

Daria Ageeva

DESIGN CONCEPT FOR A NEW ELECTRIC CENTRIFUGAL JUICER

For Russian company Zencha

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Author (authors) Daria Ageeva	Degree Bachelor of Culture and Arts	Time November 2016
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<p>Abstract</p> <p>This thesis work demonstrates the product design process employed by the author when creating a new domestic appliance concept. The work was carried out in collaboration with industrial design and engineering firm Forma Studio in St Petersburg and describes the multiple steps the designer went through to achieve the goal.</p> <p>The project aimed to create a series of three-dimensional concept visualisations of an electric centrifugal juicer for Zencha, a Russian company that intends to extend its current product range into the manufacture of domestic appliances.</p> <p>The primary objective of this study was to create a unique product that would both successfully represent the company's brand identity in this new product area and satisfy all the design requirements set by the client in their brief. Furthermore, the product should meet the functionality demanded and at the same time remain unique enough to excite both the customer and future consumers, making it a desirable purchase.</p> <p>The research centred on finding useful information regarding the mechanical workings of juicers, competitor analysis of the visual styles and forms used within this field and the use of materials and different manufacturing techniques. This was then used to guide the design process, the most significant research part being the technical feasibility of the product, which led to the ideas framing the project in a specific way. The final model's appearance is only a concept and far from a functioning final prototype for mass production but the technical side of the product has been considered.</p>		
<p>Keywords</p> <p>Concept design, rendering, juicer, domestic appliances design, 3D, modelling, product design, industrial design</p>		

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1 INTRODUCTION

Design is everywhere. That is probably the most general definition, but at the same time, it is hard to explain in other words. We can notice it all around – the chair you sit on, the car you drive every day, the websites you use sometimes and even the fishing rod you never use. Design is universal and comprehensive, and it penetrates into all the scopes of our lives.

The bounds of design, art and engineering are always overlapping to some extent, especially when talking about industrial design. Industrial design means creating and building up ideas and concepts that consider many aspects (visual, functional, etc.) to satisfy manufacturer and end user equally. (Industrial Designers Society of America, 2010). This field grabs terrifically much inside it, and it is incredibly hard to imagine. Nevertheless, the research will focus on concept design.

Concept design today is an independent process within product development. However, it is an integral part of it. A designer has to join ideas, perceptions, feelings and experiences facing endless possibilities and deliver them into a strong concept that should likewise consider the underlying issues and key elements of the certain field. Indeed, this task is complicated and requires a good research base.

After an internship in studio Forma (industrial design and engineering) in summer 2016, there appeared a real chance to participate in a project which was aimed to create a concept design of a new electric centrifugal juicer for a company producing different domestic appliances. The studio has been working with this company before and made some engineering projects successfully, and that helped to get a clearer idea of what the company is, in fact. After that, a long procedure of research and analysis has started. Seeking information turned out challenging because of the lack of sources and time. The project was wedged into three weeks in September and took place in Saint-Petersburg, Russia. There was no chance to go to a library and get some books, so there

was nothing to do but only surf the internet. I completed the work with some instructions and guiding from other designers and engineers at the studio.

The main objective of this work is to make a conceptual 3-dimensional juicer model and its renderings that are going to be shown to the client for further product development decision. The concept is supposed to demonstrate how the product can look like and keep the company's identity as well. The main idea of the concept is to prove that functional device can have an unusual, attractive design and keep its function as well. If the task is fulfilled well enough, there is a big perspective of mass production in future. For sure, it needs a lot of time for development and engineering; however, it is worth trying.

2 PRODUCT DESIGN PROCESS

Product design, in its simplest definition, is the design of goods. In its wider meaning, it involves ideation, concepting, product testing, prototyping or/and manufacturing of an object, system or service. It is also important as a commercial activity as it helps to convince businesses of doing products that please consumers. It can provide answers to unsolved problems, ways to improve appearance or functions. Product design is also a significant strategic tool in creating values for customers. If a product was designed competently, it is affordable, usable, practical, reliable and attractive, it makes emotional ties and increases the loyalty to the product (Milton 2011, 6-8). Design is basically about improving, problem-solving and making things better for everybody, for users, consumers, business and to the world.

Product designer designs a bigger part of the things we use in our everyday life: home appliances, computers, electronic devices, furniture, etc. The important tasks for product designers are to improve things to make them readily usable and functional, consider the latest technological and manufacturing trends, use new materials to make production more efficient and open new creative horizons (Milton 2011, 20). A product designer's role covers many fields like engineering, design, management, marketing, and overlaps also science, art, and commerce aiming at producing the actual product (Milton 2011, 6).

Product design process includes many sub-processes, and they focus on various aspects. The process is commonly completed by an association of industrial designers, particular speciality experts, engineers, etc. and it is up to the product involved. The process focuses on framing the problem, ideating and prototyping. However, it not the end. It is still needed to make the idea into an actual product and estimate the result if any improvements are necessary. If we look deeper, it has even more stages depending on each case.

Don Koberg and Jim Bagnell (1991) outlined the process in three main stages: analysis, concept, and synthesis. Analysis means research and problem defining. Concept means setting goals and a defining key issue of the matter, which

frame the future work. And the final stage named synthesis involves ideation, selecting the direction of further work, implementation, and evaluation. This explanation of a product design process seems a little incomplete and too generalised. Milton (2011) suggested a more completed description of a product design process which is shown in Figure 1.

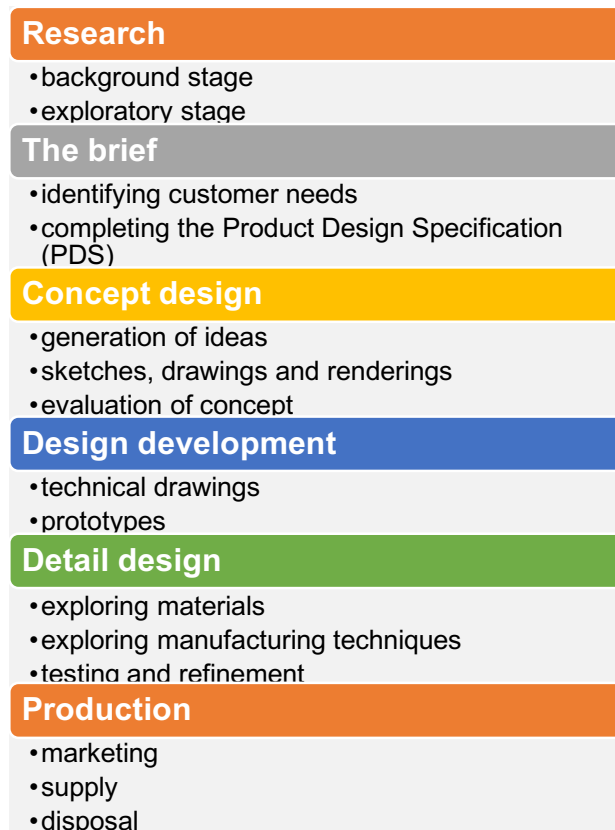


Figure 1 Stages of product design process (Milton 2011, 15)

This figure shows a more precise model of the product design process and the important point here, to my mind, is that concept design is presented as a separate stage with its procedures. It is necessary for this research because we will focus on that exact stage further.

2.1 Concept Design

Concept design is a rough and sketchy definition of a particular product, including functional, technological and aesthetic aspects. A designer depicts a product with sketches, model renderings and prototypes and how it will satisfy a

customer needs. The significance of this phase in the design process cannot be undervalued. A concept's quality determines how strong, marketable and profitable it is. If a well-done concept can be realised poorly or perfectly in the finished product, a weak concept seldom can be developed into a strong product. It is important to note that 85% of all product expenses (manufacturing and materials) are defined at the concept design stage (Ulrich 2012, 98).

Keinonen and Takala (2006,61) say: *Designing on the one hand behaviour and, on the other hand, products and business is a division that can be used in explaining and planning concept design.* That reflects the comprehensive and multidisciplinary approach to concept design. The authors also point that concept design has multiple directions and aiming at different things (Figure 2). According to their table, there are five primary objectives of concept design.

