

BY ŽOFIA BABČANOVÁ

DIGITAL AND VIRTUAL DESIGN DRAWING

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LEARN THE BASICS: PHOTOSHOP AND GRAVITY SKECTH

DIGITAL AND VIRTUAL DESIGN DRAWING

Digital and Virtual Design Drawing.
Learn the Basics: Photoshop
and Gravity Sketch

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ABOUT THE AUTHOR



Hi, my name is Žofia, and I am a sketch enthusiast! I have spent the last nine years studying Transportation Design at the Academy of Fine Arts and Design in Bratislava.

During my bachelor's and master's degrees, I was lucky enough to join the exterior design teams in Mercedes-Benz, Hyundai, Pininfarina, and Volkswagen as an intern.

I have gained a lot of skills and experience which I am happy to share with my audience.

Not only do I have a passion for design and sketching, but I also love teaching.

I enjoy sharing the experience and skills with my students.

You can learn to design beautiful objects, and I am here to help you with it!

INTRODUCTION

I wrote this book to help you with your design skills! After reading this book, you will have the tools to sketch and keep enhancing your drawing talents with a variety of exercises and useful information.

This book does contain a lot of step-by-step tutorials on how to design different subjects. Motivate yourself by the following professional sketchers from Automotive and Industrial Design: Michal Uhrín, Adrian Mankovecký, Emil Lukas, Michal Kačmár, Joaquin Obligado, Slavomír Ozánik and myself (Žofia Babčanová).

Reading this book will save you a lot of time. It will help you to find your ways to designing and drawing. I am sharing my best techniques, which will inspire you to look at the world with the designer's optics and minds.

Learn how to train your hand, brain, and eyes to cooperate and create a masterful design!

HOW TO USE THIS BOOK:

At the beginning of every chapter is a QR code. Take a photo with your phone, and it will direct you to the YouTube video. You can follow the author's process of making a masterful sketch.

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CHAPTER ONE

CAR DESIGN DRAWING

DESIGN DRAWING

Drawing is an essential design skill. It requires a lot of practice and consistent work, but once you understand the basics, it will become easier.

Sketching itself does include perspective, proportion, and surface geometry knowledge, but the author's style and taste play a considerable role as well. There are many ways how one can perceive an object. Let's have a look at an automobile. A car can be designed as a sculpture, architecture, or a machine. Through different perspectives, a designer can achieve different proposals.

No matter what point of view a designer applies. It is the fundamental question the designer must ask himself/herself: How can I communicate the concept to my audience? The answer is simple. Use the primary design language. Sketch it.

Sketching is the fastest nonverbal process for authors to share their visions, inventions, moods and ideas. When sketching, you engage your brain, eyes, and hand to create a controlled chaos of lines and surfaces.

In many ways, what we sketch is influenced by what we can see, what we remember and how we perceive visual information.

When you have the feeling that you cannot improve or you think design sketching is just a matter of talent, I have good news for you. Drawing is partly a muscle memory, so there is no doubt you can learn it.

The second part of sketching depends on the quality of your perception.

You can improve how you absorb and learn visual information, but this process is quite intimate. You need to know yourself, discover your design aesthetic, and develop keen observation skills to translate your visions into the drawings.

This book may help you with the muscle memory part. Use it as a tool, which can help you to develop your digital and analog drawing skills.

However, do not feel the pressure to be influenced by the author's aesthetic. Learn as much as you need, but communicate your vision, because the world needs to see it..

CAR DESIGN

Designing a car from scratch can be quite overwhelming. When you look at production of cars, there are so many parts and details. You don't know where to start.

A designer should be aware of the main body parts in order to translate the design into reality with ease.

You do not need to consider all these parts in free school projects, but the knowledge can help you create a meaningful design. Design is not just an art discipline. It is more about technology and marketing. Therefore you need to be capable of sketching on proportion and follow construction norms and marketing requests.

Even the best design and sketch is useless if it does not respect the technology necessary for producing a successful car.

Here are just a few fundamental parts of the car you should respect when designing a production car.

You can find a full video with Michal Uhrin talking about the car industry here (in the Slovak language)

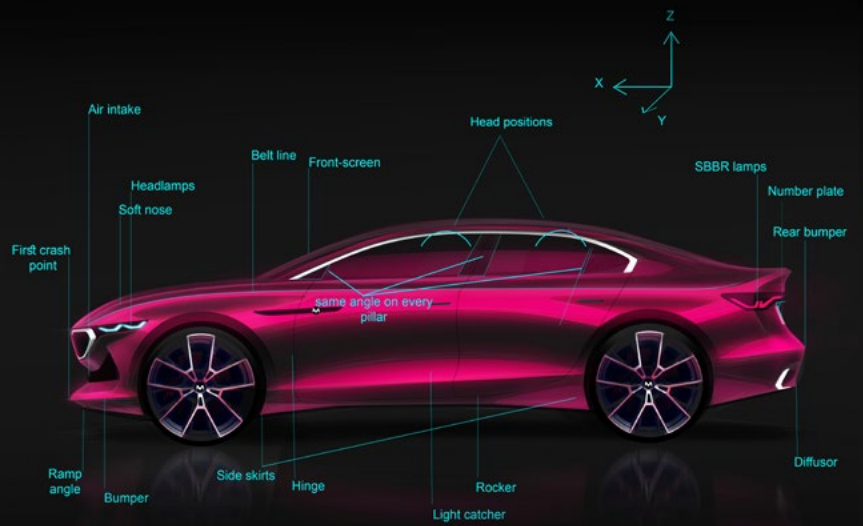


FIG. 01

A First crash point:

i is the marginal point of the front bumper at the x-axis. It protects the rest of the front from the damage caused by an accident.

Technicians **set** the **ramp angle.** A designer should respect it from the beginning. Otherwise, it can lead to unwanted changes in design later in the process.

The **Air intake** is cooling the engine. There is usually the norm defining the amount of air needed for the specific engine, and this fact affects the size of an Air Intake. Think about the size and position of an Air

Intake before you put a pen on the paper. Where is the engine placed? Where are the brakes? Which parts of the car need cooling?

Soft nose, is a body part made out of the composite preventing from the demolition of the rest of a car caused by the crashes under 30km/h.

Hinge s in a specific position in the Y-axis. There is usually a technology behind the door opening, and the designer needs to be aware of it.

Stones usually hit **Rockers** during the drive. Think about the material of the Rocker so your design is more mature.

A Lightcatcher is the surface protecting the doors from rocks (is more aesthetic than a practical feature).

Side skirts are parts of the Rocker; they are blocking the stones as well. Turn them into an appealing visual feature!

The front screen needs to be flat due to interior displays technologies.

A, B, and C pillars need to be parallel due to window opening. Designers usually decline them for a more dynamic look.

Head position: You need to respect the passenger's comfort and ergonomics. Leave some head clearance for a more realistic proportion.

The number plate has a specific angle, which is usually at 15°.

A **Bumper** usually contains the First Crash Point to protect the rest of the front.

Following and respecting all the rules mentioned above may be overwhelming for a student.

When building your personal project, you are free to sculpt a design as you wish. You focus more on a concept, futuristic forms, and solution.

When you however add realistic proportions, you prove you think about production and ergonomics, which is beneficial for your portfolio. Your future employer can see that you are aware of the realistic limitation and technologies in the car industry.

PROPORTIONS

The most challenging and essential thing to keep in mind while sketching is the proportion.

The theme and novelty of design are vtal parts of the sketch, while the proportion is the key to a successful drawing. The balance in the length, width, and volumes plays a significant role in the design process. How to learn more about the proportion of the car?

The most straightforward yet most efficient method is to use a reference. A designer uses a reference photo as a starting point,

which helps him/her develop the design features while keeping the proportion and perspective on point.

In the next tutorials, you can get inspired by Joaquin Obligado, the designer in Chery, who demonstrates how to use a photo as a starting point. The fast way how to learn the proportion and perspective is to choose the right image, manipulate it and sketch over it.

SKETCH OVER PHOTO



WATCH THE
VIDEO HERE

THE SOFTWARE PROGRAMS USED:
PHOTOSHOP

WORKSHOP BY PROFESSIONAL
CAR DESIGNER JOAQUIN OBLIGADO



01

Choose an appealing photo for your sketch. Observe the reflections and stance. Before you start drawing, use Selection to make the front wider and the greenhouse lower. This step gives the drawing more character and improves the stance of the SUV.



02

Please create a new layer and fill it with a white color. Reduce the opacity to mute the design in the photo. Outline the car and freely sketch the design theme. Don't forget to draw the central lines and wheel stance. Add some eye-catching rims from different SUV pictures. Make the wheels bigger than they are in real life.



03

Start to paint the car body. Use the Eyedropper tool to get the exact colors from the photo. Focus on the background too; keep the reference picture in the corner and check it. Study how reflections and shadows appear on the surfaces during the process of free painting. Work with a bigger Brush and focus on significant volumes and surfaces. Make sure that you already see the design theme in the thumbnail if you zoom out.



04

In this particular case, Joaquin selected the shoulder with the Lasso Tool and painted it with a white Soft Brush. The highlight defined the side volume and gave the car a more masculine feature. Paint the front grill and define the headlamps while using the Lasso Tool. Observe the glass reflections and paint the car roof carrier.



05

Add dark shadow underneath the SUV; it helps to improve the overall stance. Please focus on the right front corner. You need to showcase and balance it since it allows the viewer to understand the shapes and volumes. Use the Lasso Tool to create sharp detail in front lamps and paint the details of Air Intakes freely.



06

Observe how Joaquin made the front pop in this step. Sketch the right front tire more dramatically while overlapping the front corner (this breaks the perspective rule, but it helps the sketch stance). Notice that little changes in details helped the front to stand out more. Add deeper shadows to the surfaces to render the volume more profound. If needed, use Lasso Tool and Warp tool to define the side light catcher.



07

Now it's time to highlight the surfaces. Add lighter colors or use Overlay mode while sketching with a white Brush. The goal is to define and refine the left front corner to showcase the design in the best light possible.

Use ground reflection on the side. Pick the color from the greenhouse of the reference photo and paint the windows. Indicate the B and C pillars with a few handstrokes.

Observe how the A—pillar continues to the front surface, which wraps the hood; this gives the SUV a powerful character. Define the headlamps and bumper with contrasting precise lines. Duplicate the wheels and mirror them. Use the Motion Blur filter in the wheels reflections as a final touch to the rendering.

BMW 5-SERIES COMPETITOR

THE SOFTWARE PROGRAMS USED:
PHOTOSHOP

WORKSHOP BY PROFESSIONAL
CAR DESIGNER JOAQUIN OBLIGADO

During the workshop, Joaquin asked students to sketch the “competitor” against the BMW 5—series.

When you design a sedan, it is essential to keep in mind the fundamental proportions.

The wheelbase is usually around three wheels in the sedan segment. We can fit three rims and a quarter between the front and rear wheel in the case of BMW 5 series.

Notice how the rear overhang is more prolonged (approximately 3/4 of the wheel) than the frontal overhang (roughly 1/2 of the wheel).

The height of the sedan is usually around two wheels. The cabin is shifted to the rear, which makes the silhouette more dynamic.

Now, when you sketch, you can exaggerate the proportions a bit. Make the wheels bigger, lower the greenhouse, but keep the wheelbase around three wheels long.

Keeping these rules in mind, you can easily design a long sedan. Here are some examples of the students' sketches of the BMW 5—series side view and how Joaquin altered them.

BEFORE

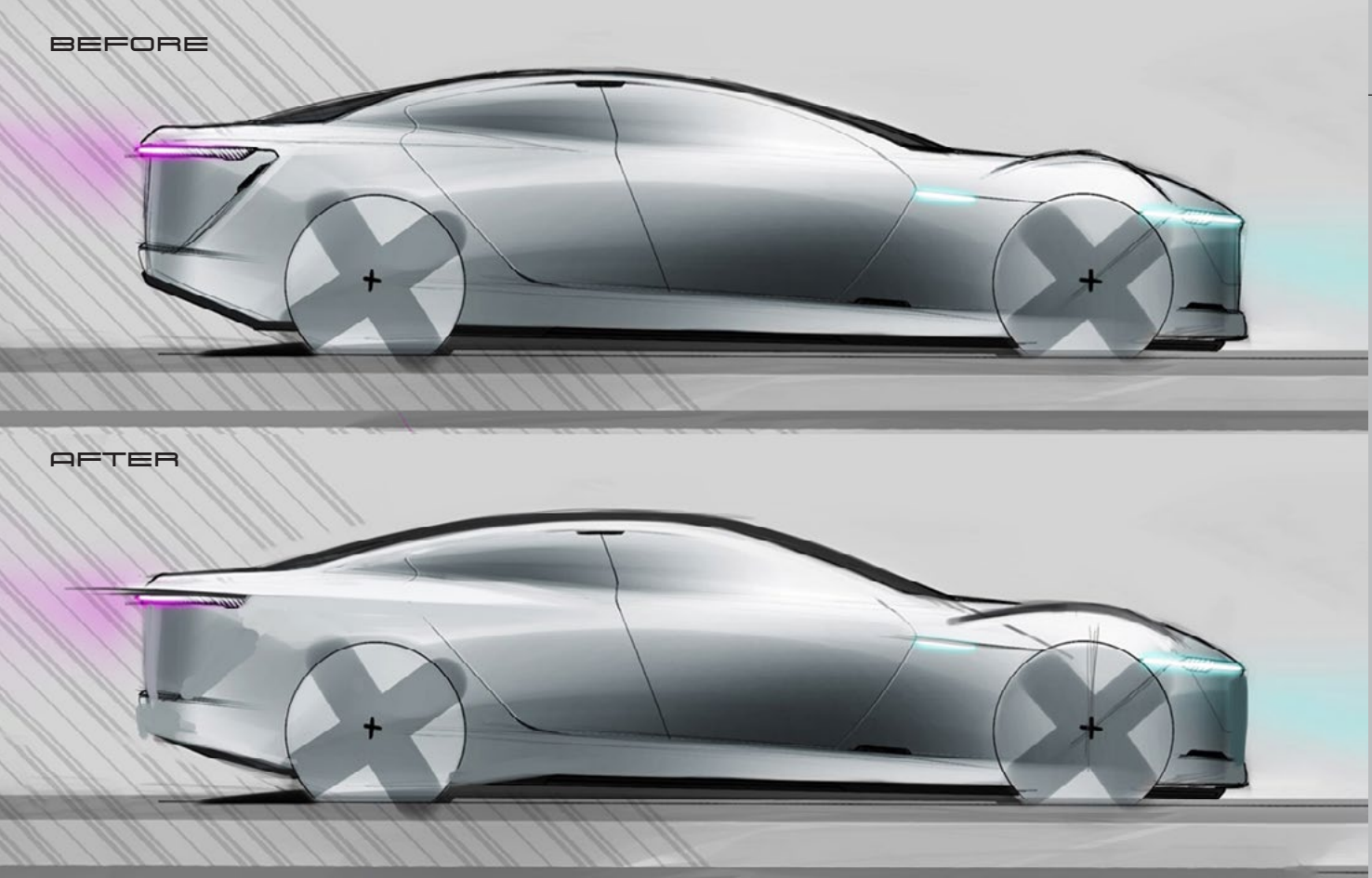


AFTER



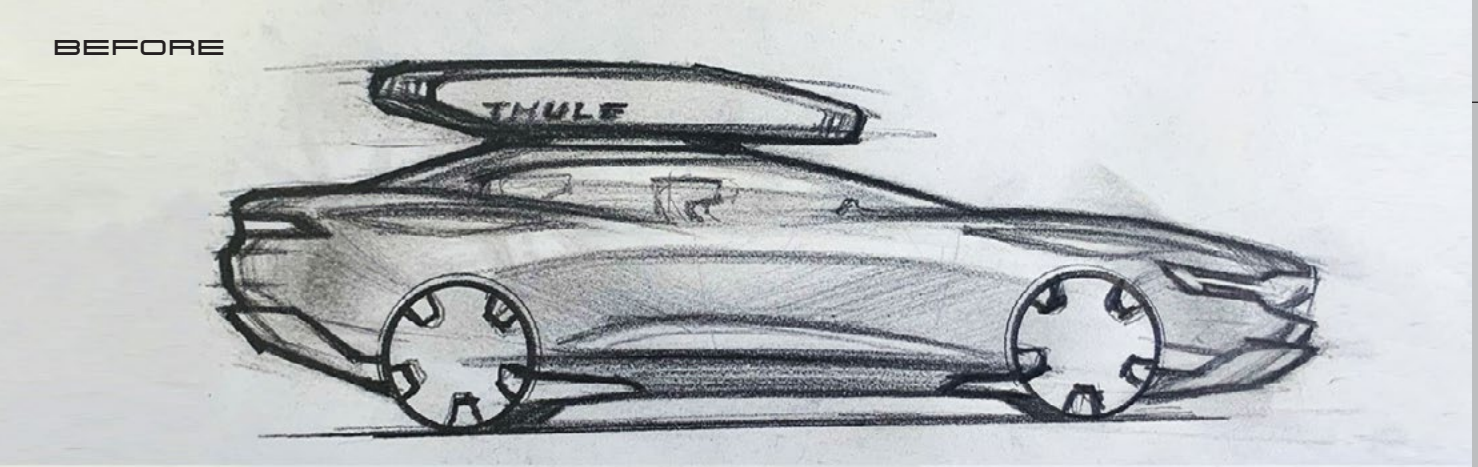
01

The student designed a sleek and elegant looking Mercedes Benz. When you compare the before and after pictures, you can see how Joaquin improved the proportion by prolonging the car body and shifting the cabin to the back. He also increased the wheels' size slightly, lifted the front overhang, and stretched the rear one.

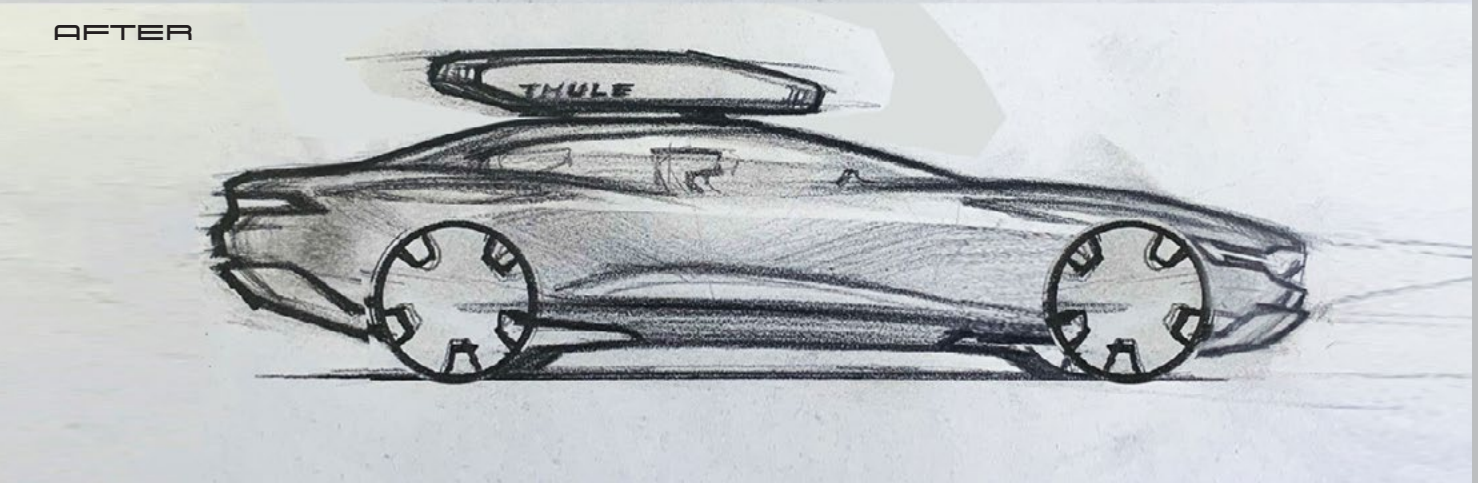


In the second case, the student drew the sedan inspired by VW Aero. There was not so much to correct; Joaquin changed the roof silhouette slightly. He enhanced the wheel arches and simplified the graphical elements.

BEFORE



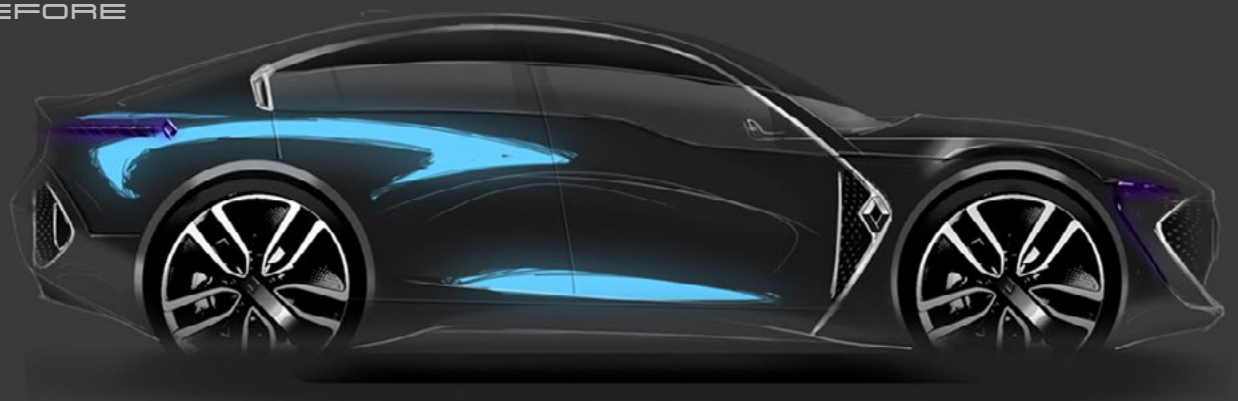
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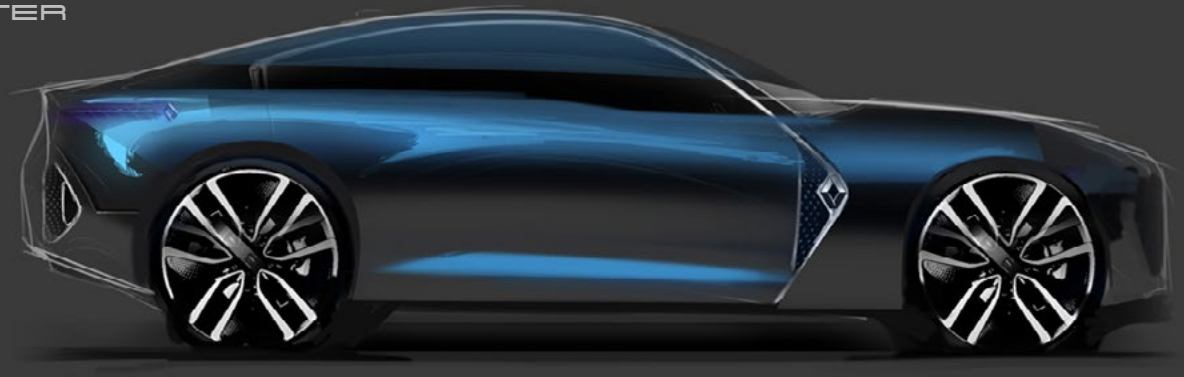
03

The Volvo sedan looks even more stunning after a few alterations. Notice how bigger wheels and a reduced rear fender improved the stance. Joaquin lowered the front and smoothed the cabin to achieve a more dynamic and sleeker look.

BEFORE



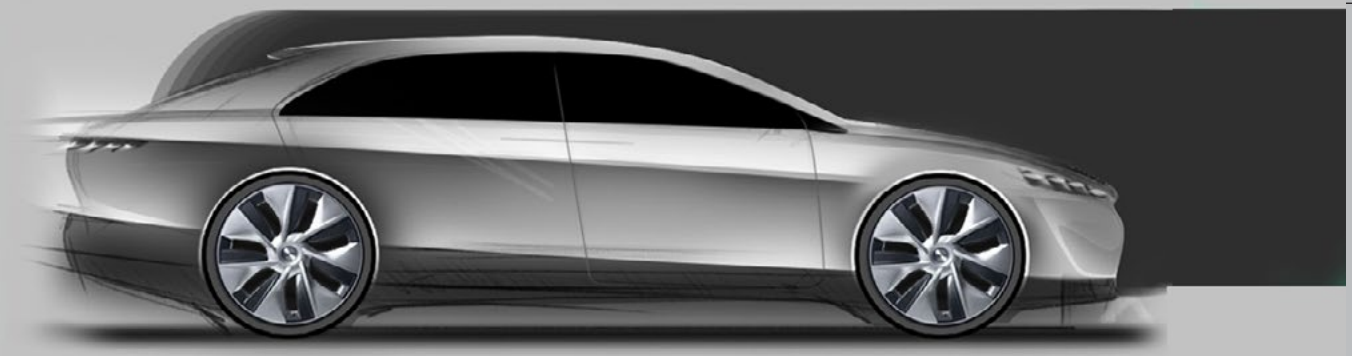
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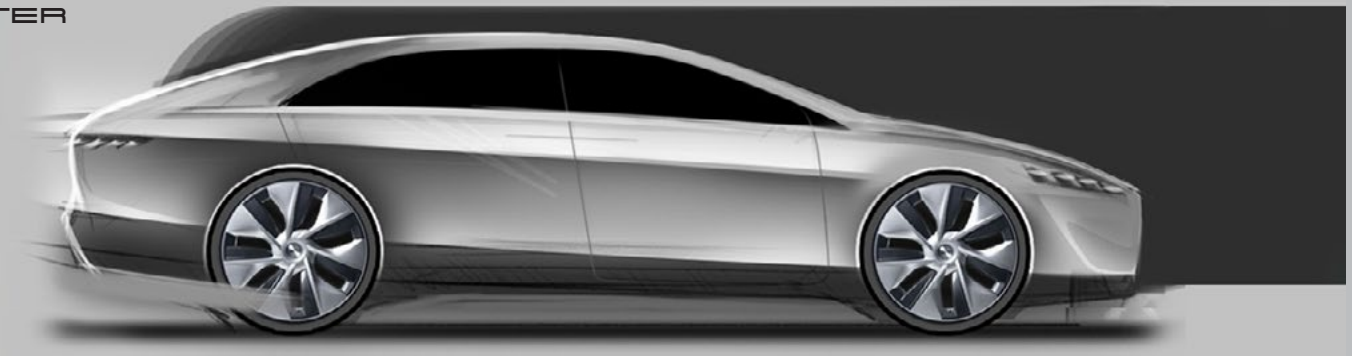
04

Joaquin reduced the size of the wheel arches and added some tension points into the roof silhouette. He stretched the theme on the body side and decreased the size of the front. When sketching, always think about the outline, wheel size, and wheelbase. It will help your rendering to look more realistic.

