first person to build a working clock with the new mechanism. This clock could keep track of the time with an error of only one minute a day. This was groundbreaking accuracy at the time. Till this day, this method is still used in the well-known ‘Grandfather clocks’.

Huygens made another important improvement in 1675. Instead of a pendulum, he used the oscillation of a spiral torsion spring to regulate the energy release. This change decreased the size of the clock even more and also allowed the clock to be used at sea where keeping track of time was very important for navigational purposes. The natural rhythm of a pendulum would get disrupted by the ships motion and the spring was not sensitive to these motions. This change lead to the final design of the mechanical watch that is still present in modern mechanical watches.

In 1840, Alexander Bain implemented electricity to wind the watch. In the nineteenth century, the properties of electric motors were used to track time. The speed of a motor could be regulated precisely. With the right gear translations, the motor could rotate the hour and minutes hands with the correct timing.

In the twentieth century, electronics developed and starting replacing all the mechanical parts. Nowadays, a watch is powered by a small battery that delivers a small current to a tiny tuning fork made of quartz crystal. Quartz is a piezoelectric material. Meaning that it will start vibrating at a certain frequency when a current passes through. When this frequency is known, it can be used as a reference to determine the length of a second. The time is then displayed using small stepper motors that rotate the hands, or using a digital display.
BASIS

This inferiority to electrical watches has pushed the mechanical in a niche market. Mechanical watches are now products of the connoisseur. The watch is supposed to be expensive and the outdated image is no longer of importance. What is important is the consumers love for mechanical engineering.

The collection of gears, springs and axles that allows the mechanical watch to accurately track time is called the movement. The average movement is made of 130 parts, most of which are only the size of a couple of millimetres. Production of these parts requires high precision machines. Assembly requires special training and can only done by hand.

These factors have made the movement one of the main features that defines the quality of a watch. Watch enthusiasts have shifted their focus from accuracy and functionality to the craftsmanship that is necessary to produce and assembly a mechanical watch.

This shift in focus is also represented in the watch as most mechanical watches now have windows at the back of the case as well. When the watch is taken off from the wrist, the owner can have a closer look of the inner workings and appreciate the time and effort that went into the making of the watch. Movements are also often decorated using coloured screws and special metal finishes. The most common of these finishes is ‘perlage’.

MARKET

The mechanical watch market can be divided into two sections. One section focuses on the design of the watch and uses standard movements bought in from other companies to power their watches. These watches range anywhere from 200 euro’s to 50,000 euro’s. The target group consists of anyone that is interested in the mechanical engineering behind the watch and therefore is willing to spend more money.

The second section focuses on the extreme upper class of society. These watches have an extraordinary movement, specially developed for a limited amount of watches. These are the Lamborghini’s and Ferrari’s of the watch industry. Exclusivity along with the use of exotic materials are the main selling points. The watches are exuberant in design. Reading the time is a secondary function and is inferior to the visual impact of the watch. The price tag of these watches range from 20,000 euro’s upwards to 800,000 euro’s.
A movement is powered by a spiral torsion spring, also known as the main spring. When the crown is in its initial position (not pulled outward for time adjustment) it can be rotated. In that position, the crown is connected to the main spring and a rotation of the crown will cause the main spring to wind. An average sized spring can power a watch for two to three days.

The crown winds the inside gear, called the ratchet wheel. A small rotating part called the 'click', makes sure that the ratchet wheel can only turn in one direction. This stops the main spring from unwinding in the unwanted direction. The winding of the main spring makes the outside gear want to rotate. This gear is known as the barrel or first wheel. As a result, the barrel puts tension on the second, third and fourth gear.

Those three gears are connected to each other with a specific ratio. The second and third wheel are connected with a ratio of 1:12. And the third and fourth wheel are connected with a ration of 1:60. This means that every time the second wheel completes one rotation, the third wheel completes twelve rotations. And for every time the third wheel completes one of those twelve turns, the fourth wheel will complete sixty turns.

These gears are connected to the hands of the watch. The second wheel is connected to the hour hand, the third wheel to the minute hand and the fourth wheel to the second hand. The ratios between the gears ensure that when the hour hand has made one rotation (twelve hours have passed), the minute hand has made one complete rotation for each passed hour. And when the minute hand has made one of those twelve rotations, the second hand has made sixty rotations around the dial (counting the past minutes). With this system, only the speed of the second hand has to be regulated to manipulate the minute and hour hand correctly.

The regulation of speed (actually tracking time accurately) is done through the escapement. The escapement restricts the movement of the gears. With no restriction, the gear chain would rotate quickly and release all the energy in the spring in a short burst. The escapement restricts the energy release, only letting energy from the spring ‘escape’ in tiny increments. The escapement consists of three parts. The balance wheel, the anchor and the escape wheel.

The balance wheel is a weighted ring that is connected to its axle with a spiral spring. At the base of the balance wheel, a small pin is placed. With a small fork-like shape, the anchor hooks in on this pin. The oscillation of the spring ticks the anchor back and forth with the pin. The other end of the pallet has two arms, each holding a small ruby jewel. Ruby is used for its extremely low friction coefficient. Each time the anchor ticks, the escape wheel is released and turns until it is caught by the other arm of the anchor. This happens again when the spring oscillates back and the pin forces the anchor back in the first position. The frequency of the spring is calculated in such a way that this process happens exactly four times a second. The gear ratio between the escape wheel and the fourth wheel is calculated so that when the escapement has made eight ticks (four times back and forth), the fourth wheel has made 1/60th of a turn (a second precisely).
Any additions or modifications to the gear train are known as complications. The most common complication is the addition of an automatic winding system. An eccentric weight is added to the back of the movement. Movements of the user's arm will rotate the weight around its axle. This rotation is translated through the gear train and is used to wind the main spring.

Other examples of complications are a date displays, chronographs (mechanical stopwatch), moon phase and power reserve indicators. The power reserve shows the amount of days the watch will continue ticking before the stored power in the main spring depleted completely. This is done with a small indicator on the dial.

Some complications are extremely difficult to develop and incorporate into the design of the movement. These complications require a large amount of parts to work correctly and/or require a very delicate assembly done by hand. Watches with such complications are very expensive (30.000 euro's and up) and are the holy grails for watch collectors.

Examples of these complications are minute repeaters (small chimes inside the watch are struck to indicate the time through sound) and perpetual calendars that take leap years into account. However, the most iconic of these kind of complications is the tourbillon. Invented in 1795 by Abraham Louis Breguet. Grandfather of the founder of Swiss watch company Breguet which is still a well-known brand in present day.

The invention originated from a need in 1795. During those years, people mostly wore pocket watches. These were always worn in the same vertical position which meant that gravity always pulled on the movement in the same direction.

This had a negative influence on the accuracy of the watch. The invention of the tourbillon solved the problem by putting the entire escapement on a platform that rotates once a minute.

The relevance of the tourbillon disappeared with the arrival of wrist watches. The continuous movement of the arm countered the constant vertical positioning of the pocket watch. Still, the tourbillon remained popular because of its visual impact.

In today's watches the tourbillon is seen as 'the beating heart' of the movement and takes a prominent position on the dial. As it rotates exactly once a minute, it is also used to indicate the seconds.
Within the watch industry there are a number of terms that describe a type of watch. Each term has its own typical design features that are incorporated into the design of the watch.

A diver watch is one of the most common models that can be recognized by a large bezel with easy to read markings. This bezel can be rotated by hand and the 60-minute mark is always identified by a triangle. At the start of a dive, the diver rotates the bezel until the triangle aligns with the minute hand of the watch. This allows the diver to easily keep track of how many minutes have passed since he or she went under water. An average air bottle can supply around 50 minutes of air\(^5\). The diver knows he has to reach the surface before his minute hand has reached the 50-minute mark on the bezel.

The bezel can only be turned anti-clockwise to prevent a diver accidently moving the bezel clockwise under water. This prevents the mistake of a diver thinking less time was spent under water than in reality. Because of the lowered visibility under water, divers watches often have large hour markings to increase readability. Additionally, divers also wear gloves which increases the wrist size. To compensate for this difference, bracelets of diver watches often have an extra setting mechanism so that the size of the bracelet can easily be increased or decreased.

The more expensive dive watches also have a helium release valve. Professional divers can spend prolonged periods of time at great depths in a pressurized diving bell. In this diving bell a special mix of gasses is used to breathe. This mix of gasses also contains helium. Helium atoms are the smallest natural gas particles found in nature and are able to enter the inside of the watch case through the water tight components of the watch. When the diving bell with the divers are brought back up to the surface and not enough time is taken to do decompression stops, the pressure difference can result in damages to the watch. In extreme cases, the window could pop out of the case.

In the 1960’s Rolex and Doxa S.A. collaborated and invented the helium escape valve. It is a one way valve that allows the helium and other gasses to escape from the watch case. The usefulness of this addition to the watch is extremely situation-al. Present-day divers have also started replacing the functionalities of a dive watch with computers. Nevertheless, the helium escape valve is still present in the more expensive watches and is seen as a gimmick to show off.
The Aviator-style watch originated from the watches that were designed for the German air force during the second world war. Multiple companies created designs after the air force requested the watch industry to come up with a unique watch for their pilots. The ‘Big Pilot’ from the International Watch Company (IWC) was one of the most successful designs. The watch was exceptionally large with a diameter of 55 mm.

This made the watch extremely easy to read. Most watches at that time had a diameter of around 33 mm². After its use in the war it became popular again under the general population in the mid nineties. The same characteristics are still present in modern aviator-style watches. Large watches with big hour and minute hands. For the minute markers on the dial a lot of Superluminova (specialized glow-in-the-dark paint) is used to also improve readability at night. In terms of aesthetics, modern aviator-style watches often take inspiration from flight instrument in the cockpit.

In terms of functionality, a trademark for the modern aviator style watch is the addition of complications that show the time in multiple time zones. There are a number of common methods to do this. One method is to add another hour hand to the dial, pointing at a different hour marker. Another method is the addition of a smaller dial on the main dial, called a sub dial. This dial has a hour hand that marks the same time as the main dial, only a number of hours earlier or later.

These methods allow the pilot for instance to see that it is 12:35 in Greenwich Mean Time (GMT) on the main dial, but also 7:35 in Colombia Time (COT) using the second hour hand or the hour hand on the sub dial.

Another method of showing different time zones is through markings on the bezel. Each hour is marked with a code for the corresponding time zone. Using the previous example; when the bezel is rotated in such a way that the GMT code is aligned with the hour hand (in this case 12 o’clock), the COT code on the bezel will be aligned with the 7th hour mark.
MILITARY WATCH

The military watch is essentially a small version of the Aviator-style watch. Readability and simplicity still being the most important design factors. The use of Superluminova to provide readability in the dark is mandatory. Furthermore the strength of the case and reliability of the watch are very important. The watch should be able to withstand a punch or two. As the name suggests, the military watch is taking inspiration from watches that were made specifically for the military, similar to the aviator style watch.

Fixed watch strap pins are also a typical characteristic that defines the military watch. Generally pins with a spring system are used to connect the strap to the case. The spring system allows them to be removed with a special tool. Military watches have solid pins that are soldered in to increase the strength of the case. This is combined with a nylon strap, also known as a NATO strap. These straps typically have a striped pattern and replace the leather and metal bracelets that are more vulnerable to weathering.

DRESS WATCH

The last category is the dress watch. This type of watch has a sophisticated and elegant design. Much like cufflinks or a tie, it fits well with a suit. It functions more as a piece of jewellery than a utility item. The aesthetics are the main focus with a minimalistic and business-like appearance. The dial is simple and legible. The case of the watch is often thin to fit under the tight sleeve of a dress shirt.
**TRENDS**

**BIGGER IS BETTER?**

The size of a watch is an important design feature that influences the wearing comfort and how the watch is perceived on the wrist. The development of the electric watch forced the mechanical watch to become a luxury item instead of a utility product. With this shift in meaning, the watches began increasing in size. The watch became a status symbol and was meant to be noticed by others. The bigger the watch, the more noticeable the decorations and design on the watch are.

A larger watch also looks more masculine. A large watch can compliment a broad and masculine wrist much better than a small watch. Celebrities such as Arnold Swarzenegger and Silvester Stallone are credited to take the size of the watch to extreme levels. By wearing watches with diameters of around 55 millimetres on red carpets and other media events, the ‘XXL’ watches quickly became popular. Diesel is one of the brands that used the XXL watch as a specific trademark of their watches.