Concept design for product development
<ul style="list-style-type: none"> •specification for the following design phases •decision to go ahead with implementation
Concept design for innovation
<ul style="list-style-type: none"> •spin-offs for immediate improvements •idea bank for future use •concept directions for technology development investments •alliances with key partners •patenting
Concept design for shared vision
<ul style="list-style-type: none"> •specific shared meanings •vocabulary for communication
Concept design for competence
<ul style="list-style-type: none"> •improving creative problem solving •improving cross-disciplinary cooperation •learning about technology and market opportunities •improving team spirit
Concept design for expectation management
<ul style="list-style-type: none"> •improving brand image •influencing consumers' acceptance level •influencing stakeholder' interest

Figure 2 The objectives of concept design (Keinonen 2006, 27)

This thesis project's concept can be referred to design for product development

as it was aimed to find a solution to the design problem, which can be used as a ground for further product development and detailed design.

2.2 Product Design Considerations

Product design is a hard task. Many people are involved in judging a design outcome. The stakeholder's needs are always different and demand something particular and new from the designer. The manufacturer bothers mainly about the production costs, saving money and efficient material usage. The buyer looks for prestige, affordable price, and good appearance. The end user seeks for functionality and convenient usage of the product. The repair department concerns more about maintenance of the product: is it and how easy it can be disassembled, reassembled, fixed (Norman 2002, 28).

The Product Designer is in the unique situation of having to meet the needs of all the individuals involved in the production, marketing, sales and use of the end product. It is important to evaluate the design from the standpoint of each of these members of the supply chain, which means it is crucial that the Product Designer has a clear overview of the expectations of all those involved. Some compromises always have to be made to accommodate the best fit for all concerned.

The product expectations set by the stakeholders will decide where the market positioning of the final product will be. Market positioning will define the level of finish and quality of materials used in production and therefore can have a considerable impact on the designer's routes of inquiry during the concept development stage. It should not be assumed, however, that only luxury products engage in using cutting edge technologies and new developments in material science, as can be seen in the development of goods produced with 3D printers and engravers.

3 JUICERS

A juicer (also called juice extractor or juicing machine) is a tool that is used to extract juice from various fruits, vegetables, leafy greens or herbs. It takes the juice out of the pulp by grinding, crushing or squeezing. They can be manual or mechanical and, of course, it affects the productiveness of the device.

The history of the electric juicing machine starts in the last century, during the 1930s, when the first one was invented by Dr Norman Walker. He was the first one who allowed ordinary people to extract the juice from vegetables and fruits efficiently. That machine was large but effective – first grating and squeezing fruits and vegetables; it pressed the pulp in a linen bag using a hydraulic press. Then, in the mid-1950s, the first masticating juicer was invented. The high speed of the turning rod was too fast and that caused friction, heating and destroying the live enzymes and other nutrients. Subsequently, a twin-gear juice extractor was produced in 1993. It was also based on the same mortar-and-pestle method but without heating and saving all the nutrients from fruits and vegetables (Crocker 2016). The first centrifugal juicer was invented around the 1950s, and it had many significant disadvantages: it was cumbersome, too noisy and there was no place for the pulp, so the users had to stop the machine to clean it too frequently (Morozova 2011). The centrifugal juicer has seen many improvements in its design since the 1950's and is now the most common form of home juicer type.

Today, many kinds and models of juicers are available, including mentioned above, but improved and redesigned. They are mostly divided by the aims of using. Manual ones are used mainly for citrus and grass (for example, wheat-grass) and for all the other purposes there are electrical ones. Electrical juicers are faster, more productive and efficient and that is why they are so common nowadays.

3.1 Electric centrifugal juicer

Centrifugal juicers are named for their working principle, which is based on

chopping up the produce with a cutting blade and same time spinning it at a very high speed to let the juice separate from the pulp (Figure 3). To compare, remember how a washing machine twists the water from wet clothes (Just Juice 2014). On the picture below you can see the strainer basket with little holes, the liquid passes through keeping the pulp behind (Just Juice 2014).



Figure 3 Centrifuge basket (Just Juice 2014)

This unique spinning system has many pros and cons. For example, the faster a juicer is spinning, the more juice it gets and that makes centrifugal juicers less efficient than masticating ones which grind every drop from produce. Moreover, the fast spinning creates heat and friction that reduces the quality of the juice diminishing both the quality of its taste and nutritional value. However, these juicers are easier to use and clean and, they are much faster at producing fresh juice in comparison with other electric juicer types because they work fast, and also they need less preparation time as these juicers take in bigger chunks of fruits and vegetables. Furthermore, the prices are more reasonable (Just Juice 2014).

To understand how juice is separated from its pulp, see Figure 4. There are arrows of three colours which show the stages of getting juice. The yellow arrows indicate how the produce goes to the blade to get grated in the basket which is spinning. Then, the juice gets separated from pulp with the help of centrifugal force (red arrows), and the pulp goes up with the green arrows direction (OTK 2012). There are also juicers with the same system and same basket but inverted, it gives the same result, and it is used only in a few models

because it is harder to produce and to service. The first basket type described is more accessible and cheaper.

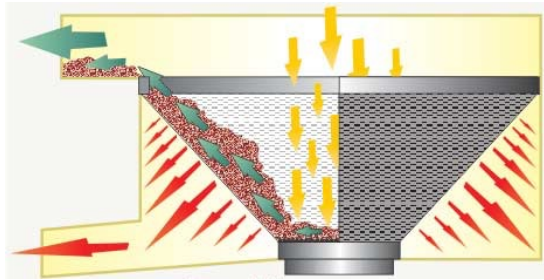


Figure 4 Centrifugal basket while working (OTK 2012)

The Figure 5 shows how an electrical centrifugal juicer is organised (further numbers in this paragraph are all related to Figure 5). It contains a motor, a steering mechanism, a power button and safety system (optional) in its opaque body part (3, 4). The transparent part includes a juice container (1), a pulp container (2), a locking mechanism (5) which can be different depending on model, a removable juice separator bowl (6), a removable centrifugal basket with grating disk (7), top cover with a feeding chute (8) and a food pusher (9).

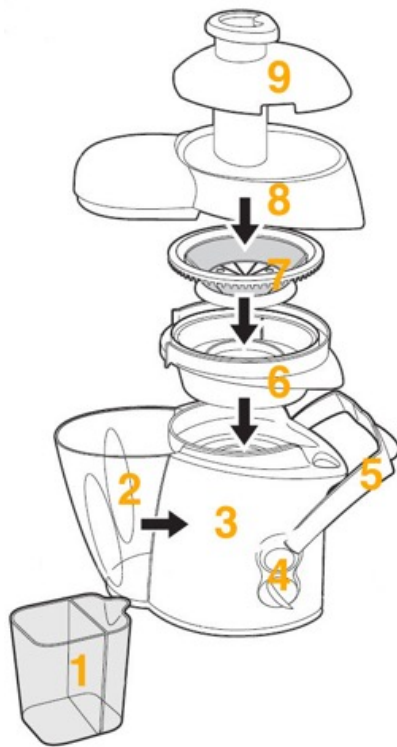


Figure 5 Centrifugal juicer organization (Cherevko 2012)

The completeness of sets can vary from one model to another, and it depends mainly on usage goals of the device, for instance, some customers prefer compact models which take two times less space on a cupboard, and they need to use it from time to time. To the contrary, there are customers (talking about Russia) who prefer bigger size devices with large containers for producing a lot of juice during harvest seasons for food supply.

Besides, it is important to mention that after juicers market research I concluded that the motor with steering needs about ten centimetres cube or cylinder space. There are different types of engines, and they differ one from another in power and noise level. The client did not specify what kind of motor is planned for the juicer.

3.2 Material and Manufacturing Issues

Producing home appliances always faces the materials selection problem. The range of materials today is pretty wide, though, there are about three the most common materials used nowadays. The first place material is plastic due to its low cost, durability, lightweight, water resistance and ease of manufacturing process. Plastic have already replaced many traditional materials like stone, wood, ceramic, paper, glass, metal, leather in most of their past uses (Andrady 2009). Plastic is one of the most practical materials in respect of design as well, it is versatile and can be of any shape, colour (including transparent), thickness, hardness and texture (Tomasovic 2014). It can be a crucial point for designers if they do not focus on eco-tasks in their work because the material's huge disadvantage is its harmful effect on ecology and health. It is all about the emission factors. Most of the plastics cannot be even recycled, and this possibility is available only for high-density polyethylene (HDPE) and polyethylene terephthalate (PET) plastic resins. By the way, in producing domestic appliances, general purpose polystyrene (PS) is used (EPA 2015, 1-3).

