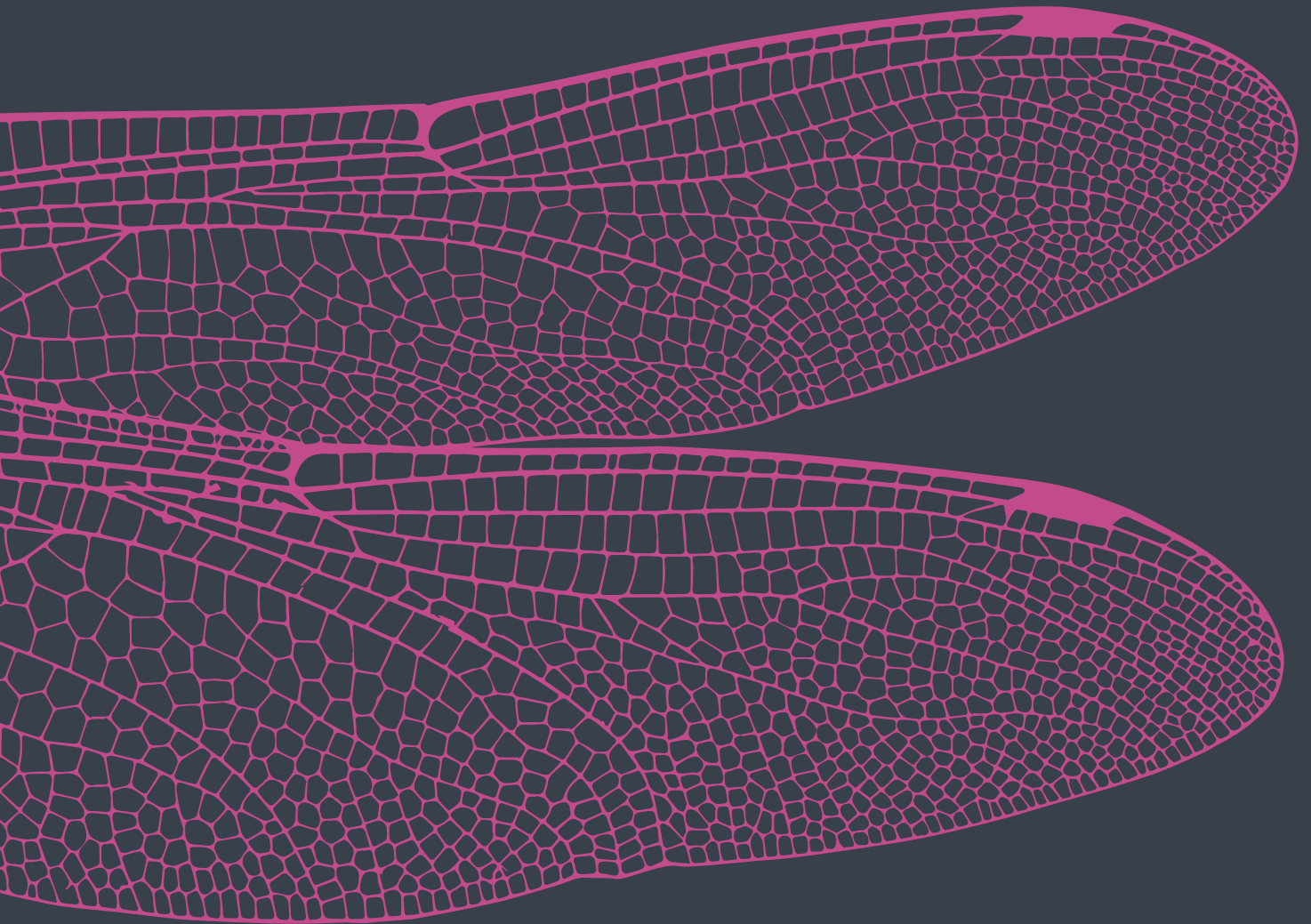


Dragonfly

| A styling strategy for
| BYD commercial vehicles



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Dragonfly

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Preface | 00

In front of you lies my master's thesis. It is the final delivery of the master: Strategic Product Design at the Delft University of Technology.

Six months ago I started this project at BYD. In a time where, due to the Covid-19 pandemic it proved hard to find a graduation opportunity, many people went to great lengths to help me get an assignment in the automotive industry. The resulting assignment was perfect. It combined strategic thinking with design and my passion for automotive. Through this assignment I felt I could prove the strategic value of styling, something that in my opinion is underexposed at the University.