BEFORE



AFTER



There were just a couple of small alterations in this picture. Joaquin wanted to keep the retro feeling, so he smoothed the silhouette, narrowed the A-pillar, and simplified the front and the rear.

RED SPORT CAR



WATCH THE
VIDEO HERE

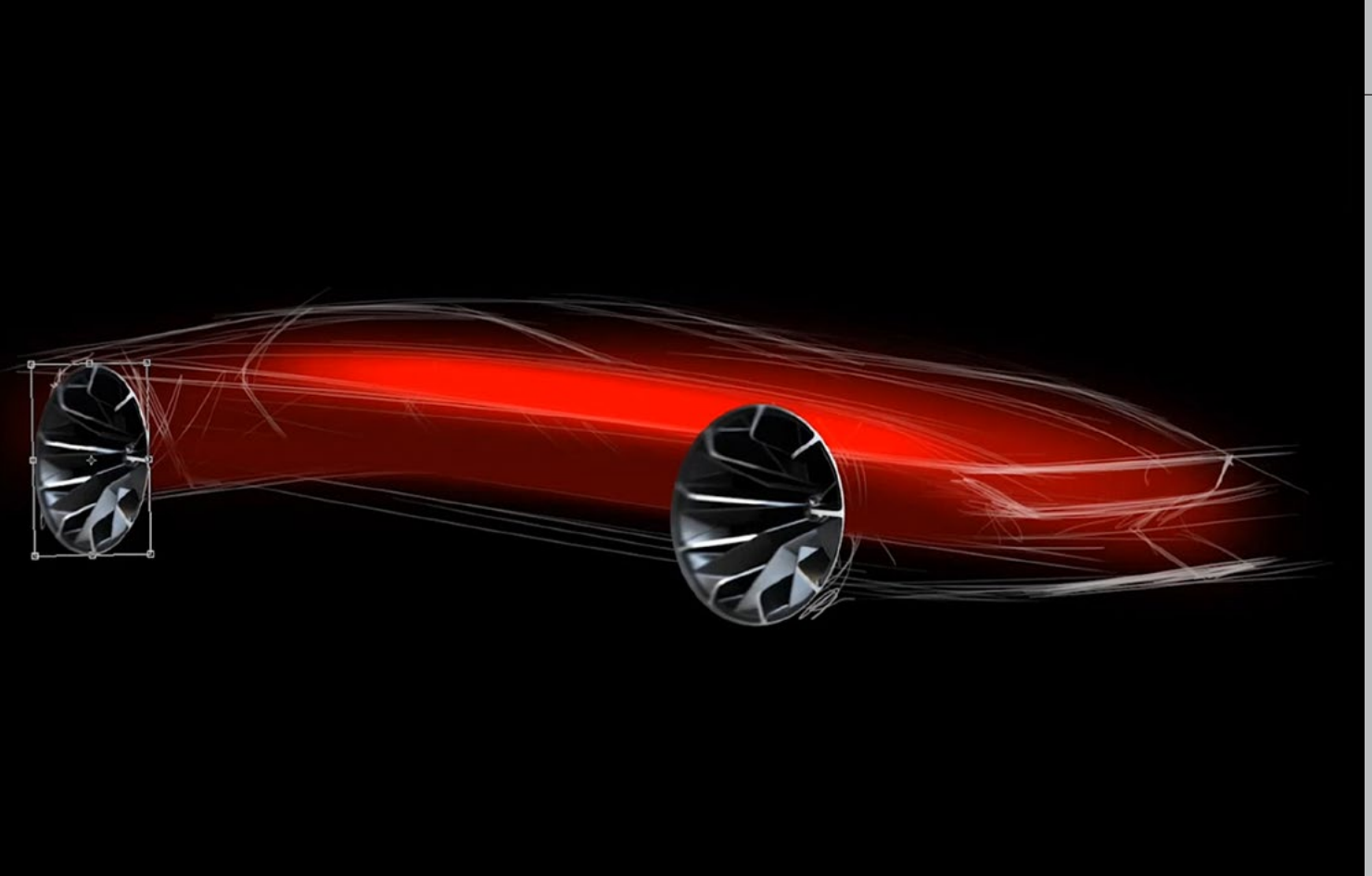
THE SOFTWARE PROGRAMS USED:
PHOTOSHOP

WORKSHOP BY PROFESSIONAL
CAR DESIGNER JOAQUIN OBLIGADO

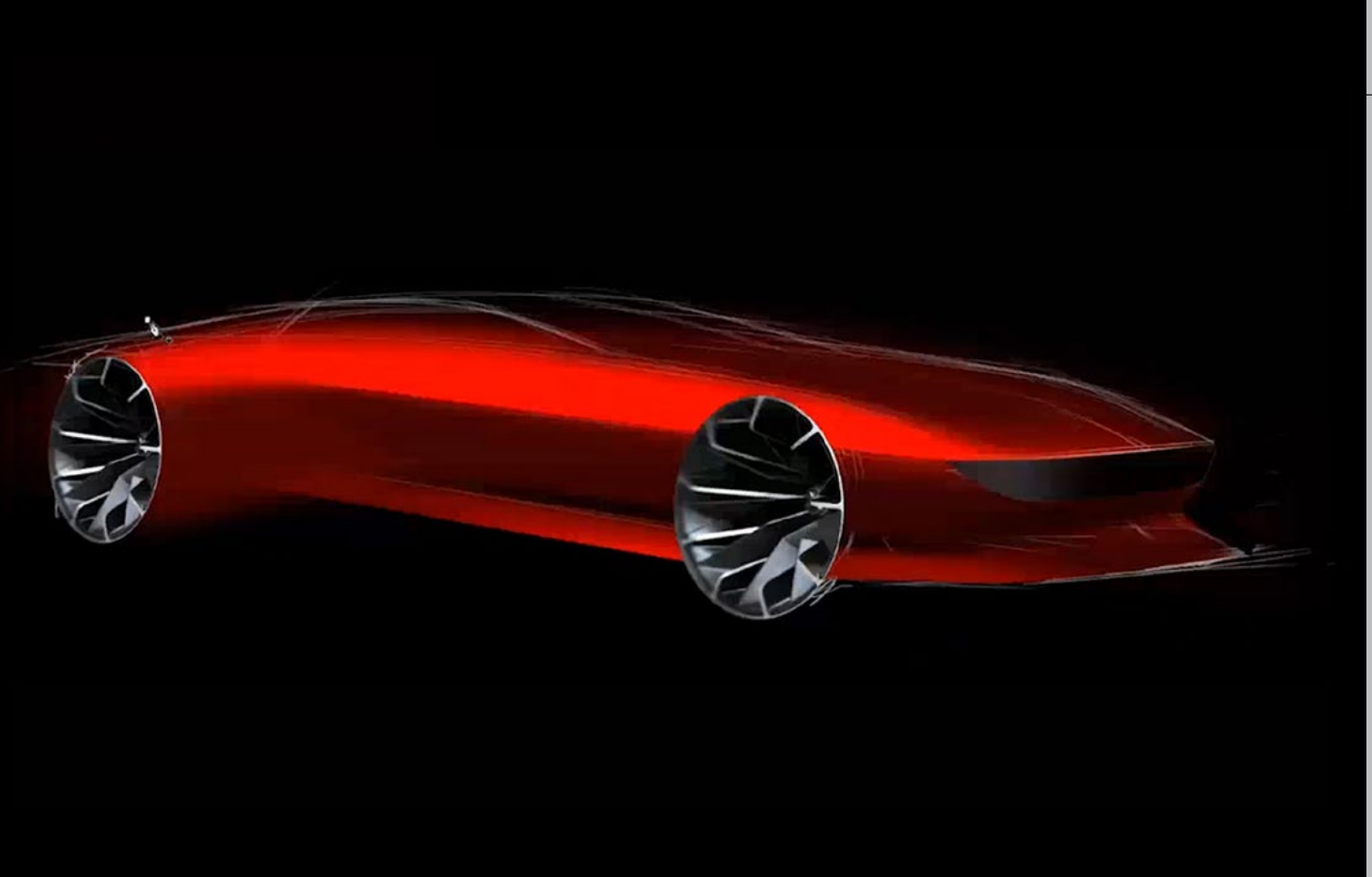


01

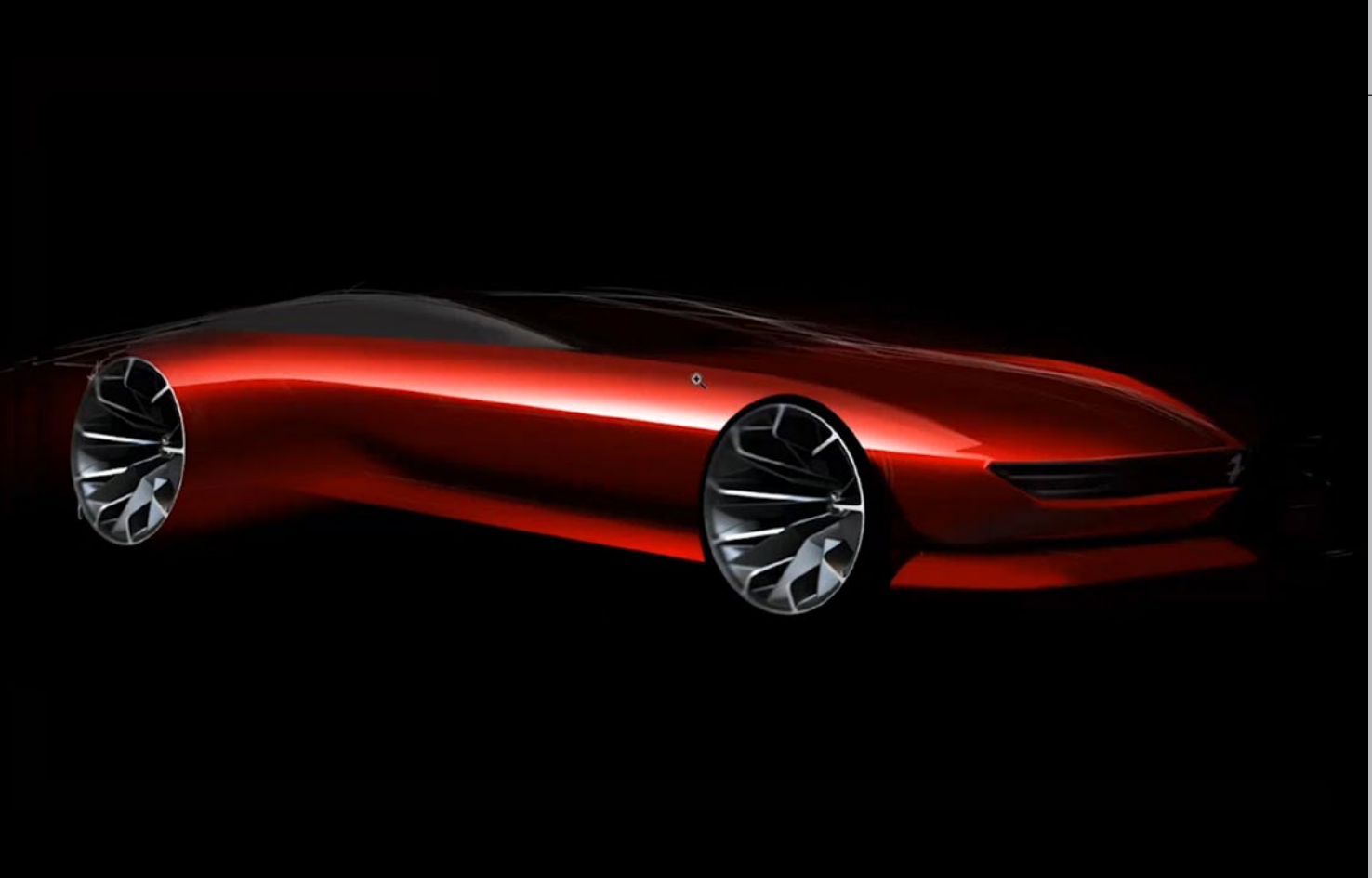
Start with low and long proportions. Use a few lines to indicate the cabin, front, and wheels. Notice how the central line gives the car a strong character.



Revert the image by pressing CTRL+I. Use a black background to create a more dramatic and edgy-looking design. Use a bigger airbrush and paint the main volume, then use a lighter red color to define the front muscle. Add some nice wheels from a photo of the car you like.

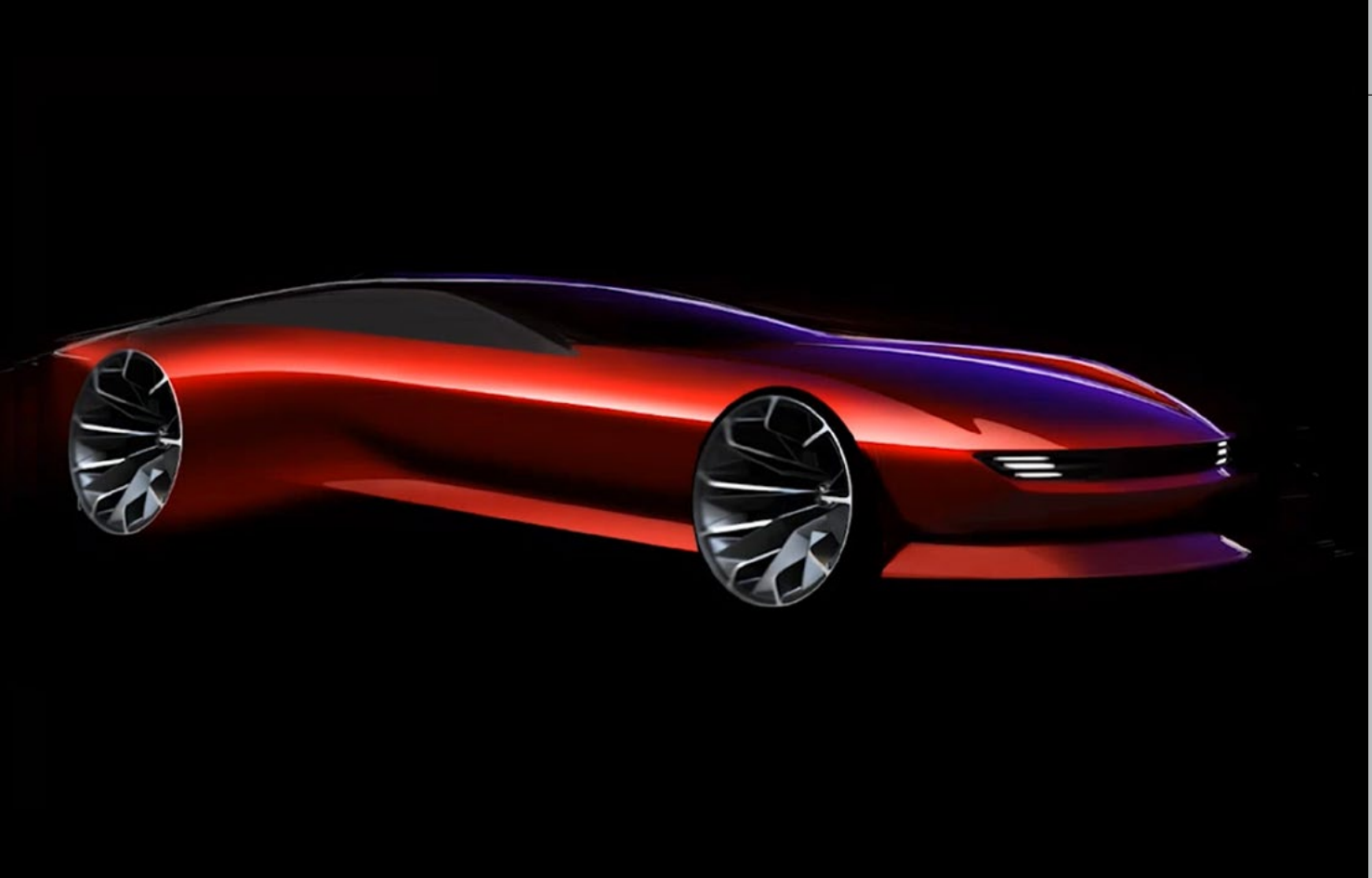


Let’s focus on the design theme. Use a the Pen to outline the bottom of the car and Make a Selection. As you can see, Joaquin used a brighter red nearby the front wheels and deeper values on the front and rear wheels. Paint the grill with simple black and gray shadows.



Paint the greenhouse with a black Soft Brush. Use the Lasso Tool to keep the edges crisp. Now, use the Path Tool again and Make a Selection to wrap the window and the shoulder.

Create an intense highlight on the central line and softer gradual shade on the window. Use the Airbrush and Eraser. Notice how the highlight instantly elevated the sketch to the next level.

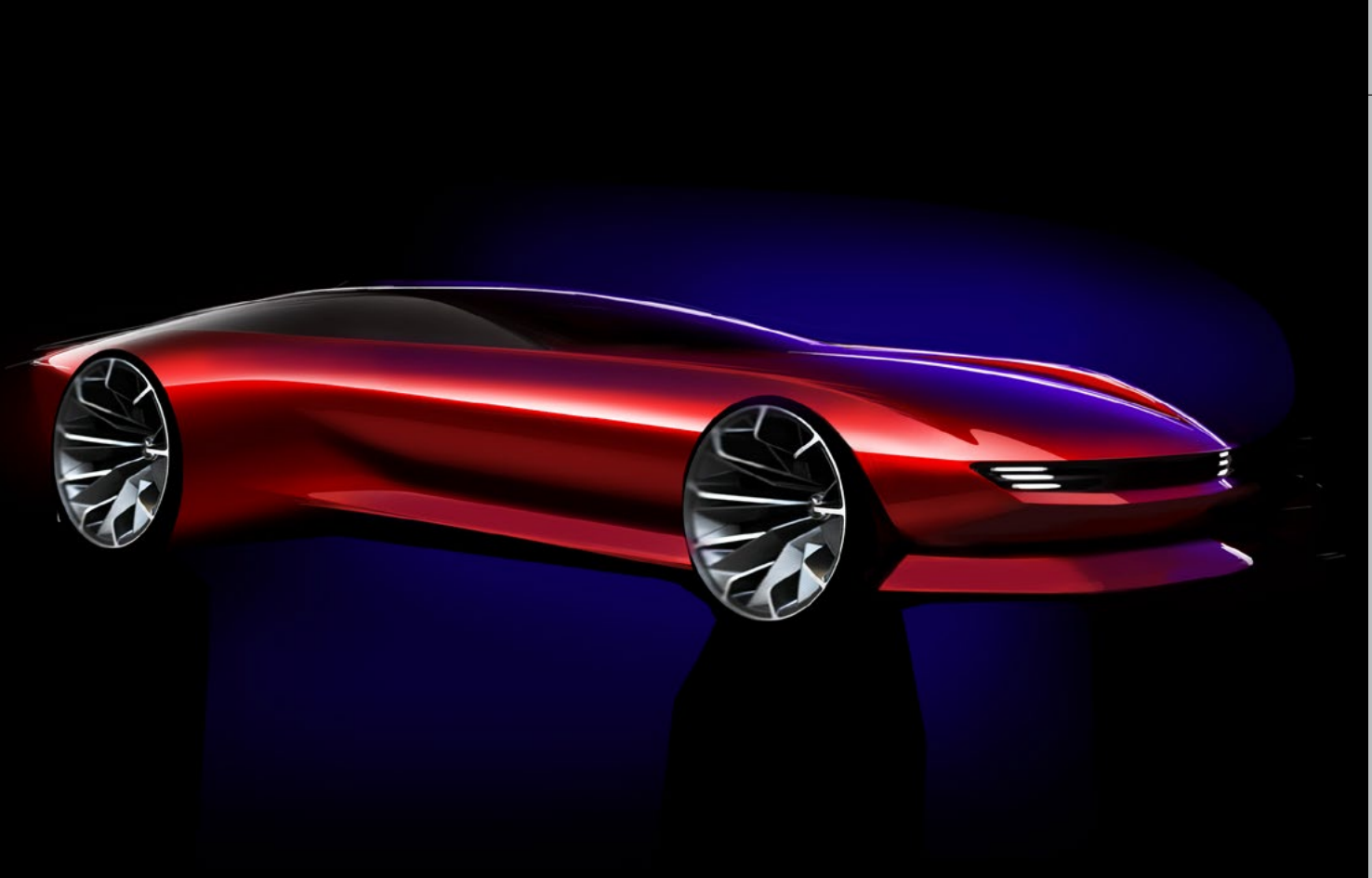


05

This step is all about the colors. Contrasting lighting helps to define the volumes and creates a smoother silhouette. Joaquin used the Lasso Tool again; he selected the hood and the roof, and painted the surface with a blue soft Airbrush.

The gradient usually changes the mood of the picture and brings the drawing to life.

Paint some headlamps and define the grill area so you bring more attention to the front.



06

Finally, bring the blueish gradient to the background as well. Define the rear end with an intensive highlight and add some deeper blue shadow on the shoulder. Add more light to the left front corner to describe the surface wrapping the grill. Aply more light tones to the light catcher and the front bumper.

SCOOTER



WATCH THE
VIDEO HERE

THE SOFTWARE PROGRAMS USED:
PHOTOSHOP

WORKSHOP BY SLAVOMÍR OZANÍK,
INDUSTRIAL AND AUTOMOTIVE DESIGNER



Start with the photo of your favorite scooter or motorbike. Cut out the wheels and technical details such as mirrors and chassis. Lower the opacity of the motorbike and indicate the proportion with a few lines.

Enlarge the wheels and keep in mind that the wheel distance in motorbikes is usually from 1,5 to 1,75— wheel long.













Let's start with some basic graphical design. The division of the scooter into two colors can help you to exper-iment with the main volume proportion.

Sketch as many variations as you can and choose the most appealing version.



This step includes basic shading techniques.

Observe how Slavomír indicated the main surfaces with the Lasso Tool and few shadows. The main contrast between the shades and light textures helps define the volumes and forms.



04

Add more defining lines and render the prominent shadows more profoundly. Enhance the bottom light catcher and sketch blurred lines, on the spot where the light hits the edge. Define the silhouette by adding one dark shade. The outline shadow instantly helps the viewer read the side view as a three-dimensional object.



Focus on the details. Refine the seat by using the Path. Sketch the front and rear lamps' shapes, and don't forget to add graphical elements inside the lights.

Add more light with the soft white Airbrush to the central theme and deepen the main shadows aswell.



06

The final touch is about contrast and detailing.

Duplicate the wheel layers and use a filter to simplify the look of the wheels.

Then use a white Brush to enlighten the tire structure. If the rendering style is precise and clean, you can show a more artistic approach in the wheels. You can duplicate the layer with the main body and play with the opacity and the layer mode.

Try to achieve a perfect contrast between the light and shadows. Use variation in the Image Adjustments to add a Hue tone to the sketch. Slavomír used a blueish color to create a more dramatic result.

