

PACKAGING DESIGN

NL → Deze tutorial is geschreven door Maarten Beerten voor het keuzevak Automotive Design. Hij zal worden toegelicht in het Engels. Er zal simpel beschreven worden hoe een basis voor een packaging kan worden opgesteld, en dit kan zo uitgebreid gedaan worden als jezelf nodig acht.

Om een goede packaging te kunnen tekenen heb je A3 papier (of A4) nodig, een passer, een liniaal en een geodriehoek.

EN → This tutorial is written by Maarten Beerten for Automotive Design. This tutorial will be in English. In this tutorial I will explain how to draw a basic packaging. You can make the packaging as detailed as you wish. You need A3 paper (or A4), a compass, a ruler and a set square.

The important part for this tutorial is having knowledge about the vehicle group you want to design.

So for instants a new: Competitors
Vauxhall Corsa Volkswagen Polo, Seat Ibiza, Dacia Sandero, Skoda Fabia
Vauxhall Astra Volkswagen Golf, Renault Megane, BMW 1 serie

So to be in a class you need to have accurate information about the vehicle class you are aiming for. There are plenty of websites to find accurate information about these kinds of cars. In the Netherlands I will advise www.autoweek.nl than use the carbase they have, (autoweek.nl → nieuwe auto's → auto's vergelijken) see page 3. You can than check all specifications from different models and compare them. You can also see different options like the number of airbags or if air-conditioning is standard or not.

An important note for this tutorial is how to calculate some of the sizes, and how to scale the car for your paper. For this tutorial I used an Alfa Romeo 159 which I want to redesign and make electric.

My competition are the:	Length	Width	height	wheel size	weight
Vauxhall Insignia	4830	1858	1498	225/55R17	1403
BMW M3	4531	1817	1421	205/55R16	1325
Volkswagen Passat	4799	1855	1417	235/45R17	1405
Alfa Romeo 156	4661	1830	1422	215/55R16	1465

So now we see our first small obstacle, what is our wheel size in mm? We can use the following calculation:

Diameter of the rim in mm + ((height of the side wall of the tire) * 2) = the wheel size in mm.

So what is what?

215 is the width of the tire (you need this for the top view drawing)

55 is a percentage (%) of the width of the tire and the tire height

R16 is the diameter of the rim in inches

So now the calculation goes as follows

16 inch needs to become mm so = $16 * 25,4 = 406,4\text{mm}$ (so 40,6cm)

Then we need to calculate the height*, so = $(215 * 0,55) = 118,25\text{mm}$ (so 11,8cm)

But now we only calculated one side wall, and we need two so * 2

$(16 * 25,4) + ((215 * 0,55) * 2) = 642,9\text{mm}$ (so 64cm)

* Because the height is a percentage of the width, we do the following: The height is 55% of the width, the width is 215mm so $215 / 100 = 2,15$ (1% of the width) * 55% = 118,25mm, we can also write this as $215 * 0,55 = 118,25\text{mm}$.

So now we know the tire size in mm, we know the wheel base, we know the length and the width and we know the height, with this basic parameters we can now start to set out our box design.

We start with a base line. If you work close to the edge, you can make your side view and top view on one page.

If you work on A3 it is probably best to work on 75% scale, so all sizes you need to do *0,75%

	100% is:	*75% is:	
Length	4661mm	3495,75mm	35cm on paper (so perfect for A3 paper which is 42cm)
Height	1422mm	1066,5mm	10,7cm on paper
Width	1830mm	1372,5mm	13,7cm on paper
Wheelbase	2700mm	2025mm	20,25cm on paper
Wheel size	642,9mm	482,175mm	4,8cm on paper

If you work on A4 Paper you can work 1:20* so than the size will be as followed:

	100% is:	*50% is:	
Length	4661mm	2330,5mm	23,3cm on paper
Height	1422mm	711mm	7,1cm on paper
Width	1830mm	915mm	9,15cm on paper
Wheelbase	2700mm	1350mm	13,5cm on paper
Wheel size	642,9mm	321,45mm	3,2cm on paper

* delen door 2 en keer 0,5 is het zelfde vandaar dat de schaal van 1:20 (/2) het zelfde is als *0,50%.