Aside from BYD as client company I was very fortunate to have the help of VanBerlo, a strategic design agency. They were involved in this project as an expert whom I could consult. Through VanBerlo it was possible to set up creative sketching sessions with designers from their design team, which obviously was a great experience.

As every graduate student will agree, the assignment is harder than it seems in the beginning. The pressure was on right from the beginning of the project. Especially since BYD's higher level management got interested and the chief design himself was kept up to date on my project. To have such an interest in the project is very exciting and also a bit scary. I wanted to show that the attention given to the project would be worth it. Despite the less than ideal circumstances during the Covid-19 pandemic, the project went well. Not being able to go to the office and meet the people from BYD, VanBerlo or the university was tough. I would have loved to get to know the BYD working environment and I missed being able to brainstorm, chat and work with people. Luckily I had a fantastic team helping me, making the best of the situation. The video calls I had with everyone involved were very pleasant and inspiring.

This graduation project has been a great experience. I have learned a lot about myself, on a personal level and as a designer. The project was challenging and it felt like cracking a puzzle. I loved the moments where I had new ideas about the solution and the pieces of the puzzle fell in place. These moments fueled my confidence about the validity of the research and therefore the project. I am very proud of the final result.

Ruben van Ommen

Acknowledgements

This project could not have been completed without the help of the amazing people at BYD, VanBerlo and the Delft University of Technology as well as the many friends and my family who supported me. Their enthusiasm and the effort they have put in meetings, creatives sessions and the much needed coffee breaks helped me to stay motivated during this project.

Thank you Peter Kiela, Jack Zhu and Gerbera Vledder for this graduation opportunity and thank you the for your confidence in me. The time you have put into coaching me and your attention to detail helped me achieve a result I am proud of. You have welcomed me at BYD and I have enjoyed our meetings. I would have loved to meet you all in person.

Thank you Wouter Kets for coaching me throughout this project. I know you were busy but you were always available for meetings and last minute talks during which you showed interest and were eager to help. Your expertise in the automotive industry helped me to create something realistic.

Thank you Dirk Snelders for your time, genuine interest and expertise on strategic design and styling. Even though we did not meet very often, the meetings with you were very pleasant. I felt we could have talked about cars, business strategy or the countryside of Brabant for hours, which we sometimes did.

Thank you Boudewijn Soetens and Bas Bruining for helping me during this project. The meetings with you felt very natural and we immediately understood each other. Your expertise and the creative sessions we have done together with the VanBerlo team proved invaluable for this project.

Dear Anniek, thank you for our hours and hours of calls. You were there for me and helped me stay calm and feel confident during stressful times. I always look forward to seeing you at the end of my day/week.

Thank you Merel for your much needed emotional support and free psychology sessions. Ever since we were young, you were looking out for me. I am lucky to have you as my sister.

A special thanks goes out to my parents: Marjanke and Marc. You have always supported me and have given me the opportunity to do everything that I wanted to do. Not only during this project but throughout my entire life you have been there for me. And for that I am forever grateful.

Executive Summary

Glossary

Strategic styling for BYD commercial vehicles in Europe

Online sales are at an all-time high. People can have packages delivered to their doorstep within two days of ordering. The e-commerce market is flourishing and customers are happy with speedy delivery without extra cost. The high demand causes logistics companies to push themselves to the limit. Therefore, the number of delivery vehicles increases which is causing some problems. The large vans and trucks are cluttering European city centers and are causing dangerous situations. Commercial vehicles are seen as blunt and annoying in traffic.

Meanwhile BYD, a Chinese automotive company that specializes in electric technology, wants to launch commercial vehicles in Europe. The challenge is to design the commercial vehicles in such a way that they have a positive impact. This thesis is a styling strategy for electric commercial vehicles in a European context. It is part of the master Strategic Product Design at the Delft University of Technology.

BYD is a Chinese company that started as a manufacturer of batteries. In 2003 BYD entered the automotive industry, specializing in electric vehicles. The corporate identity of BYD is pioneering in electric technology and guiding the world towards a green future. BYD's product portfolio consists of cars, trucks, buses, trains, batteries and electronics. In China BYD is well known, in Europe there is no significant brand awareness. A successful launch of commercial vehicles in Europe will help to create a positive brand image for BYD.

From research it was found that there is a need for smaller electric commercial vehicles in Europe. This is due to the increased need for last mile delivery vehicles in e-commerce and more governmental regulations to protect city centers by imposing emission, weight and size limits for certain areas. The logistics industry is facing a driver shortage. For making this profession more appealing companies are increasingly involving drivers during the procurement process listening to their input about comfort, safety AND styling.