Although still popular, the latest trend suggests that the average watch size is starting to stray away from the XXL side of the scale. At Baselworld 2014 (the world’s largest fair for jewelry and watches) a lot of watches were presented that had a diameter of 40-42 mm. This size is now starting to be seen as the perfect balance between being noticeable and still comfortable to wear.

**PIECE OF HISTORY**

The trend of referencing history also started because of the development of electric watches. The mechanical watch became an outdated invention. Each functionality the mechanical watch ever had, has been replaced by an electric product that does the same thing faster, better and more easily. To still appeal to customers, watch companies started using nostalgia to create a bond between the customer and the watch.

An example of this is the reference to the history of the mechanical watch itself. As described in the chapter ‘History’, astrology was one of the key drivers to increase the accuracy of the clock. To celebrate this, companies add complications that show the moon phase or positions of the stars in the sky at night. Some watches can even show the accurate rotation of the planets around the sun. Watch enthusiasts have no use for knowing the position of the planets but are intrigued by the history of the mechanical watch.

History is also being referenced in a broader sense. Romain Jerome’s ‘DNA watches’ are made from other products that were part of big events in history. They sell limited edition watches that are composed of spare parts of the Apollo 12, the spacecraft that landed the first people on the moon. A different model has coal that was recovered from the Titanic incorporated into the dial of the watch. These watches are carriers of small tangible pieces of history. This sense of nostalgia works well in combination with the ‘outdated’ mechanical watch.
WOMEN WANT IT TOO

The mechanical watch has always been relatively large in contrast with the E-watch because the movement requires more space. As mentioned before, a larger watch has a masculine look. This made the mechanical watch less fitting for a woman's wrist. Furthermore, women are expected to only be interested in the watches as fashion statements. Supposedly, women do not care if the watch has a mechanical or quartz movement inside. The amount of men's mechanical watches available therefore has always been far greater than the amount of women's watches.

This is however starting to change. Companies are realising the women are a target group that has not been addressed very well yet. Currently the women are targeted with expensive watches made from precious metals such as gold and silver. A lot of diamonds and other gems are used to decorate the watch. From a profit point of view, the margins on women's quartz watches with a lot of diamonds are very favourable. Meaning they sell for a large amount of money, while the production costs are relatively very low.

As the profit on mechanical watches is less favourable, the mechanical women's watch has not taken a stand yet. But the market is expected to grow as companies are seeing that women are buying men's watches to fulfil their need.
Mechanical watches are very sensitive to fashion. The mechanical watch is an outdated product in terms of technology and functionality. However, its design has proven to be timeless. Vintage watches that are 40 years old are just as popular, if not even more popular than the watches that were released a month ago. Therefore watch brands often remake ‘classics’ into modern versions (referencing history once again).

One of the best displays of the latest trends is Baselworld. The largest jewelry and watch trade show in the world, held once a year in Switzerland. In 2014 there were 1,500 exhibitors, including all leading watch companies. On the website Baselworld also specifically claims to be the place where trends are set.

The trends are very different each year. Trends can come in many shapes and sizes. Complications, colours, straps, materials or dial designs are all different factors that come into play. In 2014 for instance the colour green was very popular. Additionally, watches from the sixties made a return with a lot of modern remakes taking inspiration from that decade. In terms of straps, the NATO strap was trending and. Material-wise, titanium was most popular.

Evidently, what is hot and what is not changes drastically every year and beforehand it is difficult to predict what will be the next trending materials, colours and complications. However, the examination of new watch releases for 2015 can lead to some predictions. At the SIHH fair (slightly smaller but similar fair to Baselworld) held each year in the middle of January, multiple brands debuted their newest models.

A number of design traits were reoccuring in most of these new models. Most notable is the experimentation with new materials such as wood, carbon fiber and extremely exotic materials like metal taken from meteorites. The finishes of these material are also experimented with. Breguet re-introduced the old-fashioned method of ‘peening’ which is in essence a sand-blasted type of finish that is done by hand. The carbon fibre watch by Panerai was finished in such a way that the different layers of fibres revealed a circular pattern. For a visual overview of these watches, see the appendix.
Over the years, the Swiss have built up a reputation. When the term ‘Swiss made’ is printed at the bottom of a watch dial, the consumer knows the watch has been produced and assembled by Swiss hands. The term ‘Swiss made’ is perceived as a guarantee of the highest possible quality in the watch industry as it is believed true quality can only come from Swiss hands.

Switzerland has been the centre of the industry since the sixteenth century. Production of jewels were banned at the time and therefore goldsmiths started turning to the production of watches. Daniel Jeanrichard was a Swiss goldsmith that was also the first to start applying the division of labour to the industry. The efficiency and standardization increased greatly and this is suggested to be one of the main reasons that the Swiss watch industry has grown to what it is today.

Furthermore, the neutral position of Switzerland allowed the Swiss to continue producing watches while the second World War forced other countries to take a step backward. Without much competition, the Swiss took over 50% of the worldwide watch market share. The Swiss have used these developments to build up a reputation that thus far has not been contested.

The developments have also given Switzerland a monopoly on the production of movements. Fortifying the position of Swiss made watches on the market even more. Watch brands almost always purchase their movements from a Swiss company called ETA SA. This is a company owned by the Swatch Group and specializes in the design and manufacturing of movements. Development of a movement, designed from scratch, requires an enormous amount of research. In the watch industry, ETA SA is renowned for its ability to design and manufacture quality movements and it is estimated that ETA SA is responsible for around 70% to 80% of global movement production.

In 2010 this would have amounted to the production of six million movements. The only competition are Chinese companies that do the same for less money. However, the Chinese have failed to gain popularity as it is, again, widely believed that a truly reliable and high quality movement can only originate from ETA SA in Switzerland.
MARKET ANALYSIS

The birth of the E-watch has completely taken over the market from the mechanical watch. Mechanical watches are very difficult to mass produce because of the large amount of delicate parts and complicated assembly. Therefore even the cheapest watches are only available from 200 euro’s and up. The large amount of parts also make the watches much more sensitive to wear and tear. Furthermore, E-watches are also far more accurate. The average quartz watch only loses half a second or less each day whereas the mechanical watch has an error of around 10 seconds. With the arrival of smart watches, the functionality of the electrical watch also drastically improved. Which gave the mechanical watch an extremely outdated image.

It was expected that the rise of the smartphone would be the demise of the watch in general. Time could be read from a phone and therefore the wrist watch would become redundant quickly. But oddly enough, the watch industry has not suffered under the pressure of the smartphone. According to Euromonitor, a global market intelligence company, the amount of sales in the watch industry has actually increased over the last years. A large part of this growth could be credited to the development of smart watches. However, the current market share of Smart watches is only 5% of the total watch industry. 

### Top 7 of most successful watch corporate groups

<table>
<thead>
<tr>
<th>Company</th>
<th>Market share</th>
<th>Annual sales (2013)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swatch Group</td>
<td>18.3%</td>
<td>7.3 billion euro²⁷</td>
</tr>
<tr>
<td>Richemont</td>
<td>15.7%</td>
<td>2.7 billion euro²⁸</td>
</tr>
<tr>
<td>Rolex</td>
<td>11.8%</td>
<td>Unknown</td>
</tr>
<tr>
<td>Fossil (USA)</td>
<td>5.2%</td>
<td>2.0 billion euro²⁹</td>
</tr>
<tr>
<td>LVMH</td>
<td>4.7%</td>
<td>2.7 billion euro³⁰</td>
</tr>
<tr>
<td>Citizen (Japan)</td>
<td>3.9%</td>
<td>1.0 billion euro³¹</td>
</tr>
<tr>
<td>Seiko (Japan)</td>
<td>3.4%</td>
<td>1.0 billion euro³²</td>
</tr>
</tbody>
</table>

### Revenue vs. Sales³⁴

- **Revenue in millions of euros**
- **Units sold x 10,000**

### Mechanical watch sales depicted in millions of euros³⁵

- **2485+ Euro**
- **414-2485 Euro**
- **165-414 Euro**
- **0-165 Euro**

### Watch sales depicted in billions of euros³³
STATISTICS

As it is the centre of the watch industry, most information available is about the Swiss production and sales numbers. However, these watches are exported all over the world and they make up 54% of the global watch market\textsuperscript{35}. Coincidentally, four out of the five largest watch manufacturers are situated in Switzerland. Rolex was established in London (UK) but operates from Switzerland. The Swatch Group, Richemont and LMVH are corporate groups that together own 35 watch brands, all based in Switzerland. For an overview of the largest corporate groups and their subsidiary companies, see the appendix.

Of the Swiss production in 2013, 37% of all watches sold were mechanical watches\textsuperscript{36}. However, this is not representative of the actual profit that the two different categories brought to the industry. As mentioned before, the watch became more of a status symbol and this allowed its average price tag to increase. Over the last decade, the amount of mechanical watches that were sold with a price tag of 2500 euro’s and higher have quintupled while all the other price ranges below 2500 euro’s stayed roughly the same.

This is also due to the increasing amount of watches that have price tags of multiple tons and even millions in some cases. These watches have a completely unique movement with extremely extensive complications. The development of these watches takes multiple years. Only the finest materials and most accurate production methods are used. Two examples of these kind of watches are illustrated on the right.

This shift towards the luxury price range has increased the revenue of the mechanical watches. The previous mentioned 37% of Swiss watches that were mechanical brought in 13.3 billion euro’s. This is 78% of the total revenue. Almost 80% percent of all profits made by the Swiss watch industry, is coming from the mechanical watches. Around 10 million of those euro’s came from sales in the Netherlands\textsuperscript{36}. 

Uhrwerk Hammerhead

MB&F HM4 Thunderbolt
PELLIKAAN TIMING
STAKEHOLDERS

DESIGN, ASSEMBLY & MAINTENANCE
Hubert Pellikaan

RETAIL
Amsterdam Watch Company
Punte (Utrecht)
Helsloot (Muiden)
Etoille (Maastricht)
Stadsuurwerk Makerij (Culemborg)

SUPPLIERS
Movements
ETA SA & Sopord

Dials
Bedford Dials & Cador

Cases & Crowns
Kemmner
Rios, Kauffman,
De Horlogebanden Specialist

Straps
Momo, La Pratique

Hands

FOTOGRAFHY
Marcel Lubber

WEBSITE DESIGN & MAINTENANCE
Yellow Lime

PRESS
Diederick van Goolen
5 P’s

The 5 P’s, also known as the marketing mix, is a business method that helps determine how a company is set up.

PEOPLE

At the moment, Hubert Pellikaan, the company owner, estimates that 95% of his clientele are men. Most of which are between 40-60 years old, enjoying a Dutch average to above average income. More often than not, the customers are entrepreneurs themselves.

PORTFOLIO

Pellikaan Timing currently has six different models. Four of which have automatic movements, the other two are manual winders. An overview of the models can be found on the next page.

PRICE

The watches are sold within the price range of 900 to 1900 euro’s. The price tag is mostly dependent on the stock price of the movement that is incorporated. This relatively low price range is a conscious decision as Pellikaan Timing believes it is important to make the watches affordable for everyone.

PROMOTION

Advertising is done through a number of channels. Twice a year Pellikaan Timing has a press release that is presented on multiple blogs. Examples of these blogs are Ablogtowatch.com, Monochroom-watches.com and Watchtime.net. These press releases update on the development of Pellikaan Timing. The latest of these updates was the release of the Hendrik Lorentz model. Pellikaan Timing also has a banner on the home-page of Monochroom-watches.com that refers to the website of Pellikaan Timing.

Gaining publicity is also achieved through the attending of fairs such as the Rikketik fair. This fair is held four times a year in Houten (the Netherlands) and completely revolves around the mechanical clock and watch. Hubert Pellikaan represents the company with a small stand on which the watches are displayed. Pellikaan Timing also attends business events such as the event organised for professionals by Rabobank.

Furthermore, Pellikaan Timing has specifically chosen retailers that connect on a very personal level with their customers. These retailers take the time to explain the background story of products they sell in their store and therefore make the watches more interesting for potential customers.