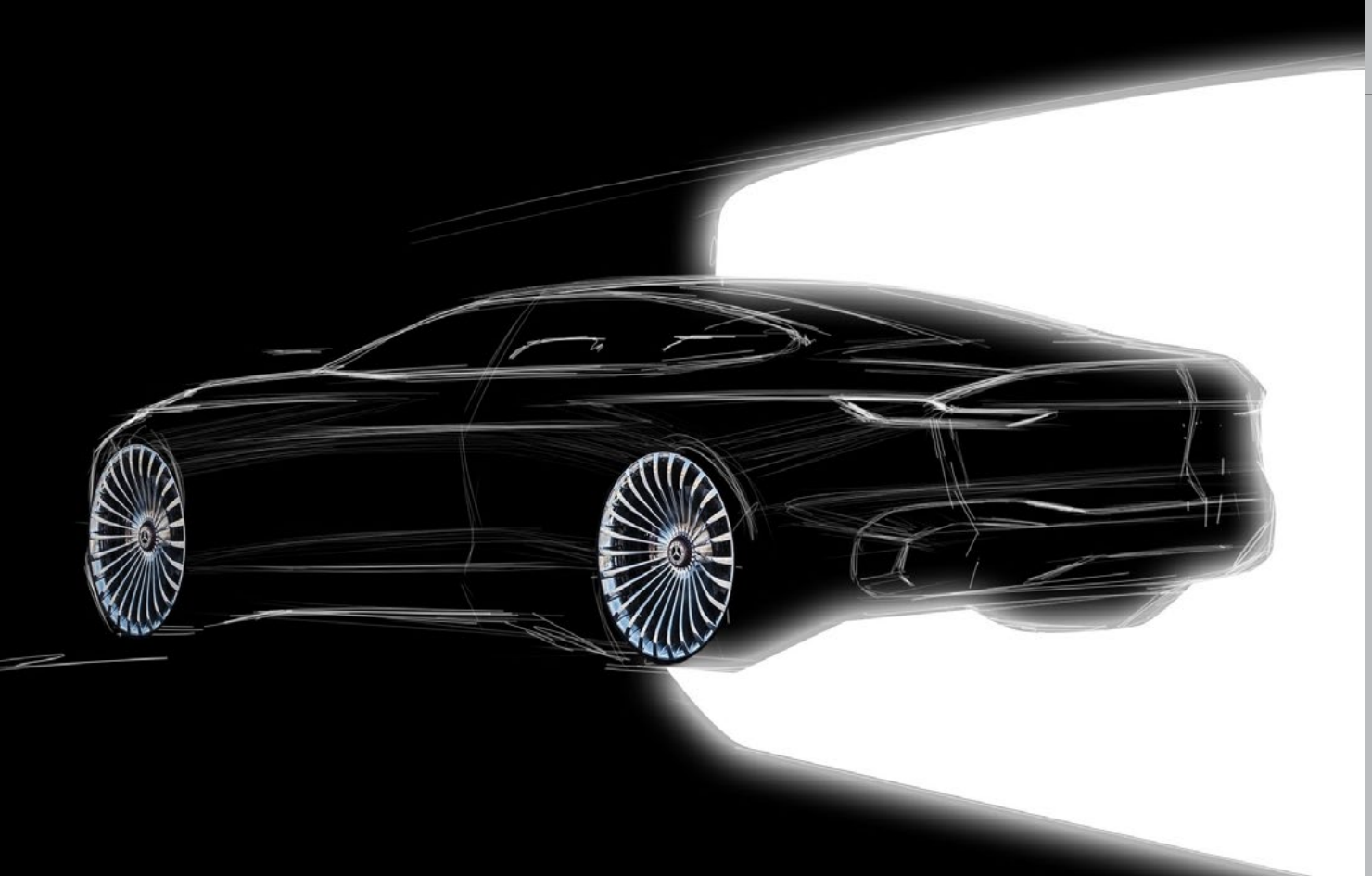
JUICY POLISH MERCEDES



WATCH THE
VIDEO HERE

THE SOFTWARE PROGRAMS USED:
PHOTOSHOP

WORKSHOP BY PROFESSIONAL
DESIGNER MICHAL UHRÍN

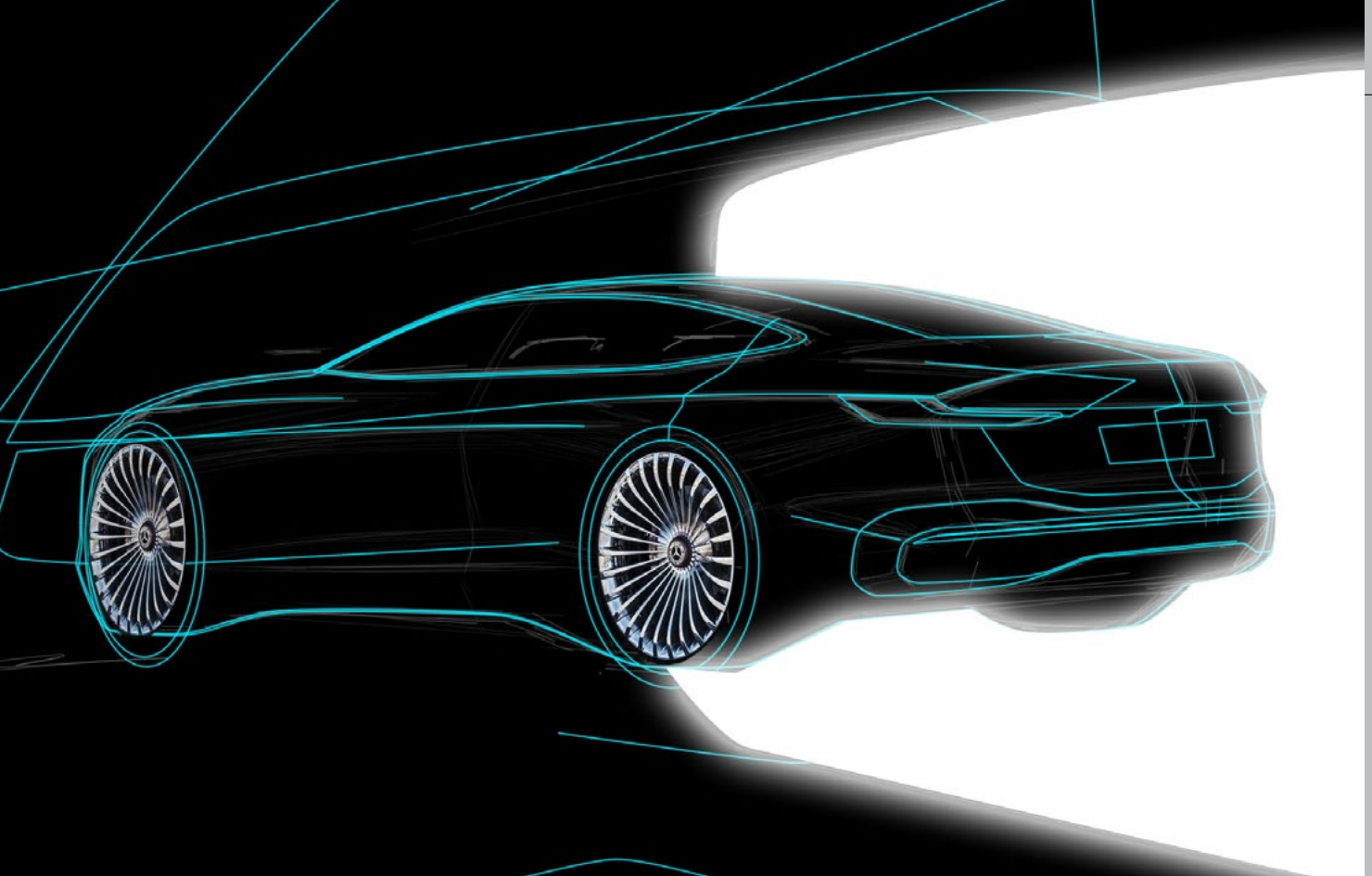


01

Start with a white line sketch on black background in Photoshop. Add your favorite wheels from a car in perspective (a vast collection of vehicles is on netcarshow.com). Think about the part of the vehicle you want to show off the most. In this case, it's the rear corner.

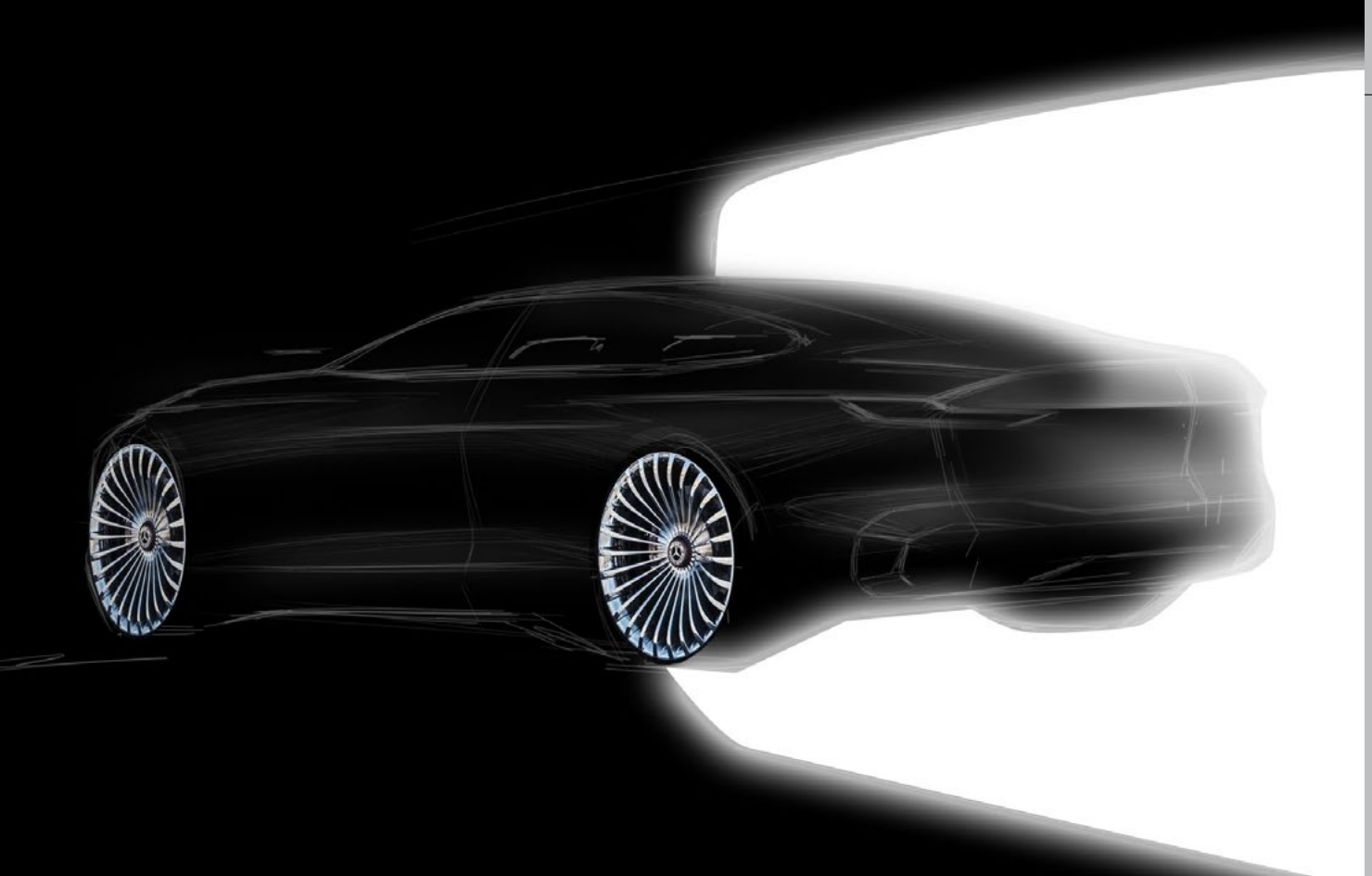
The main goal is to design a sleek and an elegant-looking car. Create a white shape around the back part of the vehicle and choose Outer Glow from layer style.

Set the opacity of the glow around 70%. It will empha-size the rear corner and helps with soft surface modeling.

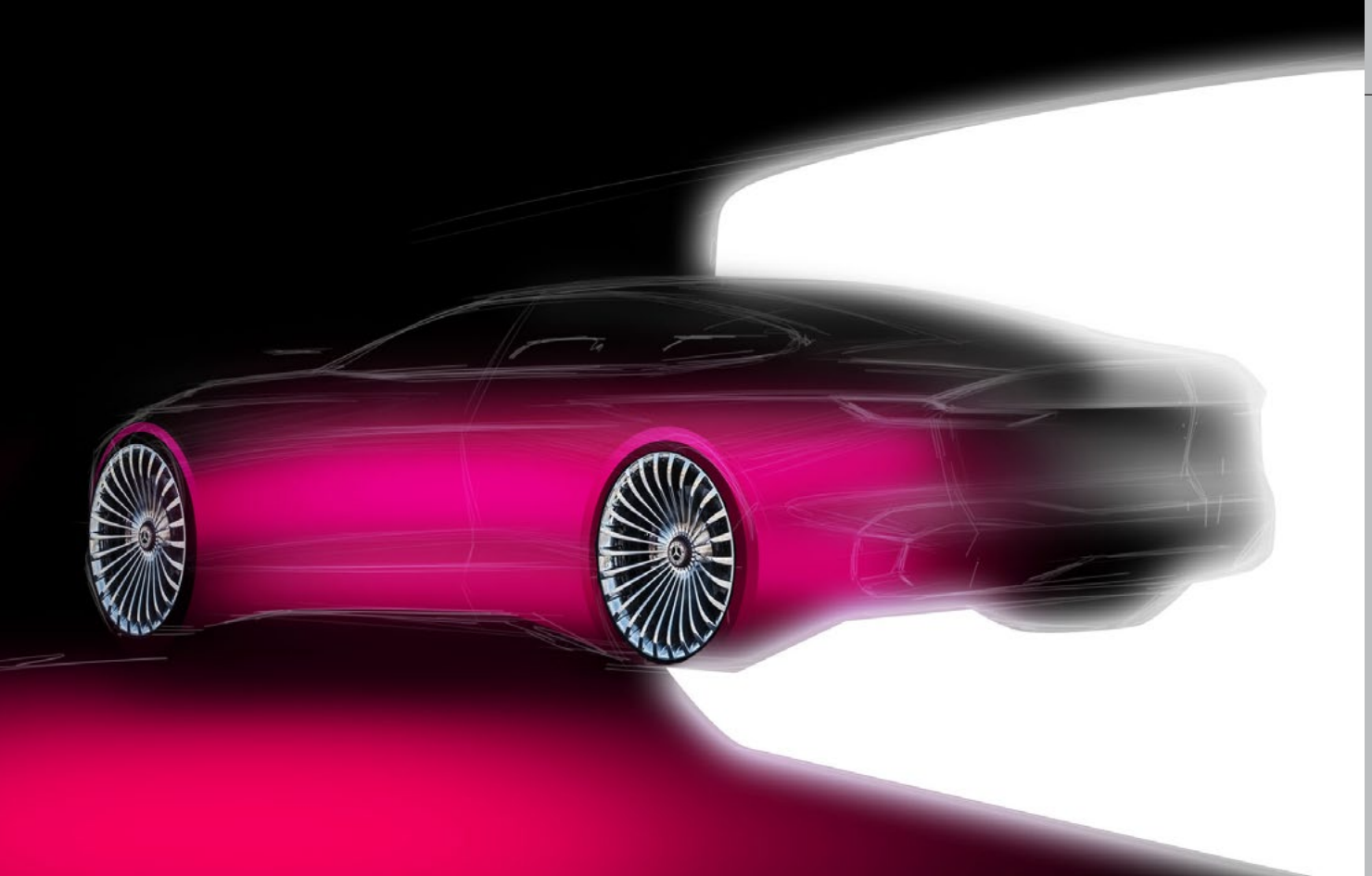


The next step consumes a lot of time, but be precise and pay attention to the details and flow of the forms.

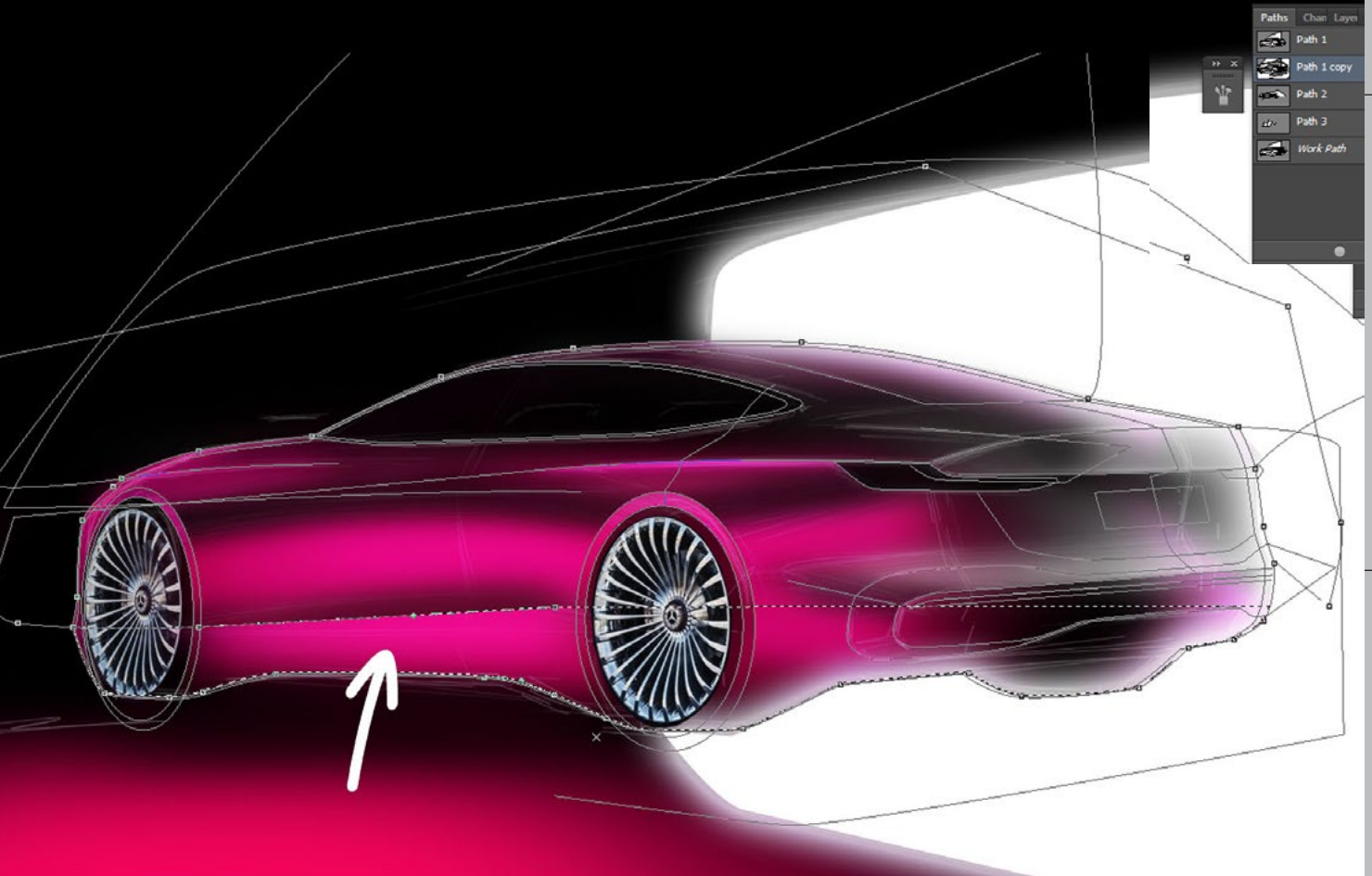
Click on the Pen Tool, choose a path from the top bar, and draw all lines defining the car. Use Elliptical Paths for wheel arches. Sketch Cross Section, graphics elements and corners. You don't need to close all ways (e.g. the rocker and shoulder). Defining paths can lead out of the sketch. Pen Tool will close it when you click on Make Selection.



Alter the opacity of the drawing to 30%. Add some smooth white brush strokes, coming from the glowing background. It instantly creates more focus on the rear part.



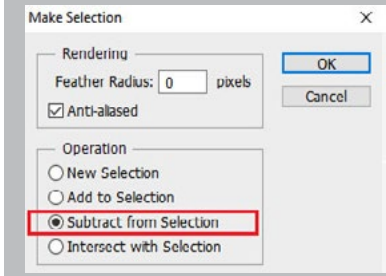
Continue with a primer color. Choose a vivid and juicy value, which contrasts the black background. In this case, the designer used a neon pink shade to define the main body of the car. Then change the blending mode from Normal to Linear Dodge and reduce the opacity of a layer to 70 —75%.



Add shadows through Paths.

Click on the primary outline path; choose Make Selection. Then choose the way that defines the rocker bottom line and press the Make Selection again. It will open a new window where you click the Intersect with Selection.

Press Ctrl+H to hide selection. Select wheel arch paths and click the Subtract from the Selection. Now you can work with soft brushes without concern of erasing the unwanted brush strokes on wheels, graphics, etc. Define the rocker, shoulder, and rear corner with a similar technique.





Squeeze the image to see if all lines and shadows are defined. Focus on the rear bumper.

Define and refine main shadows while using paths and selection. Use a white shadow to showcase the back and black and pink values to render the side of the car.

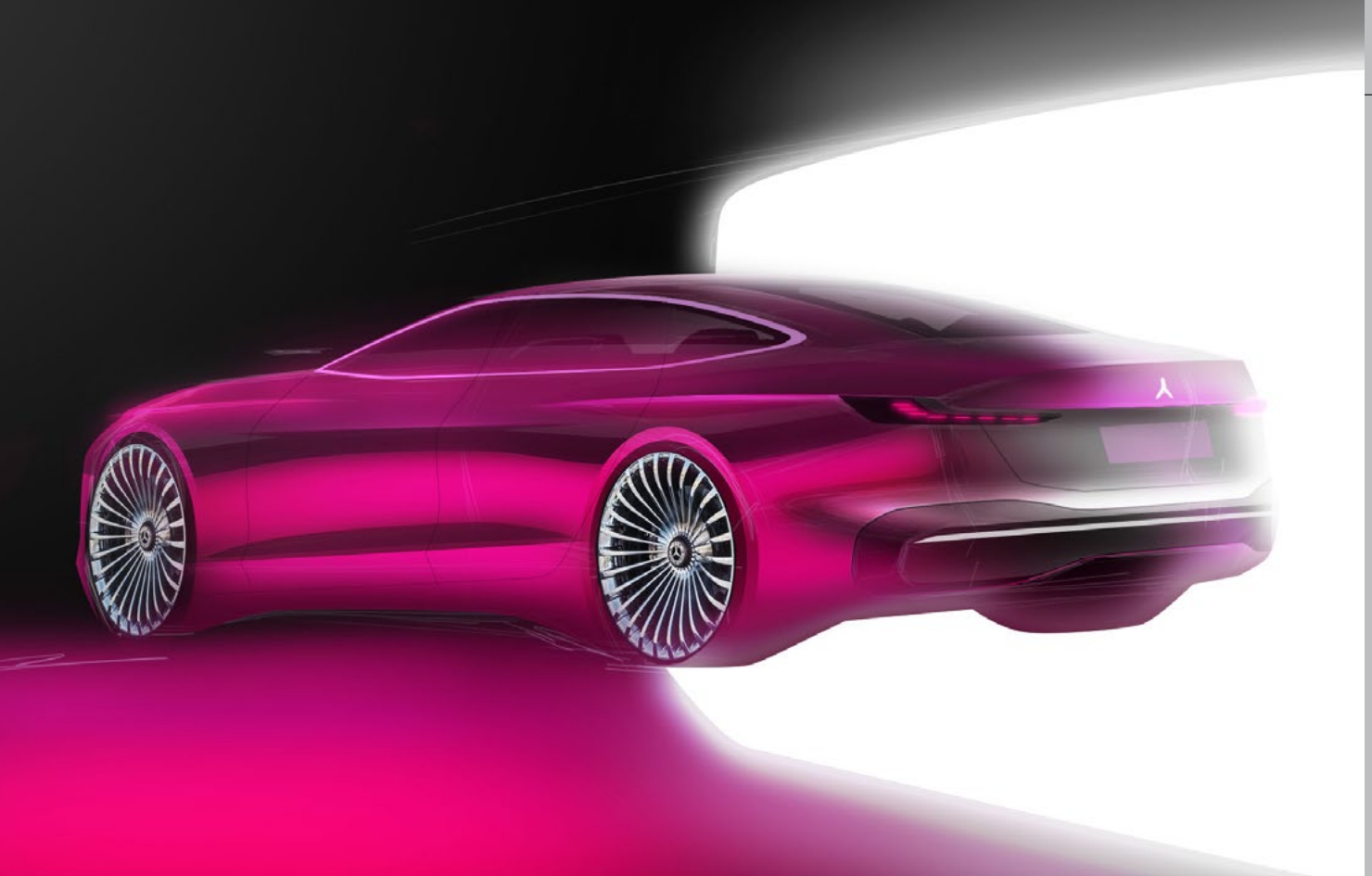
Squeeze the image: *Go to top bar click the View, then Pixel Aspect Ratio, and choose Set Pixel Aspect Ratio. A new window will pop up, set the Factor to 0,2. Now you can see all the mistakes in lines and reflection. To unsqueeze, set the Factor back to 1.*



In the next step, the aim is to deliver the details. Focus on the greenhouse trim, tail lamp, and bumper chrome trim. Add Highlight to define the rear corner. Every shape needs to be precise and sleek in order to achieve a modern luxury look.



Add more highlights on the shoulder and bumper. Create a scale detailing in the rear lamp.



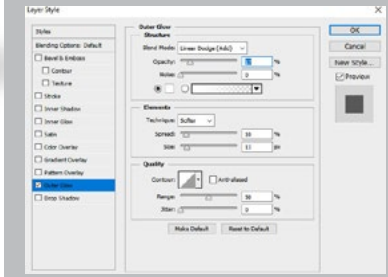
09

Add one great highlight defining the wheel arches, shoulder and greenhouse.

Use white color and reduce the opacity to 60%. Sketch the interior with a white brush and lower the opacity to 30%.

Use Paths to make Cross Section and shut lines. Add logo, and adjust the background.

Final steps: Select the main outline path and choose from the Layer Style "Outer Glow." Adjust the opacity and the angle. Create a shadow with a Soft Brush under the car. Emphasize the shadows and add few highlights on the rear and greenhouse graphics.