For determining the right styling strategy for BYD commercial vehicles in Europe, the European context was mapped. Trend research and interviews revealed the underlying themes that are important and resulted in a set of three desired product qualities which the product must have: Lightness, Wholesomeness and Professionalism. The Styling strategy should be easily explained and the best way to do that is by using a theme. The theme connects the desired product qualities with the BYD brand identity and helps to translate that to a tangible design.

The theme for the styling strategy is Dragonfly. Just like a dragonfly BYD commercial vehicles move silently and nimbly from location to location. They are lightweight, agile, effective and harmless. According to Chinese folklore when a dragonfly arrives at your doorstep it is said to bring prosperity and good luck. People should say the same thing about BYD's commercial vehicles.

Body

The outer shell of the vehicle

BYD

Build Your Dreams

Chassis

The load bearing framework of a vehicle

Color and Trim

The color and materials used on a vehicle

E-commerce

The online market and resulting logistics

Greenhouse

The set of windows around the driver and passenger area

ICE

Internal Combustion Engine

Last-mile

The delivery to the final customer which is the last step in the logistics chain.

Leitmotif

A set of signature styling elements which characterizes a design

OEM

Original Equipment Manufacturer

Package

The complete set of features of a vehicle

Platform

Layout of the major components of a vehicle

R&D

Research and Development team at a company

Short/long haul

Short and long distance logistics operations

Shoulder line

A line formed by the area where side surfaces and top surfaces meet, for instance where the hood meets the fender.

Stance

The way a vehicle 'sits' on the ground often determined by the space between the vehicle and the ground.

Styling Strategy

A strategy for the design language of a product portfolio

TCO

Total Cost of Ownership

Theme

A unifying idea used to explain a complex matter

TU Delft

Delft University of Technology

Volume

The overall shape of the vehicle

Wholesome

Promoting health or well-being of mind or spirit

Lightweight

Lightly built or constructed

Professional

Used during a job that needs skill, education or training.

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Introduction



1 | Design Brief

This project was done for the company BYD, 'Build Your Dreams' and is part of a master's thesis for the master Strategic Product Design at the Delft University of Technology (TU Delft). In this chapter the assignment will be explained.

1.1 BYD

The main stakeholder of this project is BYD. BYD stands for Build Your Dreams and this is a Chinese manufacturing company that produces batteries, electric vehicles and other electronic devices. BYD was founded in 1995 and is an Original Equipment Manufacturer (OEM). BYD will be launching Electric Commercial Vehicles to the European market and is interested in how these vehicles should look in the European market.

For BYD this assignment is an opportunity to get insights from a European perspective. Furthermore, it is an opportunity to work with the TU Delft and use their expertise. For the R&D department of BYD Europe it is the first time a graduate student is working on a project.

1.2 TU-Delft

Strategic Product Design is a master study from the TU Delft and is part of the faculty of Industrial Design Engineering. The faculty of IDE approaches design from the perspective of people, organisation, and technology (About IDE, 2021). The master Strategic Product Design puts an emphasis on the business context. The graduation assignment

is needed to successfully finish the master. The TU Delft is represented by two supervisors, chair: prof. dr. H.M.J.J. Snelders and mentor: dr. W.F. Kets. Together they will assess whether the thesis is sufficient to pass and for the student to acquire the title of engineer.

1.3 VanBerlo

VanBerlo is a Dutch design agency specialized in strategy and innovation. VanBerlo frequently works together with BYD and through them the contact with BYD was initiated. VanBerlo took on the role of outside advisor for this project and has offered their expertise throughout this project.

1.4 Domain

To assure the project can be done in around 20 weeks, the project is limited to the Electric Truck division of BYD Europe. In that domain Electric technology capabilities of BYD will be researched and its desired effect on the styling of the trucks to fit the European market.

1.5 Time-frame

The outcome of this project is aimed at five years in the future (2026). This limitation was put in for making this project feasible. BYD aims to launch their first commercial vehicles in the coming years and this project could be used to help improve their designs before that time. Furthermore, since the development of electric technology and the growth of BYD as a company, predicting a future further than five years ahead would lead to too many uncertainties.

“ Design a future styling strategy for BYD trucks in Europe by defining the market and technological context and showing how this context translates into the styling of the vehicles and the BYD portfolio. ”

1.6 Assignment

The project elaborates on the connection between automotive strategy and styling, where styling can be a strategic tool for branding. There are factors influencing the styling of BYD vehicles such as the transition to electric driving. However, styling also affects how the brand is perceived by customers, users and from an outside perspective. It can be strategically used to create a positive brand image not only for the commercial vehicles but for BYD in general. In short, there are factors driving styling and there are factors driven by styling. By aligning these factors, a future styling vision can be achieved.