Pellikaan Timing also creates special editions of his watches in honour of specific events. An example of this is the Helen Downing edition that Pellikaan Timing donated to the institute of the same name to be auctioned for the good cause. Another example is the FC Utrecht limited edition. This is the Flying Dutchman model with a FC Utrecht logo printed on the dial. This watch was a gift for the professional players that left the team in 2011 and created a lot of media attention.

Finally, social media is also used as another method to release the latest updates of the company’s development. Facebook and Twitter are the main channels that Hubert himself regularly updates.

PLACE

The watches are primarily sold in the Netherlands. Only around 5% of the sold watches end up going abroad. Mostly to the surrounding countries such as Germany, France and England. The sales from abroad mainly go through the web shop. The watches sold in the Netherlands are more often sold through the retailers. Most of these retailers have a different core business and sell watches from a couple brands at the side. The largest dealer is a jewelry store that, similarly to Pellikaan Timing, is located in Utrecht.

Watches are also often personally sold by Hubert Pellikaan. People like to email or call Hubert Pellikaan himself to set up a meeting. During this meeting the customer usually brings some friends or a husband/wife and the afternoon is spend talking about the watch industry and the extensive watch collection of the customer.
<table>
<thead>
<tr>
<th><strong>FLYING DUTCHMAN</strong></th>
<th><strong>FLYING DUTCHMAN II</strong></th>
<th><strong>FLYING DUTCHMAN III</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diameter</strong> : 45 mm</td>
<td><strong>Diameter</strong> : 45 mm</td>
<td><strong>Diameter</strong> : 40 mm</td>
</tr>
<tr>
<td><strong>Thickness</strong> : 13.5 mm</td>
<td><strong>Thickness</strong> : 13.5 mm</td>
<td><strong>Thickness</strong> : 9.5 mm</td>
</tr>
<tr>
<td><strong>Strap width</strong> : 22 mm (Black or brown leather and NATO strap)</td>
<td><strong>Strap width</strong> : 22 mm (Black or brown leather and NATO strap)</td>
<td><strong>Strap width</strong> : 22 mm (Black shell cordovan leather and NATO strap)</td>
</tr>
<tr>
<td><strong>Movement</strong> : Automatic ETA 2892A2 soignee with date display</td>
<td><strong>Movement</strong> : Manual ETA 6498-1 elaboree</td>
<td><strong>Movement</strong> : Automatic ETA 2892A2 soignee with date display</td>
</tr>
<tr>
<td><strong>Spring reserve</strong> : 38 hours</td>
<td><strong>Spring reserve</strong> : 46 hours</td>
<td><strong>Spring reserve</strong> : 38 hours</td>
</tr>
<tr>
<td><strong>Price</strong> : €1490,-</td>
<td><strong>Price</strong> : €890,-</td>
<td><strong>Price</strong> : €1895,-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>FLYING DUTCHMAN SPORT</strong></th>
<th><strong>FLYING DUTCHMAN SPORT II</strong></th>
<th><strong>HENDRIK LORENTZ</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diameter</strong> : 45 mm</td>
<td><strong>Diameter</strong> : 45 mm</td>
<td><strong>Diameter</strong> : 40 mm</td>
</tr>
<tr>
<td><strong>Thickness</strong> : 13.5 mm</td>
<td><strong>Thickness</strong> : 13.5 mm</td>
<td><strong>Thickness</strong> : 9.5 mm</td>
</tr>
<tr>
<td><strong>Strap width</strong> : 22 mm (Brown leather, black shell cordovan leather and NATO straps)</td>
<td><strong>Strap width</strong> : 22 mm (brown leather and NATO strap)</td>
<td><strong>Strap width</strong> : 22 mm (black alligator leather and NATO strap)</td>
</tr>
<tr>
<td><strong>Movement</strong> : Automatic ETA 2892A2 soignee with date display</td>
<td><strong>Movement</strong> : Manual ETA 6498-1 elaboree</td>
<td><strong>Movement</strong> : Automatic Soprod A10-2</td>
</tr>
<tr>
<td><strong>Spring reserve</strong> : 38 hours</td>
<td><strong>Spring reserve</strong> : 46 hours</td>
<td><strong>Spring reserve</strong> : 38 hours</td>
</tr>
<tr>
<td><strong>Price</strong> : €1490,-</td>
<td><strong>Price</strong> : €890,-</td>
<td><strong>Price</strong> : €1895,-</td>
</tr>
</tbody>
</table>
COMPANY MISSION

“Creating reliable watches that are easy to read and usable in every situation.”

COMPANY VISION

‘Searching for the secret treasure, via the shortest route, having as many meetings as possible on the way’

DESIGN PROCESS

The first Pellikaan Timing watches were created by making adjustments to an existing watch case. The size of the case was determined by the size of the chosen movement. This case was sent back to a Chinese watch case fabricator who made a hundred cases with the requested adjustments.

For the design of the dial, Hubert takes inspiration from other classical watches. He experiments with 2D graphical software to find a combination of lines that he likes. All other parts are stock parts that are carefully selected by Hubert to fit the design of the watch.

BUSINESS STRATEGY

Hubert Pellikaan currently has two companies. A pharmacy company and Pellikaan Timing. Hubert would like to see Pellikaan Timing grow and develop so that he can focus on the watches full time. His ideal vision would be to have around six distinguished watch models divided into two product lines. One line with ‘tool-watches’ that are focused on usability and one line with more extreme watch designs. These extreme watches would still be focused on usability but would feature custom movements and extraordinary complications.

BRANDING

To achieve that vision, the company needs to grow and make more profit in order to finance the development of new watch models. Hubert’s strategy for the company is to expand the retailer network around the country. The product will then be more accessible for the customer which will allow Hubert to spend more money and effort into the promotion. This should improve the brand awareness and allow Pellikaan Timing to make a name for itself.

BRAND IMAGE

Pellikaan Timing stands for Dutch Made designer watches. As the website of Pellikaan Timing states, the brand is all about the usability, technology and the readability of the watch. A Pellikaan Timing watch is easy to read. It has a strong case that allows the watch to be used under all kinds of circumstances. The owner of a Pellikaan Timing watch is never afraid that his watch will scratch or stop working. The movements inside are reliable and of Swiss origin.

A watch from Pellikaan Timing has a number of
characteristics that express this brand image. The watches are relatively thick and show a lot of steel to transfer the idea of a strong watch to the consumer. To prevent scratches during use, the windows of the watch are made of synthetic sapphire. This is the second hardest transparent material (after diamond) and is therefore highly resistant to scratching.

Another measure to prevent scratching is the shape of the lugs. These are facing downward and function as little legs on which the watch rests when it is laid down on a flat surface. The legs prevents the back face from touching the ground and scratching when the watch is moved around or picked up. Furthermore, the usability of the watch is improved by the shape of the crown. The shape of the crown allows the user to pull it outward easily to select time or date adjustment and the extra deep notches allow the user to easily grip and turn.

Another ‘toughness’ factor is the fact that all the watches are water resistant with a rating of at least 5ATM. This means the watch can endure five times the normal atmospheric pressure. The watch will not leak when it is submersed in water, up to depths of 50 meters. Each watch is also delivered with two straps, a leather and a nylon (NATO) version. The nylon strap can be installed instead of the leather one with tools that are also provided. The nylon strap has a more sport-like design and is not affected by water damage.

Readability is provided through the use of Super-luminova paint on the hour markers and hands. This allows the watch to be readable for multiple hours after dark. A watch from Pellikaan Timing also always has a highly contrasting combination of colours for the dial and hands. Finally, the markings on the dial, allow the user to accurately read the time. The hour, minute and second hand have their own separate ring of markings with in the centre a crosshair to indicate the quarters.

In terms of technology, Pellikaan Timing uses Swiss movements that are chosen for their proven reliability and accuracy. Hubert Pellikaan personally checks each watch and movement before they reach the store shelves to ensure the customer always receive high quality timepieces.

BRAND PERCEPTION

The image a brand has intended does not always comply with the perception consumers have of the brand. A number of jewelry stores were contacted to get some information about the brand perception of Pellikaan Timing. First, a retailer of Pellikaan Timing watches was interviewed. Secondly, three jewellery stores that sold watches similar to the ones of Pellikaan Timing were asked to answer a short questionnaire regarding their familiarity with the brand and their impression of the watches. Finally, a questionnaire filled in by 33 Pellikaan Timing customers was examined. In the questionnaire, the customers were asked to describe themselves and their perception of the brand.

From the questionnaires could be concluded that the consumers are very much attracted to design of the watch. They appreciate the watches for their minimalistic and highly legible dial designs. Also the choice of movements and Hubert’s personal quality check are described to be qualities of the company.

Interestingly, the ‘toughness factor’ and usability of the watches are almost never mentioned to be a liked attribute of the watch. Seemingly, that core value of the company is completely overlooked. This is due to the fact that Pellikaan Timing does not have a competitive advantage in these areas. The usability of the watch is very much in the details. The Pellikaan Timing watches are not much more usable of ‘tougher’ than any other watch brand. Therefore, the core values are not recognised by the consumers. This causes the vision of the company to get lost in translation. It is no longer clear what the company exactly stand for and what the company is trying to achieve in comparison to its competitors. The results from the questionnaires can be found in the appendix (D).

In a later chapter of the report (Marketing), suggestions are made on which adjustments need to be made in order for this problem to be solved.
COMPETITORS

Pellikaan Timing’s portfolio has a price range of 900 to 2000 euro’s. In the mechanical watch industry, this is the lower and very crowded side of the scale. The three jewelry stores that were questioned for the brand perception were also asked if they would be interested to add Pellikaan Timing to their portfolio. The stores replied that they would not as they were already content with their current supply of brands in that price range. Adding Pellikaan Timing would not help differentiate their portfolio.

In the table to the right, the best selling brands are presented along with their price ranges. The green bar represents the price range of Pellikaan Timing. The brands that Pellikaan Timing is competing with, are brands with archetypical watches. There is little to no innovation and the most common complication is the relatively simple date display. Therefore aesthetics and brand status are the main differentiating factors between the watches. Exclusivity is almost nonexistent as these watches have an unlimited availability.

From the 4.000 euro mark, the truly sought-after and desirable brands are starting to spill in. The Porsches and Aston Martins of the watch industry, featuring high quality, archetypical but very stylish watches. As with the cheaper brands, there is little innovation. However, the complications are more varied and in most cases more than one complication is featured on a watch.
INNOVATION IN FUNCTIONALITY

True innovation is generally only found in the high end of the price ranges. From the 10.000 euro mark and up, watches start to have custom movements and complications. It is only in this range, that watches also have functional innovations such as easy to replace straps and two sided watches (see the picture on the right). In this range more effort is put in trying to display the time in a unique manner as well.

CONCLUSION

It would be wise for Pellikaan Timing to find a less crowded section of the market. The brands that are presented in the overview of competitors are only a small part of the entire market. The choice in watches is of an abundance and Pellikaan Timing does not diversify enough to gain a competitive advantage over these brands.

As innovation in the watch industry only starts from the 10.000 euro mark, a new and functionally innovative Pellikaan Timing watch could be very distinctive in the range below 10.000. There is however also a danger in doing so, because the pricing can have a lot of influence on the perceived quality of the watch. The quality of the watch and movement is regarded as one of the more important features. The more expensive a watch is, the better the perceived quality is as well.

A relatively cheap price tag can result in consumers believing that the quality of the watch is much lower than it actually is.

A price tag of around 4.000 euro is likely to provide the best balance. It will put the watch in the low price range of the more desirable brands. The comparison to these companies that have proven to create high quality products over many years will also improve the quality perception of the Pellikaan Timing watch. The innovation the watch will have, will justify the increased price in comparison with the current portfolio.

Another important motivation to increase the price range is described in the chapter ‘Market analysis’. The watches that are more expensive than 2.500 euro have become five times more profitable over the last ten years than the watches below 2.500 euro’s. It would be wise for Pellikaan Timing to follow this trend.
WATCH FUNCTIONALITY
The previous chapters have shown that the mechanical watch has remained popular even though the E-watch has made it a completely outdated product. This is a contradiction that needs to be solved in order to get insight into the attraction of the mechanical watch to the consumer.

To do so, a context mapping session was organised with eight watch enthusiasts. Six of which were customers of Pellikaan Timing. All attendees were males between the age of 45 and 60 with the exception of one who was 29 years old. The session lasted for two hours and was held in the home of Hubert Pellikaan.