* dividing by 2 is the same as * 0,5 so /2 or *0,5 the answer is the same.

MOTOR		
cilinders	i	4, in lijn
kleppen per cilinder	i	4
cilinderinhoud	i	1956 cm ³
boring x slag	i	83,0 x 90,4 mm
compressieverhouding	i	16,5:1
max. vermogen	i	100 kW (136 pk)
		4000 tpm
max. koppel	i	350 Nm
		1750 tpm
brandstofsysteem	i	common rail
klepbediening	i	dohc
turbo	i	ja, met intercooler
katalysator	i	partikelfilter
PRESTATIES		
topsnelheid		202 km/h
acceleratie 0-100 km/u	i	9,9 s
verbruik binnen beb. kom	i	6,6 l/100km
		(1 op 15,2)
verbruik buiten beb. kom	i	4,2 l/100km
		(1 op 23,8)
verbruik gemiddeld	i	5,1 l/100km
		(1 op 19,6)
CO2 uitstoot	i	134 g/km
energielabel	i	B
Meer weten over schoon en zuinig rijden? Ga naar Groenopweg.nl		
ONDERSTEL		
aandrijving	i	voor
wielophanging voor	i	onafh., dubb.dr.
wielophanging achter	i	multilink
vering voor	i	schroefveren
vering achter	i	schroefveren
stabilisator voor	i	ja
stabilisator achter	i	ja
remmen voor	i	gev. schijven, 305 mm
remmen achter	i	gev. schijven, 278 mm
bandenmaat	i	215/55R 16
draaicirkel	i	11,1 m
VEILIGHEID		
botsproef voor/opzij (sterren)	i	★★★★★

Vergelijk selectie

Voeg versie toe aan selectie

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Vergelijk selectie

GEWICHTEN		
massa leeg	i	1465 kg
max. toelaatbare massa	i	2040 kg
max. laadvermogen	i	575 kg
max. aanhangermassa geremd	i	1500 kg
max. aanhangermassa ongeremd	i	500 kg
max. kogeldruk	i	60 kg
max. dakbelasting	i	80 kg
INHOUDEN		
bagageruimte	i	405 l
brandstoftank		70 l
EXTERIEURMATEN		
lengte		4661 mm
breedte		1830 mm
hoogte		1422 mm
wielbasis	i	2700 mm
spoorbreedte voor	i	1593 mm
spoorbreedte achter	i	1578 mm
INTERIEURMATEN		
afstand rugleuning/pedalen		910-1130 mm
hoofdruimte voor		920-980 mm
lengte rugleuning voor		670 mm
lengte zitting voor		550 mm
instaphoogte voor		530 mm
interieurbreedte voor		1460 mm
afstand rugleuning voor/achter		600-840 mm
hoofdruimte achter		930 mm
lengte rugleuning achter		690 mm
lengte zitting achter		520 mm
hoogte zitting achter		330 mm
interieurbreedte achter		1470 mm
afstand rugleuning 2e/3e zitrij		- mm
hoofdruimte 3e zitrij		- mm
lengte rugleuning 3e zitrij		- mm
lengte zitting 3e zitrij		- mm
hoogte zitting 3e zitrij		- mm
interieurbreedte 3e zitrij		- mm
hoogte tildrempel bagageruimte		770 mm

Vergelijk selectie

Voeg versie toe aan selectie

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Vergelijk selectie

This is the specification lists you can find on autoweek.nl to get the information for your vehicle you need. (Autoweek.nl → Nieuwe auto's → Auto's vergelijken).