The assignment has been formulated as: “Design a future styling strategy for BYD trucks in Europe, by defining the market and technological context and by showing how this context translates into the styling of the vehicles and the BYD portfolio.”

1.7 Desired results

The desired result is a styling strategy in which the focus lies on exterior styling of a range of vehicles. This document should serve as inspiration for BYD's designers and provide a clear framework of what is important in a European context. The styling strategy will include a styling theme for a desired portfolio and show how this translates to styling of the vehicles from BYD as an example.

2 | Strategic Value of Styling

This thesis builds on the notion that styling can be used strategically. This chapter explains the strategic value of styling.

The design brief is to design a styling strategy. First it is important to know why styling is an important feature of (automotive) design and how it can be implemented in a strategic way.

In a competitive market such as the commercial vehicle market it is important to be recognized as brand. Because BYD is new to the European market, the launch of commercial vehicles by BYD marks their first touchpoint with many companies and people on the street, even though BYD buses are already used in Europe.

Roughly 9% of all registered road vehicles in the Netherlands is a commercial vehicle. This seems low but these vehicles spend more time on the road than personal vehicles. The mileage of an average personal vehicle is 12.800 km per year (Centraal Bureau voor de Statistiek, 2020a) and the mileage of an average van is 17.800 km per year (Centraal Bureau voor de Statistiek, 2020b). Therefore, commercial vehicles are very visible, especially during working hours. For distinguishing itself from the competition it is very important for BYD to show their brand qualities through styling. According to Person, Snelders & Schoormans (2012) styling has the power to reinforce a company's capabilities. This is why companies like MAN put recognition in styling as their number one rule for good design (www.mantruckandbus.com, 2020).

MAN is not the only company communicating their brand identity through product design, there are many companies that do that (Karjalainen, Snelders, 2010). An example in truck design is Daimler (figure 2.1), owner of



Figure 2.1 Stylistic unity in the form of Mercedes-Benz vehicles

the Mercedes and Mercedes Trucks brands, who link their commercial vehicles to the passenger vehicles through styling (Stamov, 2017). Their strategy is to show that their commercial vehicles share the same brand values as their cars (Mercedes-benz.com, 2020).

The electric vehicle market is revolutionizing. The 'new' electric technology offers many opportunities in design. Somehow however, electric vehicles seem to follow their ICE ancestors in styling. James Dyson has stated: "if the product contains any new ideas then it is absolutely essential that the product be visually different" (Person, Snelders, Karjalainen & Schoormans, 2007). For electric vehicles this proves to be difficult. Car manufacturers are stuck in what is called the 'Horseless Carriage Syndrome' which occurred in the early 20th century with the rise of cars. Early cars looked like carriages without a horse to pull it. The vehicles were designed like this because the designers had no clue as to how a car could look and therefore designed with familiar forms, hence a carriage. Current car designers face the same fate. Electric cars are fossil fuel vehicles without a combustion engine. Theoretically,

the more a product is styled to deviate with comparable products, the more attention it is given (Person, Snelders, Karjalainen & Schoormans, 2007). But that only works up to a certain point. If the product deviates too much, the market will never accept it. There must be a balance between novelty and familiarity, otherwise known as 'most advanced, yet acceptable' (Hekkert, Snelders & Wieringen, 2003). Companies can use similarity in product styling to classify a product as a member of a certain product category or brand (Person, Snelders, Karjalainen & Schoormans, 2007). So far, this is what most automotive companies are doing by adding fake grills, air intakes and exhaust like features on electric cars. They are trying to keep electric cars familiar and do not want to change too much in fear of losing market share. This might be the reason why many car brands choose to construct separate brands or sub-brands for their electric vehicles for example: Polestar by Volvo and the ID series by Volkswagen.

Slowly but certainly the vehicles are changing and consumers accept a new form language of automotive. BYD has the opportunity to be a front runner. The expertise on electric technology and the capabilities to develop in house put BYD in the position to use a new way of styling to their advantage and drive us away from the 'horseless carriage syndrome'.

3 | Methodology

This chapter explains the methodology used during the project. The project followed an adaptation of the Vision in Product Design (ViP) Method (Hekkert, Van Dijk, 2016). In this chapter the ViP method and the alteration of the method for this project are discussed.

3.1 The ViP method

The ViP method was created by Paul Hekkert and Matthijs van Dijk and is widely used among designers, especially from the TU Delft. The ViP method is an act of defining a vision of what you want to create. The goal is to define a reason for existence for the final design (Hekkert, Van Dijk, 2016). This is reached by a step-by-step process of deconstructing and reconstructing.