The main goal of the session was to answer the following questions:
- What does the consumer find to be valuable characteristics of a mechanical watch?
- What experience does the mechanical watch provide that other products do not?

METHODS

Two methods were used during the session. These two methods indirectly approach the essence of the questions that were previously mentioned. The indirect approach of these methods assures that the conversation would be easier to steer and would likely lead to a deeper understanding of questions at hand.

The first method is the Consumer Buying Decision Process. This method divides the thought process of purchasing a product into five steps. The problem/need for a product, the gathering of information, the evaluation of alternatives, the purchase itself and the review.

The second method is the Use-cycle. The daily use of the mechanical watch is analysed by again dividing it into steps: before, during and after. Of both methods a walkthrough was done, letting the attendees discuss freely. Follow up questions were used to keep the discussion within the bounds of the research questions. During the discussion, all suggestions given by the attendees were written down on post-it notes an put on large posters.

The last part of the session was used to evaluate fifteen ideas that were generated using the information that was gathered during the first phase of the project. Each idea was shortly discussed and the attendees were asked to choose the three ideas that they would be most willing to have incorporated in a watch.
During the discussion about the problem/need, it became clear that the purchase of a watch is most often a special occasion. A new watch is bought either as a personal treat or as a gift to others.

The decision to buy a new watch can have multiple reasons. The need can rise of wanting to fit within a certain group, for example 'Rolex-owners'. Another reason to buy a new watch is to mark a special moment in the life of the consumer. The watch is then connected to a memory and holds special meaning.

The purchase of a watch is also seen as an investment. Mechanical watches from well-known brands often become more valuable over time. They are timeless 'classics' that become more rare and sought after over time and are therefore worth a lot of money.

During the decision process, the consumer uses a lot of criteria to pick the watch that best fits his needs. The watch should fit as many of the demands as possible and as a result, the decision process often takes a lot of time. The most important criteria are:
- The quality and origin of the movement
- Aesthetics (authenticity)
- Brand appearance and status

When the decision for a specific watch is made, the consumer will want to seal the deal. The only threshold that needs to be overcome is the consent of the partner. A watch is a big investment and the partner will have to give the 'go' to let the purchase be completed.

After the purchase of the watch, there are a number of reasons that can make the consumer regret the decision. If the company service is bad, some members of the brainstorm claimed to never go back to that brand again. Other influences are trends and fashion. Seeing the watch in commercials or on other people's wrists is also influencing. These factors can have a positive as well as a negative effect on the watch experience. If the watch no longer fits the contemporary trends or is seen worn by a disliked person, this will influence the experience of the watch in a negative manner. But when for instance a consumer owns an old watch, and vintage watches are starting to trend again, this will have a positive effect.
RESULTS USE-CYCLE

Some consumers are not particular in their watch choice for the day. They either always wear the watch they bought last, or just pick something at random. Most people however pick their watches to fit their clothing or the activity of the day. During the day, the watch can also be switched out if for instance the person has a business party in the evening and needs a more fitting watch to that occasion.

Additionally, the watch is looked at not only to check the time but also pure for the enjoyment. People will not brag about their watches or try to make other people notice it but when it does happen, it is seen as a fun moment. During the day, watch enthusiasts spend time eyeballing what kind of watches other people are wearing. Each watch brand has a number of prejudices concerning the owners. Classy businessmen wear Longines watches and golden Rolex watches are only worn by rich people that want to brag about their wealth.

Finally, the watches are seen as valuable items. However, not a lot of effort is put in protecting the watch from scratches or other forms of damage. The watch is only taken off during sports or in close contact with water. The consumer tries to avoid leather straps to come in contact with sweat or water as this is the most vulnerable part of the watch.
AUTHENTICITY

One of the most interesting conclusions of the context mapping session was the fact that the authenticity of the company is very important to the consumer. According to the theory, authenticity is staying true to who you are, what you do and who you serve as a company and brand. It sets a company apart from the competition and defines the unique identity of the company. It also builds a bond of trust between the company and the consumer as it helps the consumer know what to expect.

There are a number of brands that have continued to be popular over the years. Examples of these are Rolex, Omega and Longines. These companies have authenticity, a story that fits the company values. Taking Rolex as an example; Rolex claims to create timeless luxury watches. They pay high attention to details and each and every Rolex watch is tested to survive extreme conditions. Over the years, Rolex has stayed true to these values. Vintage/old Rolex watches are often worth much more than their initial price. Because of the timeless design, the watches are always fashionable and wanted. And because of the increasing rarity as timepieces are slowly lost in time, the value only increases.

As for the extreme conditions, Rolex has always pushed the limits of their watches. Producing watches that are tested to withstand situations that go far beyond the average use scenarios. Rolex states on their website: ‘Few companies have been so consistently identified with the pursuit of excellence, the quest for the absolute, the discovery of original approaches and innovative solutions Rolex watches have proved themselves from the start in the most extreme conditions imaginable - from the depths of the deepest oceans to the summits of the highest mountains, in the air and on the race track’.

And to communicate that to the consumer, Rolex has made sure that their watches were part of ‘limit-pushing’ happenings in history. Examples being the first cross-channel challenge in 1927, first expedition flight over Mount Everest in 1933, world records for land speed in 1935, etc. The list goes on up to 2013 where a Rolex watch was taken on the first solo dive to the deepest place on earth. This authenticity is also what gives Rolex its brand status. Rolex timepieces are of high quality, durable and a result from a long history of development.

Building such authenticity takes time and consistency. Pellikaan Timing is a young company with a very short history. Thus, authenticity needs to be build up by staying consistently true to what the company stands for. Pellikaan Timing has chosen usability, readability and technique as the core values. These values are the reason of the company’s existence and should be carried out in every watch.
To gain competitive advantage over competitors, the watch should stand out and be unique. Not only in aesthetics, but in functionality as well. Creating a meaningful innovation for the new watch design can also make it a lot easier to create media attention and improve the brand awareness. Something Pellikaan Timing currently is struggling with.

The gathered information from the previous phase of the project were instantaneously used to create ideas for the design phase. The emphasis during the development of these ideas was put on the innovative functionality of the watch.

This process resulted in fifteen ideas. These ideas were discussed in a brainstorm session with mechanical watch enthusiasts. More details of this session will be discussed in a later section of the report. The five ideas that received the most positive reactions are illustrated on the following pages. The remaining ideas can be found in the appendix (E).

**ONE IDEA A DAY**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Plays off on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Layered Time</td>
<td>The dial is divided into four separate disks. Each hand has its own disk with time indicators. The bottom most outer ring shows the seconds with the seconds hand, the layer above that shows the minutes with the minute hand, etc.</td>
<td>The fact that Pellikaan Time watches are characterised by their separate markers for each hand (hours, minutes and seconds)</td>
</tr>
<tr>
<td>Rotor Dial</td>
<td>An automatic watch normally has the rotor at the back. This design incorporates the idea of having the rotor at the front, functioning as a date display. The rotor can rotate freely, however, when the user pushes a button on the side of the case, the rotor snaps to the location in such a way that the window in the rotor shows the correct date.</td>
<td>The appreciation of watch enthusiasts for any form of movement on the dial (such as the tourbillon).</td>
</tr>
</tbody>
</table>
Circular Time
- The time is presented in an unorthodox way. The minutes are indicated by a rotating disk with an arrow. A window in the disk shows the respective hour that rotates along with the disk.

Multiple watch brands having great success with unorthodox ways of showing time. It has helped them create a signature design trademark that sells the brand story. Examples of these brands are Meistersinger, Uhrenwerk and Ressence.

Replacable Watch Dial
- The side of the watchcase features a window that can be opened by rotating the bezel. When the window is open, the dial of the watch can be removed and easily replaced by another, giving the watch a customizable face.

The fact that watches are often selected to fit an activity or clothing the user wears. Adding customizability to the watch allows the user to adjust the watch to fit their needs even better.
CONCLUSIONS

The ideas that have incremental innovations and stay closest to the archetypical watch are the most popular ideas. The more radical innovations raise a lot of conversation about the essence of the mechanical watch. People see it more as an art piece that belongs in a museum and although the idea speaks to them, they would never consider buying or wearing it.

The ideas based on Dutch inventions had varied reactions. The idea in itself had much more impact on the reception than the fact it referenced the Dutch history. These idea however did connect well with the brand identity of Pellikaan Timing.

The discussion also showed that the watch enthusiasts can be split into two groups. The more technical people that are not only interested in aesthetics but also the technical innovation. These men are compelled by the extreme watch designs for their mechanical ingenuity. The other group is more solely interested in the aesthetics and the status a watch brand has. They prefer a archetypical watch. This group outnumbers the ‘techies’.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Plays off on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huygens Centrifugal Force</td>
<td>The top face of the watch has twelve small slides that are closed in the original position. When the user pulls the button on the side of the case, the top face starts to rotate fast. The centrifugal force pushes the slides outward. Doing so, the opening slides shed light on the layer underneath the top face. The layer underneath shows the time in the traditional way.</td>
<td>Pellikaan Timing’s other references to Huygens in its current portfolio and the trend of referencing history.</td>
</tr>
</tbody>
</table>
STATEMENT OF REQUIREMENTS

From the previous chapters a statement of requirements can be deducted. These requirements will be used as a decision making tool, as well as a means to test the outcome of the project. The requirements are as following:

AESTHETICS
- The watch fits within Pellikaan Timing’s current portfolio
- The brand image of Pellikaan Timing will be altered (see chapter Marketing), the watch will reflect the new core values.
- The watch fits the consumers that Pellikaan Timing is targeting with the current portfolio.

COMPONENTS
- The watch will have a high-grade movement incorporated

FUNCTIONALITY
- The watch will have an innovative functionality
- The innovation does not interfere with the expected functionality of the watch (being able to read the time)

PRICE
- The watch will have a price tag between 3.500 and 4.500 euro’s.
- This price tag is validated through the use of high-quality materials, movement and production techniques.

PRODUCT DEVELOPMENT
- The finished product requires no more engineering and can be produced with little to no assistance.
- The company owner is involved with every design decision so that the final product is a true representation of his vision.

LAUNCH STRATEGY
- The watch can attract media attention through its innovative functionality
- The watch will be released together with a strategy to provide personal service to strengthen the bond between the customer and the company.
DESIGN DIRECTION

The context mapping session showed that watch enthusiasts are most interested in the character/authenticity of the watch brand and the watch itself. A watch that has a certain story or history to tell is much more intriguing than a watch from a unknown company which only motivation is to make a profit.

Pellikaan Timing currently creates authenticity by connecting with the customers on a personal level. Through forums, fairs, retailers that are able to tell a story and a personal service system, the company owner is able to share his passion for the mechanical watch. Customers enjoy the fact that the watches are Dutch made (with exception of the movement) and that the company owner personally checks the quality of each watch.

However, to sell more watches, the authenticity needs to grow on a larger scale. The Pellikaan Timing watches and brand image should tell a story by themselves. To do so, the watches should fit and carry out the company story of creating usable, readable watches that are the pinnacle of mechanical technique.

With this criteria, the five best received ideas were split into two groups. The ideas that fit the company core values, and the ideas that do not. The ideas that did not fit were discarded. Ideas such as the Huygens centrifugal force fit the story of referencing Dutch inventors, as Pellikaan Timing did in the current product portfolio. However, the reference in the current portfolio is not very apparent in the design of the watches. Secondly, the context mapping session showed that the people did not add a lot of value to the reference. The ideas fit the company story but not the core values. Therefore it was chosen to discard them.

Fitting:
- Layered time (readability)
- Circular time (readability)
- Replaceable watchface (usability)

Not fitting:
- Rotor Dial
- Centrifugal force

The three fitting ideas ideas can be classified into two design directions:
- Innovative ways of showing time
- Customizable/modular watches

These two directions were compared to one another using a Harris Profile. The criteria that were used in the profile were taken from the statement of requirements.

INNOVATIVE WAYS OF SHOWING TIME

The idea provides a lot of potential for a design trademark that will set the Pellikaan Timign watch apart from the competition. However, multiple companies have already applied the same technique. A lot of high end watches have innovative ways of showing time. In the lower end of the price range this is less common but there are still some brands that experiment with the visualisation of time.