BLUE CAR



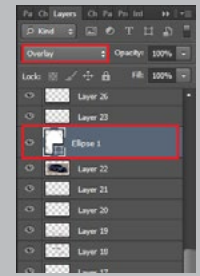
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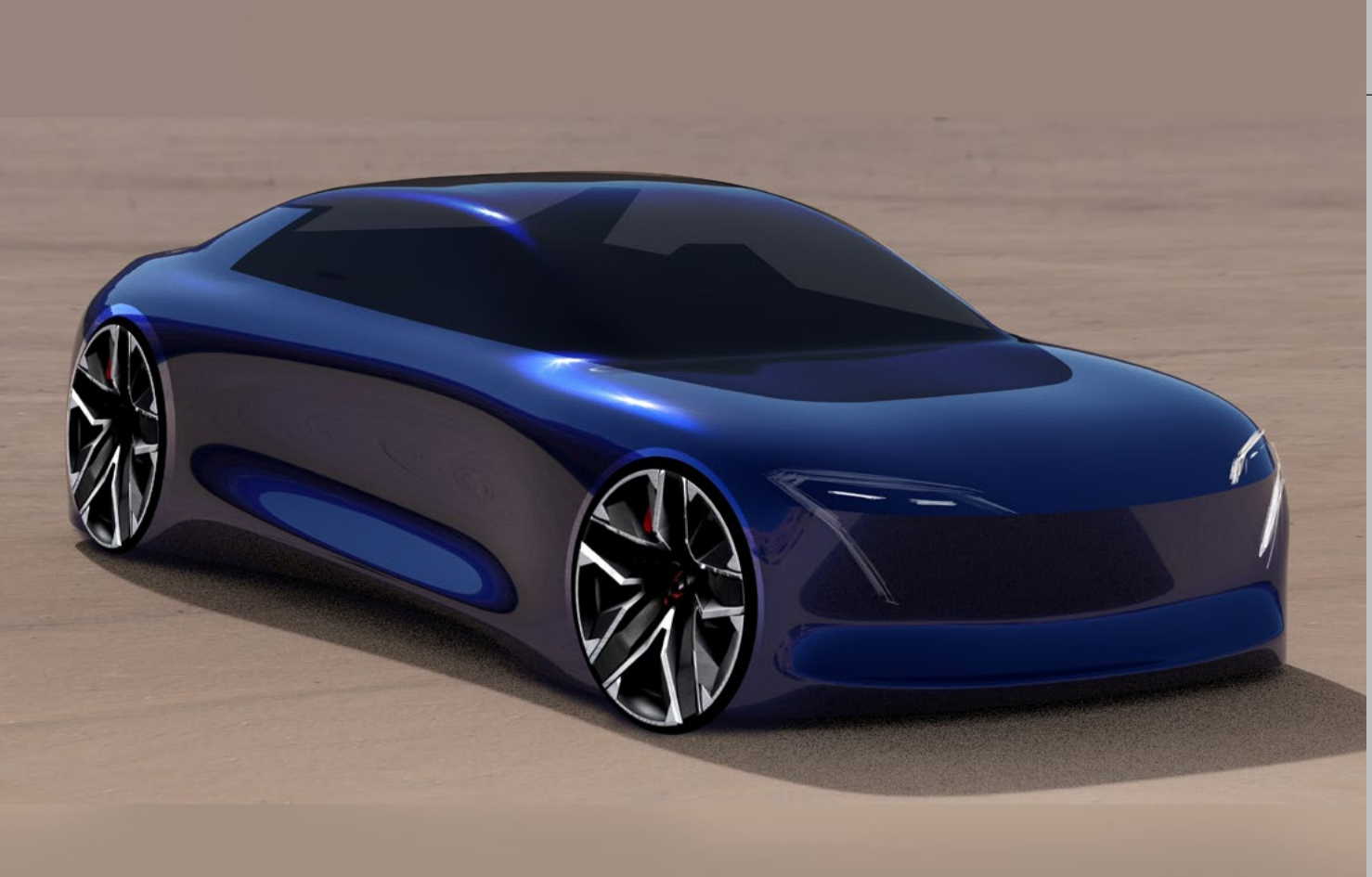
THE SOFTWARE PROGRAMS USED:
ALIAS SPEEDFORM, VRED, PHOTOSHOP

MADE BY PROFESSIONAL
CAR DESIGNER MICHAL UHRÍN

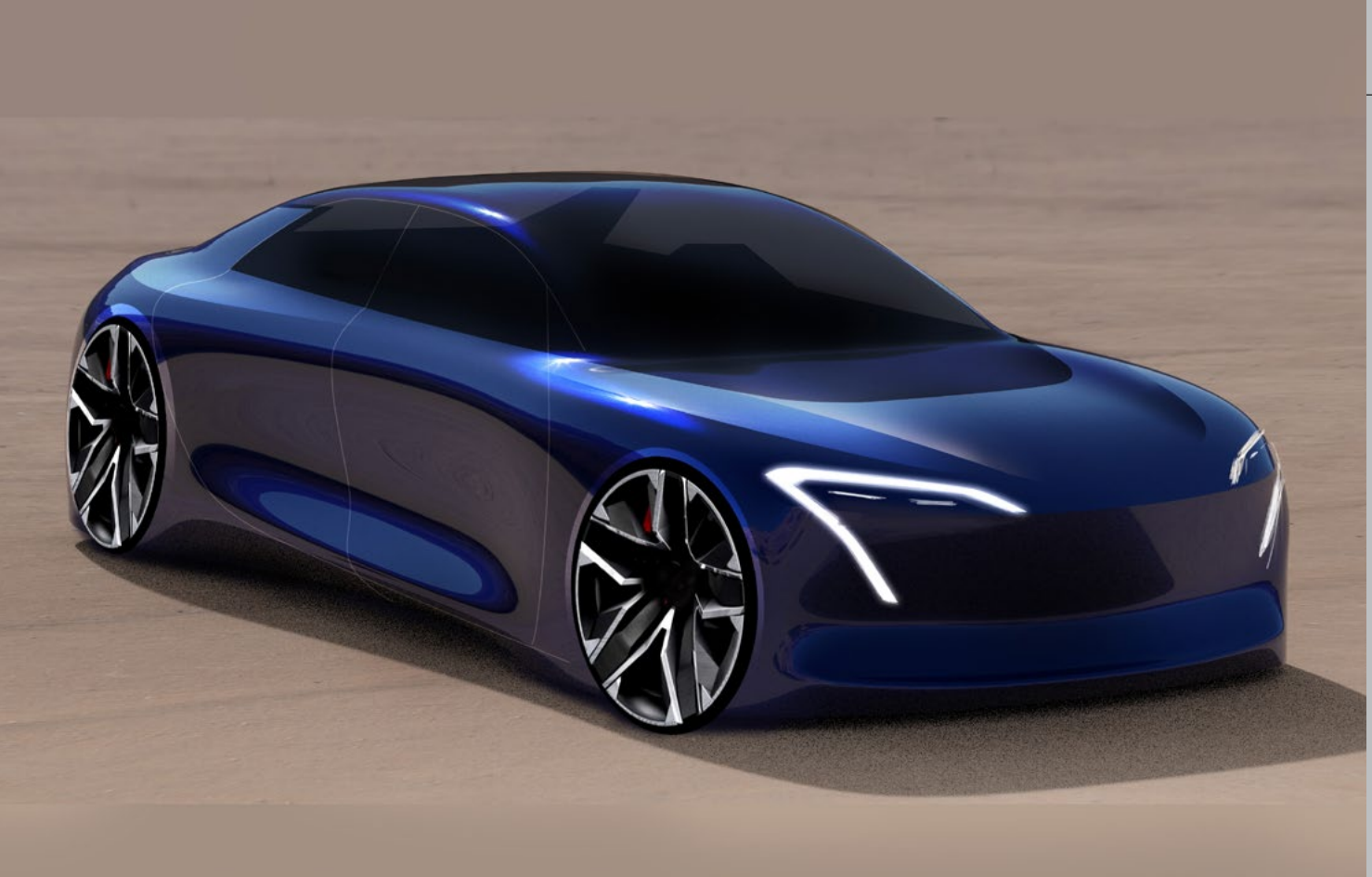
Create a quick basic polygonal model in Speedform, Maya, or Blender. For the workflow, check the Youtube tutorial. Use Keyshot or Vred to get some beautiful renderings.

Blur the background of the render and add wheels of your choice. Create black oval shapes to mimic the tire. Duplicate them and modify the color to white. Then change the Layer mode to Overlay. It will create subtle wheel arches.

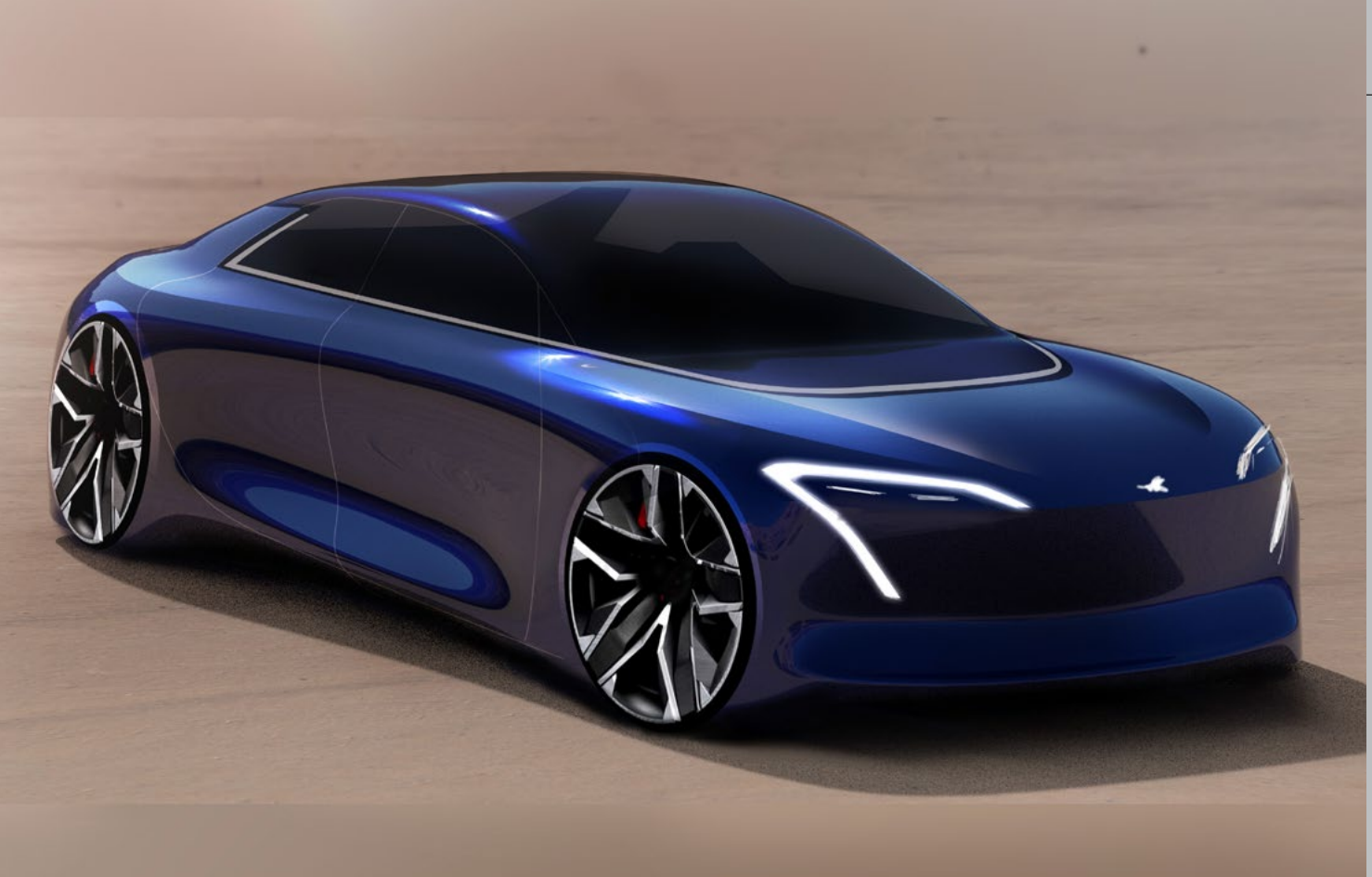




Sketch simple headlamps with white color. Use black Paths to build a greenhouse graphic. Don't forget to outline the interior and C—pillar for a transparent effect.



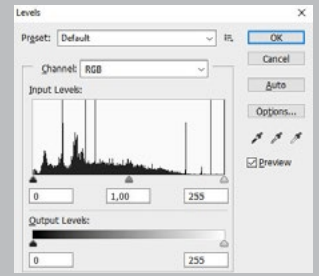
Define the hood and the shoulder. Use a Soft Brush and with few white and black strokes model the surfaces. Add shut lines for a realistic look. Show off the headlamp while using Outer Glow in a white shape.



04

Press Ctrl+Shift+Alt+E to merge the picture, then manipulate it with a Transform Tool to set a better stance and proportion. Use Paths to define the chrome trim to emphasize the greenhouse area. Correct the main side highlights by selecting the desired area. Then press Ctrl+C and Ctrl+V. The new layer appears on the top. Manipulate it with Warp or Perspective Tool.

Follow the same method to emphasize or refine corners and highlights, if needed. These simple corrections can make your design to look a lot better. Sketch front bumper and add ground shadows. Highlight the chrome detail and adjust the background coloring and light. Press Ctrl+L (Levels) to adjust the contrast.



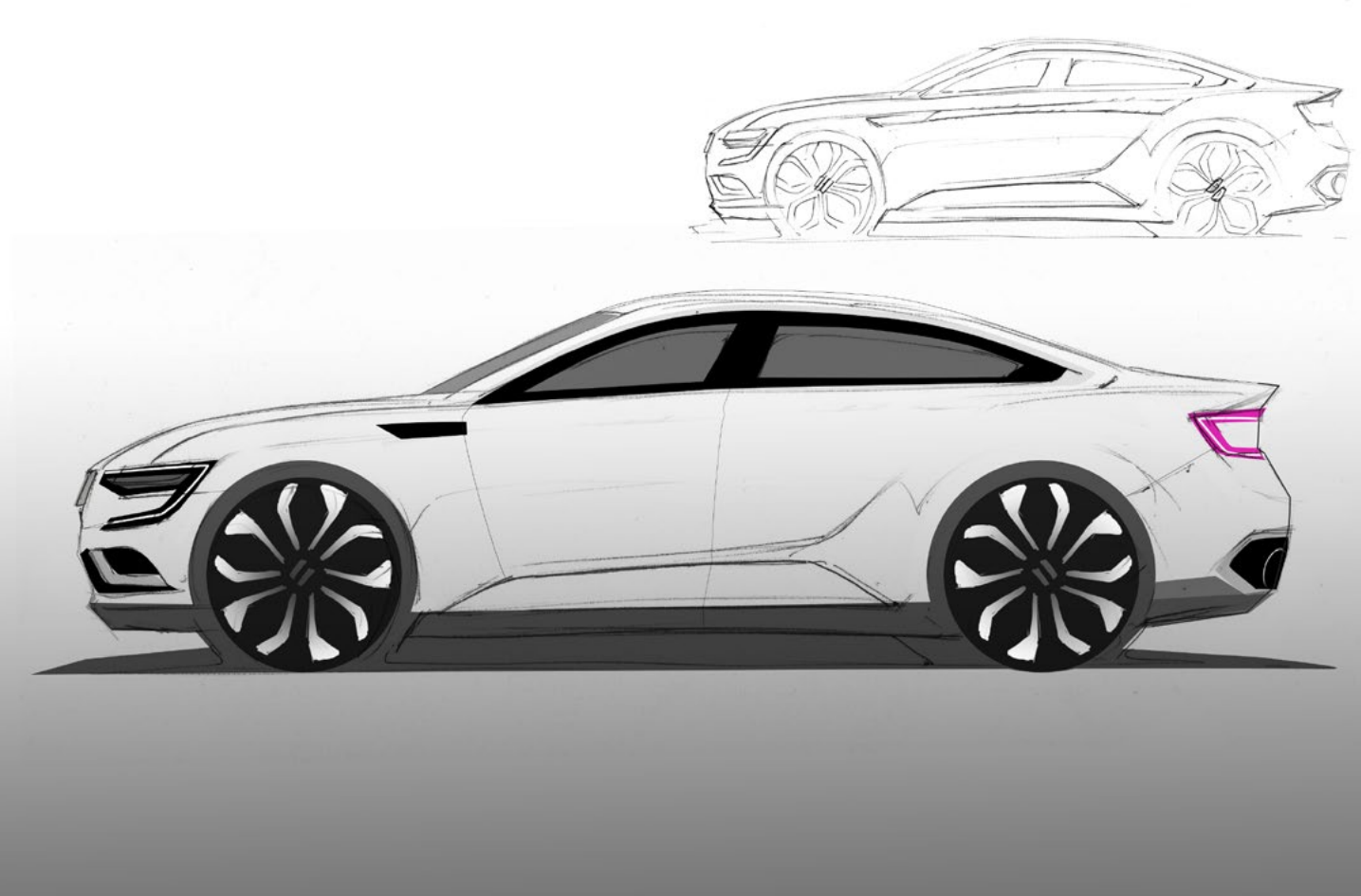
RENAULT TALISMAN



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THE SOFTWARE PROGRAMS USED:
PHOTOSHOP

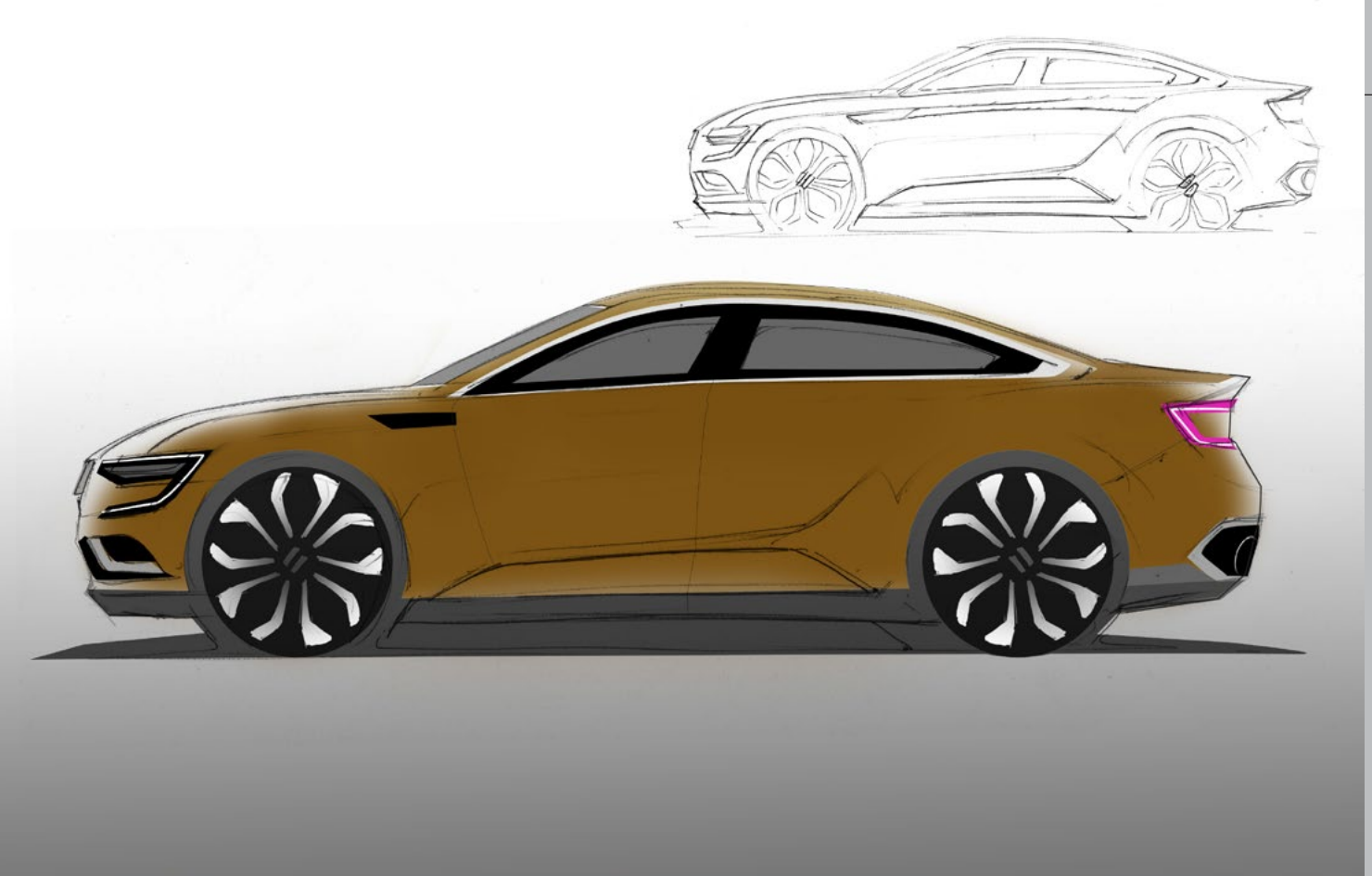
STEP BY STEP TUTORIAL,
SIDE VIEW BY ŽOFIA BABČANOVÁ



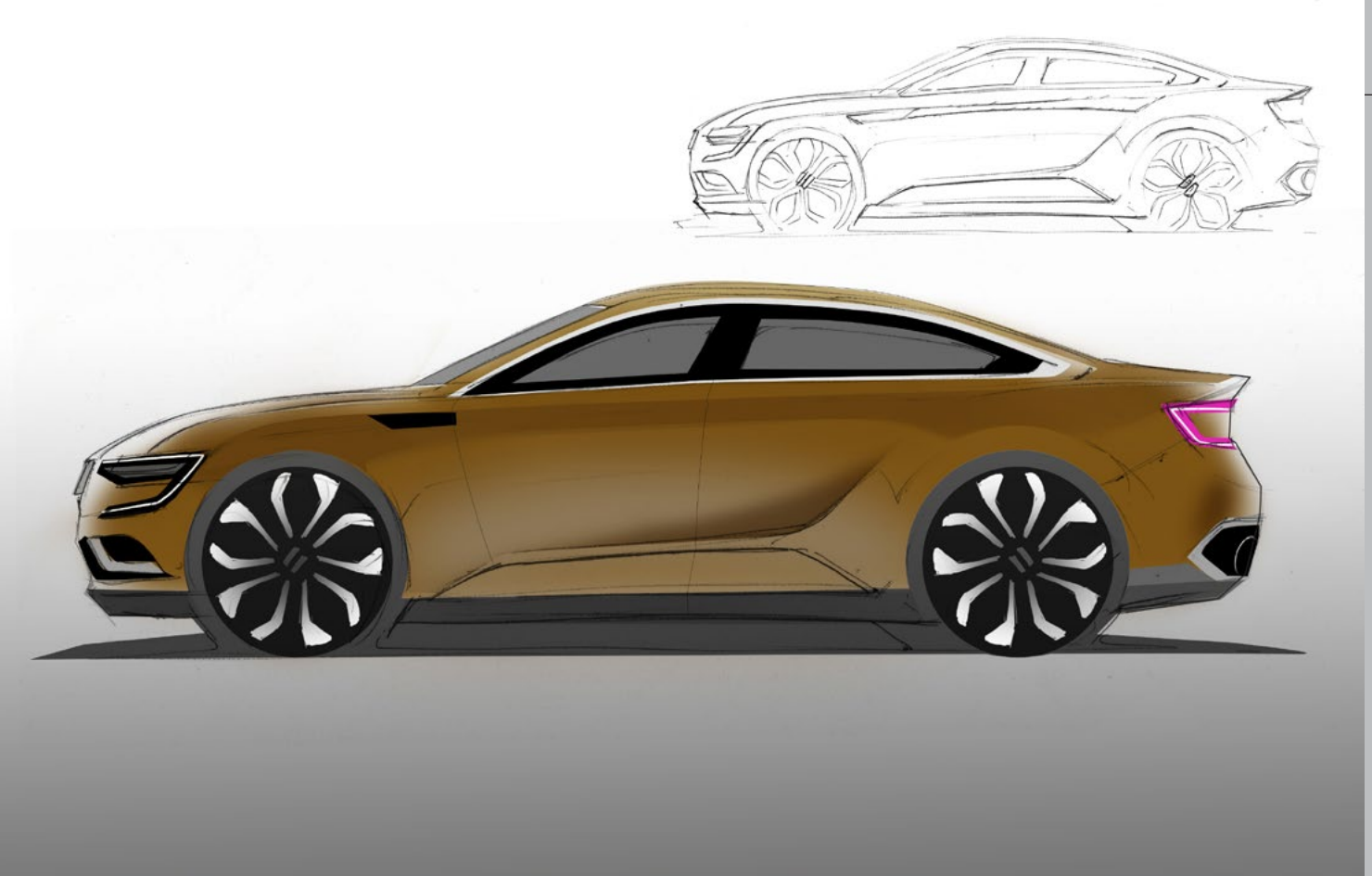
Start with a pen or a freehand pencil sketch. Scan it and open in Adobe Photoshop. Adjust Levels (Ctrl+L) and convert it into a black and white version.

Alter contrast and brightness and get rid of the unwanted shadows. Create a simple background with a gray Gradient.

Lock the line sketch on the very top and change the blending mode from Normal to Multiply. Use Paths or Shapes to draw all the lamps, wheels and graphics in black or gray color.



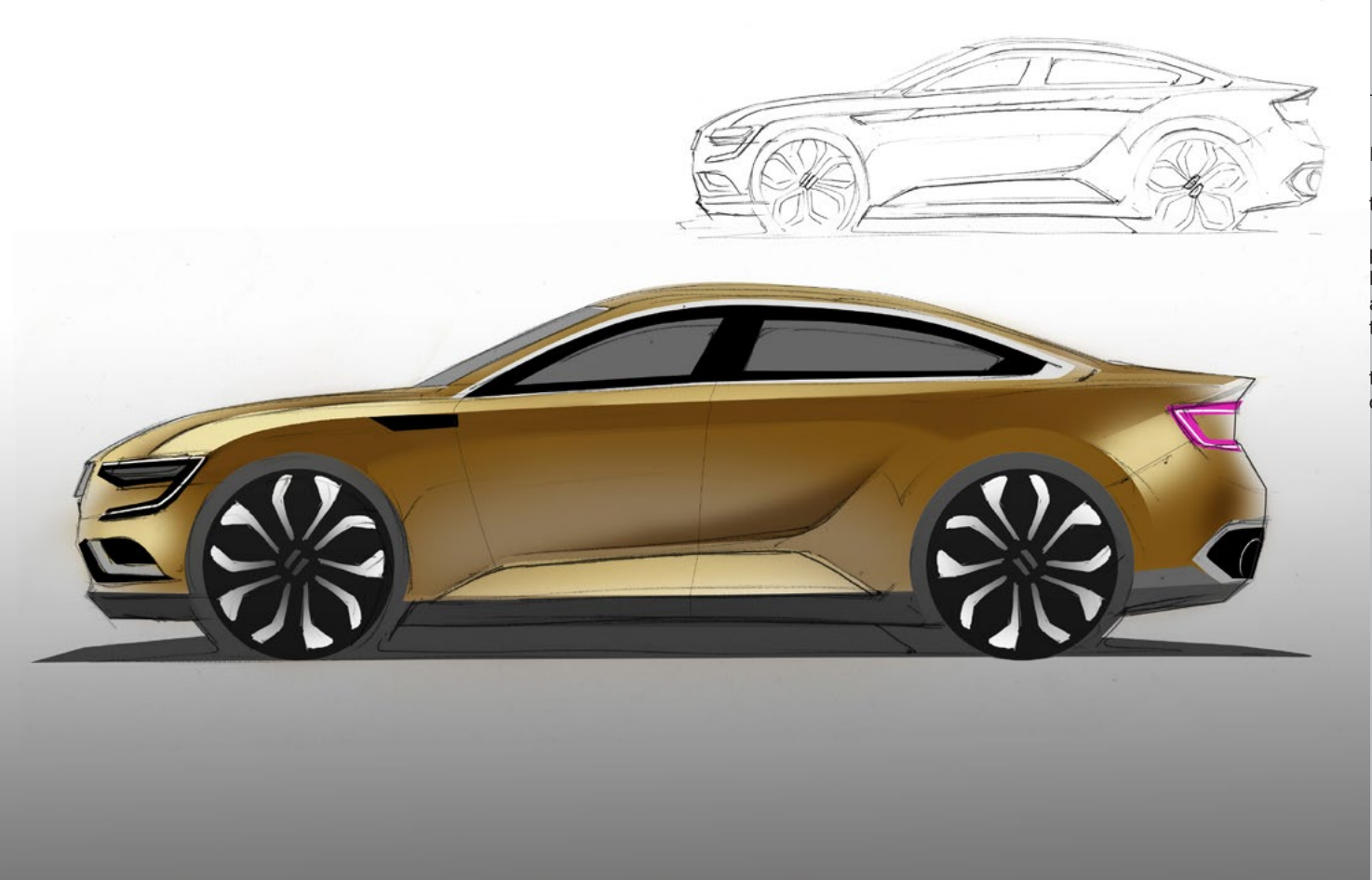
Choose a primer color (in this case mustard yellow). Paint the outline of the side with a Soft Brush. You can use Selection or paint by freehand.



Now it’s time to apply shadows. Use light gray paint with a Soft Brush over the rocker area.

Keep the graphics layer over the shadow layer, so there is no need to erase shadows from wheels and lamps. Another deep darkness is under the shoulder. Draw the shadow in the exact yellow primer color. Change the mode of the layer from Normal to Multiply.