The method consists of two phases: Deconstruction and Design phase. The designer works his/her way up and down 3 abstraction levels: Product level, Interaction level and context level. During the

deconstruction phase, the designer will start at product level and deconstructs the literal design, examining the shapes and lines in the design. Then the designer moves on to the interaction and defines what the interactions with the product look like, answering questions like how people feel around the product. The last step in deconstruction is determining the context in which the original designer designed the product. This leads to an understanding of how the design came to be.

In the Design phase the designer starts at the future context and defines what factors influence the design in the future. In this stage a domain, context factors, a context structure and a mission statement are formulated. The next step is defining a desired interaction with the future product. The last step of the method is to return to product level and define product qualities, a concept and the final design according fitting the earlier determined interactions and future context (Hekkert & Van Dijk, 2016).

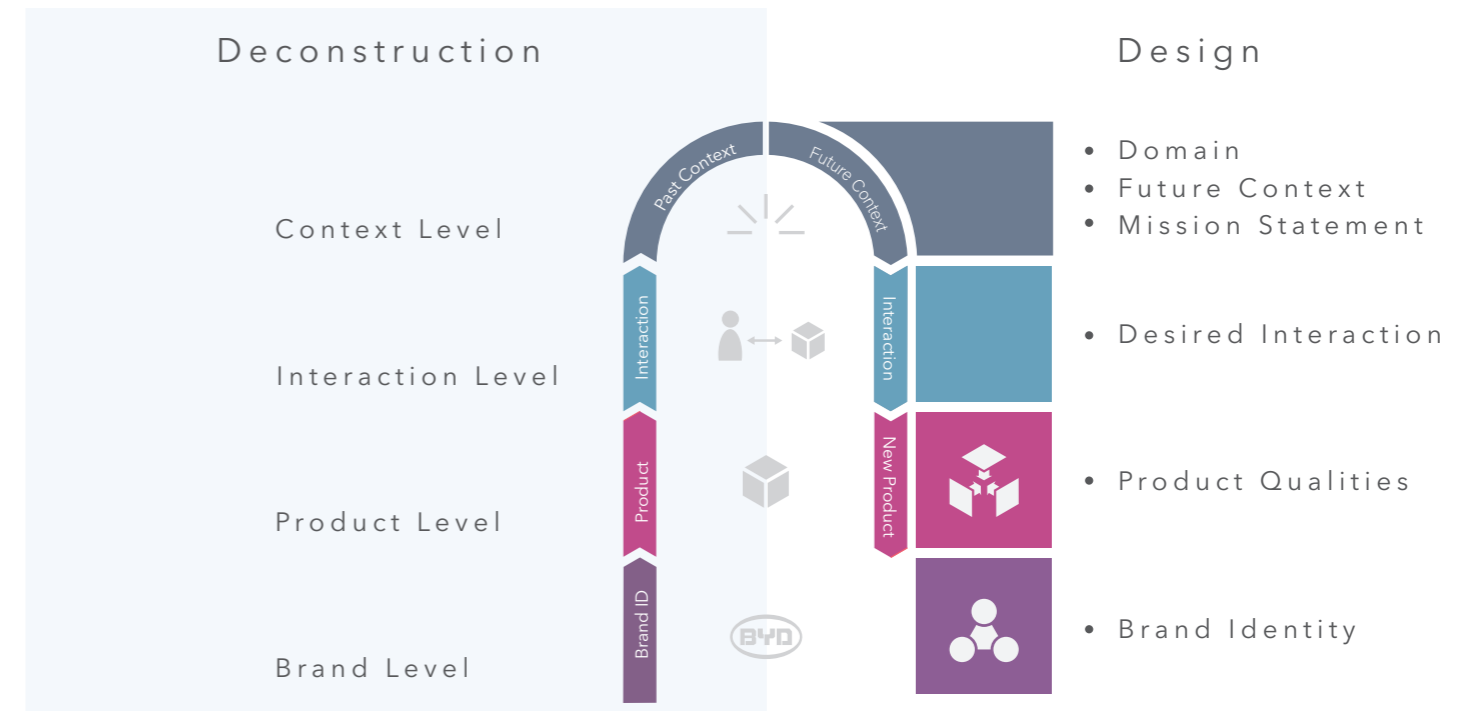


Figure 3.2 Adapted ViP method structure

3.2 The ViP method adaptation

The ViP method is ideal to create new and innovative solutions. The method allows for a lot of freedom for the final design. However, in practice a project is often bound by a design brief from a client and there are certain expectations around the end result. Furthermore, the ViP Method seems to be missing a step for this project: Brand Level. Especially when working with a brand as client, assessing the brand identity is useful to achieve an end result fitting to the company. However good a design might be, a question often asked when presenting the result is: "Why does it fit the Brand?". In theory the design is leading and can be adapted to a certain brand. In practice, or at least during this project, it was useful to determine the brand identity at an early stage. The brand Identity could then be used to guide the project and make decisions with the brand

in mind. This ensures that the end result will fit the client's needs. As stated in the Vision in Design book (Hekkert, Van Dijk, 2016), a designer is allowed to add steps to the guide. The altered version can be seen in figure 3.2.