Meistersinger watches for example, a direct competitor of Pellikaan Timing, are characterized with a single hour hand that shows the time on a 24-hour dial. The watches do not have a minute or second hand which fits the companies brand story that “some moments shouldn’t be measured in minutes, but in their meaningfulness”.

Furthermore, reworking the way a watch tells the time will likely lead to adjustments to the movement which can prove to be a very difficult thing to develop. The movement is a complex combination of gears that does not provide a lot of flexibility.
CUSTOMIZABLE/MODULAR WATCH

The modular watch is the most promising of the two and is the final chosen direction. The watch is completely customizable to the user’s needs, making it very versatile and usable. The many ‘faces’ of the watch can also appeal to a large amount of potential customers, including women. However, instead of a replaceable dial, the chosen modularity for the watch will be of the bezel and the strap. Replacing the dial requires a partially open case. This allows dust, dirt and water to enter the case and damage the movement.

Modularity is not a common functionality. Glamrock is a fashion-driven watch brand that is one of the few examples that do have modularity built into the watch. The Glamrock SoBe is a watch of which the bezel can be replaced through a clamping system. There are also some high end watches that allow the strap to be replaced when the watch is partially taken apart. A watch that combines the two with a simple and easy to use system however has not seen the market yet.
Aside from the functional innovation, the watch will also have a technical innovation. Large watch companies spend a lot of time trying to improve the accuracy or the endurance of the movement. These innovations are extremely incremental but are regarded as an added value by consumers. Even if the actual effect of the innovation on the accuracy or endurance is negligibly.

During the project, Hubert came up with an improvement to the anchor. The anchor is an asymmetrical part of the gear chain that regulates the energy release from the mainspring (see chapter 'Movement'). Because of the asymmetrical shape, the centre of gravity does not align with the axle of the part.

In order to explain the benefit of a balanced anchor, an exaggerated version of the problem is presented on the right. In this example the anchor is replaced with a circular plate with a pin. The balance wheel is replaced with a rod that oscillated back and forth. The movement of the plate is restricted by two blocks that blocked by two black walls on either side of the plate.

The completely round plate is perfectly in balance (ignoring the pin and blocks). When a rotating part is balanced, the gravitational centre corresponds exactly with the rotational axis. This means that the first motion of the rod requires the same amount of force as the second motion back to the original position.

When the plate is unbalanced (see the second situation), the gravitational centre is on the right of the rotating axis. In this situation, the first motion still takes the same force as the second motion. But this changes when gravity is taken into account. In the visualisation of the unbalanced plate, the black arrow on the right represents the direction of the gravitational force. With the addition of gravity, the first motion takes more effort as the gravitational centre has to be pushed up against gravity. The second motion takes less effort as the plate is already willing to drop down by itself.

The same situation applies to the unbalanced anchor. Because of the asymmetrical shape, the gravitational centre does not correspond with the rotating axis. When somebody wears a watch, the movement of the wrist constantly varies the position of the watch, ergo the movement, ergo the anchor. When the oscillation of the balance wheel and anchor are in line with the gravitational force, the first motion of the balance wheel takes more effort than the second motion. This causes a discrepancy in the regulation of the movement.

By making an addition to the anchor, the balance can be restored. This ensures that gravity has no influence on the motion of the anchor.
TESTING

The counterbalance was designed and then laser-cut by a specialist (the part is only 0.2mm thick). The results can be seen on the right. The counterbalance is press fitted on the axle of the anchor. A small ring is used in between as a spacer. Two different designs were tested. One inspired on a motorcycle wheel in reference to an old picture of Hubert’s grandfather on a harley davidson. The spokes have a technical look and feel and emphasize the rotating motion of the anchor. The second design is an abstract representation of the beak of a Pelican in reference to the company name.

The benefit of ballancing the anchor was not proven yet. Therefore the idea had to be tested. This was done with the help of a electronic tool that is used by watch makers. It is a small device that listens to the ticking of the movement. From the rhythm of the ticking, the device can deduct how accurate the movement is tracking time and the amplitude of the oscillation of the ballance wheel.

The electronic tool measures the movement’s timing in ten different positions. The first two positions are with the watch in horizontal position, with the dial upwards and downwards. For the remaining eight positions, the watch is turned on its side and rotated around its axle. These ten positions simulate the movement of the wrist during the day. The picture below illustrates the different positions for the watch and the according anchor inside the movement.

For the results of the test, it was expected that the regulation of the movement would become more accurate mostly in the zero and 180 degrees position for the reasons that are explained in the exaggerated example.
RESULTS

The graphs on the right present the results from the movement measurements. The y-scale represents the amount of seconds latency that the watch is expected to have during a day according to the measurement. The x-scale represents the different positions of the watch in which the accuracy of the movement was measured. And finally, the different colours represent the winding of the watch. In a watch that is fully wound, the mainspring is exerting a large force on the movement whereas a almost entirely unwound mainspring only exerts a small force. This influences the accuracy of the watch.

Even though the anchor has a increased moment of inertia, the graphs clearly show a large increase in accuracy. This leads to the conclusion that the moment of the anchor has very little influence on the regulation of the movement. This can be explained by the geometry of the anchor. The balance wheel exerts its force on the anchor at a position that is relatively far away from the axle of the anchor. As a result, the balance wheel creates a large moment on the anchor. A moment that is far larger than the moment of inertia. Thus making the added moment of inertia of the counterballance necligable.

The improvement that is illustrated in the graphs is quite drastic. The unballanced anchor has a maximum latency of 29 seconds a day, whereas the ballanced anchor delivered a maximum of 18 seconds. The average improvement over all positions is seven seconds.

MOMENT OF INERTIA

The addition of the counterballance also adds to the moment of inertia of the anchor. The increase in moment could affect the accuracy of the watch negatively as it would require a larger force to move the anchor back and forth. This would be especially true for an almost completely unwound watch. The increased necessary force to move the anchor would surpass the force the main spring delivers on the movement quicker than would be the case with the unballanced anchor. In order to solve this, the anchor itself had to be reduced in weight so that the moment of inertia remained the same.

This process involved a calculation of the moment of inertia of the anchor before and after the counterballance was added. With the help of this calculation, a balance was found between the dimensions and weight of the counterballance, the weight removal from the anchor and moments of inertia. The entire calculation can be found in the appendix (M).

However, removing weight from the anchor proved to be difficult in reality due to the small size of the anchor. Therefore the counterballance was first tested without any adjustments to the weight of the anchor. Meaning that the anchor had a increased moment of inertia.
Another interesting result is the fact that the winding of the watch has less influence on the latency. This is especially true for the 180 degrees position. With the unballanced anchor, the different rounds of winding have a standard deviation of 6.4 seconds. Whereas the ballanced anchor has a deviation of 3.0 seconds.

The hypotheses predicted that the ballanced anchor would improve the accuracy mainly in the zero and 180 degrees position and would have little influence on the deviation between the different windings. However, the results show that the reversed is true. The accuracy was improved evenly over all positions and the deviation between the windings mostly improved around the 180 degrees position.

Finding the exact explanation for these results is difficult. One of the possible explanations is that the ballanced anchor has less friction in the axle because the gravitational centre is alligned. This would improve the accuracy of the movement in all positions as the friction is not dependent on the orientation of the anchor. Furthermore, a smaller force would be necessary to move the anchor back and forth. The smaller force an almost entirely unwound main spring excerts on the anchor would then still be enough for a regulatory timing. Unfortunately, there is however no way to accurately verify this.
AESTHETICS
LIFESTYLE

As described in the chapter ‘Context mapping’, the mechanical watch is a very personal product. A watch tells a lot about the owner through aesthetics and the brand image. For this reason it was of high importance to look for a lifestyle that fitted Pellikaan Timing. In return the lifestyle helps fitting the aesthetics of the design with the company.

A male, in this example called Harry, was chosen as the consumer to design for. Harry is 39 years old and enjoys an above average income. His background is entrepreneurial and currently he owns a small ICT business with a close friend. Because of his company, his wife and daughter of 12 years old, Harry has an active life. To exercise and relax, Harry plays a couple matches of squash each week with some old school friends.

Harry drives a Audi stationwagon because he likes a goodlooking car, but functionality is just as important. Aside from his car, there are only a few objects that Harry really cares about. His Les-Paul guitar he had since he was 16 and a mechanical watch he got from his grandfather. The watch sparked his interest and he has been collecting mechanical watches ever since.

Harry always had an interest for old mechanical technology in modern products. He bought a tube amplifier to one day take apart but never gets to it. Secretly he hopes that one day he will have the time to buy an old cafe-racer and rebuild and modernize it so he could spend his retirement on the road.
DESIGN LANGUAGE

For the design language it was chosen to emphasize the qualities that the current clientele of Pellikaan Timing appreciate. Currently the Pellikaan Timing watches are mostly characterised by their signature dial design and the bold addition of a very large diamond shaped crown.

This boldness is something that needed to be present in the new design as well. A number of pictures were chosen to visualise the desired design language. These pictures are illustrated on the right and describe a modern language. The boldness is emphasized by the use of strong geometric shapes.

The shapes have been made interesting by the addition of a small twist to the design. Either by an elegantly placed chamfer/fillet or for example the use of complementary material finishes. The minimalistic design also give the products an exclusive and high quality feel.
CONTRASTING VISION

Company owner Hubert Pellikaan was also asked to make a collection of pictures that illustrated the vision that he had on product design. The results can be seen on the right and clearly show a belief in the ‘design follows function’ aesthetics. Hubert described his own taste to be for ‘bulky and tough products that do not look like they are designed’.

These images contrast very much with the images that were chosen on the left. They present a very eccentric taste in product design that reflects a completely different time period. In terms of inspiration for the new design, the pictures were used especially to characterize the boldness that needed to be presented into the designs. However, the modern take from the pictures on the left were taken as the leading inspiration. A more modern take on the watch design would likely appeal to a bigger audience which in turn makes the watch easier to sell.
The graphic on the right visualizes the thought process during the design phase. Adobe Illustrator was used to quickly make 2D presentations of different design ideas. For each idea, a geometric shape was taken as the basis.

The freedom in terms of shapes has been restricted by the functionality of the watch. The watch will have to accommodate a rotating dive bezel. Therefore, the shape of the bezel and dial has to be round. The thickness of the bezel was also predetermined. The larger the bezel, the higher the visual impact when the bezel is replaced with another design.

The exploration started with lugless designs. The simple shape of the watch corresponded well with the inspiration pictures but strayed too far away from Pellikaan Timing’s current portfolio. The two other options were lugs that were only functional, and lugs that extended the shape of the case. The designs that feature lugs that were molded into the shape of the case showed much more potential for a design that would stand out from the competition.

Another important addition to the design was a large crown protection in combination with a large crown. This emphasized the ‘boldness’ that was desired in the designs. In the appendix (G), six of the most promising designs are illustrated with different bezels and straps.

The asymmetrical cases were very unique and visually interesting. However, Hubert felt these cases were too unconventional and did not match with his personal taste.
ROTATING LUGS
The rotating lugs allow the watch to fold around the wrist and provide a more comfortable wear. The idea did not make it to the final design because a completely solid case created a stronger look.

LUGS PART OF THE CASE SHAPE

LARGE CROWN PROTECTION

MULTIPLE MATERIALS
The use of multiple materials created a more dynamic appearance but also overcrowded the aesthetics of the case very quickly. For a simpler to read case, it was chosen to stick to one material.

EXPOSED SCREWS
Exposing screws on the front of the watch is an aesthetic that is used more often to create a tough and mechanical look. It was not used in the final designs because it was distracting from the dial of the watch.

THREE FINAL CHOSEN DESIGNS
DIAL & HANDS

The dial is one of the signature design traits of the Pellikaan Timing watch. Customers of Pellikaan Timing like the readability and it is seen as one of the main selling points of the watch. For the new design, the same structure of time markers was used for continuity and recognizability.

Because of technical requirements, the bezel not only has to be wide but relatively high as well. This means that the dial of the watch is surrounded by a high wall. To compensate for this depth, the dial is divided in four layers. The hands are placed between the bottom and top layer. Because of this sandwich-like construction, the minute hand moves underneath the top layer, creating a more three dimensional sense of space on the dial.