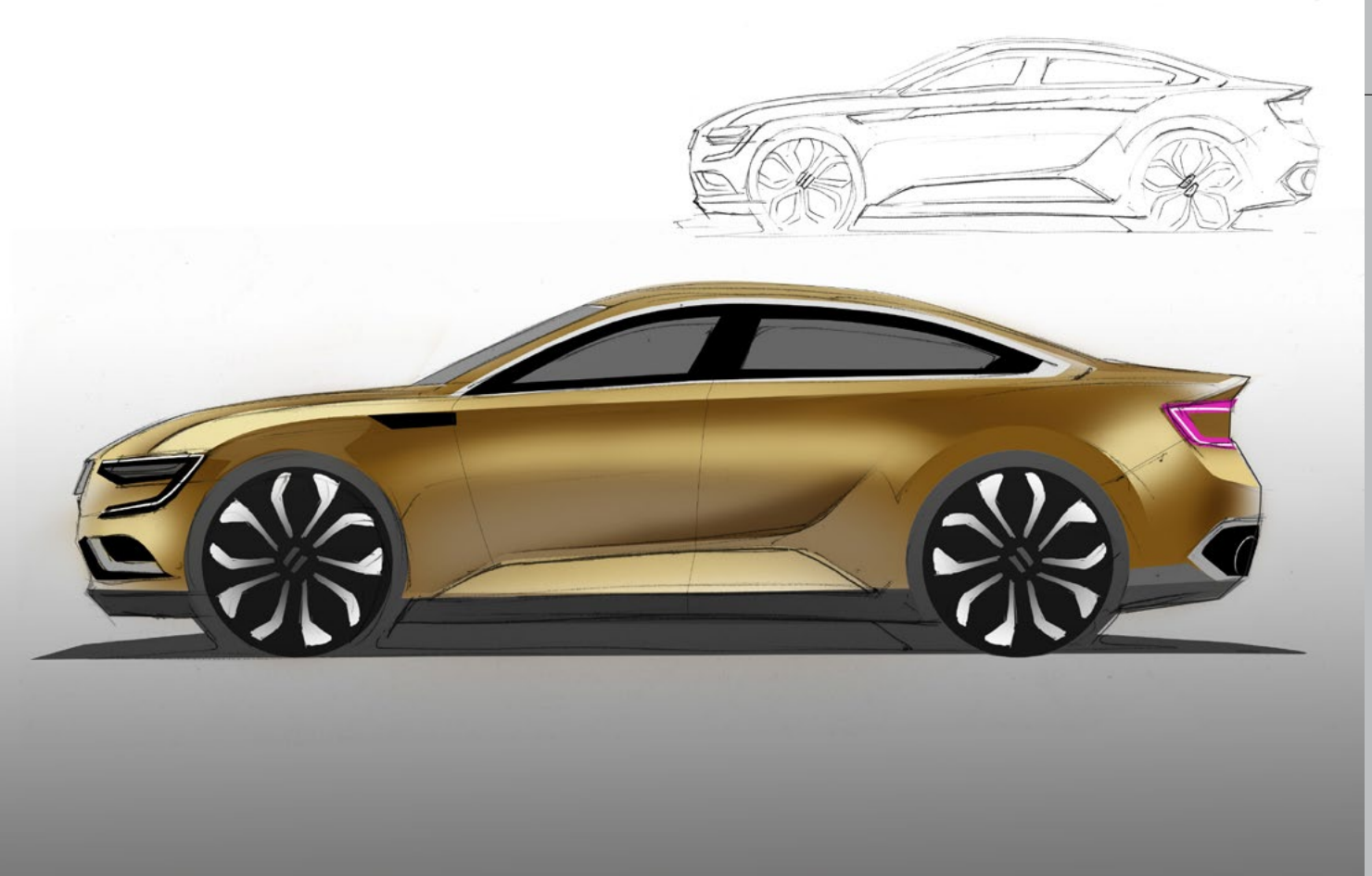
Add a simple shadow behind the rear wheel. Erase the shadow with a circle selection tool to showcase wheel arches.



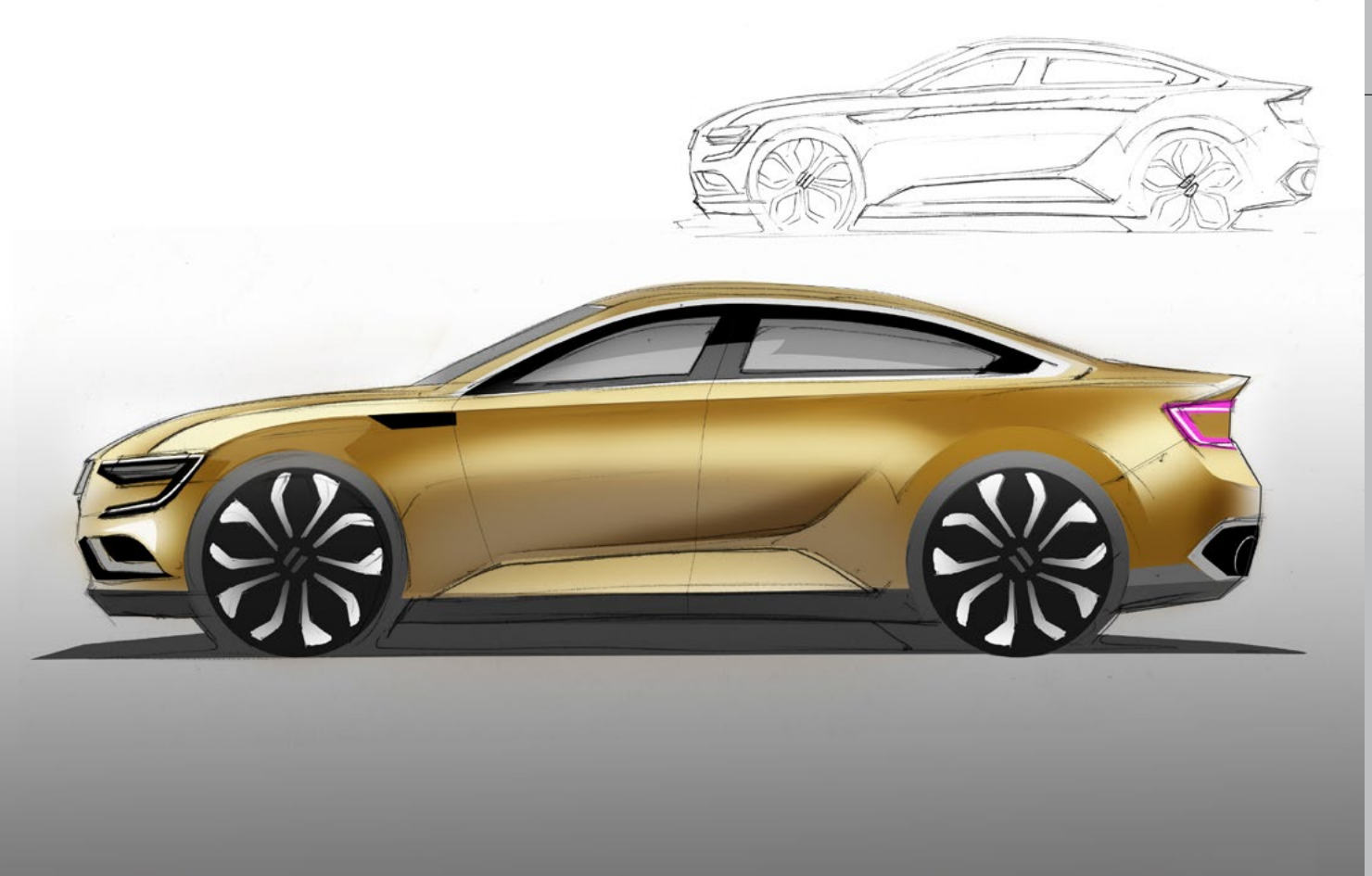
Next step is all about lighting. Imagine the light hits a car from top. It means the roof and shoulder are the lightest part of a vehicle.

Select the form of the shoulder and paint it with the Gradient or a Soft Brush. Another illuminated part of a car is a light catcher. Use the same technique to render it.

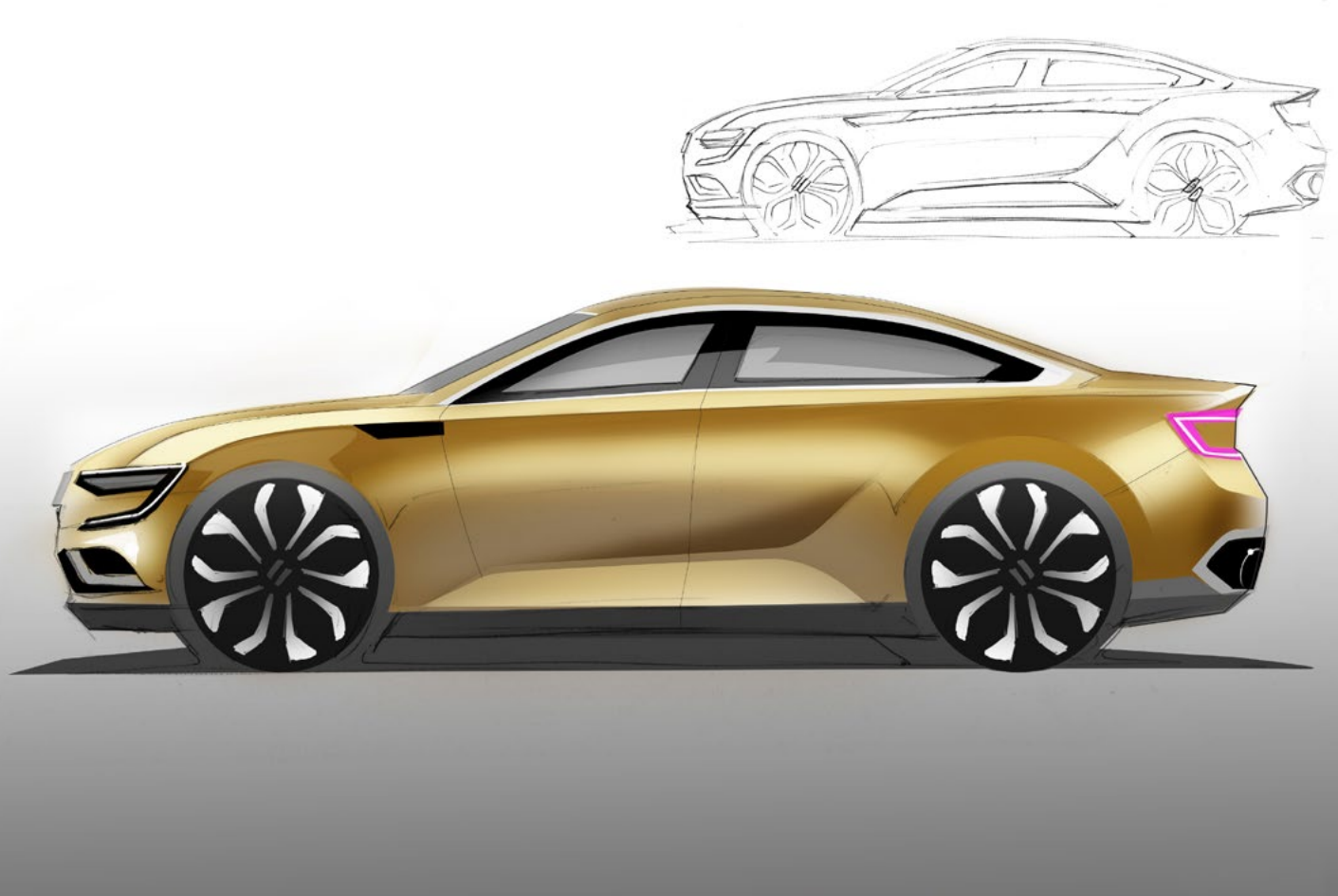
Add a few smooth brush strokes at the front and rear ends to show the car's roundness.



Continue with surface rendering. Use a Soft Brush and paint the most prominent part of side with a light yellow color. Select the rear area around the number plate and render it similarly. Add light above wheel arches.



At this point, the sketch seems to appear too dull. Click on the top layer press Ctrl+Shift+Alt+E. It will create a new layer on the top. Change the blending mode into Screen. Erase the background and the bottom of the sketch.



Add a few little highlights and details. Draw shut lines with a Path Tool. Erase the line drawing and tune the contrast and hue, if needed.

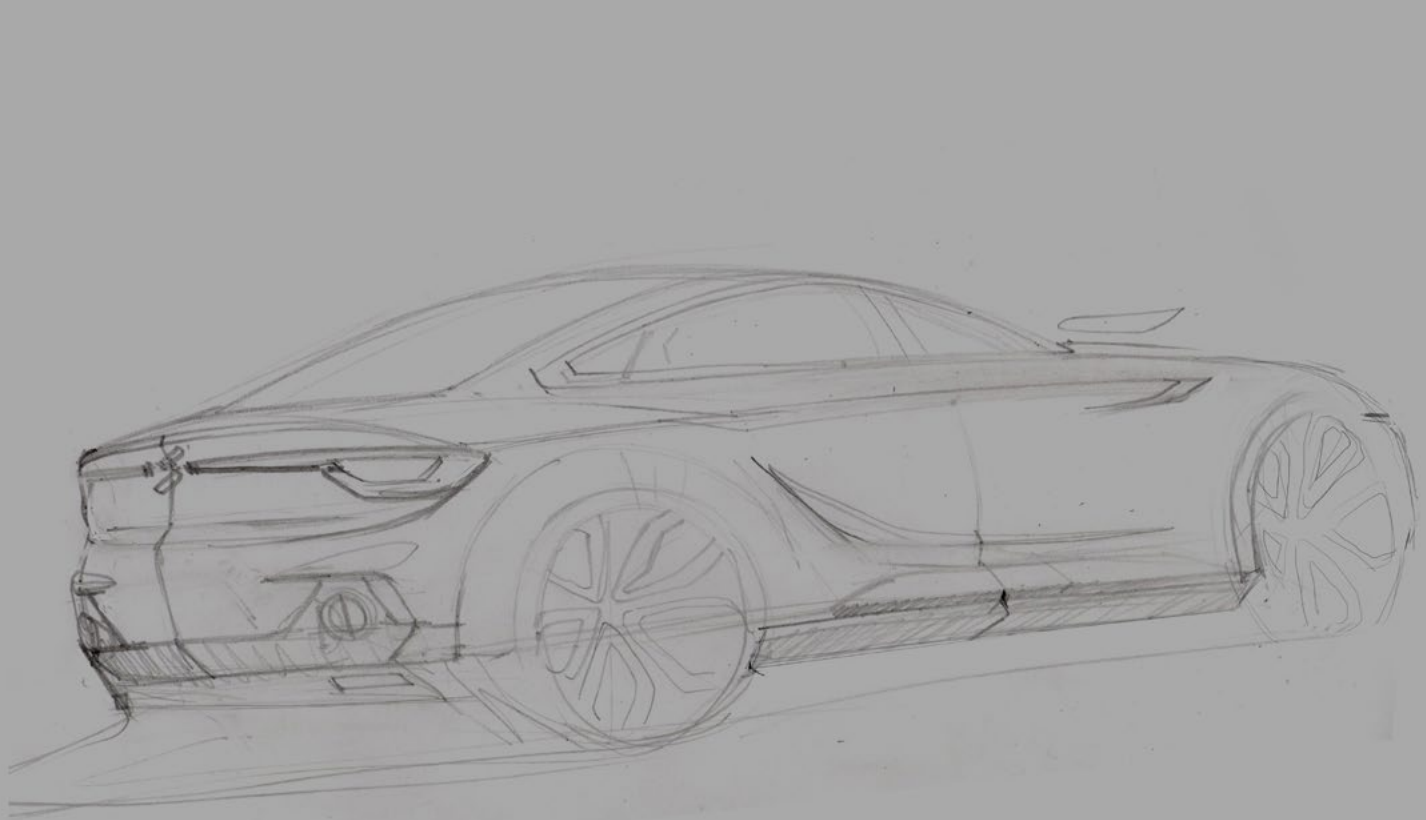
RENAULT TALISMAN



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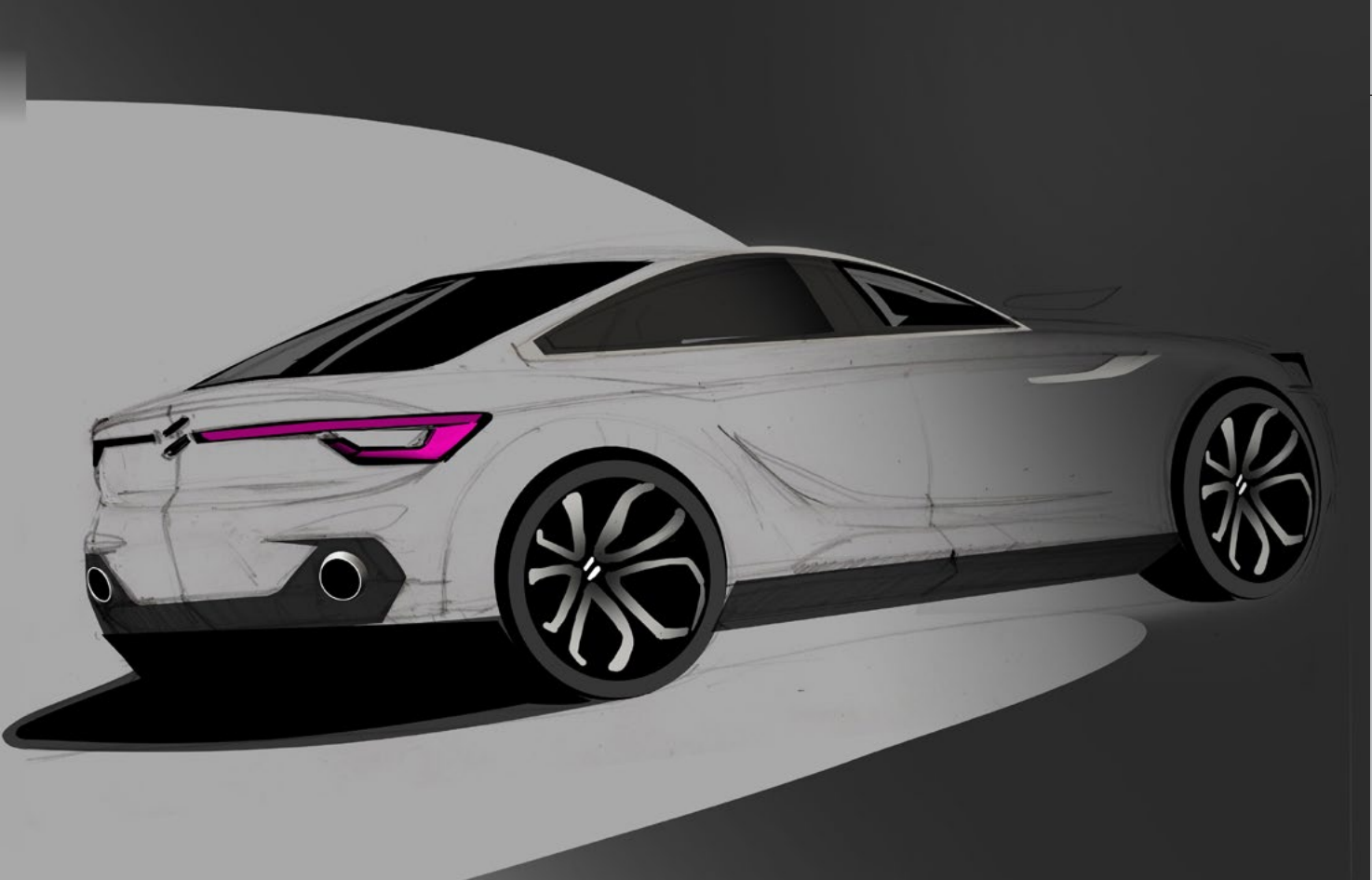
THE SOFTWARE PROGRAMS USED:
PHOTOSHOP

STEP BY STEP TUTORIAL, THREE — QUARTER
FRONT VIEW BY ŽOFIA BABČANOVÁ



01

Let’s start with a scanned freehand sketch. Adjust the picture with Levels (Ctrl+L) or with adjustment layer to black-and-white version. Add a gray background in the very bottom layer.



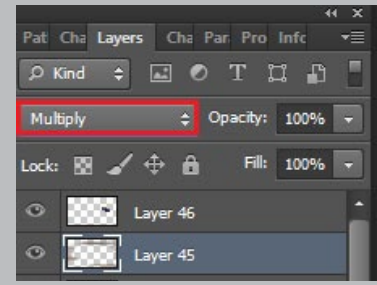
It is essential to keep in mind that the car's part, which you are showcasing in a perspective view (in this case, it is a rear-end), needs to stand out the most. Therefore, start with a contrasting background.

The light background area will emphasize the rear part of the car. Use Paths or Shapes to blackout the graphics such as wheels, greenhouse, and tail lamps. Pay attention to detail, the curvature, and the corners of each form.



Paint the basic shape of the car with a soft brush. You can use a path or sketch freehand.

The shadow under the shoulder is usually the darkest part of a vehicle. Select the shape and paint it with the same yellow color. Change the mode of the layer from Normal to Multiply. This Photoshop mode creates a shadow whose value of yellow is more profound than the original color





After applying the shadows, you need to focus on light. Imagine that the spotlight is on the right rear end of the car.

The goal is to emphasize and render part of a vehicle precisely, so it stands out from the image.

Select a Soft Brush and paint with white color on the very top layer. Use the same technique on wheel arches, light catcher, and the rear part. Decrease the opacity of the white layer, if necessary. Remember, you model volumes with the light, so place the bright color strategically.



Now focus on the details. Define the rear, add thickness to the exhausts. Create a shadow under the bottom of the car. Define the front end and add a mirror. Add highlights on the rear to define the soft corner. Add gray shadows to the bottom of the wheels.



07

Add the final touch to the sketch. In this step, it is important to correct all the imperfections. Pay attention to perspective and the stance of the car. Select a part you want to alter. Press Ctrl+Shift+C, and then press Ctrl+Shift+V.

A new layer will appear on the top. Manipulate the layer with transformation tools such as Perspective, Distort, or Skew.

In this case, select the rear end and lift it in order to correct the perspective issues. Add more highlights to define the shoulder and back glass to set the volumes. Render details like a door handle or a mirror.

RENAULT TALISMAN

THE SOFTWARE PROGRAMS USED:
PHOTOSHOP

STEP BY STEP TUTORIAL, THREE — QUARTER
FRONT VIEW BY ŽOFIA BABČANOVÁ



01

Let's begin with a scanned freehand sketch. Create a dramatic background with a focus on the foreground. The aim is to design Renault Talisman with a more aggressive front. Use Shapes to blackout the graphics, wheels, lamps, and details.

Use the background color to define the side shape. It helps to describe the car body from the very beginning. Add a few highlights on the front glass to render the roundness correctly.



Paint the main body with your favorite primer color. Keep this layer under the pencil layer to avoid useless erasing. Define the front bumper with a Shape Tool.

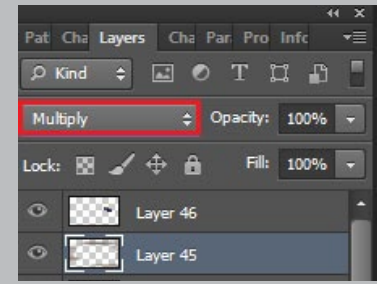


The next step is all about shadows. Use the Eyedropper Tool to choose the color of the primer.

Sketch a few smooth strokes with a Soft Brush to add shadow. Change the blending mode from Normal to Multiply. Set the Opacity to 70%.

Use the Eraser to define the surfaces on the hood and the side. Use the circle selection tool and paint wheel arches with contrasting tones. Don’t forget to apply highlights on the bumper and rocker part.

Darker the roof with a few brush strokes and emphasize the central theme on the side view. Redefine the main lines on the front hood with a Soft Brush and Selection.





05

It's time to bring the picture to life! Select warm and light yellow, which will contrast the deep primer color. Imagine the spotlight hits the car just above the front wheel arch. Place the highlight strategically to define the shoulder, hood and bumper curvature.



Add some small highlights and details. Show off the softness of the greenhouse with some soft strokes on the A-pillar. Press Ctrl+Shift+Alt+E to merge the picture and manipulate the perspective and stance, if needed.

SKETCH VS. TECHNOLOGY



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WORKSHOP BY PROFESSIONAL
CAR DESIGNER MICHAL KAČMÁR

CHAPTER TWO

INDUSTRIAL DESIGN SKETCHING

INDUSTRIAL / PRODUCT
DESIGN SKETCHING

The first stage of design thinking is usually hand sketching. At this level, you can allow yourself to go freely and draw with a more sculptural and minimalistic approach.

Creating a bold and iconic design requires a lot of practice of hand—eye coordination. The main goal is to create a meaningful and straightforward drawing pattern that can be translated into reality without losing its visual appeal.

The next stage is more about empathy and understanding of people's needs. Being aware of their routines, habits, and hobbies can help you to create meaningful and beautiful things. This approach can also help you to engage the customers' attention and offer them what they desire.

Throughout the whole design process, you should think about technology, materials and assembling process.

In every company, there are some technical limitations you should respect.