In some cases the client company has a fully determined brand identity and in some cases it is unclear. In the case of BYD the brand identity was partially determined by BYD and partially had to be constructed during this project. In order to take full advantage of the extra brand level, both the analysis and construction of the brand identity should take place simultaneously and not follow the ViP method where the first half is analysis and the second half is design. The extra step works best when the brand identity is clear for the following steps of the ViP method. Therefore, the brand level takes a short-cut to the design phase.

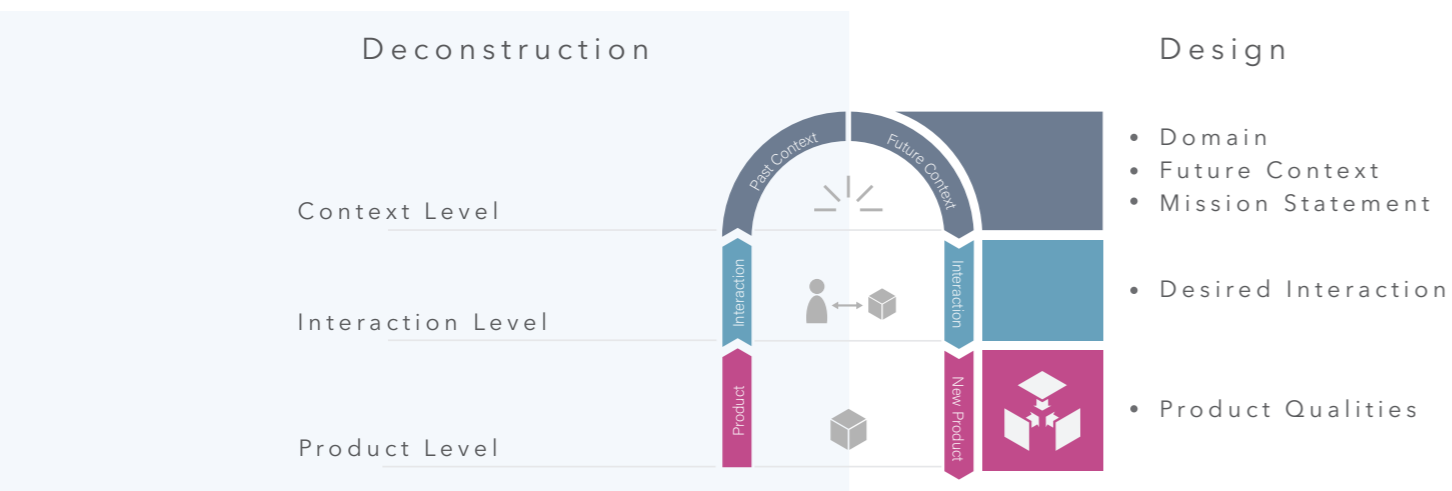
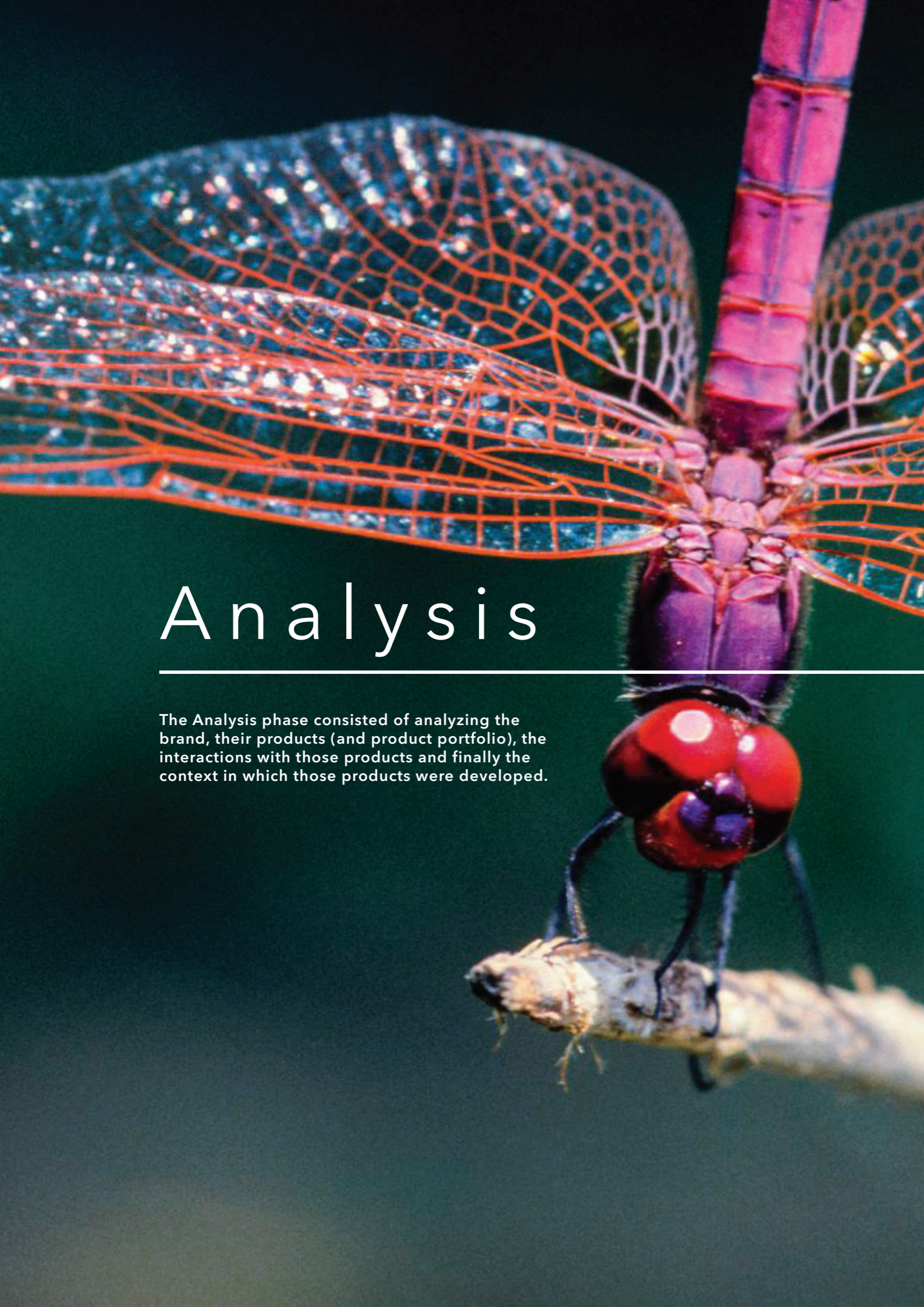