For the hands a square shape was chosen to contrast the round dial design. The thickness of the hands could make the branding on the dial hard to read. Therefore windows were added so the dial could be seen through the hands. Additionally, the hands are painted in the same colour as the dial to decrease the visual impact even more. The large Superluminova-filled areas on the tips of the hands assure that the time is still easy to read from a distance.

Glow-in-the-dark view of the dial
THREE CONCEPTS

CONCEPT 1

CONCEPT 2

CONCEPT 3
TWO CONCEPTS

The decision for which watch to continue with fell hard on the company owner. To put the designs in perspective, he showed the designs to a number of watch enthusiasts including the owner of the watch magazine called Watching Magazine and the manager Haute-Horlogerie at Schaap&Citroen. A high-end jewelry store situated on multiple locations including the PC Hooftstraat. Most positive reactions were aimed towards the second concept.

Hubert himself expressed the most appreciation for the first concept. However, the design of the first concept was not completely to his satisfaction yet. Evidently, the owner had a wish to add a tough looking dive watch the the Pellikaan Timing portfolio. With this design project, the owner was looking to kill two birds with one stone. Aside of being modular, the watch primarily had to function and look like a dive watch.

In order to get a grip on what Hubert exactly was looking for, the first concept was adjusted to his exact wishes. The biggest modifications were the disposal of the large button on the left side of the watch and the design of the dial and bezel. The result is illustrated on the right.
In order to make a better argumented decision, the second concept and the adjusted first concept were presented through renders on the Facebook page of Pellikaan Timing, a well-known Dutch watch forum (Horloge-forum.nl) and on the Rikketik fair held on the 11th of January 2015 in Houten. At the Rikketik fair, the people (aside from renders on paper) were also presented with 3D printed models of both designs. Spread over these three media, a grand total of 95 people gave their opinion. An overview of the comments that were made can be found in the appendix (H).

From the comments could be concluded that the first concept was admired for its tough, strong and bulky design language. It was the more unique design of the two and fitted better with the idea of a divers watch. The negative opinions were mostly aimed towards the design of the dial as it was deemed too bulky.

The second concept was seen as a more commercial design, shaped to the needs of the general public. The shape of the crown protection was the feature that either made people love it or hate it. Interestingly, the crown protection was compared a lot with the crown protection for which Panerai is notorious. Nine out of ten people related the watch to Panerai for that reason. On the downside, the watch looked too big for some people.

On the Rikketik fair, people were asked which design they would rather have. Although most people were enthusiastic about both watches, 14 people choose the first concept whereas 26 went for the second design. Interestingly, there were also quite a number of people that would like to see the case design of concept one with the dial of concept two.

FINAL DESIGN

Panerai Radiomir
ALUMINUM PROTOTYPE

Renders only give a visual reference of the designs. To better understand the physical differences between the designs, aluminum prototypes were built for both designs. The goal for the prototypes was to simulate the watch as closely as possible so they could help judge not only the design's aesthetics, but also the positioning on the wrist, size and wearing comfort. Furthermore, the prototypes also served the purpose of judging the functionality of the bezel and strap changing mechanisms.

From the prototypes could be concluded that the second concept felt more comfortable on the wrist as the lug-to-lug distance is smaller by five millimeters. Both watches feel heavy on the wrist due to the quite large case size of 45 millimeters.

Due to the size of the case, the size of the crown and crown protection were of concern. However, on both watches the crown and crown protection did not interfere with the movement of the wrist. It is a common problem that large watches have a crown that painfully presses into the back of the hand with certain movements of the wrist. This was not the case for these models.

In terms of feasibility, the second concept proved to be more difficult to prototype. The crown protection needed to be a separate part so that the crown could still be assembled. Producing the crown protection is very difficult because of the small size and lack of areas where the part can be mounted into the milling machine.
DECISION

The conclusions from the prototypes and the feedback from the consumers led to the decision to go forward with the first concept that was adjusted to the wishes of the company’s owner. The Harris profile below illustrates the strengths and weaknesses of each concept.

The brand identities that both concepts expressed were the main drivers for the decision to drop the second concept. Almost all the consumers that were shown the second concept had affiliations with Panerai because of the signature crown protection. The release of this watch would have detrimental consequences to the brand identity of Pellikaan Timing.

Being unique in design is very important in the watch industry as it is such a large part of the attraction of the mechanical watch. The first concept allows Pellikaan Timing much more to set a bar for its unique way of looking at aesthetics with a tough but elegant design philosophy.

Even though the second concept was more promising in terms of popularity, the first concept fits better with the target group that Pellikaan Timing is trying to address. Another plus side of the first concept is the feasibility as the second concept is more difficult to produce which brings along certain risks in terms of investment costs. It might become apparent that the crown protection of the second concept is very expensive to produce.
ENGINEERING
STARTING POINT

In preparation of the engineering phase of the project, advice was taken from Jan Binnendijk and the CNC specialist from the Industrial Design faculty prototype workspace. Jan Binnendijk is a watch builder and owner of the Dutch watch company called Dumet Watches. Aside of designing and building his own watches, Jan also does production for other Dutch watch companies. During a visit of his workshop, he was able to give advice on the production of a watchcase and the possibilities and restrictions of CNC milling.

MOVEMENT

The movement is the basis around which the case is engineered. The measurements of the movement dictate the minimal size of the watch and the positioning of the crown. The mechanical watch industry is very much a closed market. To acquire movements, contacts in the right places are necessary. Currently, Pellikaan Timing purchases ETA movements from a company in Germany who distributes them. Getting movements directly from ETA is impossible because the company only produces for large companies. For more special custom movements, Pellikaan Timing works with Isoprog. A French company that customizes and improves standard movements from ETA. Currently Isoprog offers eight different movements. An overview of these movements can be found in the appendix.

As discussed in chapter ‘Competitors’, the suggested price tag for the watch will be around 4,000 euros. For watches in this price range customers expect something different than a standardised movement from ETA. For this reason a customised ETA 6498 movement from Isoprog was chosen as the basis of the watch. The movement has a diameter of 37.2 mm and has a central second hand.

Isoprog also has a edition of this movement that has a black rhodium plated finish. This finish is very uncommon and compliments the sandblasted metal look of the case very well. Therefore this edition was chosen to be fitted into the watch.
ENGINEERING RESEARCH

A number of watches were taken apart and studied to further research the construction, assembly and production of a standard watch. The study gave insight into the spring system that is used to create the rotating bezel of a dive watch. Other insights involved the waterproofing, required parts and assembly of a watch. This information was used for the development of the Pellikaan Timing watch.

BEZEL

The dive bezel is a three-part system. The bezel itself, a click spring and a bezel spring. When the bezel is assembled, the click ring is placed on the topside of the case around the dial. On top of the click ring the bezel is snapped into place with the help of the bezel spring.

The click spring is a flat metal ring that has sections that are bend upward or downward. The downward bend sections fit exactly in small slots that are drilled into the case. These keep the ring in place and make sure that the ring cannot rotate. The upward bend sections act like small springs that press against the underside of the bezel. This underside has a saw-like pattern with sixty points that correspond with the sixty minutes that are displayed on the front of the bezel.

When the bezel is rotated, the spring-like sections bend and snap back in each notch as they pass by. The saw-like shape allows the spring to give way in one direction but blocks rotation in the other direction. This construction creates the signature clicking sound and provides the unidirectional rotation of the bezel.

To snap the bezel in place on the case a bezel spring is used. This angular ring works as a retaining ring. The bezel has a slot on the inside and the watchcase has a corresponding slot on the outside. During the assembly of the bezel, the bezel spring is placed in the bezel slot. Then the bezel is press fitted onto the case. The two slots align and the bezel spring snaps in place between the two parts. The points of the octagonal shape of the bezel spring stick into the bezel slot and the straight sections fit into the case slot. The bezel cannot be removed from the case but can still rotate freely.
A waterproof case is very important to prevent damage to the movement. Especially in the case of a divers watch. A watch is made waterproof with the help of rubber O-rings that are placed in between vulnerable parts in terms of water tightness. These vulnerable areas are the glass windows, the caseback and the crown.

During assembly, the glass window is press fitted into the case. An I-ring, usually made from nylon, provides a watertight seal between the glass and the case. The same construction for the window on the back side of the watch.

The watertight connection between the caseback and the case is a different story. The caseback will be removed from the case a number of times during the lifetime of the watch for maintenance of the movement. Instead of a nylon I-ring, a rubber O-ring is placed in between the case and the caseback. When the caseback is screwed into the case, the rubber O-ring is squeezed between the two parts, thus creating a watertight seal.

Another vulnerable part is the crown. The crown stem has to reach through the case in order to manipulate the movement. To waterproof this opening in the case, the case is fitted with a crown tube. This tube is press fitted into the case. The tolerances on this press fit are high enough to prevent water from leaking through. The tube partially sticks out of the case and the crown is fitted over this tube. The inside of the crown is fitted with small O-rings that provide a watertight seal between the crown and crown tube. Thereby preventing water to enter the case.

**ASSEMBLY**

The mechanical watch has a specific sequence of assembly that is required. The assembly of a watch starts with the movement. The movement is fixed to a movement holder. This holder prevents the movement from directly touching the case which could potentionally damage the gears. The holder also keeps the movement in place.

The second step is to place the dial inside the case. The movement and holder are inserted into the case to trap the dial inside. To lock all the parts in place, a circular spring is inserted into the case. Finally the case is closed by screwing the caseback.

The circular spring between the movement holder and the caseback has two functions. Primarily, the spring exerts a constant force on the movement holder, pushing the movement and dial against the top section of the case and holding them in place. And secondly, the spring also pushes back on the caseback. This force is necessary as it creates friction and prevents the caseback from loosening easily.

To complete the assembly, the crown together with its stem is inserted from the side of the case. The stem locks into the gears of the movement so that the watch can be wound with the crown.
MECHANISMS

The functionality of the watch requires two mechanisms. One to release the straps and another to release the bezel so they can be replaced. Firstly it was attempted to combine both mechanisms so that both functionalities could be regulated through one button. However, first drafts of this system quickly lead to the conclusion that the one-button system would be impossible to achieve due to lack of space in the case.

Therefore the two mechanisms were separated. The bezel mechanism would be operated through a button on the left side of the watch and the lugs would be operated from the right side of the watch through a interaction with the crown protection.

LUGS

The challenge for the lug mechanism was to create an easy to use system that locked the straps firmly in place. In a normal watch, the straps are connected to the case using a small bar with spring loaded pins on both ends. The pins can be retracted by putting force on them, allowing the bar to be placed in between the two lugs of the watch. To release the strap again, a special tool is needed that can latch behind the pins and retract them while they are pushed inside the lugs.

From a selection of ideas, the mechanism depicted on the right was chosen (version 1). For an overview of the other ideas, see the appendix (K). This mechanism features a crown protection that can be pulled outward from the case. With this action,
the attached lugs would be pulled along and unlocked from the case, allowing them to rotate. This created the space needed to remove and replace the straps, without having to retract the spring-loaded pins.

A 2:1 scale model with this mechanism was 3D printed to experience how the interaction would be. From this model, it could be concluded that the freely rotating lugs had a bad influence on the experience of the watch. A more restricted movement of the lugs would likely create a more sturdy experience that was better fitting of an expensive mechanical watch.

A different mechanism was chosen (version 2). By rotating the crown protection ninety degrees, space was created to allow the lugs to slide away from the strap. Small springs inside the case push the slider back to the original position after the strap has been removed. This mechanism was further developed in the engineering phase.

**BEZEL**

The biggest challenge for the bezel mechanism was the functionality of a divers bezel. A dive bezel has a rotating ring that can rotate in one direction. The click spring inside the bezel creates the signature clicking sound and restricts the rotational movement of the bezel. Normally this spring is situated in between the bezel and the case. However, with the removeable bezel, the spring system had to be implemented inside the bezel.

For this reason, the space for the implementation of a releasing mechanism inside the bezel was very limited. As a result, the mechanism needed to be placed inside the case. To create a tight and sturdy fit, the bezel has to lock into the case in at least two places. Multiple mechanisms were considered (see appendix (K)). The mechanism that provided the best locking system and was easiest to use is illustrated in the picture below. The bezel has two external snap fits that click into the case. To release the snap fits, the user has to slide a button on the left side of the watch. This button is connected to a slider inside of the case that has wedges on both ends. These wedges push against the snap fits and release them from the case.
The concept mechanisms were taken into 3D CAD software for further development. The challenge was to fit all the mechanisms within a watchcase that was no larger than 45 mm. The larger the watch, the less wearable it becomes for the targeted demographic.