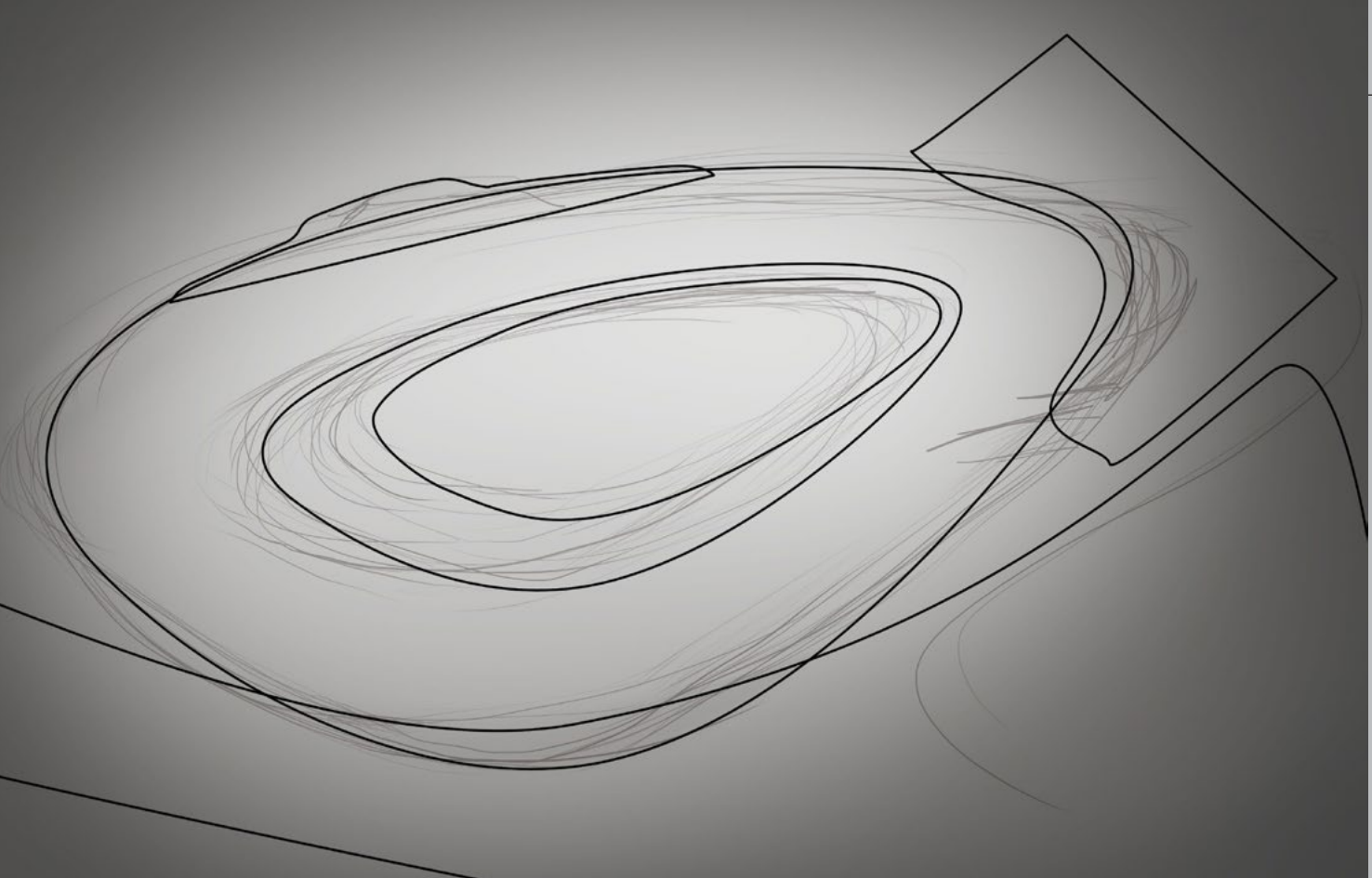
As a student, you have the opportunity to create freely with no restrictions. Always ask yourself "How could your designs be beneficial for your portfolio and career?"

Use these tutorials as a tool. Copy the tips and include them into your sketching routine to improve your skills.

HAND MIXER

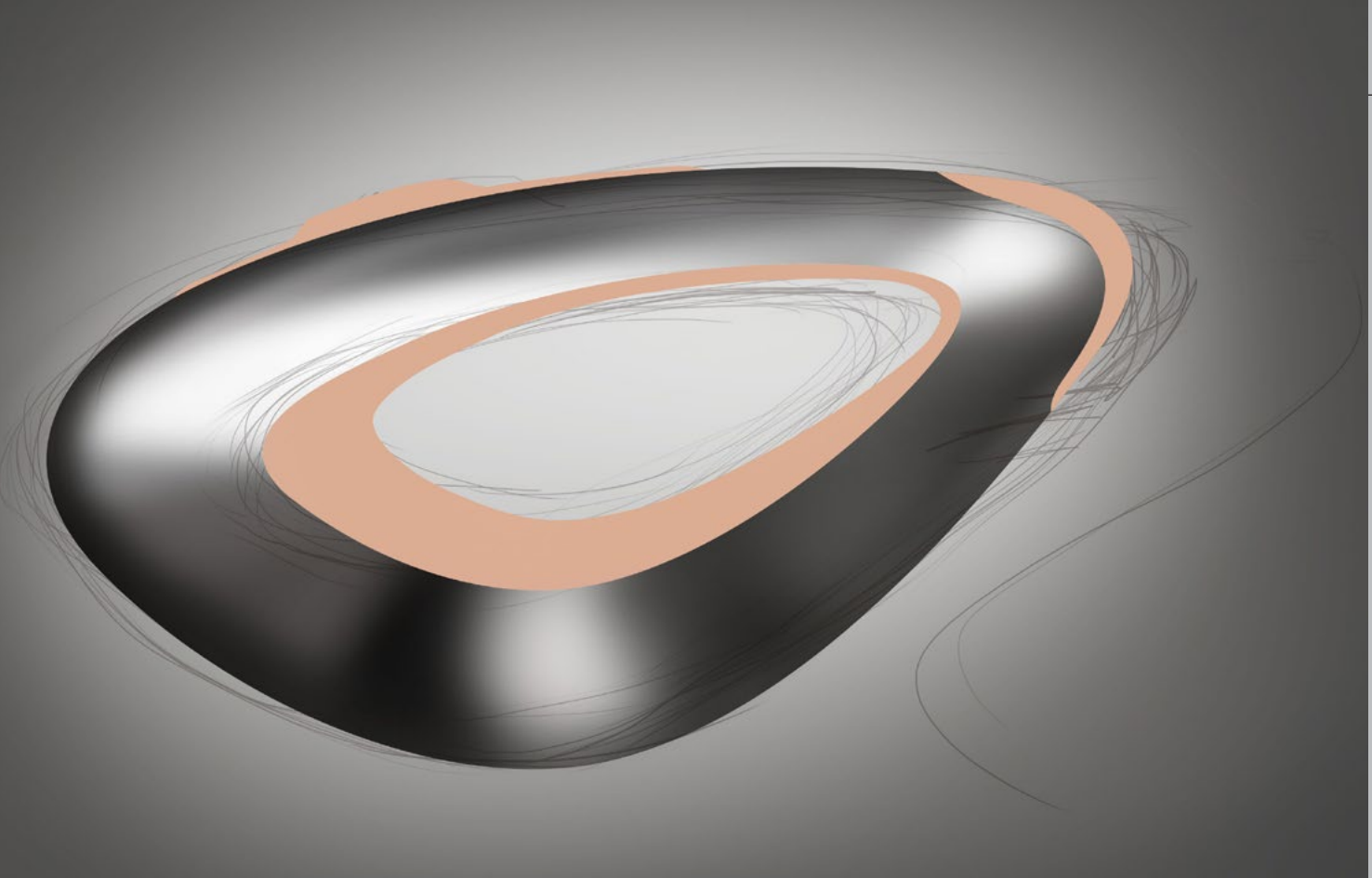
THE SOFTWARE PROGRAMS USED:
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STEP BY STEP TUTORIAL
BY ŽOFIA BABČANOVÁ

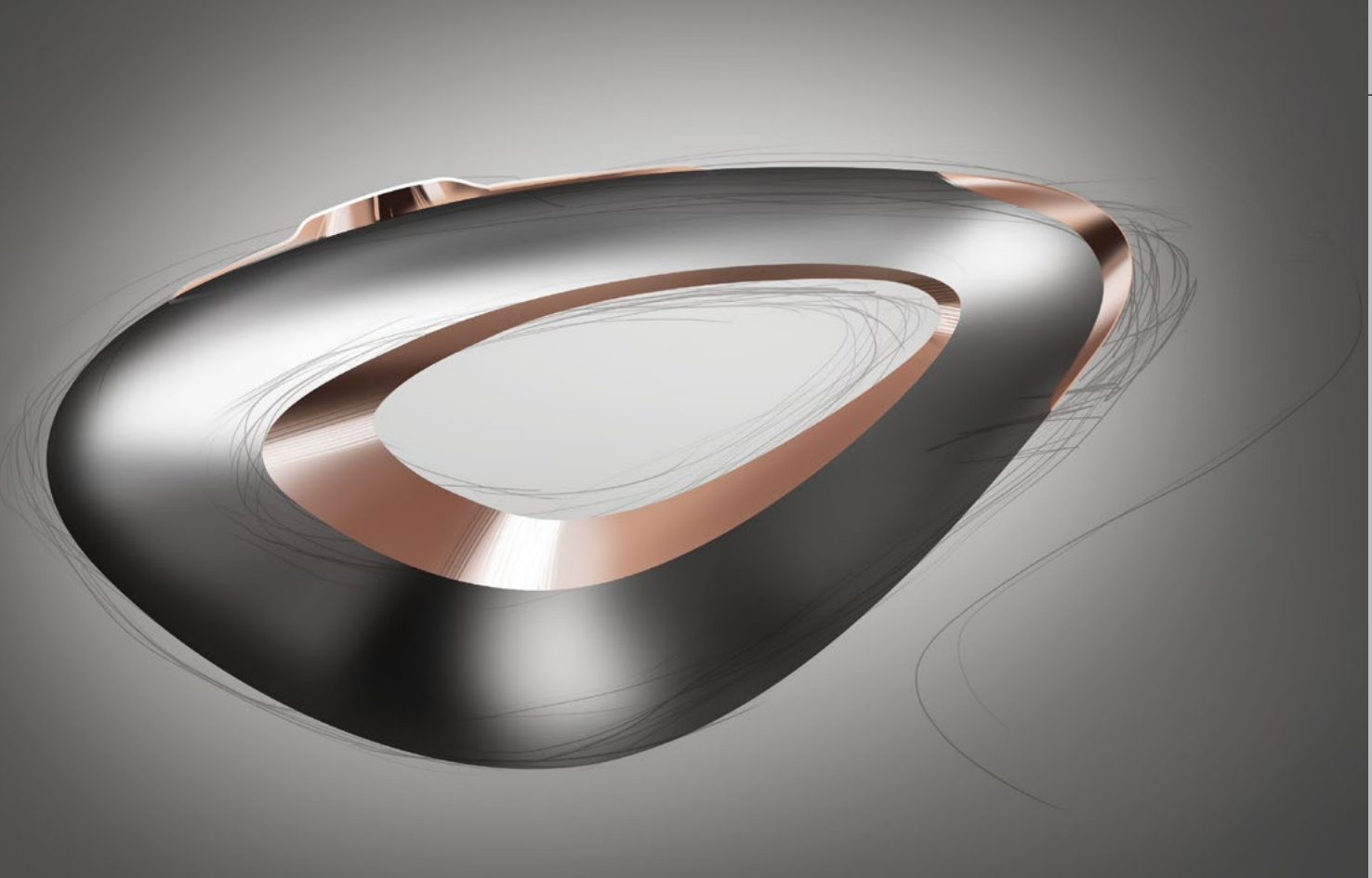


01

Let's begin with a rough sketch. Loose up your lines and find a balanced and soft shape. Define the main lines with precise paths in the Paths Editor. Please keep them in one layer to simplify the whole process.



Apply flat colors on details and the main body. Click on the Outline Path and choose Make a Selection. Then click on the Paths defining the handle and press Subtract from the Selection. Paint the shape with a primer color. Paint the stem and top button repeating the same steps. Apply soft shadows to define the smooth surfacing.



Use dark brown, pale orange, and white values to achieve brass or copper material. Do it freely to analyze the shape. When you create highlights and deep shadows, imagine the position of the light source first.



04

At this point, I decided to add more contrast to the sketch. Simplify the object with black color and few gray shadows to emphasize oval shapes.



Add striking highlights on the top of the mixer. Use the white shape, then decrease the Opacity, and Erase the edges. Use a small rectangular Selection and paint it with the same colors as mentioned in the "Copper tutorial".

Having finished, press Ctrl+T to stretch the layer to the form of a long tube. Copy the shape and scale it to achieve the shapes and sizes of the whiskers. Use the same technique to design holders on the whiskers and wire connectors.



06

Delete the layer with the rough sketch. Spice up the copper detailing. Press Ctrl+Shift+Alt+E and make a merged layer on the top. Select the inner copper handle a transform it with a Warp Tool. I stretched the inner part to improve the proportion. Add a wire with black or white outlines to emphasize the design. Focus on the speed button and cooling elements. Adjust the colors and contrast, if necessary.

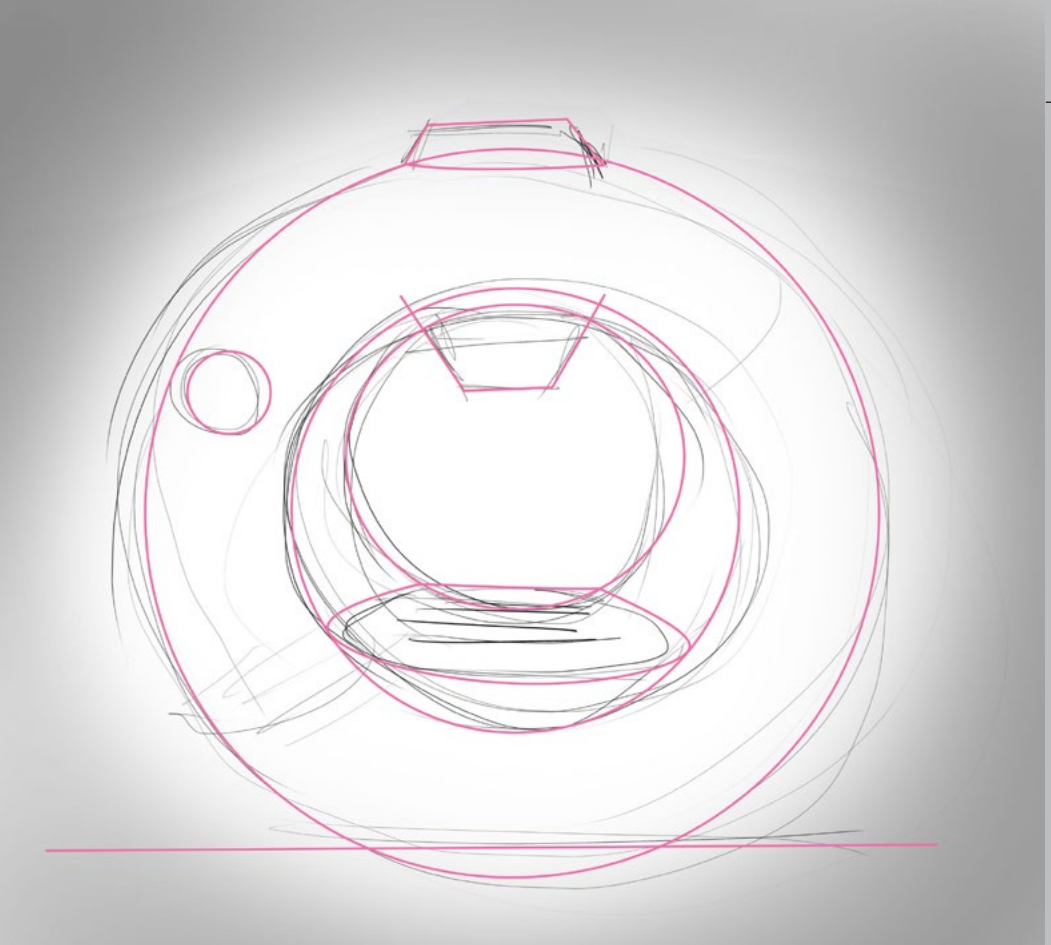
COFFEE MACHINE



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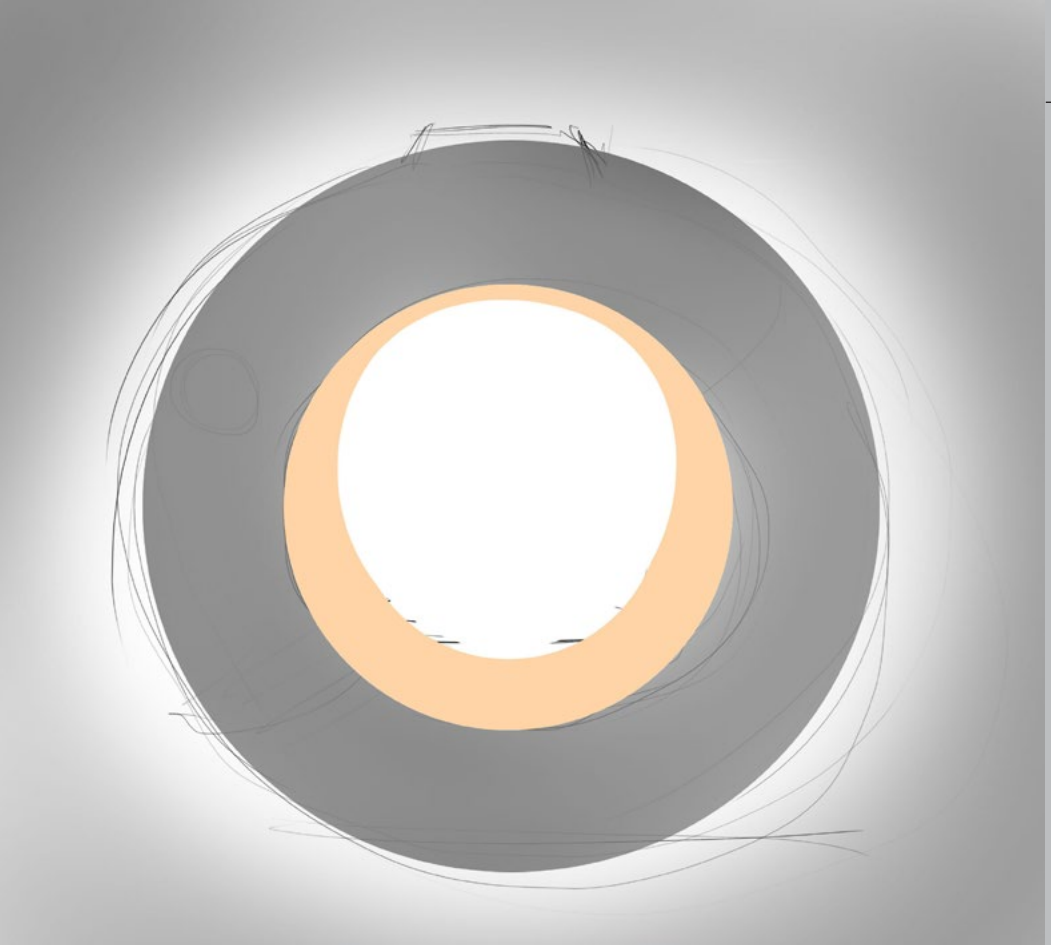
THE SOFTWARE PROGRAMS USED:
PHOTOSHOP

ICONIC AND BOLD DESIGN
BY ZOFIA SUTA

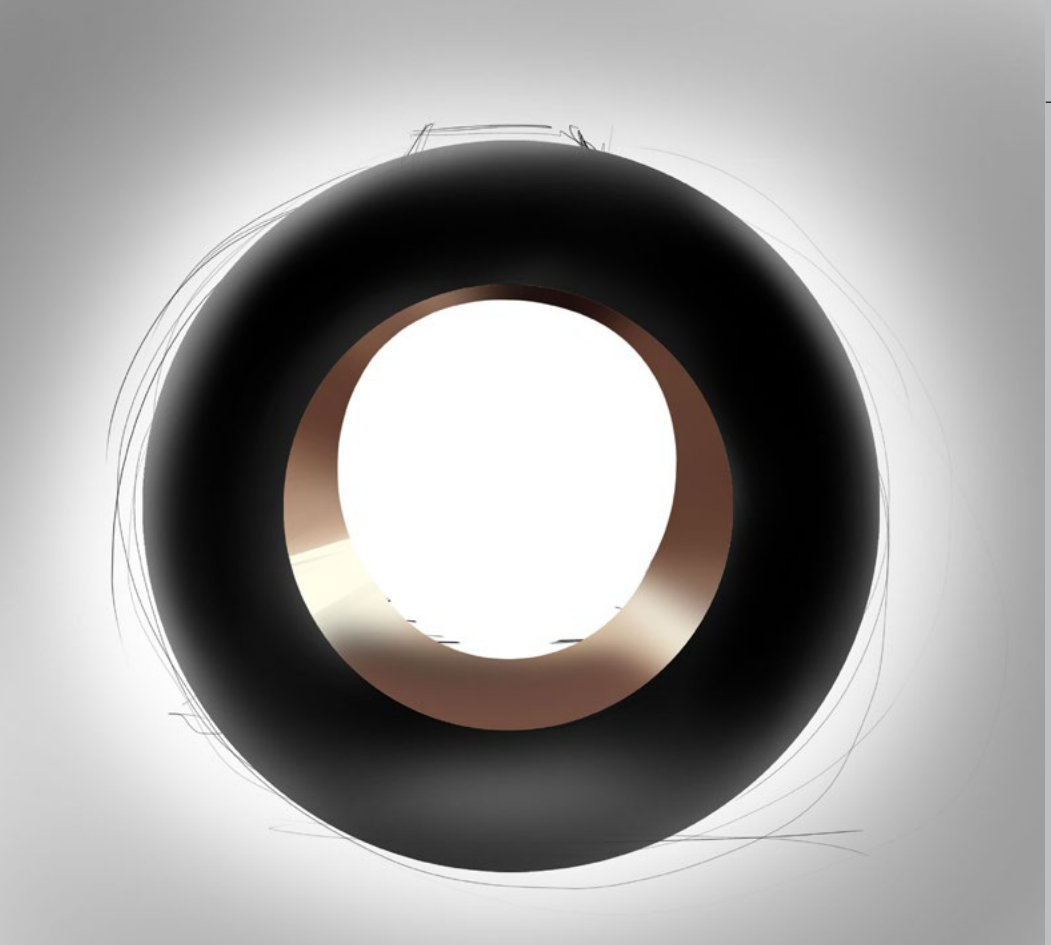


01

The goal is to create an iconic, luxury coffee machine. As usual, start with a loose sketch. It doesn't have to be precise. Try to capture what's in your imagination. Use the Ellipse Tool to make it easy. Make the Path then press Ctrl+C, Ctrl+V, and scale it.



Make a Selection by clicking on the Outer Path, then choose the inner circle, and press the Subtract from Selection. Now paint the elements with flats.



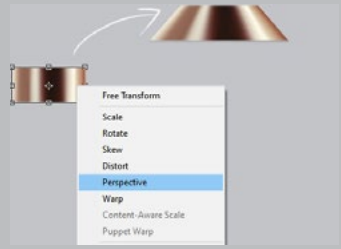
Add darker colors to showcase the volumes. Use light gray to render the roundness of the black part. Apply brown, subtle orange, and pale yellow to achieve copperish material.



04

Paint intense white highlights, then lower the Opacity and Erase the edges with a Soft Brush. Add details such as water lid and bottom tray.

Render the tray and filter basket. Use a simple rectangular Selection, and apply the brownish colors. Then press Ctrl+T and manipulate the layer with the Perspective and Warp Tool. Copy the shape and repeat the process to achieve the cylindrical shapes.





Add details to the drip tray and the bottom of the machine. Press Ctrl+Shift+Alt+E. It will merge the picture, and a new layer will appear on the top. Flip it vertically. Decrease the opacity and create the ground reflection.

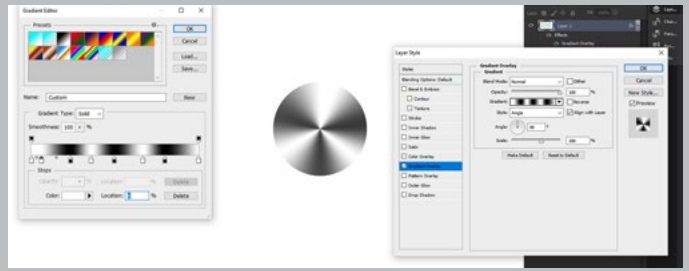


Sketch a copper button with the Gradient Overlay Effect. Bring the sketch to life with a few subtle brush strokes. It helps to define a smooth surface. Add a photo of a cup and apply the filter Accented Edges to make it sketch-like.

Gradient overlay effect: *Paint Elliptical Selection with a primer color. Choose Gradient Overlay from Add a layer style.*

Select the Radial style and double click on the gradient icon. A new window will pop up. You will see the Gradient bar with small squares.

Click on one of them, hold Alt, and drag it out. Please change the color of it to be contrasting with the primer color (for instance, white and black). Drag around six squares to create the shiny polished button.



RACING HELMET



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VIDEO HERE

THE SOFTWARE PROGRAMS USED:
PHOTOSHOP

STEP BY STEP TUTORIAL
BY INDUSTRIAL DESIGNER AND
FREELANCER ADRIAN MANKOVECKÝ



01

Start with a loose and subtle sketch on a gray background. Focus on the main features to capture the feeling of a sports helmet.



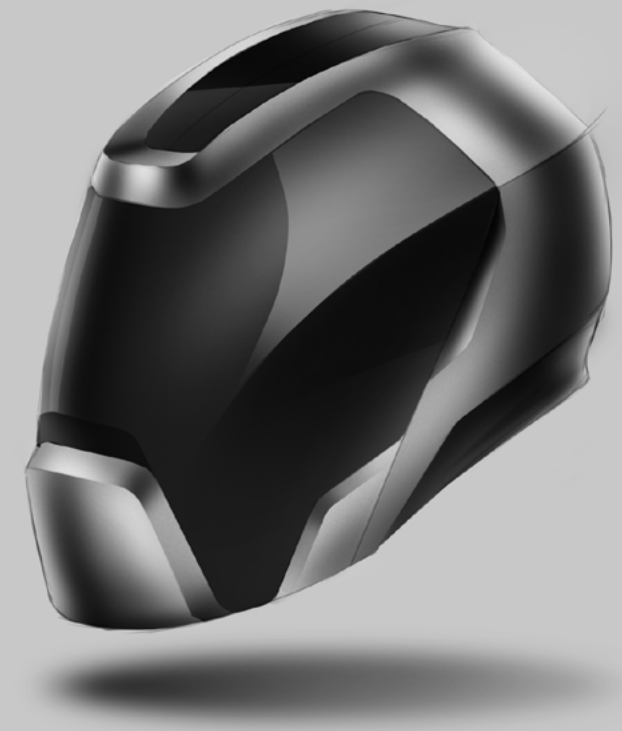
Paint the flats. Choose contrast colors to render different materials. You can use a Brush or Path Selection to paint the surfaces efficiently.



Use a Soft Brush to add a subtle shadow. Define the edge on the glass with the Eraser tool or Selection. Showcase the roundness of the helmet with a black brushstroke. Adrian emphasized the thickness of the silver part by rendering the edges.



Continue with adding the shadows and highlights. Focus on the bottom of the helmet and make it darker since there is no light source



05

It’s time to bring the sketch to life. Showcase the semi-transparent glass with hard reflection. Observe how the edge on the side view catches the light. Add some white stripe to the front glass part. Render the plastic piece on the top of the helmet by adding a gentle highlight. Don’t forget to add a drop shadow.



The next step is all about the details! Focus on shut lines and graphics. Geometrical features add some sport spice to the image. Choose a minimalistic font to mimic stickers. Adjust the contrast of the sketch by adding a lighting source coming from beneath the helmet. Consider sketching small flashing indicators on the top and sides of the helmet.

CHAPTER THREE

MATERIAL RENDERING

MATERIALS

A part of the designer's job is also to choose and render proper materials. The quality of sketch can sell the whole design, so it is essential to learn how to showcase the idea in the best way possible. One of the cars which changed the game was

Peugeot Onyx. This concept car is famous for contrasting copper sheets and carbon fiber panels. The interior is out of layers of recycled newspapers pressed in desired forms and shapes.