The second place material in home appliances production is metal. This material has almost same advantages as plastic, except cost and weight. This deciding factor makes metal lose to plastic even though there are some definite benefits like fire resistance, safety (withstanding harsh treatment) and, of course, eco-friendliness. And one more important material in manufacturing domestic appliances is glass which is seldom used, but it has some strong reasons for using it. It is natural, neutral, resistant and has no effect on contents (this is significantly more for kitchen appliances). Unfortunately, it is an expensive and easy breakable material, and that causes the low demand (Verallia 2016).

Considering all the information mentioned above, it is logical to conclude that plastic is the best solution in most of the design tasks, including this thesis's work. There are many ways of manufacturing and forming plastics, but not all of them are reasonable for stakeholders and manufacturers. In a case of producing home appliances, it is important to understand that they should have thick wall sections in comparison with, for example, plastic bottles. That means that such method as, for instance, blow moulding wouldn't suit for the task. The thickness of (as an example) a juicer's body parts should be around 2.5-3 millimetres. The best choice in the situation would be the method called injection moulding, the leader of all plastic processing techniques. A heated cylinder is filled with plastic pellets which are melted and injected by a screw into gates and runners, then into a water-cooled steel mould at high pressure, and when the plastic solidifies, the machine opens the mould and pins eject the part. This method is widely used as it is universal and versatile and allows to get highly complex parts of different shapes, with different surfaces. However, the complexity raises the cost of the work (Lefteri 2007, 178-180).

There is also an improved technique called gas-assisted injection moulding, which has the same process, but before the plastic injection, the gas is injected to prevent the shrinkage of the plastic when cooling. The gas speeds up the production process and makes it energy efficient as consumes 15 percent less energy (Lefteri 2007, 183-184).

Besides the injection method, there are two more methods of plastic manufacturing: compression moulding and precise cast prototyping. The first one is a simple technique and can be compared with a hand jamming into a clay lump, a mould consisting of two parts is heated, and the pellets are placed between them and pressed. But this method is usually used for large plastic parts with thick wall sections and simple forms. A good side is that it is cheaper (Lefteri 2007, 156-157). The second approach involves computer-aided design (CAD) and combines casting and milling processes. First, the cad-driven milling machine forms the mould shape for the future part; then the cavity is filled with a polymer and, when it is hardened, the same milling machine cuts the needed form. This method is time and costs efficient, and the complexity of shape is limited only by CAD drawing, though a small number of manufacturers suggest it. It is more suitable for small and complex parts like mobile phones or cameras (Lefteri 2007, 174-175).

4 CLIENT

4.1 Market Niche

Zencha is a corporation that was established on the founding of an electrotechnical factory in 1960. Today it is a fast growing, successful and developing company with great potential and many manufacturing possibilities. The company already has a range of products on the market and intends to widen its market share by starting to produce more kitchen appliances. Their existing products (Figure 6) include low-voltage devices and consumer goods such as a selection of different types of heaters, electric water boilers, electric stove plates and a collection of appliances for Russian dachas like wash stands, barbeques, and showers (Zencha 2016). Zencha is considered as a mid-price range market company.

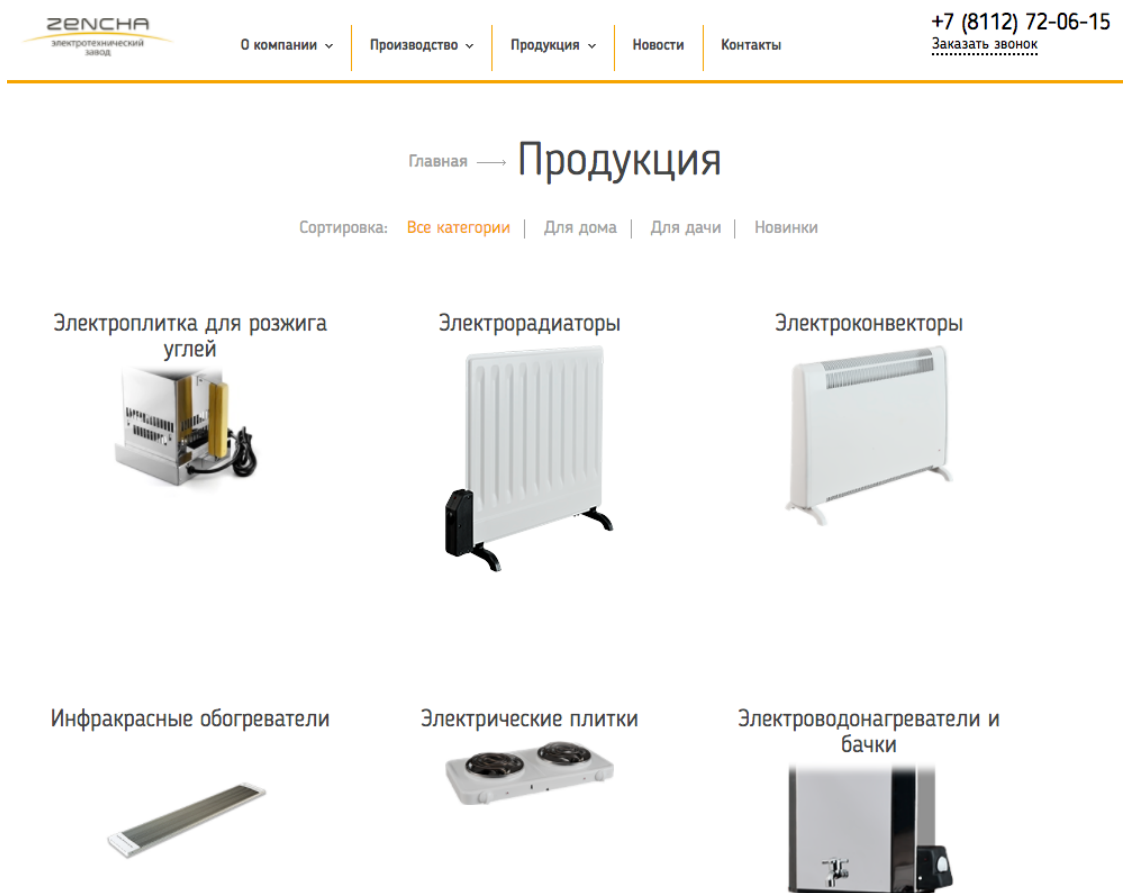


Figure 6 Zencha's website. Products catalogue (Zencha 2016)

4.2 Client's Brief

The assignment received from Zencha and the design studio, and therefore the goal of the thesis, was to design an electric centrifugal juicer concept and to deliver ten photorealistic visualisations of said product. The design brief is available in Appendix 1 (only in the Russian language). The brief includes general requirements considered aesthetic and technical features, and also the structure of the work that has to be done.

These aesthetic requirements were listed in the client's brief:

- Colour spectrum: white colour (RGB 255,255,255) and its shades, possible to use corporate identity colours (brand book Zencha)
- Logo "Zencha" on visible parts of the product
- Minimalistic style of appearance – simple, accurate and lucid
- Forming: sweeping smooth lines

The client gave next technical requirements:

- Product: juicer
- Type: electric centrifugal
- Quantity of speed programs: 1
- Possible materials: plastic, metal
- Container volume: 1-1,5 litres
- Maintenance: serviceable (changing components, wires)

The structure of the designer's working process, following the client's requirements, starts with design research. This means the designer undertakes the analysis of existing products to understand the pros and cons of different solutions regarding the product's design and functionality. The second stage is sketching and form seeking, continuing to the third stage of creating a final 3D model based on client's comments.

4.3 Identity and Brand Book

When working on the project, the Zencha Corporate Identity Brand book was given to the designer as a reference. The brand book pages can be found in Appendix 2. Brand books are important in establishing the rules of use of a company's visual identity within a design. It outlines how and where a designer can use the company logo and brand colour schemes.