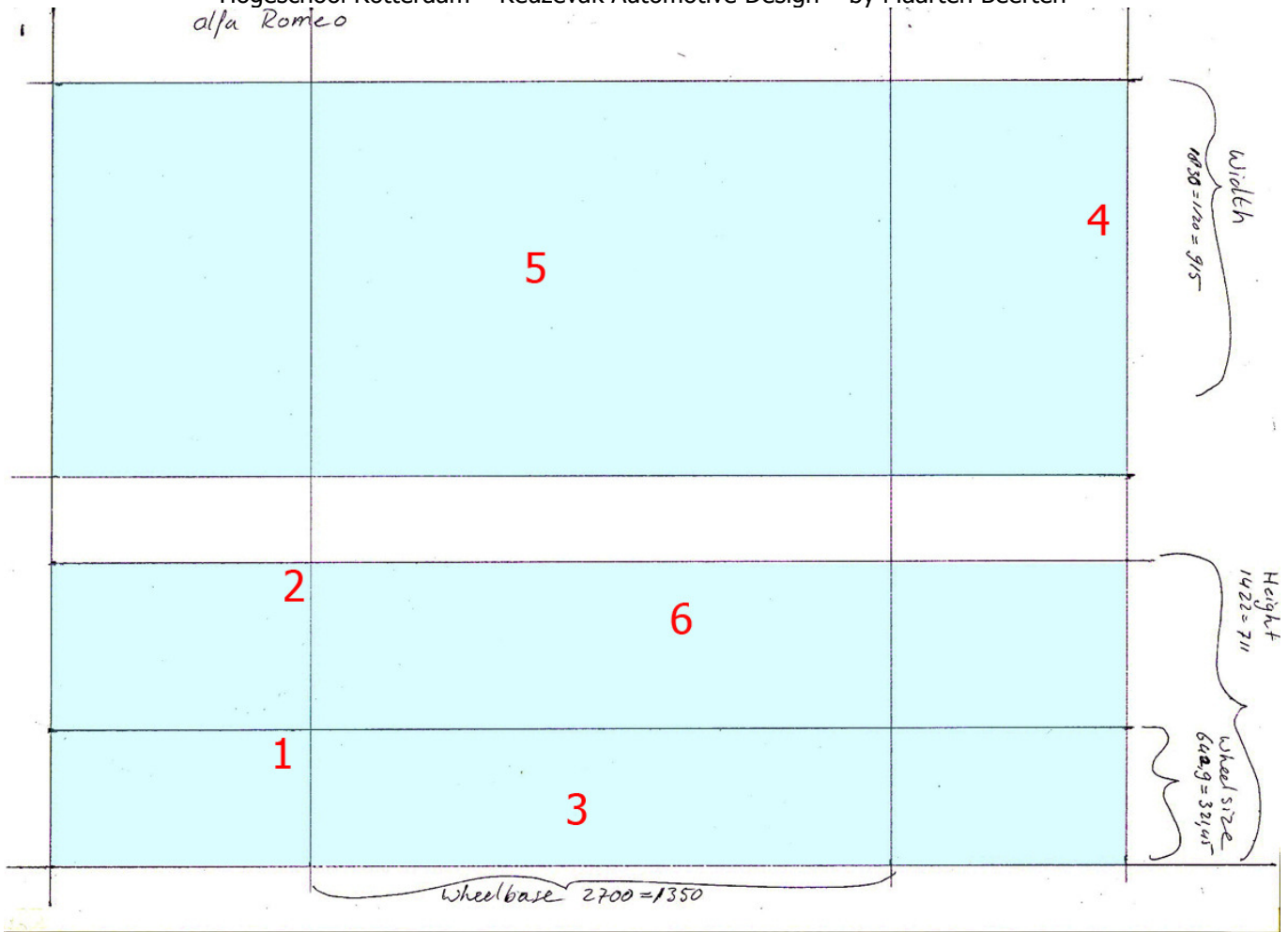
It is also important to know the front overhang and rear overhang of the car. The total length of this particular car is 4661mm, and the wheel base is 2700mm so there is 1961mm left which hangs over the front and over the rear. (The front and rear overhang is seen from the centre of the front wheel forwards for the front overhang, and from the centre of the rear wheel and backwards for the rear overhang).