From the early sketches, designers appealingly rendered the different materials.

It was easy to see the whole idea and be captivated by it. If you want to impress your audience, you need to learn how to sketch differently.

When you think about elements of your design and how to assemble it, you have an advantage. The advantage of story about different materials working together.
A designer should be able to sketch with perspective and the developed and mature proportion. Rendering materials is the extra sparkle, which can outstand your design from others.

I want to present to you a few tips, how to render the metallics and other textures.

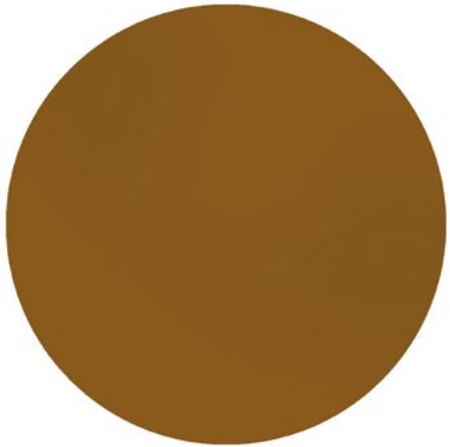
MATT GOLD

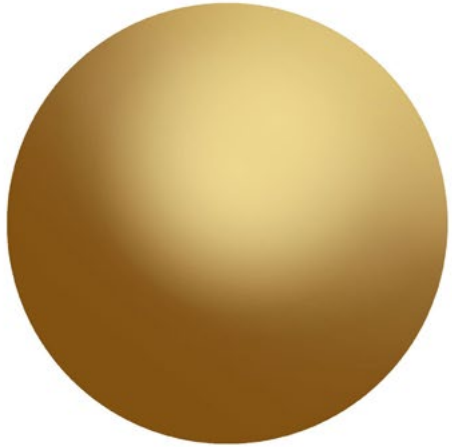


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THE SOFTWARE PROGRAMS USED:
PHOTOSHOP

STEP BY STEP TUTORIAL
BY ŽOFIA BABČANOVÁ





01

The first thing to do is to make a perfectly round shape. Use a circle Selection tool in Photoshop. Start with a primer color. Choose a mustard yellow as a base.

02

Add some darker colors. Use a Soft Airbrush to do this. Make sure you don't go all the way to the upper edge; leave some light there. Paint on the layer above your initial circle and set that layer to the Clipping Mask. Create a new layer and paint reflection with a soft yellow airbrush.

Clipping Mask: *Layer will clip to the layer beneath it. The new layer will show only the pixels situated in the area of the former layer pixels. Create a new layer press Alt and go with cursors on the boarders between two layers you want to clip. While holding Alt, click with the left mouse button. It will create a Clipping layer.*





03

Emphasize the lightest part of the ball. Use a Soft Airbrush and paint with the same yellow used in the previous step. Then change the layer to the Overlay mode, which will add more shine to the ball.

04

Continue with adding spotlights on the top of the ball. Use the Clipping layers in the whole process. It will help with the workflow. Add ground shadow at the bottom with a soft yellow airbrush.





05

Create an intense highlight with an Overlay layer. Paint free shapes to add more texture to the gold. Please focus on the bottom of the ball and bring deeper shadows to it.

06

Finally, let's add a drop shadow. Paint it on a layer under the ball. Add more spotlights on the top, so that the ball is more vivid. Add a bit of soft ground reflection to emphasize the roundness more.

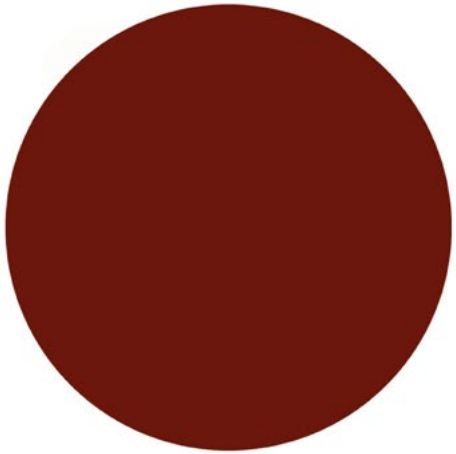
SHINY ROSE GOLD/COPPER

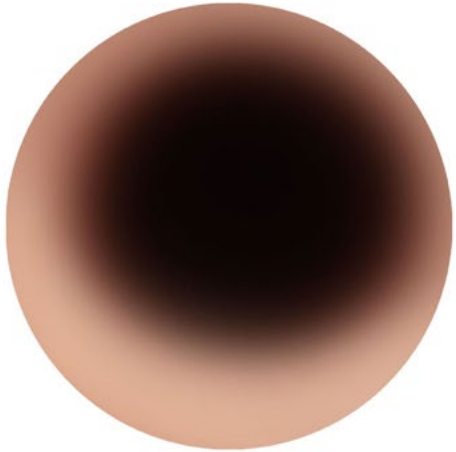


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THE SOFTWARE PROGRAMS USED:
PHOTOSHOP

STEP BY STEP TUTORIAL
BY ŽOFIA BABČANOVÁ



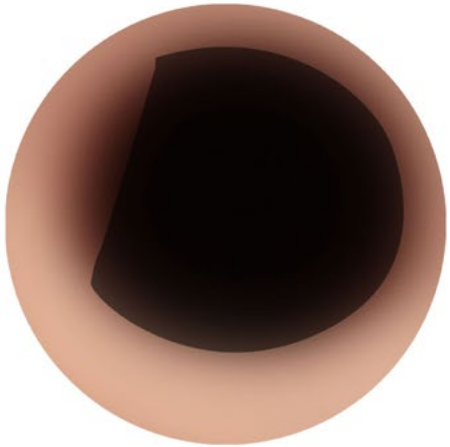


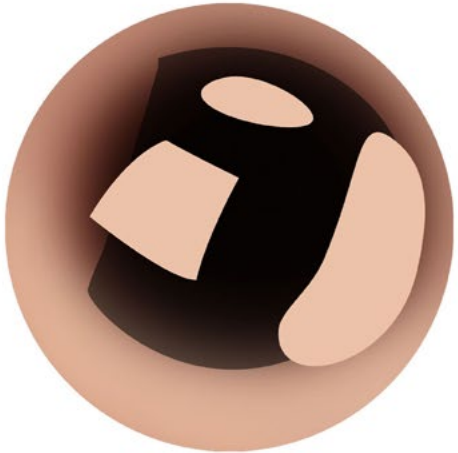
01

Let’s start with a perfectly round shape. Paint with the Elliptical Marquee Tool, or use the circular Shape tool. Use the same technique as in the "gold tutorial."

02

Render the ball with warm beige value and dark brown in the middle. Make sure you don’t go all the way to the upper edge; leave some light there.





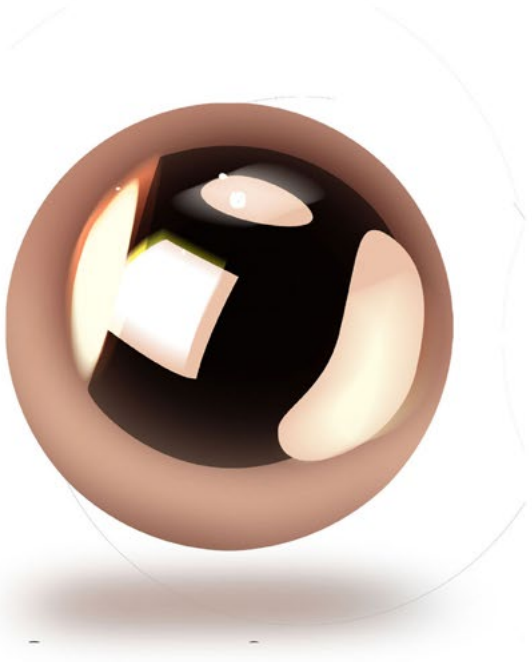
03

Add middle shadow with the Shape tool. Use dark brown so that it creates the illusion of reflective material. Apply a soft beige color from the bottom of the ball, which has warmer value.

04

Create three light-toned forms with the Shape tool, which adds spotlights to the darkest part, so that the ball is more vivid. This step emphasizes the reflectivity of the ball.





05

Duplicate the shapes and change them to the Overlay mode. This step will create the warm orange tones in the copper sphere. Use the Motion Blur filter to the overlayed shapes to smudge them a bit. Whether the material is shiny or matte depends on the reflection we apply. Sharp reflection makes the material shiny, while blurry reflection makes it matte. In this case, the ball should be almost mirror-reflective, so smudge them just a little bit.

Motion blur: *In the case you want to blur a layer, click on Filters in the top bar, and choose "Motion blur" from "Blur" option. Set the angle and distance as needed.*

06

Finally, add drop shadow and subtle ground shadow to the ball. The rosegold ball will reflect color onto the surface and it will influence the color of the shadow. The shadow should have a warm undertone. I used a Soft Air-brush and painted with a beige color.

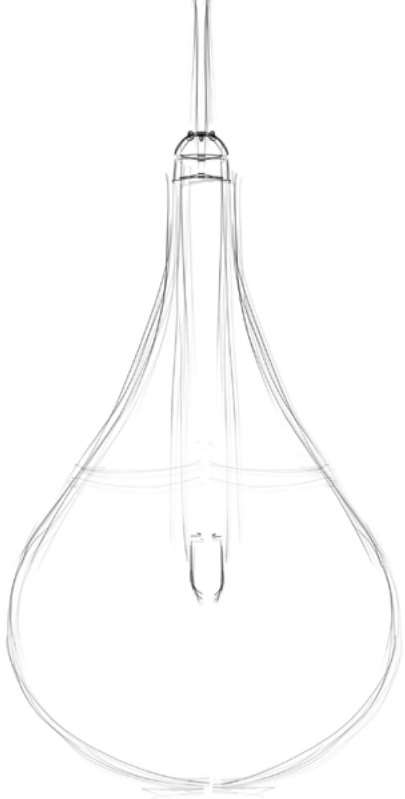
GLASS BULBS



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PHOTOSHOP

STEP BY STEP TUTORIAL
BY ŽOFIA BABČANOVÁ



Sketch loosely and freely. Focus on the flow and elegant shapes to create a simple object. Select half of the sketch with the Rectangular Marquee Tool, and press Copy and Ctrl+T. Flip the duplicate horizontally and delete the unnecessary half. Now you have a completely symmetrical design.

You can use this tip to any solids of rotation such as bottles, lamps, vases, etc.



Use the Gradient Tool to create a simple gray background. Erase it behind the drawing so that you subtle light around the bulb. It is time for a Path tool.

Use the Pen to create a defined and elegant line. Then click on the Path Selection Tool (black arrow) and select the path. Press Ctrl+C and Ctrl+V. Now you have duplicated the line. Press Ctrl+T and flip it horizontally. Close these two paths with the Pen Tool.



Apply a few gentle strokes with a black airbrush. Focus on the edges so that the center of the bulb is lighter. You can use Contract Selection to add black thickness to the glass.

Contract Selection: *Choose the Path and click Make a Selection. If you want to decrease the size of it, click on Selection on the top bar, and choose to Modify the Selection and press Contract Selection. Contract it by 5-10 pixels. If you need to enlarge the selection, choose Expand.*



04

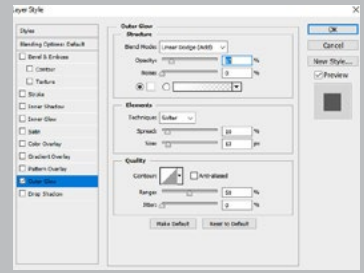
Let’s sketch the copper bulb holder. Use a small rectangular Selection and paint it with the same colors as mentioned in the "Copper tutorial". Having finished, press Ctrl+T to stretch the layer to the form of a long tube. Copy the shape and scale it to achieve the shapes and sizes of clamps and other details. Decrease the opacity to make the bulb more translucent.



Use the Shape tool to render a transparent look. Use a Pen to create a fluid white shape. Rasterize it and decrease the opacity. Erase it with the airbrush Eraser from the inner side. Duplicate it and flip horizontally. Use the Wrap Tool and manipulate the shape, so that it describes the form of a bulb.



Delete the rough-sketch layer. Draw the actual light bulb, and apply the Outer Glow from layer style. It helps to mimic the light of the bulb. Sketch a wire.





Try to render different shapes and sizes of lamps with this technique. Sketch different proportions and play with the wire caps and bulb forms.

CHAPTER FOUR

VIRTUAL REALITY AND GRAVITY SKETCH

GRAVITY SKETCH

In the last five years, we are witnessing the rise of virtual reality in the design field. The new era started in 2015 when Google promoted new software called Tilt Brush.

It opened the door for digital artists and allowed them to enter their designs.

Glen Keane, one of the first Disney animators, tried the application and said: "I can put goggles on, and I just step into the paper, and now I'm drawing in it."

The process of creating a new design feels like a dance. You create a humancentered design with your body. You draw your creations in life—size proportions. Imagine you can sketch the interior of a car or a room, and everything develops aligned with your size or proportion.

Gravity Sketch is the software developed especially for industrial and automotive designers. It offers sketching with lines and surfaces as well. You can easily edit drawings with grabbing and moving control points. One of the benefits is the possibility of turning the sketch into a real 3D printed object.

When we discuss a new VR tool, we need to consider the primer tool, i.e. our body. Throughout the history, human beings created many useful objects such as ships, houses and carriages without sketching or designing them. They simply use their bodies as a measuring tool.

The roof was as high as their hands could reach and a window was in the position of their head. We didn't think about the shape as we think today.

Today, we create design with the mouse, following norms and ergonomic rules. In the past, our body simply decided what is proportional and where certain features should be placed.

In this chapter, I would like to show how to use the essential Gravity Sketch tools. Let your body design the shapes and forms. Follow your intuition and transform your ideas into gestures.

RENAULT SKETCH

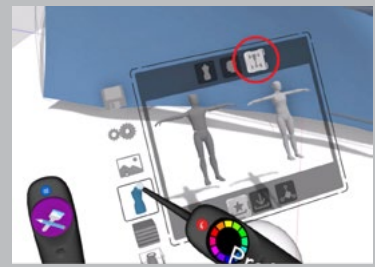


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THE SOFTWARE PROGRAMS USED:
GRAVITY SKETCH

STEP BY STEP TUTORIAL
BY ŽOFIA BABČANOVÁ

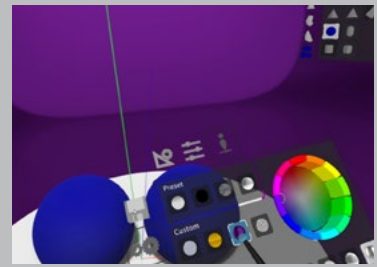
When designing a vehicle in Gravity Sketch, you have the opportunity to import your data, or to use the existing chassis. Use the Ink tool and create loose lines while holding the trigger. Grab the line with the thumb button and click with a left hand to edit it. You will see the Vertex points, which can be easily altered by grabbing and moving in the space.



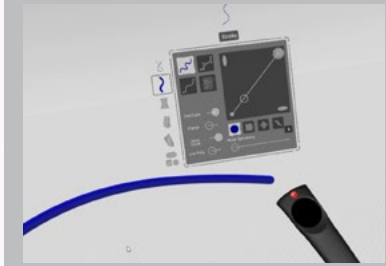
The next step is creating surfaces. In this case, the final model is from the NURBS surfaces, which are not connected. This tutorial is more about sketching than modeling. Select the Surface tool. Use both hands to regulate the curvature of the surface. When you are satisfied with a rough shape, grab it with the right controller, and click the top button with the left index finger. Now you can edit the Vertex points.



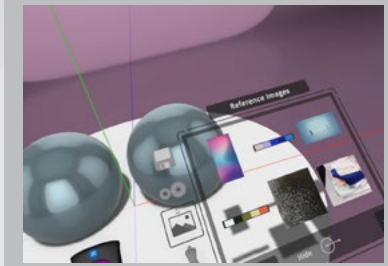
Build the main surfaces so that you can see the whole proportion. Switch on the Mirror effect. Having finished the entire package, focus predominantly on neat modeling. Bring the surfaces together. Check the highlights with reflective material and set up the lighting in the Custom menu.

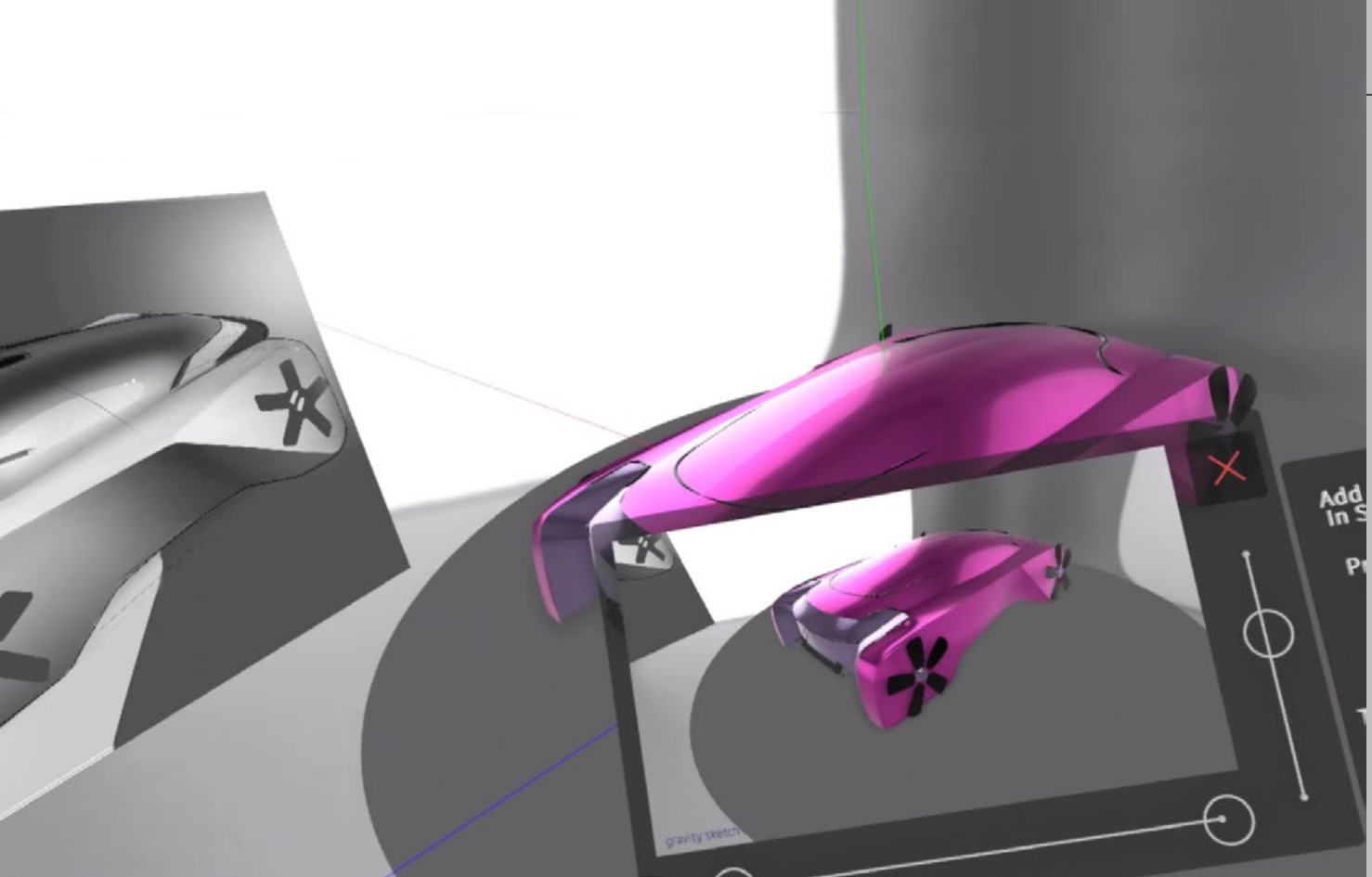


Let’s focus on the details. Use the Stroke tool to create lines defining headlamps, logo and shut lines. Duplicate the surfaces defining discs and create simple wheels.



Discover new materials and lighting in Settings. You can use any JPG picture and import it from the Reference Library. Grab the image and place it on the space. Then change the color of the object you are modeling. You will see a small ball with the JPG you just put into the interface. You can try to hold the sketch and click on the ball, which wraps the JPG as a texture around the chosen surface. You can even change the attributes of the surface by selecting Sketch, Reflective, or Toon material.





Another possibility is to take photos by Camera tool. Take some snaps of the model during the process. Set the lighting and materials to achieve the best renderings. Then you can continue with these print screens in Photoshop, and create more dramatic and outstanding sketches.

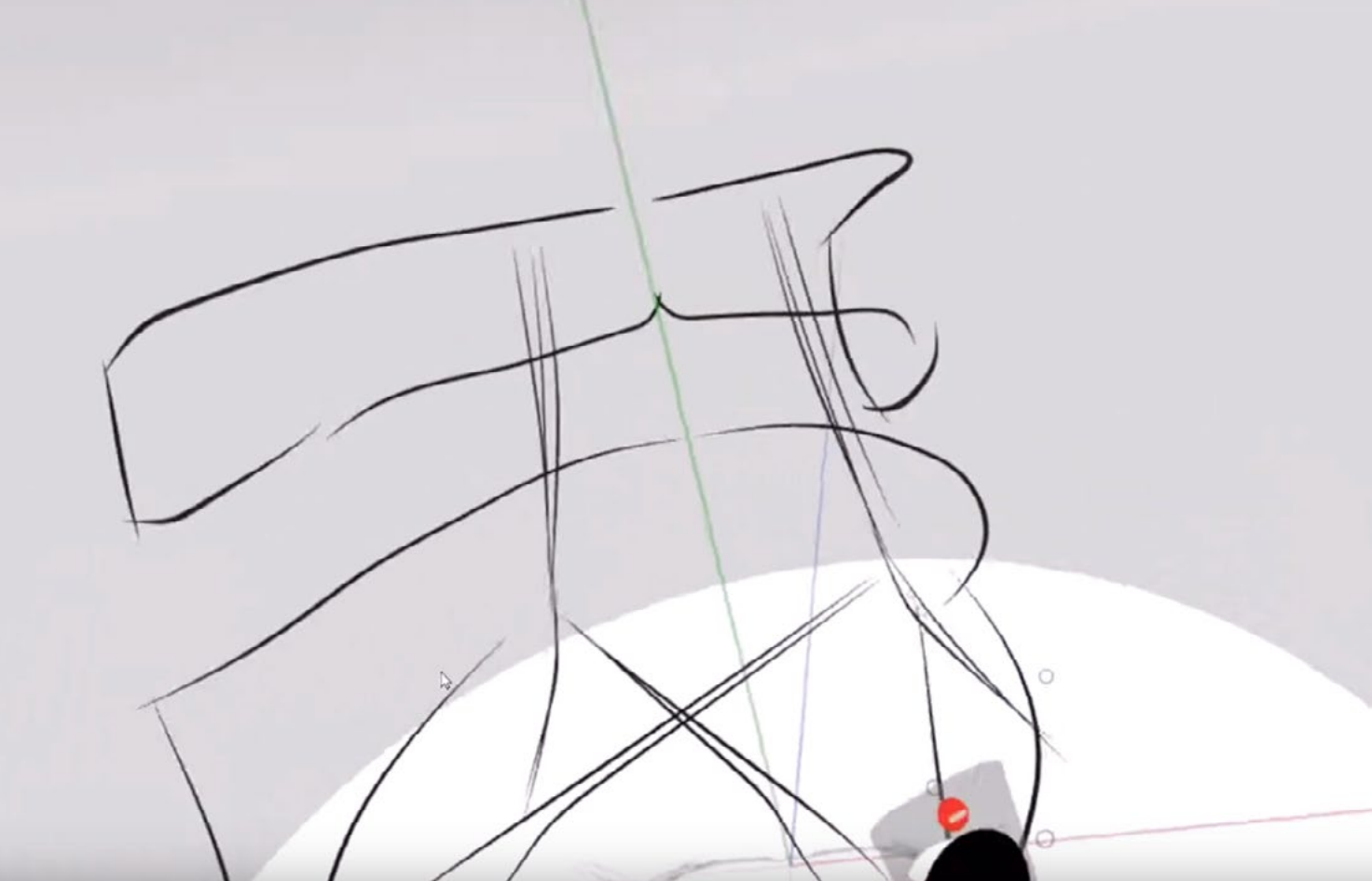
SIMPLE CHAIR



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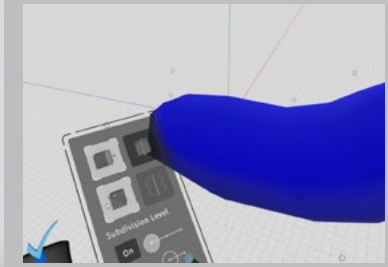
THE SOFTWARE PROGRAMS USED:
GRAVITY SKETCH

STEP BY STEP TUTORIAL
DESIGN BY MAURICIO SANIN
ARTWORK BY ŽOFIA BABČANOVÁ

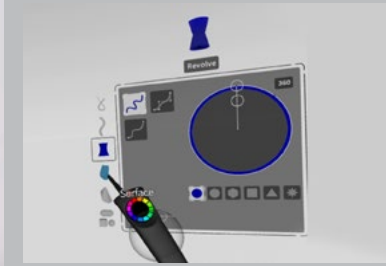


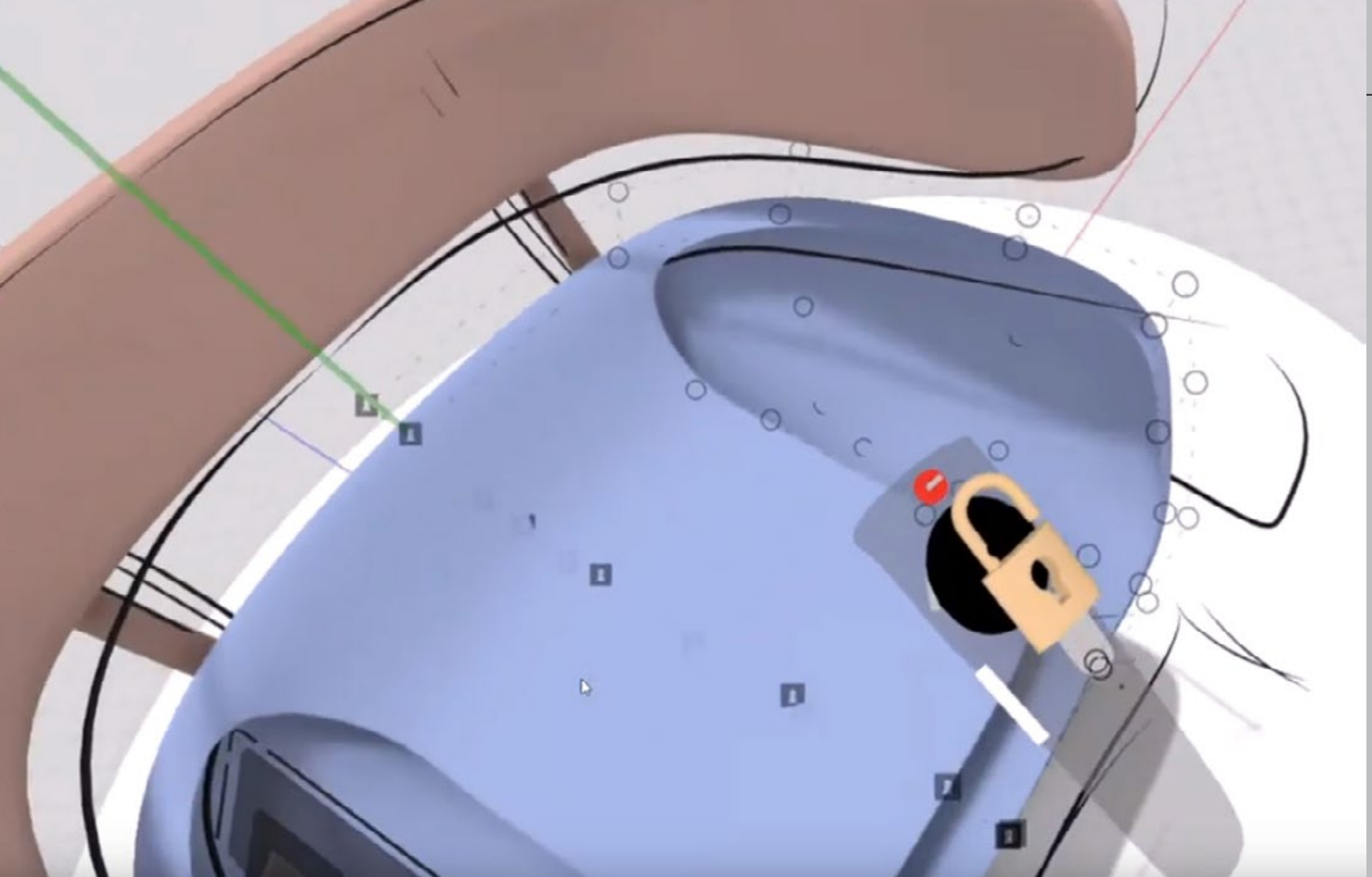
Start with a simple loose sketch. Use the Ink tool to achieve the feeling of a freehand sketch. You don't need to focus on perspective. Capture the main idea. Edit the point by grabbing them with a right thumb and moving them in space.