The brand book contains instructions on the logo and ways of using it depending on situation – for example on a white background the dual-coloured logo should be used, in all other cases, the monochrome version should be used. The corporate colour scheme allows mainly for the use of 4 colours as seen in (Appendix 2/2). The meaning of the logo is explained in the brand book. It is based on the idea of sunrise on the horizon which defines the brand as something global and powerful. The 'technical' looking font is used, and it highlights the type of activity of the company.

The brand book also defines the typography and how it should look like on the product or packaging. Blogger Sans (bold, regular or light) is the font that should be used for headings and text which should be visually emphasised. Myriad Pro (bold, semi-bold or regular) – the one that is used for body texts and auxiliary information.

5 DESIGN PROCESS

5.1 Ideation and Sketches

After an in-depth research and analysis, the design process itself has started. The first stage was ideation and seeking of the design direction based on the client's brief. Having free hands, I decided to go outside the scope with form. Market research helped to understand that all designs are close one to another. Mainly all of the juicers have a roundish shape from a top view, and it is due to technical features. I've started sketching based on ideas and forms of existing juicers on Russian market (Appendix 3).

Beginning with simple forms and changing them a bit, I tried to find some unusual and interesting shapes. Form evolution can be seen from Figure 7. First, the form was resembling a truncated pyramid with rounded edges, and then the final shape was developed by narrowing the pyramid.

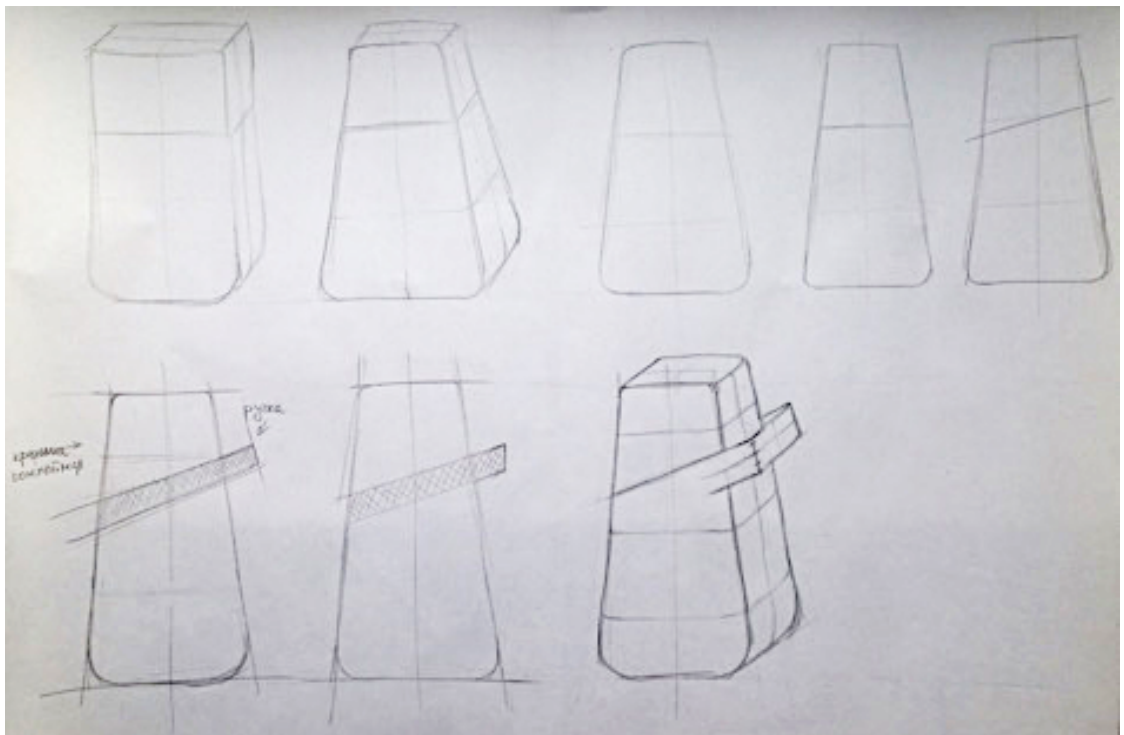


Figure 7 Form evolution (Ageeva 2016)

The diagonal line on Figure 7 (down sketches) is the cutting line of main body and cover. With this cutting line the idea of a handle which continues the line and protrudes out of the body appeared.

The solution to hide the feeding chute with a top cover came up due to an unwillingness to cut the shape. The top of the cover was supposed to be straight at first with a small fillet. However, it was decided that the line would be improved by concaving it a bit. This line, however, had to be changed again as when modelling, it was found a convex line, as seen in currently available versions, was easier to produce, the concave being too challenging a task in the manufacturing aspect.

The final sketch (available in Appendix 4) shows the proportions that were implemented in a model later.

5.2 Modelling

3D modelling is a process of creating and developing a representation of any three-dimensional surface of an object using specific modelling applications. The result is called a 3D model.

Modelling was the most challenging part of the process. It is always difficult to develop sketches that are by nature 2D into a 3D object. What you imagine in your head is not always the same in reality. Moreover, the software used to make this model was new to me because I only started using it only while on practical training at this design studio. The program used is SolidWorks, and I am more experienced in the use of Rhinoceros. However, I accepted the challenge, and this gave me a new and very useful experience that can help me in the future. The difference between the two programs is that SolidWorks is a solid modelling CAD while Rhinoceros is based on the use of the NURBS mathematical model. My personal experience was that I also had to change the algorithm of modelling process a little using this new software.

For me, as a novice industrial designer, it was hard to think ahead about the hundreds of things that had to be taken into account, particularly the engineering considerations. For example, I had to keep in mind how the final product was going to be assembled, which is why I made the bottom as a separate part

from the main motor housing. This gave better access to the engine. To emphasise this as a separate section when rendering I made it orange, and I liked how this colour differentiation looked.

In the beginning, I started by trying to capture the overall form by concentrating on achieving my sketches' proportions, later I adjusted the fillets of the edges. After I had got the form I needed I continued with cutting into it, assembling the solid parts and adding details like the handle and feeding chute.

Many problems remained unsolved as the time was limited and the client could not negotiate about some important issues. Firstly, I did not make a pulp section and a hole for getting it out of the basket. There was an idea to put the pulp container under the handle, but the modelling process did not go so far. Secondly, the problem of fastening parts was not worked out. It also depended on the client's decision and the client did not make contact. Nevertheless, the main idea of the project was to develop a general concept that could be then improved and realised.

5.3 Rendering

Rendering is a process of creating images from a 2D or 3D model or a models scene by computer programs, and the result images are also called renderings. It is used for visualising and making lifelike pictures of a model or a scene. Rendering software considers the geometry of an object (or objects), lighting and shading information, materials and textures, and viewpoint.

Rendering is usually the most pleasant part of 3D modelling because a rough looking model transforms into a natural looking object with an environment. When rendering the juicer, I used the program named KeyShot. KeyShot is a standalone real-time rendering application used to demonstrate what the product would look like with different surface properties. The software enables the user to visualise the surface of the product with different materials and different

levels of ambient occlusion, that is to say, different levels of shine or matte surfaces. It is a fast procedure to check what the juicer would look like in a shiny PVA plastic, brushed chrome or a ceramic finish for example.

The rendering process itself took a little of time as the colours and materials were already specified in client's brief. I tried to combine two primary colours (orange and white) offered by the customer in different ways, and when the result was satisfying my chief designer and me, we made the rendering pictures from several perspective views and showing several states of the juicer. It was important to show how the top cover works when using the product and the possibility of using it as a container (Appendix 5). Another advantage of using Keyshot is that it supports the making of animations of moving objects. The Chief Designer and I also made front and side views (Appendix 6) to show the object with minimum distortion. Further renderings were created to show close-up details such as the top cover (Appendix 7), the power button, how the logo would be positioned, the rubber gasket on juicer's bottom and the power cable (Appendices 7-8). The logo was added later using the Adobe Photoshop application.