Source: http://www.autoevolution.com/images/testdrive/gallery/alfa-romeo-159-18-tbi-2010-500_3.jpg

In the picture from the side we can see that the front overhang is larger than the rear overhang, so something like 1100mm in the front and about 861mm rear overhang. With this information we can start our drawing. I will keep some extra space so I can vary a little with the sizes. (If you re-design a car, a little bit size difference can be allowed, but be shure to keep the head room in mind this is probably the most important measurement). (If you are re-designing an older car, like a car from the 60 for instants, look at competitors of this era so you know the size you need to use. This is because cars are larger than they used to be, because people are bigger, and there are more safety regulations (for crumpling zones for instants)).

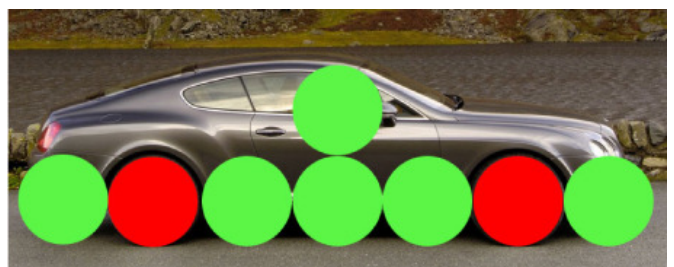
Because I need to be able to scan my packaging drawings I work on A4 for this occasion. Normally I work with A3 paper and depending on the vehicle size I work on 10% or with the 0,75% rule I just explained.