When you sketch the main proportion, build the main surfaces. Use the Surface tool, draw the shape roughly, and edit the points. Then change the Nurb planes to the Subdivisions. Set the Subdivision level to the maximum so that the chairback is soft. Extrude it to add thickness.

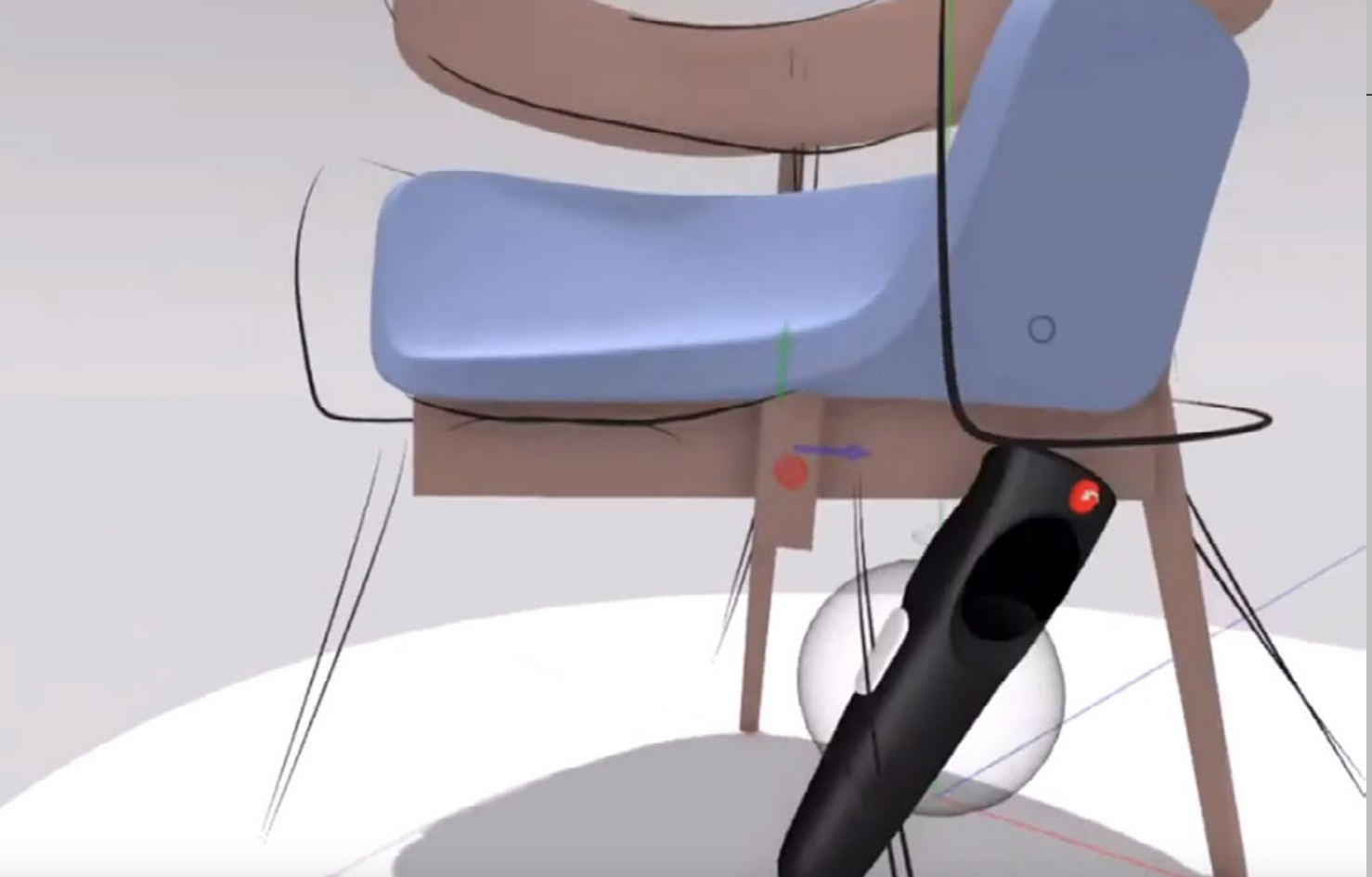


For the legs use the Revolve tool or use a Cylinder from the Primitive volumes. Edit the Vertex points by grabbing them and scaling the intersection of the leg. Duplicate the leg by holding it, and then press the trigger.

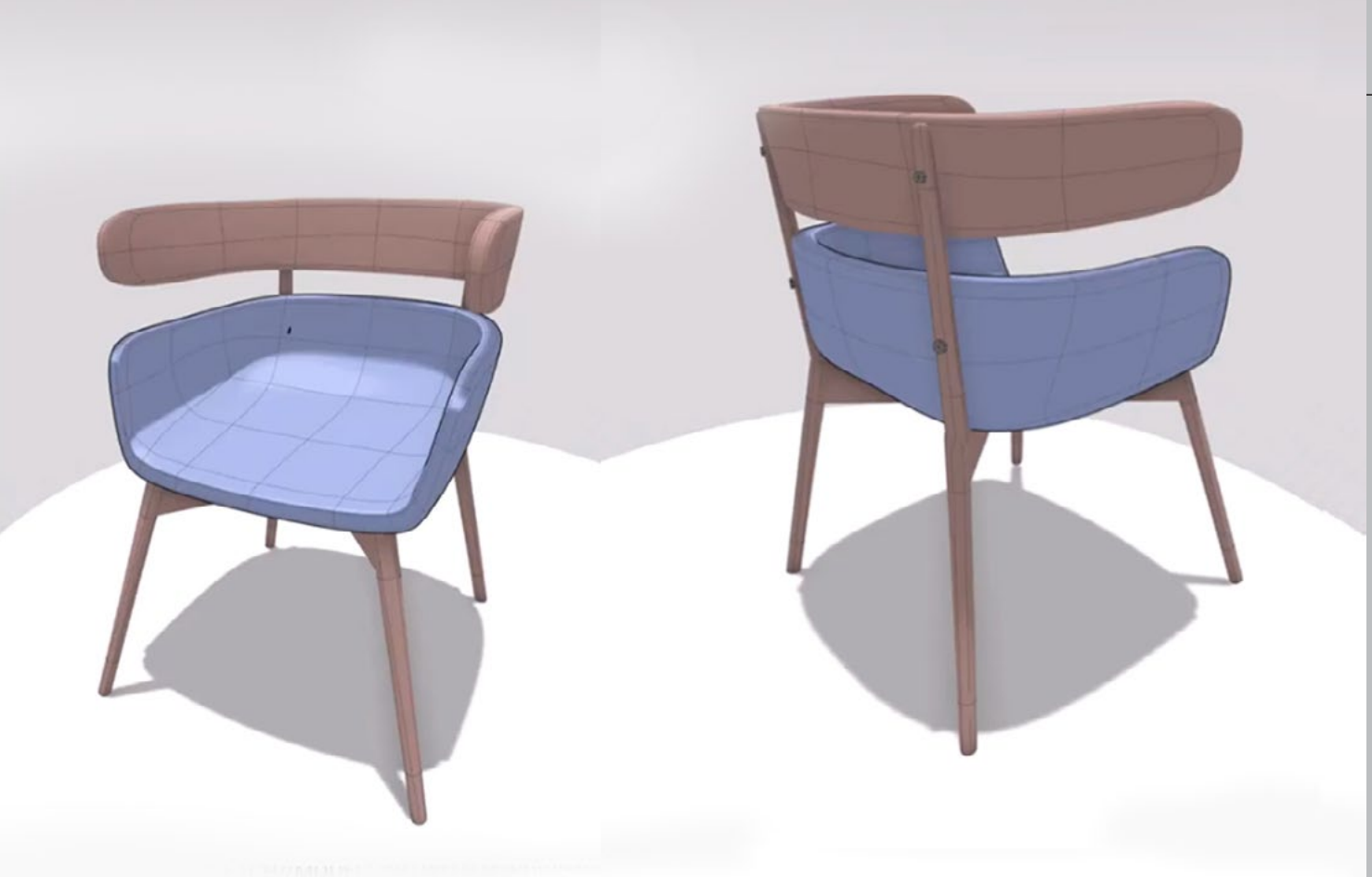




Build the seat the same way as the chair-back. Select the edges and extrude them. Close the surfaces by moving the Vertex. When the Vertex overlaps, drop the right thumb button, and they will connect. Close the mesh to finish the seat.



Let’s build the framework of the chair. Go to the Primitive volumes and choose a cube. Make sure you work with the Subdivision one. Scale it with green, blue and red arrows. Place it under the seat and adjust the Vertex to join the legs.



Add some screws to make the chair more realistic. Turn off the layer with the loose sketch. Adjust the colors, materials and lighting to make some beautiful snapshots.

SIMPLE LINE SKETCH



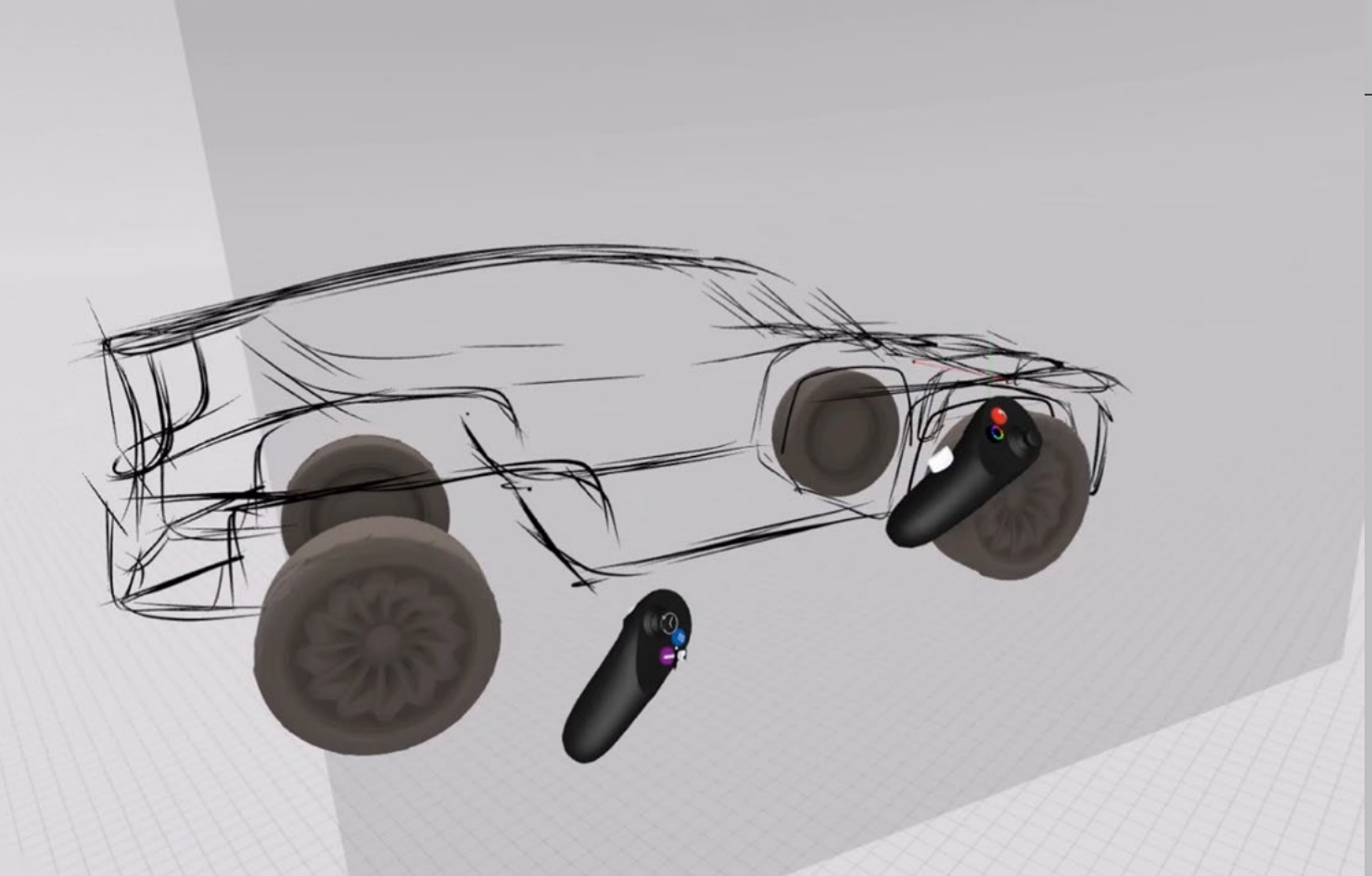
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THE SOFTWARE PROGRAMS USED:
GRAVITY SKETCH

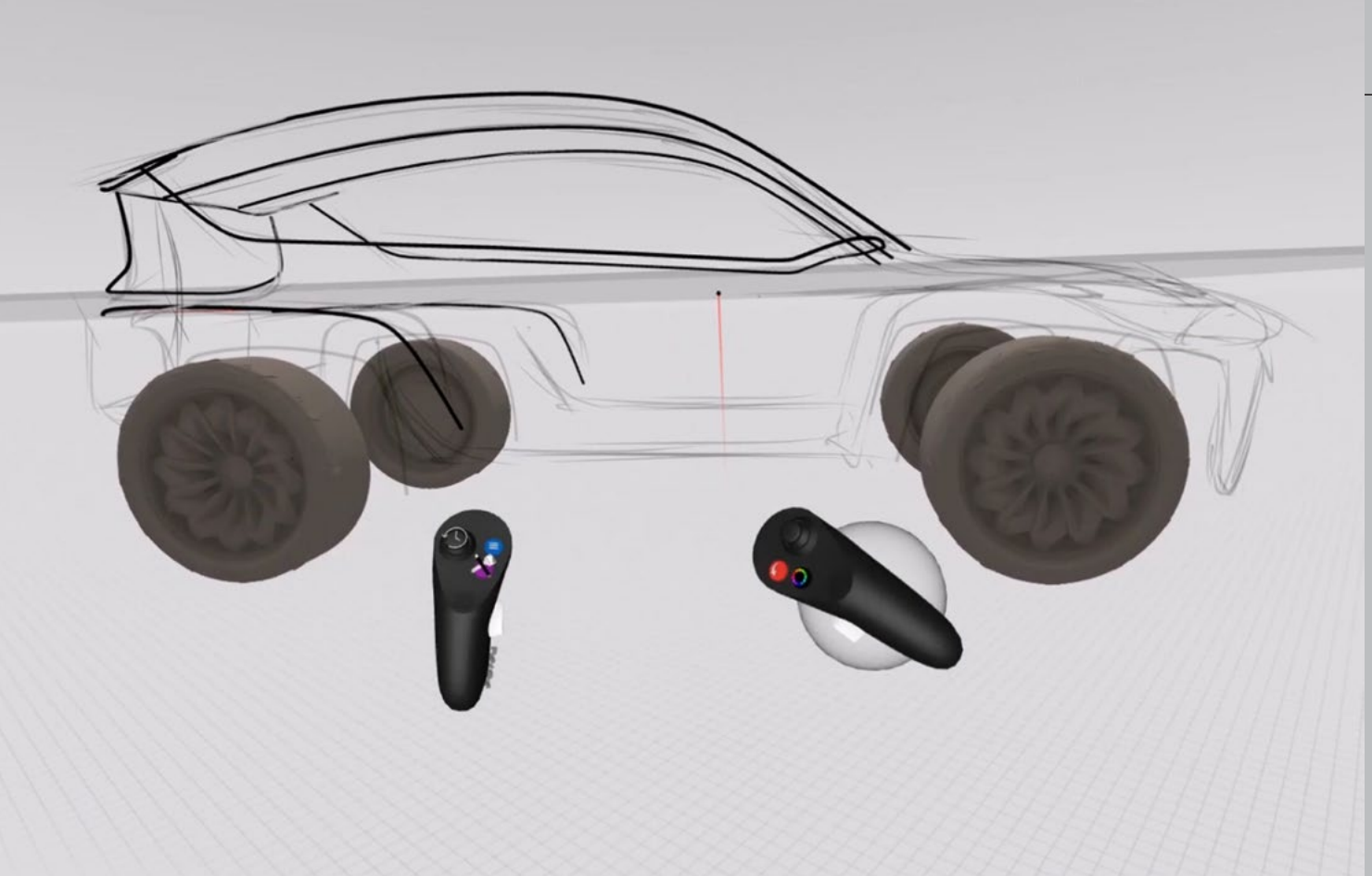
GRAVITY SKETCH TUTORIAL
MADE BY EMIL LUKAS

Sketch some wheels using the Volume tool and duplicate them. Choose the Ink Tool and create loose and flowy lines. Turn on Planar from the Inktool edit box. Hold the trigger, point the face of the controller to the direction you want to go, and lock it on the centerline.



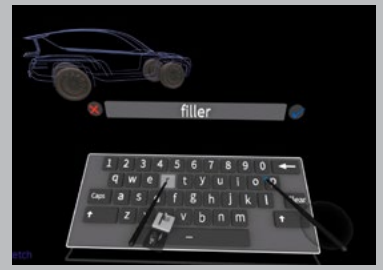


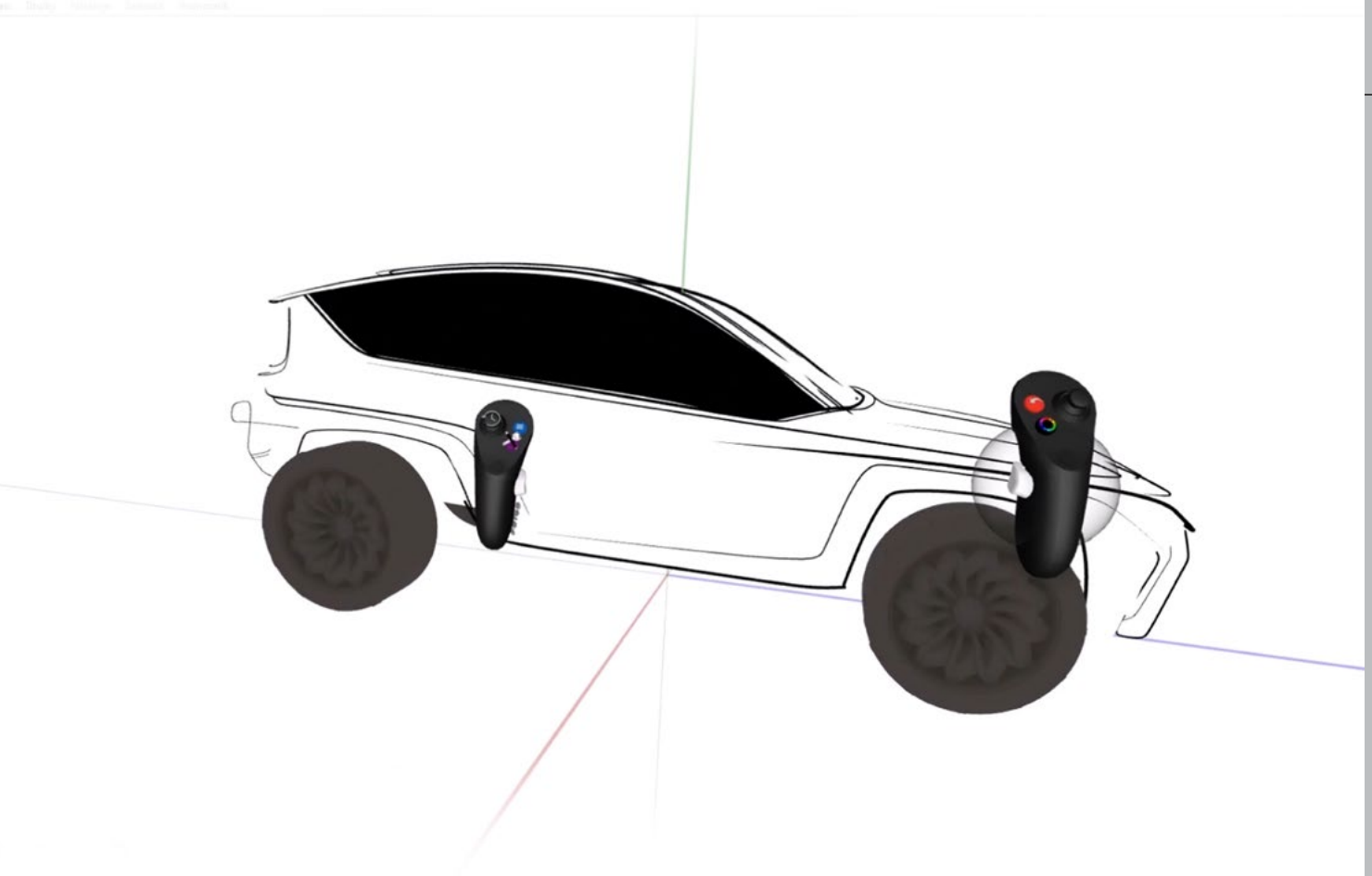
Sketch the centerline of the vehicle on the Planar, which fixes your hand in two axes, so that you can sketch 2D drawings. Emil grouped all lines of the center by grabbing them and pressing the Purple Menu button. Copy them and move them on the Yaxis by aligning controllers head to toe and holding the Grab button.



Sketch the wheel arches by using the Planar again. Align it just behind the wheel so that you can precisely draw the wheel arch with the Stroke tool. With the same technique sketch the greenhouse line or any line you want to make 2D. When you want to edit the 2D line, switch off the Planar, and you can move Vertexes in any direction. Emil used the Stroke tool and put these lines into a new layer

Put the free lines into an individual layer and decrease the opacity. Now, use the Stroke tool to make precise lines. Edit the lines to create the construction model. Now, edit the workspace and choose the flat black environment from the Custom one. Create a new layer and name it Filler. Choose the Volume tool with a very bright color. Fill the car with it roughly. This hack will fill the volume of the vehicle. Make sure you don't intersect the lines.





Group the volumes by grabbing them and pressing the Purple Home button. Change the color to a flat white one. Choose the color of the studio to a flat white one as well. The white background makes the sketch look like 2D drawing in the space. Use some Surfaces to sketch the greenhouse graphics.

It's time to bring the sketch to life. Edit lines by grabbing end-points, go from right to the left with the joystick, and taper them. Tapering makes the lines looking more like pencil strokes. Continue with adding the details, shut lines and construction lines. Pay attention to the thickness of the Paths. You can use the Camera tool, and take some beautiful snapshots.



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Sincerely yours,
Zofia

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I congratulate Zofia Babcanova, the author of this e-book for her effort to share and produce the e-book ‘DIGITAL AND VIRTUAL DESIGN DRAWING’ for the benefit of all young budding automotive designers. A clear step by step sketching technique using available software makes your sketch ideas into a more clear and stunning presentation as you know that a good sketch will always put your ideas to acceptance to your audience.

Professor Sulik Suleiman
Mohd Salleh MDesRCA
Fellow, Product
and Automotive Design
Malaysia

The Žofia Babčanová’s publication will definitely become an essential guidebook for the teaching of Design Drawing. Due to the digital technology boom, Design Drawing is changing at rapid speed. As a design theorist, I especially acknowledge her idea that the drawing is not just a mechanical connection between the designer’s head and the final product. With great potential and independence, Žofia can inspire the designers.
As Marshall McLuhan said,
“The Medium is the Message.”

prof. PhDr. Zdeno Kolesár, PhD.

The publication, which is an outstanding achievement in doctoral studies, attempts to be the foundation for the students of Design. The department’s ambition is to write the academic work which provides insight into the creative process from the drawing to an actual model. This publication represents the newest trends in Design Drawing, and so it opens the library for the Transportation Design. The work is undaunted, authentic, and it explains the basic techniques and possibilities of Digital Drawing in a systematic and pedagogic way. There has not been any similar work for a long time. The Žofia Babčanová’s publication has totally filled in this empty space of the Transportation Design.

prof., Ing., akad. soch. Štefan Klein