5.4 Size and Materials

The approximate dimensions of the future juicer were outlined at the research and sketching stage. The sizes can be seen from the technical drawings in Appendix 9; they are shown in millimetres, and the scale is 1:2. There are three views: front, top and bottom. All the sizes are approximate and can be easily changed in a further development of the product.

It was decided to make the juicer about thirty centimetres in height, and about fifteen in its maximum width to get enough space for the motor and electronics package. The width of a segment, where the basket is supposed to be placed, is around thirteen centimetres. The distance between the handle and the body is approximately three centimetres to fit human fingers into. The width of the

feeding chute is nearly six centimetres, and it is in the form of a rounded rectangle that fits bigger pieces than a rounded one. The length of the metal nozzle is around 3 centimetres. When modelling, the sizes changed a bit due to some changes in form and the final numbers are available at the technical drawings (Appendix 9).

The typical material of the juicer is plastic. It's light, cheap and easier to manufacture. All the body parts are supposed to be made of plastic. The colour choice was framed by the customer's brand book and brief, though, I consider white and orange samples can organically work together. As white is a primarily used colour by Zencha, it would be a basic colour for the juicer as well, and the orange one would perfectly complement it.

When rendering, I was choosing between different finishes, and I decided to combine satin and matte surfaces. It seemed that the juicer, when orange cap and base were glossy, was looking cheap and unattractive, but when I changed it to matte, it became more sophisticated. The white part is supposed to be satin as it is easier to clean and also because it looks refreshing. The parts like pusher and feeding chute would also be orange but glossy and transparent; that is determined by the need to clean these parts frequently, and to see what is happening inside the device.

The grey colour from the brand book was taken for the small details like button and bottom gasket; they would be made of matte rubber which feels soft when touching. The nozzle would be shiny metal (for instance, chrome) due to safety and reliability reasons. A plastic one would not be a solid part of the body because it is not possible to manufacture by two-parts mould, that is why it would be easy breakable. All the parts and details mentioned above can be found from Appendices 5-8.

6 RESULT

The result of this design project can be seen from Figures 8-9. The model has an entirely new look in comparison to usual juicers. The form is different; the colours attract attention, and the design is clean.



Figure 8 The final model (Ageeva 2016)

This juicer consists of 4 main parts: the orange cap container at the top, the transparent orange cap with the feeding chute and pusher (Figure 9) under the cap container, the main body (white part) with its handle and spout, and the orange base part.

The cap's function is collecting the juice when in use and covering the feeding chute cap during storage, which also means it has an aesthetic function (Appendix 5). The cap makes the device look neat, impressive and distinct and that means that the end user doesn't have to put the product away in a cupboard after every use. This is an important issue for users who are willing to use it every day.

The secondary cap covering the juicing pan is transparent because the user needs to see what is happening inside when processing and if it is time to clean the device. It has a feeding chute for putting vegetables and fruits inside and a pusher that helps the juicer get all the pieces into the grinder. This cap is easily removable for washing, and it is supposed to have a simple groove fastening with a click-system holding it in place. It not shown currently on the model, as this function had to be discussed with the client who unfortunately had not prior to this time come back with comments.



Figure 9 View without cap (Ageeva 2016)

The main body covers and contains the working mechanism. Inside there are all the key equipment parts, including motor, basket steering device, removable protection bowl, removable centrifugal basket with a blade. The main body is assembled onto the orange base and at the joint line can be found the grey power rubber button (underneath the logo in the rendering) and the power cable from the back side. All those details can be accessed from Appendices 7-8.

A defining feature is a handle on the right side of the device. This element is

unique to this particular juicer. It protrudes out of the body, and it is a solid extension of it. The handle is solid inside with a thickness of about 3 millimetres – it is hard to break. The interior of the handle is orange as a contrast to the white exterior.

The metal nozzle on the left side is a spout for the extracted juice to exit the device. It is long enough not to let the liquid splash around and high sufficiently to enable the end user to place a bigger bottle, jar or glass under it as a collecting receptacle. The Zencha's brand book was the source of the company's logo (Appendix 2/1). I decided to put it close to the power button, so the user will see it every time they use the machine.

The juicer has an entirely new fresh design, though many constructional and functional unsolved design problems are remaining. The most significant part that was not clarified is the way how the pulp leaves the juicer when processing. The client did not negotiate about the design and preferred decisions and that caused losing time for the designer. I was going to suggest two ways of deciding the problem: to make a container for collecting pulp or to make a special nozzle, which would let the pulp out but not splashing it around.

Another unsolved problem was the locking mechanism which fixes the cap with feeding chute to prevent opening while working. This question was discussed with other designer and engineers, and it was decided, that the best way to avoid extra details (that could ruin the minimalistic design), is to make latches. Unfortunately, I did not manage to realise the idea because of the lack of time. This needed more research and engineering experience. Even though the project did not progress in its usual way, I gathered considerable experiences and knowledge, and that was a part of my self-perfection.

7 CONCLUSION

This conclusion was written to understand if the objectives of the project were achieved and if all the design problems were solved or not. The thesis's main purpose was to make a conceptual 3-dimensional juicer model and its renderings to show to the client for further product development decision.

I consider, the primary objective was achieved as the result of this work is a 3D model and ten renderings of an electric centrifugal juicer. The idea is clear and can be easily brought further if the client responds positively. The negative side of the project was the fact that the stakeholder was not negotiating about the design and project itself. There are possibly some reasons for that, though it led the project to a deadlock. Hopefully, it is frozen for some period and will be continued later.

Earlier, in the research, I was writing about product design considerations. Now, when the product is designed, it can be evaluated. The stakeholder is seeking for a special product, that would probably be notable among the others. To my mind, this task is fulfilled as the design is new, it keeps the brand's identity and has a minimalistic design as was specified in the brief. It is cheap to manufacture as the material cost is low and the production method should be easy – that is important for the manufacturer. It is clearly seen how it is disassembling (all the parts have different colours) and there should not be any problems with repair service. It is now hard to say what the price would be like, but the product would be functional and easy to use, the appearance is attractive, and that should satisfy the customer and end user needs.

The overall look of the product is unique, and it can arouse divergent emotions. When I was working in the studio, there were opposing opinions about it but mostly based on individual perceptions and experiences. I assume that there are many construction and design issues to discuss and improve yet, but I consider the concept has its right to be brought further and developed into a real product.

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Техническое задание
на разработку промышленного дизайна линейки бытовых приборов №1 по Этапу №1

1. Определения

Линейка №1 – перечень объектов разработки: бытовая соковыжималка (далее – Изделие №1), бытовая мясорубка (далее – Изделие №2), бытовая сушильная камера для овощей, грибов и фруктов (далее – Изделие №3).
Эскизная трехмерная модель – компьютерная трехмерная модель Изделия, выполненная без детальной проработки, служащая лишь для визуализации Изделия.

Фотореалистичная визуализация (рендеринг) – процесс, направленный на получения изображения Изделия путем применения материалов и освещения к трехмерной модели Изделия, результатом которого являются графические файлы JPEG.

2. Цель выполнения работ

Целью выполнения работ является разработка промышленного дизайна Линейки №1 и создание отчетных материалов по её результатам:

- Фотореалистичная визуализация поисковых вариантов внешнего вида Линейки №1 – по два варианта внешнего вида на каждое Изделие, по 10 (десять) рендеров на каждый вариант каждого Изделия.
- Фотореалистичная визуализация итогового (финального) варианта внешнего вида Линейки №1 – по одному варианту внешнего вида на каждое Изделие, по 10 (десять) рендеров на каждое Изделие.
- Пояснительная записка с описанием предполагаемых для дальнейшего производства материалов, технологий, параметров цветорграфических схем.

3. Параметры и требования

3.1 Общие эстетические требования к Линейке №1.

- Цветовая гамма: белый цвет (RGB: 255, 255, 255) и его оттенки, возможно присутствие цветорграфических схем из фирменного стиля Заказчика (брендбук Zencha).
- Наличие логотипа “Zencha” на видимых частях Изделий.
- Минималистичный стиль внешнего исполнения - стиль, характеризующийся лаконичностью выразительных средств, простотой, точностью и ясностью композиции.
- Формообразование: плавные линии.

3.2 Справочные технические требования к Линейке №1.