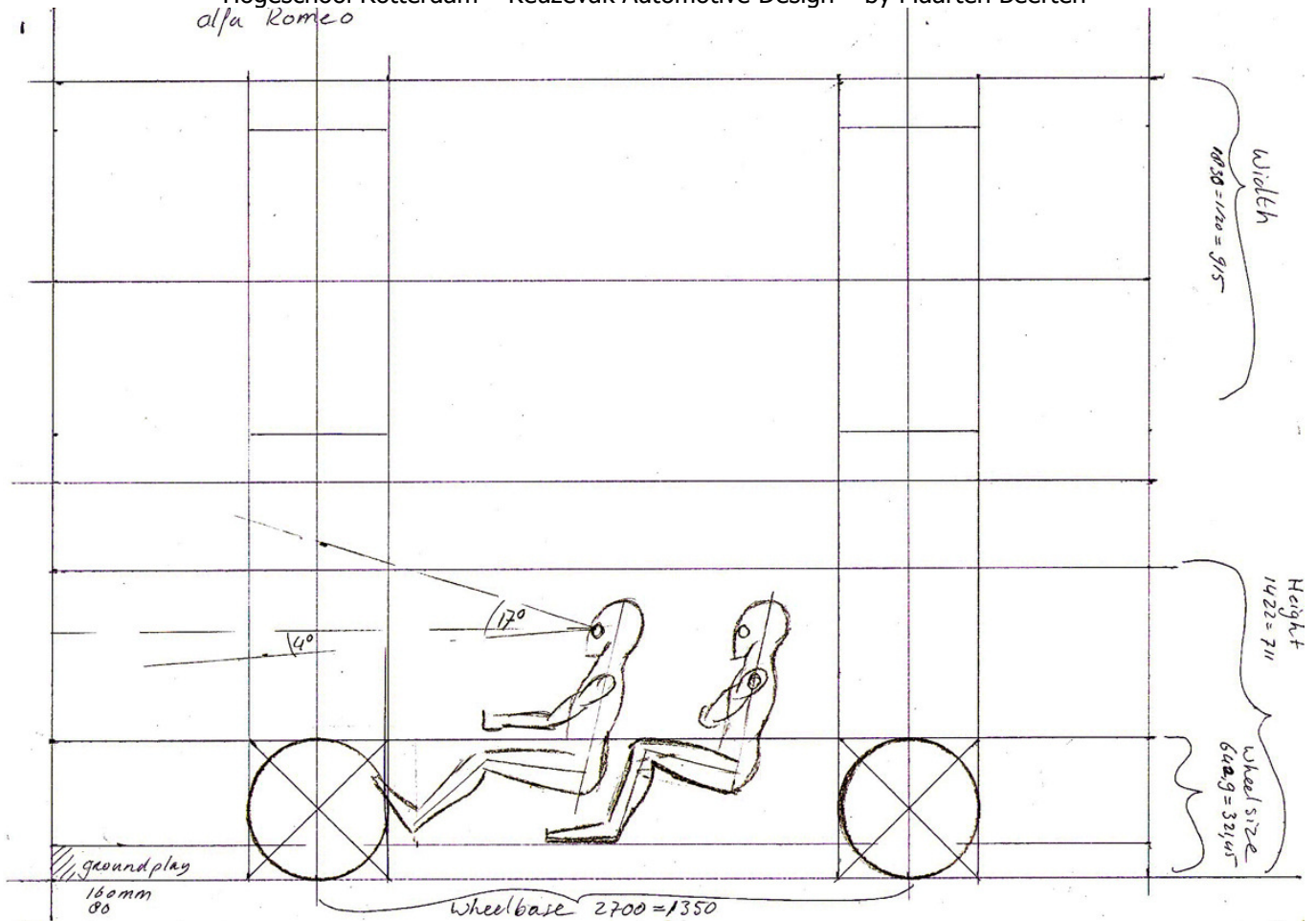


- 1 Height line for the wheels
- 2 Height line for the roof
- 3 length for the wheel base
- 4 Width for the top of the car
- 5 Surface of the top view (light blue)
- 6 Surface for the side view (light blue)

In the drawing above the text is the base for the packaging, I started with an outline of 1cm/10mm. There for I have now enough room to put the side view and top view on one page. Next step is the marking of the height for the wheels and the roof. Next I put in the wheel base. As I said I want to keep a little extra room for the front and rear