With the implementation of the customized ETA 6498 movement, the space between the movement and outer wall of the watch was 3.9 mm wide. The development of the model went through many versions. The most important being the one that is presented on this page.

The two most defining factors in the engineering phase were the assembly and the water tightening of the watch. This played mostly a role with the lug mechanism.

To make assembly of the mechanism possible, the case had to be divided into three parts. The assembly of the watch with the mechanism is illustrated in the pictures on the right. The first step is to insert the lugs and crown protection into the middle section of the case. The front section can then be lowered into the middle section (step 3).

The geometry of the front section locks in the lugs and the crown protection. A more detailed explanation of the geometry can be found in the appendix (I). When this step is completed, the movement can be placed in the case and locked in place by inserting the crown from the outside through the crown protection and case into the movement. The final step is to close the case with the back section.

The easiest way of connecting the three sections of the case would be to screw the front and back section of the watch to the middle section. However, the openings in the middle section for the lugs and crown protection would allow water to leak into the watch.

In order to create a watertight box for the movement, the solution was to create a inner wall that connected the back section directly to the front section. This direct connection between the front and back section created a watertight box for the movement. The middle section, lugs and crown protection were clamped on the outside of the box inbetween the back and front section. This construction allowed the mechanisms for the lugs and bezel to operate outside of the waterproof box. The crown tube was placed in the front section of the case and the crown protection rotated around the tube.
ASSEMBLY STEP 3

ASSEMBLY STEP 4

ASSEMBLY STEP 5

SECTION VIEW OF THE 3D MODEL

Hands

Movement holder

Case - Top

Crown protection

Crown tube

Case - Middle

Bezel release slider

Circular spring

Case - Back

Sapphire glass window

Dial

Crown

Movement

Case - Top

Sapphire glass window
PROTOTYPE LUG MECHANISM

To test the functionality and user experience of the previous described and developed lug mechanism, a 1:1 scale prototype was built from aluminium. This prototype was built in advance of the the prototypes that were mentioned in the chapter ‘Final design’. The following conclusions were made from the model:

The spring loaded pins were far more powerful than expected. A lot of force was needed to trap the pins between the lugs. More force than any spring inside the case could ever compensate for. To get the lugs to trap the pins automatically with the help of a spring inside the case, the bar would have to be replaced with a non-spring loaded bar. These are not common and would have to be delivered with the watch so that customers can replace the spring loaded bars in their straps for the non-spring loaded,

Secondly, the lugs do not move away perpendicular to the bar but more in a angular direction. As a result, the strap is pushed against the case when the lug is moved towards the open position. It also made it harder to align the bar with the hole inside the lug when the lug was closed again.

The sliding range of the lug was just enough to let the strap through and close adequately again. The user experience would be improved greatly if the range was larger so that the strap was easier to place between the lugs. Sadly, due to the lack of space, the current range was already optimised. Finally, the 3D CAD model was taken to the Model Making and Machine lab of the TU Delft. The CNC specialist advised that the case sections would be very difficult and therefore expensive to make. Namely the lugs and crown protection are very small and difficult to clamp in a milling machine. Specialized tools would be required which increases the production costs dramatically. Far beyond the prefered cost price of around 300 to 400 euros.

CONSEQUENCES

In discussion with the company owner it was decided that the risks were too high to continue with the lug mechanism. The prototype showed that the mechanism had potential but also brought a lot of problems to the surface. Trying to solve the problems at hand would require a complete rework of the mechanism. In addition, reworking or implementation of another mechanism would lead to the same clamping issue during production as small parts will always be necessary to create a functioning mechanism.

Due to the small size of the company, Pellikaan Timing cannot afford the risks of implementing a mechanism that does not work to the completely desired effect. Therefore it was decided to only add the bezel releasing mechanism which in contrast to the lug mechanism only has one moving part that is much easier to produce as well.
The decision to drop the lugs mechanism lead to a much simpler design of the watch case. The lugs and crown protection are solidly connected to the front section of the case. This allowed the front and middle section to be merged into one part. Creating a two part assembly instead of three. This type of watch construction is used in most mechanical watch.

In order to create a waterproof box for the movement, the case still needs to have an inner wall that is connected with the case back. The bezel mechanism has a sliding button that requires an opening in the side of the case. Without an inner wall, water can leak into the case.

For a fully watertight seal, a rubber O-ring is placed between the inner wall of the case and the case back. The section view that is illustrated below gives an overview of how the case is constructed.

The two aluminum prototypes that were mentioned in the chapter ‘Final design’ were built after this decision was made and therefore also do not have the lug mechanism incorporated.
SOLIDWORKS BEZEL

As mentioned before the divers bezel had to be extra thick and high in order to make room for the click spring. The divers bezel is the only bezel that requires internal parts as other bezel designs have no use for a rotating system. For this reason the dive bezel was taken as the basis for the engineering phase. Other bezel designs can easily be adjusted to the measurements of the divers bezel.

The initial idea for the bezel mechanism had a snap fit design that clicked into the case. To see what kind of force was necessary to move the snap fit so the bezel could be released, a calculation was made using the Finite Element Method. This calculation showed that the snap fit was far too short to provide any elasticity. Essentially the snap fit had to be made from plastic before an acceptable force came even into range of the average person’s strength. See the appendix (L) for the results of the calculations.

As a result, the snap fit was replaced with a latching system. The pictures on the right illustrate the interaction between the bezel and the slider inside the case. Instead of snap fits, the bottom of the bezel has two extensions with horizontal slots carved into them. The slider inside the case is shaped to fit into the slots of the bezel. A spring constantly pushes the slider into the slots. To release the bezel, the user has to push the slider. This rotates the slider and unlocks the bezel. When the user wants to put a new bezel on the case, the process simply is reversed.
DIVE BEZEL

The click and rotation system of the dive bezel is in essence the same as the system that was studied in the chapter 'Engineering research'. With the biggest difference being the placement of the system inside of the bezel instead of inbetween the bezel and the case.

The bezel is divided into two parts. The top layer can rotate freely around the bottom layer. The bottom layer is fixed to the case with the help of the two extensions. Inbetween the two layers there is a space for the click spring. The top layer is fitted with 60 notches that together with the click spring create the unidirectional rotation and the signature clicking sound.

Furthermore a hexagonal spring is fitted between the two layers. This spring keeps the two layers together but still allows them to rotate.

ALUMINUM PROTOTYPE

The aluminum prototypes that were described in the chapter 'Final design' had the mechanism incorporated into the model. The mechanism in the prototype functioned correctly but required a few adjustments to make it work perfectly.

The space for the bezel ring was too small, which allowed the two parts of the bezel to snap loose when too much pressure was applied. And the extensions at the bottom of the bezel were too small. A wider extension would provide more area for the slider to latch onto and would create a tighter lock.

The two pictures on the right are the rotating and stationary layers of the aluminum prototype. During the build of the prototype, only a mill with a diameter of two millimeters was available which caused the bezel to only have enough space for thirty notches instead of sixty.
PRODUCTION

MATERIAL

More than 50% of all watches are made from steel. However, in the higher price range it is common to take materials that are a little bit more exotic. Examples of this are the precious metals such as gold and silver. Another high end material that is often used is titanium. Titanium is known for its high corrosion resistance and strength-to-density ratio.

These characteristics fit very well with the company values of creating watches that are tough and a match for any situation. Titanium’s resistance to dents and scratching emphasizes the durability of the watch.

The newest watch releases suggest that experimenting with new materials might be a trend to be seen in 2015. However, this does not fit the no-nonsense and down to earth image Pellikaan Timing currently has. For this reason it was chosen to stick with the more common but better fitting titanium.

There are multiple alloys of titanium. These alloys are called ‘grades’. The two most common grades are titanium grade two and five because of their high strength and corrosion resistance. Both grades are also suitable for milling. For the watch it was chosen to go with grade two. This grade is generally easier to come by.

<table>
<thead>
<tr>
<th>Number</th>
<th>Material</th>
<th>Standard part</th>
<th>Production method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nylon</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Titanium</td>
<td>X</td>
<td>Turned on a lathe, then the slots for opening and closing the caseback are milled. The part is finished by sandblasting.</td>
</tr>
<tr>
<td>3</td>
<td>Spring Steel</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Mostly brass</td>
<td>X</td>
<td>The counterbalance for the anchor is lasercut from 0.2 millimeter thick sheets of brass and is assembled into the movement by Hubert.</td>
</tr>
<tr>
<td>5</td>
<td>Brass</td>
<td>X</td>
<td>Lasercut from 0.3 mm thick sheets. Super luminova for the hour markers are placed by hand. The graphics are printed at Bedford Dials in England.</td>
</tr>
<tr>
<td>6</td>
<td>Titanium</td>
<td>X</td>
<td>Lasercut profile from 3.8 mm thick sheets. Then the part is lasermilled to create the slot that slides in part two. Finished by sandblasting.</td>
</tr>
<tr>
<td>7</td>
<td>Titanium</td>
<td>X</td>
<td>Milled from a 20 mm thick blank. The geometry of the case requires four milling directions (four reloads in the fixture). The indentations for the strap pins are created by drilling slanted holes. Finished by sandblasting.</td>
</tr>
<tr>
<td>8</td>
<td>Brass</td>
<td>X</td>
<td>Lasercut from 0.3 mm thick sheets. Super luminova is placed by hand.</td>
</tr>
<tr>
<td>9</td>
<td>Sapphire</td>
<td>X</td>
<td>Turned on a lathe, then the slots for the clicking mechanism are milled. Finished by sandblasting.</td>
</tr>
<tr>
<td>10</td>
<td>Titanium</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Sapphire</td>
<td>X</td>
<td>Turned on a lathe to the correct size</td>
</tr>
<tr>
<td>12</td>
<td>Rubber</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Brass</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Brass</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Titanium</td>
<td>X</td>
<td>Lasercut profile from 3.8 mm thick sheets. Then the part is lasermilled to create the slot that slides in part one. Finished by sandblasting.</td>
</tr>
<tr>
<td>16</td>
<td>Stainless steel</td>
<td>X</td>
<td>Sandblasted finish</td>
</tr>
<tr>
<td>17</td>
<td>Nylon</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Titanium</td>
<td>X</td>
<td>Turned on a lathe. After which the bottom is milled until only the two extensions are left. Finished by sandblasting.</td>
</tr>
</tbody>
</table>
PRODUCTION COSTS

The following estimations were made assuming a very small production run of three watches. The watch will not be sold in high numbers, especially in the early stages of market introduction.

In the table on the right, the supplier or producer of each part is indicated. Most notable is Dumet Watches. The one-man business run by Jan Binnendijk. The company was chosen for its relatively cheap production costs in comparison with other companies.

Another benefit of Dumet watches is the experience in the watchmaking business. A watch is a small object that requires high precision and ‘delicate’ machining. The drawback is the delivery time of the products as Jan Binnendijk has to perform all the work by himself. However, due to the low amount of enquired watches, this is not an issue.

The total estimated production costs of one watch will be €1,027,50. The movement is responsible for almost half of that sum. The second largest cost item is the production of the case. Aside from the production costs, there are additional expenses involved that influence the final price tag of the watch. These include transport costs, taxes, a margin for the retailer. Assembly will be done by hand by Hubert himself.

To make a profit, these costs needs to be compensated for together with a margin for Pellikaan Timing. Taking a multiplication of the production costs by four times as a rule of thumb, the final price tag of the watch will need to be around €4,100,- in order for Pellikaan Timing to make a profit.