При создании визуализации Линейки №1 (дизайна), являющейся целью Проекта, Исполнитель проводит данные работы с учетом нижеприведенных справочных технических требований, относящимися к цели Проекта лишь с точки зрения визуализации:

3.2.1 Бытовая соковыжималка (Изделие №1):

- Тип: центробежная.
- Объем чаши: 1 – 1,5 л.
- Количество режимов – 1.
- Возможные материалы исполнения: пластик, металл.

3.2.2 Бытовая мясорубка (Изделие №2):

- Класс: Класс «А» (Производительные и мощные мясорубки, которые предназначены только для дробления мяса, птицы или рыбы для фарша).
- Возможные материалы исполнения: пластик, металл.

3.2.3 Бытовая сушильная камера для овощей, грибов и фруктов (Изделие №3):

- Мощность: 600 Вт.
- Количество поддонов: 6 шт.
- Диаметр сушильной камеры: 390 мм.
- Высота Изделия №3: 470 мм.

_____/Куликовский С.В. /

_____/Бозе Э.Ю./

- Объем сушильной камеры: 3 л.
- Время непрерывной работы: 10 часов.
- Возможные материалы исполнения: пластик.

3.2.4 Эксплуатационные справочные требования к Линейки №1:

- Возможность переноса одним человеком.
- Возможность сервисного обслуживания.

4. Состав работ Этапа №1

4.1.1 Дизайн-исследование. Исполнитель проводит работы по исследованию рынка схожих Изделий Линейки №1, анализ достоинств и недостатков схожих изделий компаний-конкурентов и прочие работы, связанные с информационной поддержкой Проекта. Результаты дизайн-исследования не подлежат публикации и иному разглашению, т.к. являются собственностью Исполнителя и служат только для реализации целей Проекта и Договора в целом.

4.1.2 Создание эскизных вариантов. На основании Дизайн-исследования, Исполнитель разрабатывает два варианта внешнего исполнения Изделий Линейки №1 в виде рендеров эскизных трехмерных моделей, не менее десяти различных изображений в формате .jpeg на каждый из двух вариантов каждого Изделия.

4.1.3 Создание финального варианта. На основании комментариев Заказчика по результатам рассмотрения выполненных Работ п.4.1.2. Технического задания, Исполнитель либо дорабатывает одну из версий Линейки №1, либо разрабатывает ещё один вариант внешнего исполнения Изделий. После предоставления доработанного, либо вновь созданного варианта, Исполнитель осуществляет не более одной доработки на основании полученных от Заказчика комментариев. Иной механизм внесения правок оговаривается Сторонами отдельно. Утверждение окончательного внешнего исполнения Изделий осуществляется путем подписи Заказчика на распечатанном изображении каждого Изделия.

4.2 Сдача Проекта.

1. Визуализация двух направлений Линейки №1 - по 10 изображений каждого изделия (две концепции), Визуализация финальной версии Линейки №1 - по 10 изображений каждого изделия. Итого: Альбом дизайн-проекта: 60 поисковых изображений, 30 финальных изображений, пояснительная записка.

5. Прочие условия

- 10.1. Эстетические требования могут меняться по согласованию Сторон.
- 10.2. Все стадии (п.4) выполняются последовательно, если иного не оговорено Сторонами. Переход к следующему пункту осуществляется сразу после сверки Заказчиком результата с требованиями Задания на выполнение предыдущего пункта (подпункта).

Заказчик
Исполнительный директор
АО «ЗЕНЧА-Псков»

_____/Куликовский С.В./

«__» _____ 2016г.

Исполнитель
Генеральный директор
ООО «Форма»

_____/Бозе Э.Ю./

«__» _____ 2016г.

_____/Куликовский С.В. /

_____/Бозе Э.Ю./

Логотип и фирменный знак

Расположение файла: /logotype/base/

В основе концепции логотипа лежит стилизованный восход солнца над горизонтом, характеризующий бренд как что-то глобальное и мощное, освещающее тьму, возрождающееся, дарящее свет и жизнь. Имя бренда набрано «технологичным» шрифтом, подчеркивая деятельность группы компаний, что перекликается со слоганом. При этом буквы имеют округлые «смягченные» края, добавляя лаконичности и легкости. Так же был разработан миниатюрный вариант логотипа (знака), для расширения возможностей использования фирменной айдентики.

ZENCHА



2

Цветовые решения

Для белых плоскостей используется основное двухцветное решение, для ярких, темных и дробных фоновых подложек - начертание в один (оранжевый или белый) цвет. Это правило касается и миниатюрного варианта.



4

Дополнительные начертания логотипа

Расположение файла: /logotype/additional

Данные логотипы служат для смыслового усиления и дополнительной информатизации рекламных материалов и деловой документации. Построение и зона отчуждения дополнительных логотипов идентична основным начертаниям.



14

Фирменная цветовая гамма



Zencha Grey
HEX: #3d3934
HSB: 32, 14, 23
RGB: 61, 57, 52
CMYK:
Pantone: Black 7 C



Zencha Orange
HEX: #f5a81c
HSB: 38, 88, 69
RGB: 245, 168, 28
CMYK: 2, 38, 100, 0
Pantone: 130 C