overhang, so I took 1,2meters, so 6cm of space in the front for the front overhang and 1,1meters in the back, so 5,5cm for the rear overhang. Next I drew in the width of the car two cm above the side view. The car is 1830mm wide so 9,15cm in the drawing.

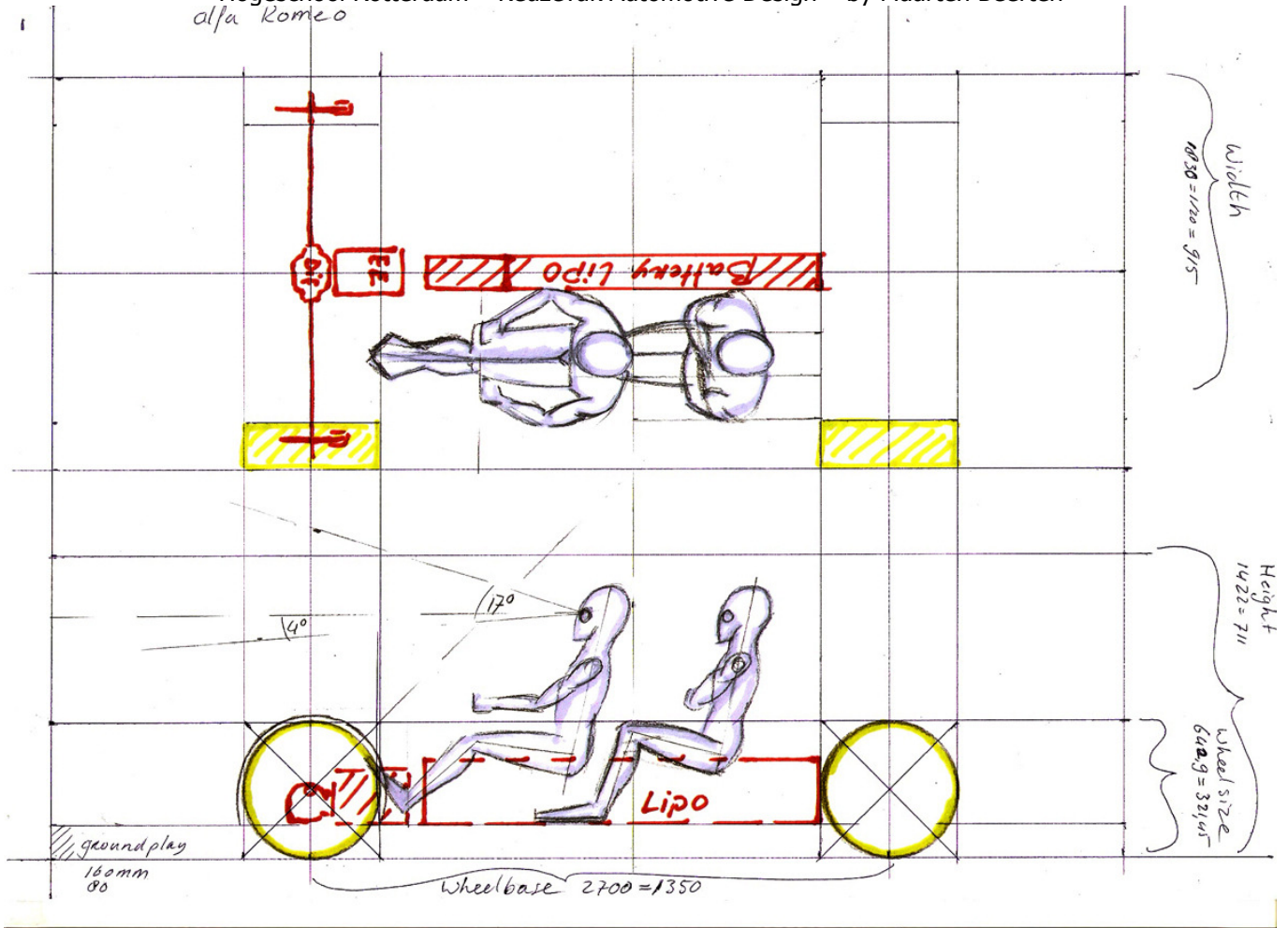
(A funny fact you can see from this information is that this is a 'design' car, so the try to stay as close as possible to the design rules of 2 wheels high and 7 to 7,5 wheels long to create a perfect balanced design) (height $1422\text{mm}/642,9\text{mm}=2,2$ length $4661/642,9=7,25$ wheels)