<table>
<thead>
<tr>
<th>Part</th>
<th>Company</th>
<th>Standard part cost</th>
<th>Production cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-ring (2x)</td>
<td>VOF vandegevel</td>
<td>€5,-</td>
<td></td>
</tr>
<tr>
<td>Caseback</td>
<td>Dumet Watches</td>
<td>€50,-</td>
<td></td>
</tr>
<tr>
<td>Spring</td>
<td>Soprod</td>
<td>€1,-</td>
<td></td>
</tr>
<tr>
<td>Movement</td>
<td>Isoprog</td>
<td>€460,-</td>
<td></td>
</tr>
<tr>
<td>Dial</td>
<td>Veldlaser/Bedford dials</td>
<td>€40,-</td>
<td></td>
</tr>
<tr>
<td>Slider pt. 2</td>
<td>Dumet Watches</td>
<td>€50,-</td>
<td></td>
</tr>
<tr>
<td>Case</td>
<td>Dumet Watches</td>
<td>€200,-</td>
<td></td>
</tr>
<tr>
<td>Hands</td>
<td>Veldlaser</td>
<td>€40,-</td>
<td></td>
</tr>
<tr>
<td>Front window</td>
<td>VOF vandegevel</td>
<td>€16,-</td>
<td>€50,-</td>
</tr>
<tr>
<td>Bezel pt. 2</td>
<td>Dumet Watches</td>
<td>€16,-</td>
<td></td>
</tr>
<tr>
<td>Back window</td>
<td>VOF vandegevel</td>
<td>€3,50</td>
<td></td>
</tr>
<tr>
<td>Waterproofing ring</td>
<td>VOF vandegevel</td>
<td>€3,50</td>
<td></td>
</tr>
<tr>
<td>Movement holder</td>
<td>Soprod</td>
<td>€2,-</td>
<td></td>
</tr>
<tr>
<td>Dial blank</td>
<td>Cador</td>
<td>€3,-</td>
<td></td>
</tr>
<tr>
<td>Slider pt. 1</td>
<td>Dumet Watches</td>
<td>€50,-</td>
<td></td>
</tr>
<tr>
<td>Crown</td>
<td>VOF Vandegevel</td>
<td>€5,-</td>
<td></td>
</tr>
<tr>
<td>Crown tube</td>
<td>Kemmner</td>
<td>€1,-</td>
<td></td>
</tr>
<tr>
<td>Bezel pt. 1</td>
<td>Dumet Watches</td>
<td>€35,-</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL**

€ 506,50
€ 521,00
€ 1,027,50
FINAL PRODUCT
The results from the previous chapters have led to a final design that is illustrated on the following pages. The watch will be called the Pellikaan Timing Stingray. The watch will primarily be marketed as a divers watch. This fact together with the colour/finish of the titanium case and the ‘tough’ aesthetics have led to reference of a stingray. The seacreature is both elegant and fierce. This resonates well with the image that the watch is portraying.

Two adjustments were made to the aesthetics after the engineering phase. The size of the crown was increased with two millimeters. This increase in size allows the user to have an easier grip on the crown, as well as toughens the look of the watch. The second adjustment is the minute hand. The hand has a point instead of a flat end. This was done to increase the contrast between the hour and minute hand. Additionally, the pointing end allows the minutes to be read more accurately.

PELLIKAAN TIMING STINGRAY
PACKAGING

With a high end watch, a high end packaging is expected. Mechanical watches are commonly packaged in a manner that is similar to jewelry. In a fabric covered box with foam bedded internals. The watch is placed around a circular cushion in an upright position.

For the Stingray it was chosen to do a similar thing but in a more high-end fashion. Instead of a fabric covered box, the main material is mahogany wood. Mahogany was chosen for its durability, excellent workability and warm colour. The wood gives the box a sense of something precious kept within.

The lid of the box has a brushed metal inlay with a laser cut 2D representation of the dial and bezel. The company name is also cut into the metal inlay. The brushed metal contrasts with the wood and assures that the box has a modern and fresh aesthetic.

The inside of the box has a black fabric bedding. The watch is on the right of the box and is presented to the owner on a circular cushion. On the left of the watch a number of cut-outs provide room for the accessories. The accessories consist of two extra bezel designs, a tool to remove the bracelet and a business card.

The packaging will be made by a personal friend of the company owner who is a furniture maker with a lot of experience with wooden products.
MARKETING
The launch of the new watch also presents a great opportunity to improve the company’s marketing strategy. As was described in the chapter ‘Company strategy’, Pellikaan Timing has some issues with the brand perception not matching the brand image. The consumers do not seem to recognize the values of usability and technology in the watches. This has a big influence on the authenticity of the brand as the core values are supposed to connect the consumer with the brand.

This discrepancy is due to the fact that the Pellikaan Timing watches are not exceptional in comparison to the competitors with the values in mind. The technology and usability of the watches are very comparable to almost any other watch in the same price range. Only the readability of the dial seems to be a key feature that sets the watches apart from the competitors.

In recognition, Pellikaan Timing is collaborating with Dutch Luxury Design. DLD is a company that sells high-end design products and art on an international market. Together with DLD, Pellikaan Timing has made an effort to make some changes in the brand positioning on the market.

Together with DLD it has been decided to divide the portfolio into two sections. The original models will be put in the first section. These are the models that are fully available in production numbers. The prices of these watches stay within the 900 to 2000 euro range. Next to these watches, a second section will be added to the portfolio with ‘special editions’. These are watches that are sold in limited numbers. The first two watch models in this section are the Stingray and a special luxury edition of the Flying Dutchman that will be created in collaboration with DLD.

However, to address the brand perception, some more invasive changes needed to be made. Therefore Pellikaan Timing was advised to partially alter the core values to fit more with the current strengths of the company. Instead of technology, usability and readability, the three new core values will be technology, design and service.

TECHNOLOGY

Technology is not a strength of the company in the current state. The movements that are used are standard and are not improved in any way. But this is subject to change with the division of the portfolio. The special editions section of the portfolio is meant to emphasize the core value of technology. All movements in this section will be high-grade. Meaning they have a higher accuracy and built quality. Secondly, the ballanced anchor will be implemented as a technical improvement. The goal is to keep adding technology improvements in the future. Strengthening the brands position as a technology pushing company.

DESIGN

The questionnaire that was described in the chapter ‘Brand strategy’ showed that the customers very much appreciate the Pellikaan Timing dial design. Not only for its readability but also for its modern and minimalistic appearance. Instead of only have readability, it was chosen to change the value into ‘Design’. This value embodies the unique vision on design that Hubert has. This value is presented by the boldness of the crown shape and size, and the minimalistic features of the dial in the current portfolio and by the bulky and tough design of the Stingray.

SERVICE

The same questionnaire also showed that the value of usability is not recognised by the customers. Additionally, owners do not pay special attention to prevent scratching or damaging their watch in daily use (with exception of water damage). For that reason the value of usability was dropped completely.

With the usability value being dropped, the third core value could be filled in by a new strength of the company. One that has not been exploited very well yet. Which is the service Hubert provides with his watches. The context mapping session showed that consumers very much value the service a company provides with the watch. The small company size of Pellikaan Timing has always allowed Hubert to have close contact with a large portion of its customers. Customers often personally come by Hubert his house to deliver a watch that needs something to be fixed and to talk to Hubert about how Pellikaan Timing is doing. This
service is of high value but is never marketed to be a strength of the company. By making it a core value, it should receive more attention.

With these changes the technology aspect is elaborated much more. The values of usability and readability are redirected into the value of design. And finally the value of service is added. These new values should fit better with the consumers perception of the brand and simultaneously allow Pellikaan Timing to marketeer its competitive strengths.

WEBSITE

With these changes, it it also advisable to make some changes to the current website of Pellikaan Timing. At the moment the website does not spend a lot of attention to the core values. At the bottom of the homepage there is a link that refers to the company’s values. The link is hidden away and not much information is given about the choice for these values and what they mean for the company’s vision.

With the launch of the Stingray, the new values should be advertised as well. This will help to create a stronger bond between the watch and the company.
LAUNCH STRATEGY

Pellikaan Timing is a small company with a relatively small amount of resources to spend on the investments that are required to build the first batch of watches. The risk is high as the production costs are relatively high and there is always a chance that something does not go according to plan. This is especially the case with a new product. In order to minimize risks, Pellikaan Timing is advised to take the following strategy in mind with the launch of the product.

FINDING INVESTORS

To avoid spending money on the production of a large number watches that do not sell (in worst case scenario), Pellikaan Timing should focus on finding a small group of investors. People that are interested in taking a small risk in return for being the first owners of the new watch. The investors pay for the production costs of the first batch of watches. In return they receive the watches with a discount. Pellikaan Timing can promise these investors a little extra by making these first watches part of an exclusive and limited production. For instance by engraving each of watches with a production number, e.g. “02 of 15 First Editions”. The exclusivity increases the attraction to be one of the first owners of the watch.

This arrangement allows Pellikaan Timing to do a test production at low costs. Finding a reliable production facility with a quality output that fits the market price of the watch.

For the investors, it means they take a small risk by investing money in a product that does not physically exist yet. The risk being that something can go wrong during the production of the first watches due to it being a new product.

To lower the threshold and create confidence in the success of the production, a prototype of the watch can be made. The prototype will need to be a completely accurate representation of the final product. In functionality, as well as in aesthetics and manner of production. This prototype can be used to show investors that they are getting their money’s worth and should also improve the confidence in the production methods.

MARKETING

When the first batch with investors succeeds, the production process is settled. Pellikaan Timing knows what the production costs are and what market price needs to be handled in order to make a good revenue. The watches can be ordered and produced at will at a reliable and high quality production facility.

In order to gain profit, it is important to find as many customers as possible. Again, Pellikaan Timing is a small company and therefore does not have a lot of money to spend on marketing. An occasional article in a watch magazine and a banner on the website of the magazine are already limiting the resources.

To help with the marketing, a promotional video was made of the watch. In this video, the watch is showcased through some animated exploded views and a fly-by of the watch in multiple views. The video can be used to quickly enthuse customers for the product. The video can be presented on the Pellikaan Timing website and can also be used as means to create media attention for the product.

The video can be viewed on the Pellikaan Timing website: www.PellikaanTiming.nl

SERVICE

The Stingray provides a good opportunity to emphasize the three core values. Alongside of design and technology, the watch can reinforce the value of personal service. The Stingray has limitless options for the design of the bezels. The original Stingray will be delivered with three separate bezels.

However, the packaging can for instance be delivered with a special card that tells the owner he can send the watch back to Pellikaan Timing once a year for a free service check-up. This can serve as a good advertising tool, as well as introduces the customers to the company owner. This creates a stronger bond between the company and the customer.
The goal of the project was to design a mechanical watch that provides a new direction for the current product portfolio of Pellikaan Timing.

This was achieved by analysing the meaning of the mechanical watch for the consumer. From a context mapping session could be concluded that the mechanical watch is a very personal product. The owner connects heavily with the watch as well as with the corresponding company.

A number of ideas were created that would give the watch a competitive advantage through a functional innovation. The inspiration for these ideas was taken from characteristics of the mechanical watch industry and observations made from watch enthusiasts. The concept of a modular watch proved to have the most potential. Aside from the functionality, different options for the aesthetics were explored as well.

At multiple stages of the project, prototypes were built to support the decision making process. These prototypes lead to the conclusion to only incorporate the modularity of the watch in the bezel. The prototypes simultaneously also served as a proof of concept for possible investors.

The final engineering phase of the project resulted in the Pellikaan Timing Stingray. A watch with a diameter of 45 millimeters. The bezel of the watch can be replaced easily through a simple sliding button on the side of the case.

The Stingray is an accurate representation of the company owner’s vision on watch design. Additionally, the watch provides a lot of opportunity to advertise the company’s new core values. Not only in terms of design and technology, but also in terms of service.

The Stingray will be launched with the help of a small group of investors. The investors are attracted using a promotional video that was made of the Stingray.

One of the weaknesses of Pellikaan Timing is the lack of knowledge in marketing and branding. Coincidently, these two areas of expertise are of a lot of importance in the watch industry. The story a company tells through branding is one of the main selling points. This has become particularly evident during the design project of the Pellikaan Timing Stingray. Pellikaan Timing would benefit greatly by hiring a professional that can help Pellikaan Timing further develop the brand strategy.

Additionally, the release of the Stingray should pick up some media attention from watch magazines and blogs. It would therefore be wise to make adjustments to the website before the product is released. Any article that is written about the Stingray will likely refer to the website and this makes the website one of the main channels for Pellikaan Timing to introduce the new core values to the customers.
REFERENCES

9. Article from Rikketik.nl, number 2 (april 2014). ‘Het ontstaan van de pilotenhorloges of B-uhren’