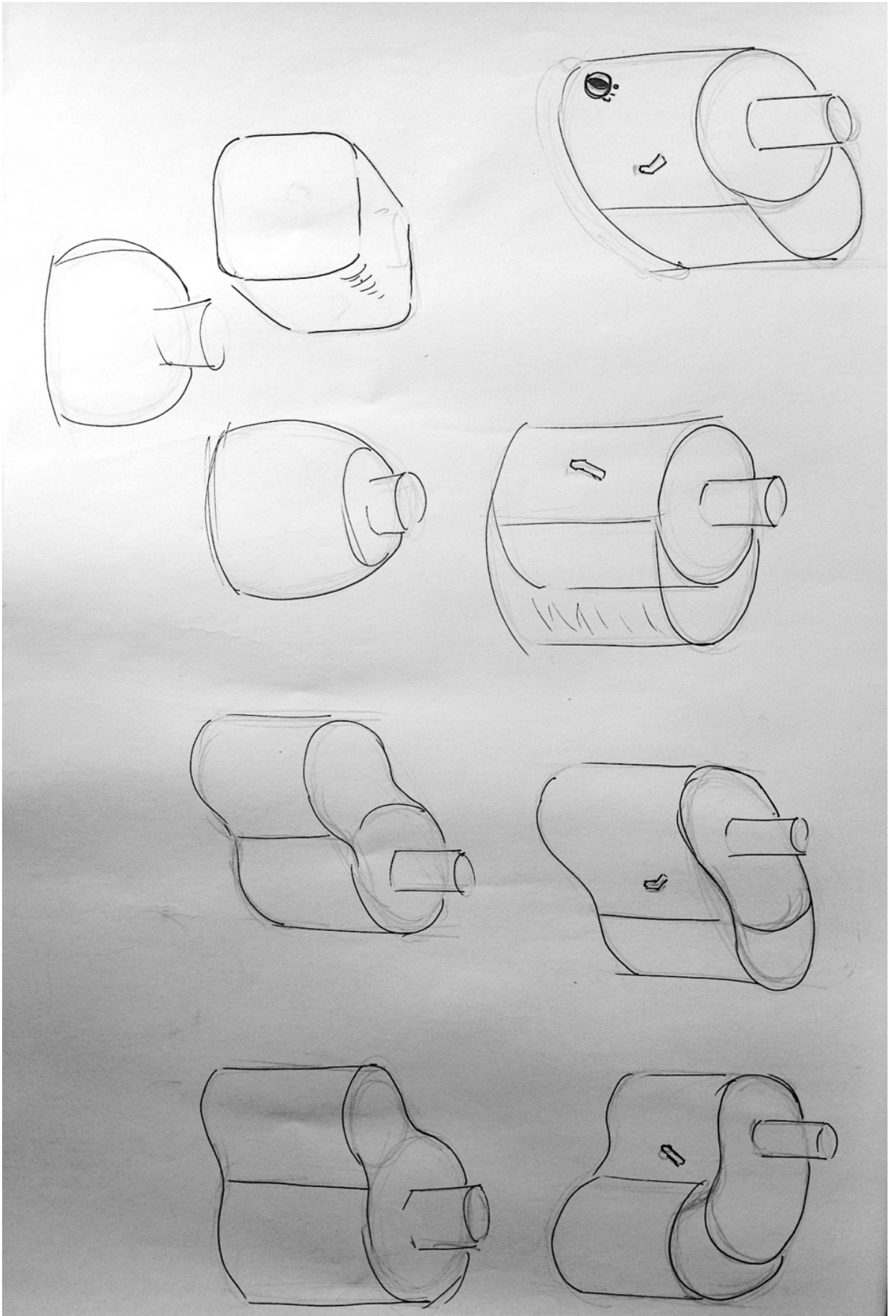


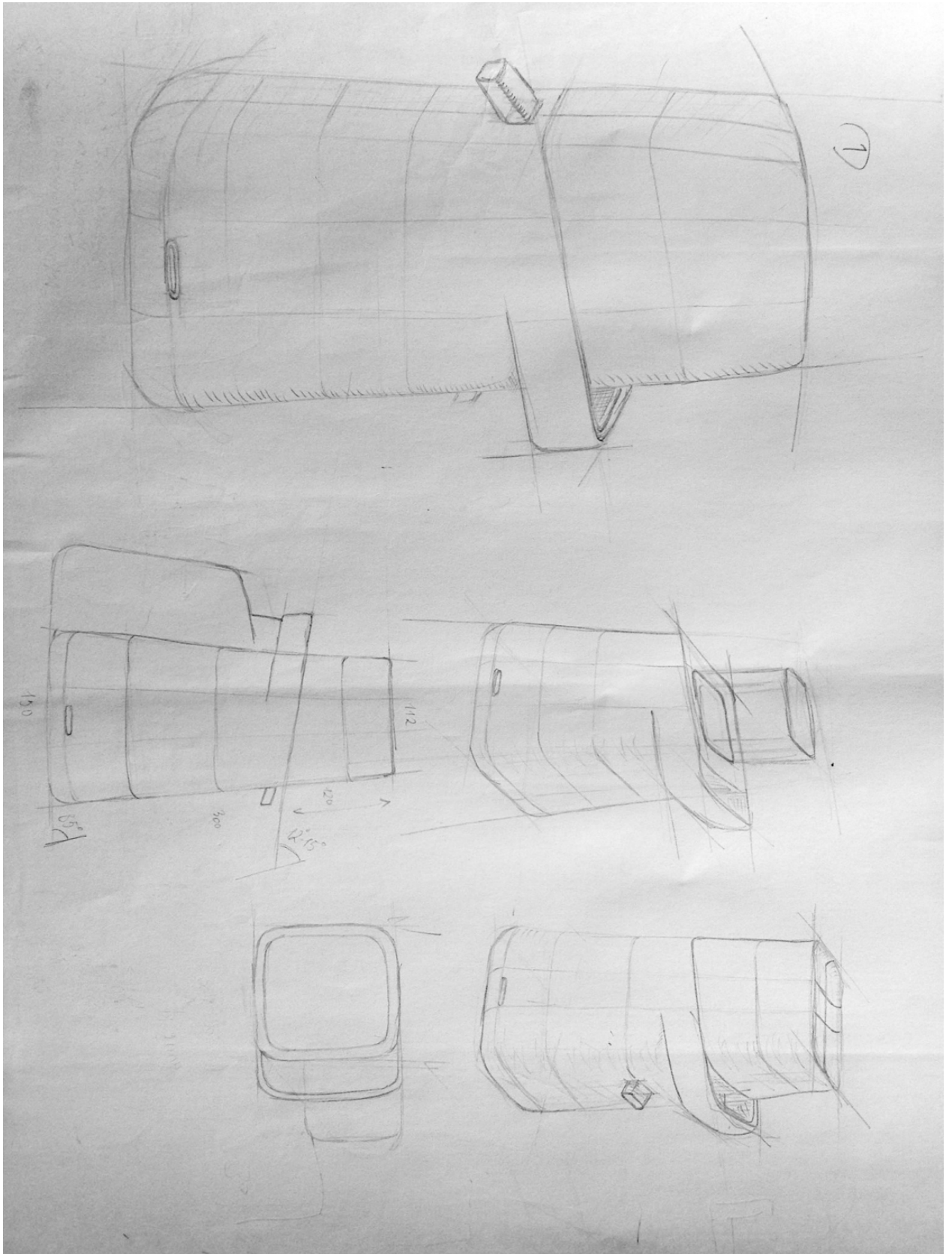
White
HEX: #ffffff
HSB: 360, 0, 100
RGB: 255, 255, 255
CMYK: 0, 0, 0, 0
Pantone: WHITE



Black
HEX: #222121
HSB: 0, 2, 13
RGB: 34, 33, 33
CMYK: 71, 66, 65, 72
Pantone: Neutral Black