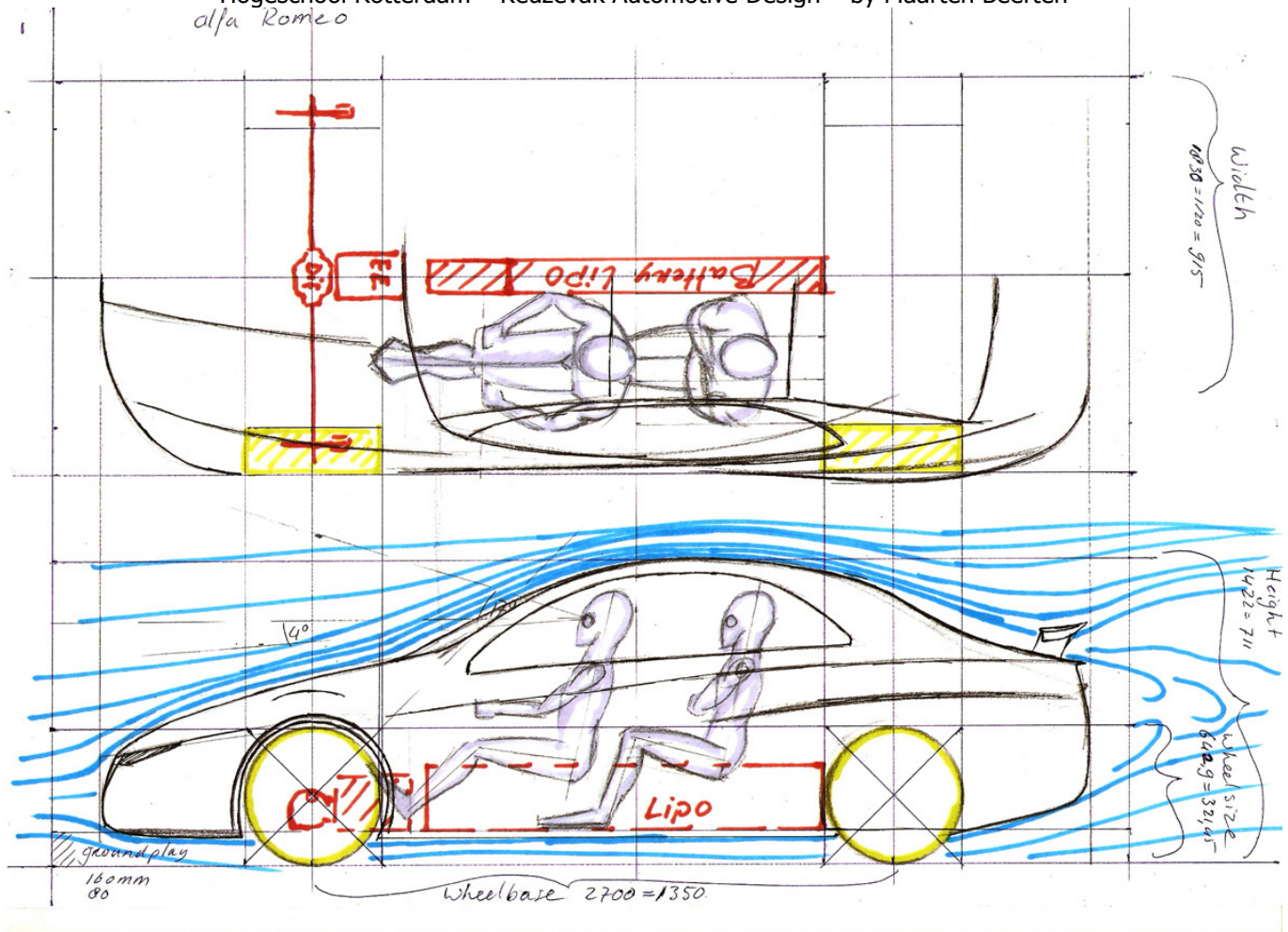


Here is the next stage. The first thing that I did was draw the wheels in side view and in top view. (the tire is a 215/55R16, so 215 is the width of the tire, /2 is 11mm in the drawing). The next step is that I drew in the normal ground clearance, which is 160mm /2 is 8mm. Now I draw the people in. I accidentally put them a bit too far forward for this vehicle. But it is all about the idea in this case. For the head, back and butt I take a minimum length of 850mm so 4,25mm than the legs twice 2,25mm. See that I put the people a bit higher in the vehicle so the legs are in normal angle. If you drop the butt of the persons the roof can become lower, but the back needs to go backwards so the room to house one person becomes bigger. But this depends on the car your designing. Being able to entre this car quit normally is important in this type of vehicle. In a Ferrari the entering and sitting position can be a bit more challenging.

Finally I drew some simple sight lines in the car, a downward angle of at least 4 degrees needs to be possible, and for the top I took a minimum of 17 degrees.



The next step is to draw in some of the important parts. As I said I want to make a electric vehicle, so no big engine in the front, but a big battery pack in the centre of the car. A much smaller electrical engine, and differential on the front axel. I put the tires in green so they are clear as well. Finally you can also see the position of the persons in the top and side view. Please keep in mind that every thing you do is correct size wise!



The last thing that I do is draw in the body design from the side and the top. It is not a very nice design or any thing, it is just to show you how it basically works. When you designed your body over your packaging, you can also mark your interior, suspension, spare tire, chairs etc. Finally I always try to draw in some of the air flow lines to show how the basic aerodynamics should be. For this car you can see they are not practically good. But as said before, this is just an example. Now you can do the same for the front and rear view. As you see I only drew the half of the top view, you can make the other half easily in Photoshop, the same goes for the front and the rear view. In Photoshop you can easily mirror half of your car.

When you have this, and you worked nicely with the measurements, you will be able to make accurate 3D drawings, or make computer models. Also when you have the interior measurements you can design your interior.

See my other tutorials at Maycodesign.nl or Maycodesign.com / Tutorials to view design rules or how to draw in 3D. Remember I only show you the basics because these tutorials are for the design classes I teach. If you want more detailed information please contact me or watch tutorials on youtube.com.

GOOD LUCK!