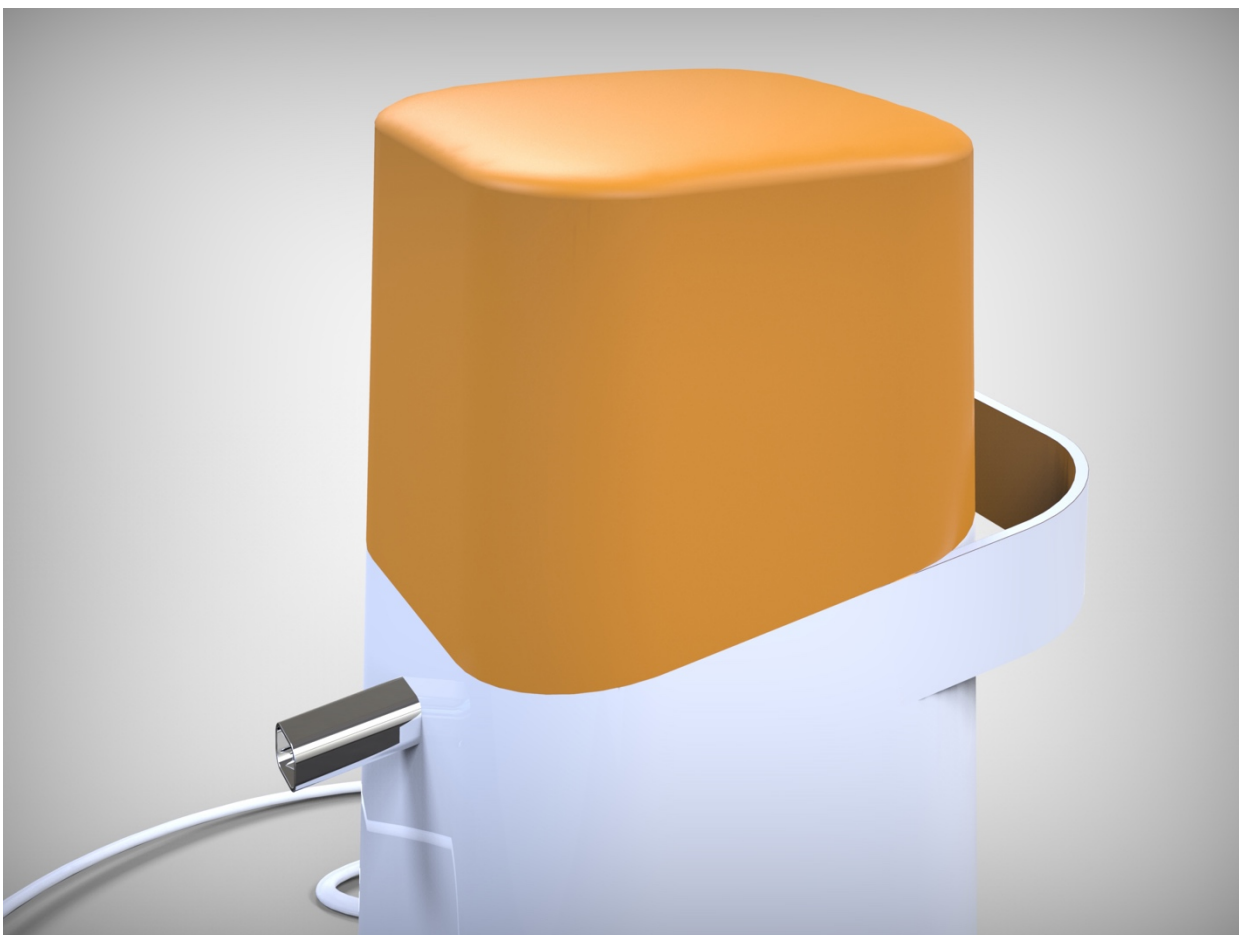
17

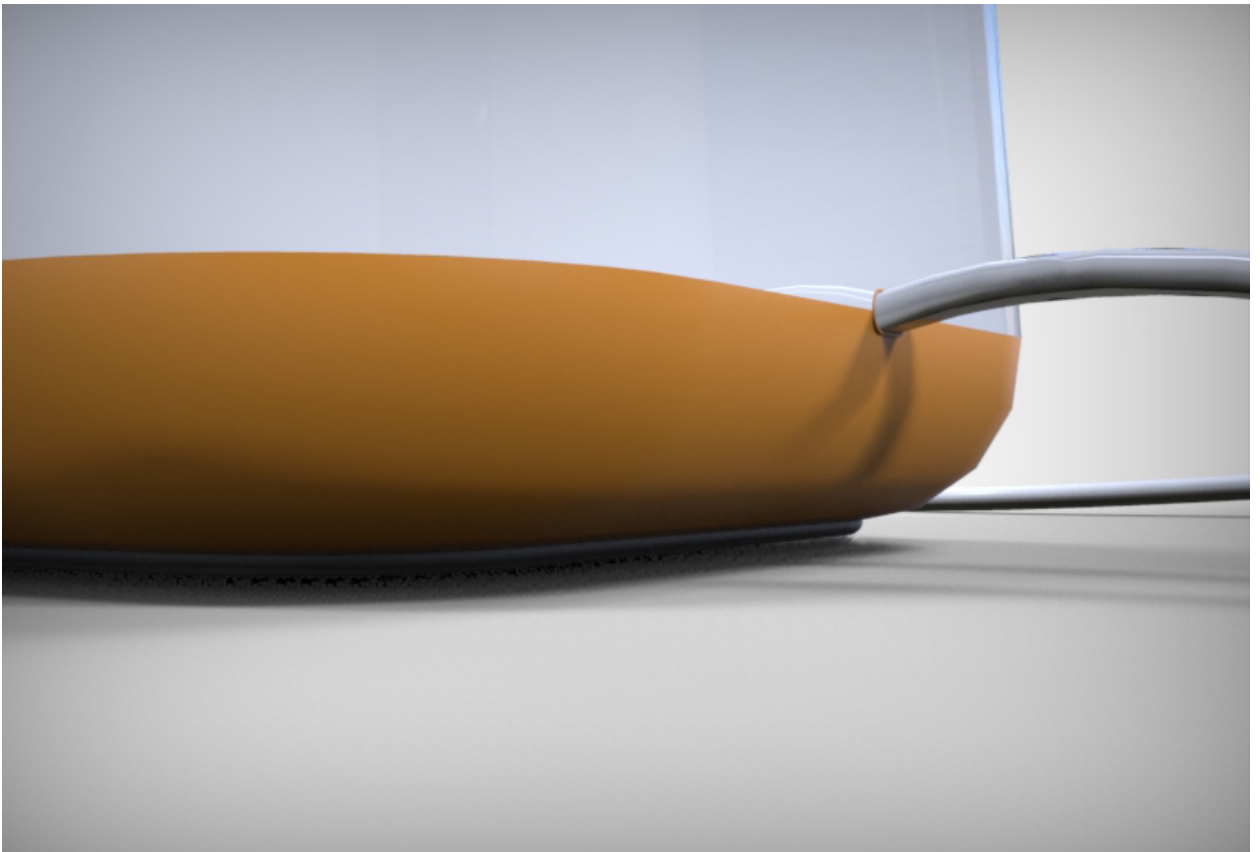












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Разраб.				
Пров.				
Т. контр.				
Н. контр.				
Утв.				

Daria Ageeva

Technical drawing
Top view (upper)
Bottom view (lower)

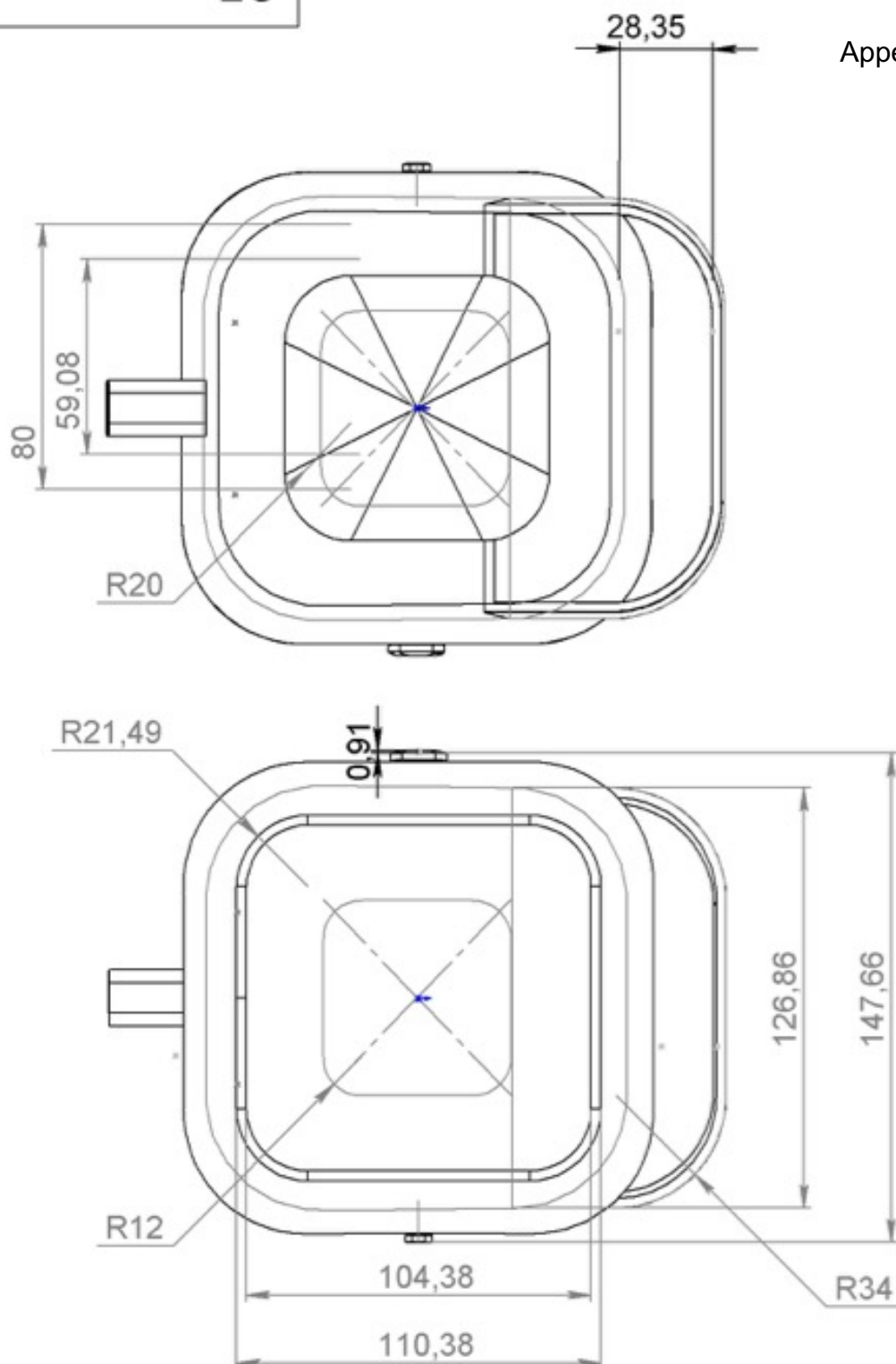
plastic

Лит.	Масса	Масштаб
	103.38	1:2
Лист 1		Листов 1
SolidWorks RUSSIA		

Копировал

Формат А4

90



Appendix 9/2