Figure 3.1 Original ViP method structure



Analysis

The Analysis phase consisted of analyzing the brand, their products (and product portfolio), the interactions with those products and finally the context in which those products were developed.

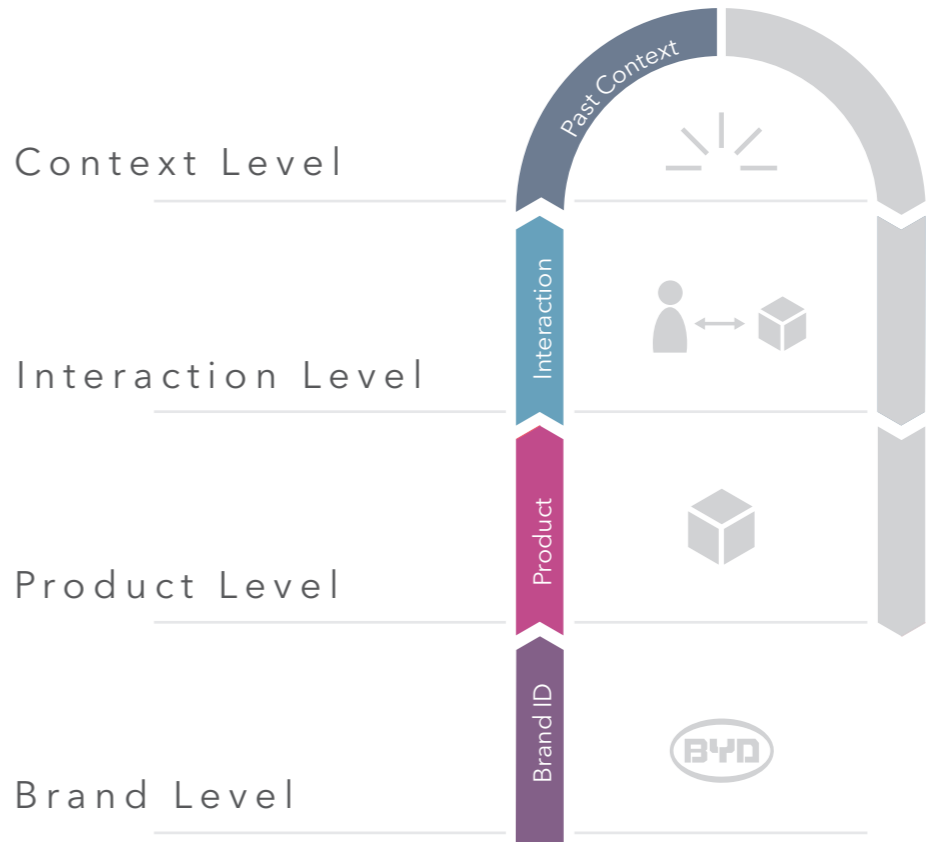


Figure 4.1 Analysis phase vip process

4 | Brand Level



Figure 4.2 Brand level

In This chapter the brand identity of BYD is discussed as part of the brand level of the adapted ViP method. To determine BYD's identity the company's own statements regarding their positioning and purpose were used in combination with the results of a brand identity workshop with the R&D team of BYD Europe.

4.1 What is brand identity?

People use brands to build their identity (Beverland, 2018). And they do this by choosing brands with personalities that fit their own. It is assumed that in Europe there is no widespread brand awareness around the BYD brand. The commercial vehicle market offers a unique possibility for BYD to show their brand identity and

build a positive image. So, for BYD this means their brand image is a blank slate. What BYD decides to show in a European context will have a great impact on the brand image in Europe. As they say: "There is no such thing as a second first impression."

4.2 Brand identity vs brand image

Brand identity and brand image are not the same. In this context the brand Identity means the desired perceived identity or personality. Brand image means the actual perceived brand identity. Brand identity is what you are as a company, brand image is a feeling and what you think about the brand (INBRANDS, INTERICS DESIGNS, 2019).

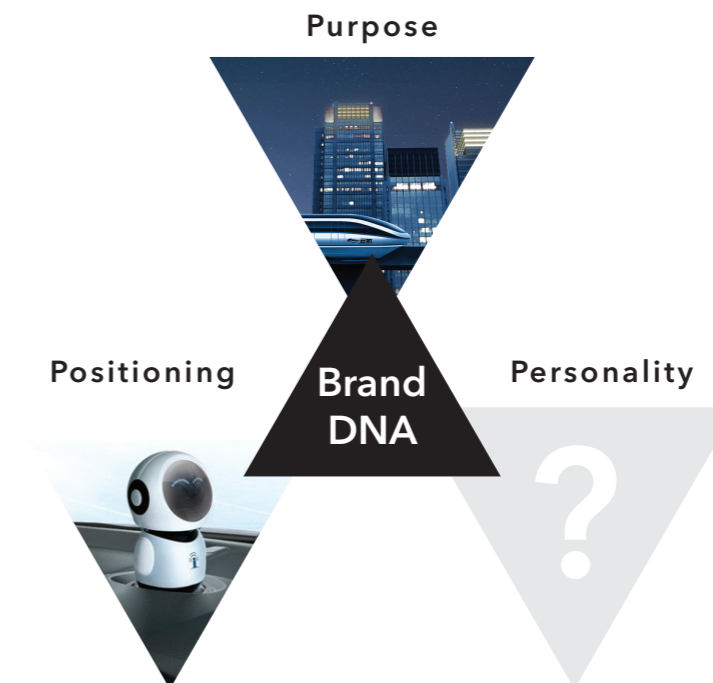


Figure 4.3 The 3 P's

4.3 The three P's

The brand identity, otherwise known as brand DNA consists of three things: Purpose, Positioning and Personality. To construct a brand identity, all three elements must be determined. Because there are many brands, it is important to be different and stand out from the competition (Zijlstra, 2020).

The purpose is clarified in the global statement of BYD. The positioning is partly set by the market segment 'commercial vehicles' which BYD wants to enter, and can be further defined. Both will be discussed in the next paragraphs. The brand personality for BYD Europe was still unclear and needed to be defined to establish the brand identity. This was done through a workshop with the R&D team of BYD Europe.

4.4 Introducing BYD

BYD Europe has their headquarters in Schiedam in the Netherlands. BYD Europe is part of the larger concern BYD, which stands for 'Build Your Dreams'. The company was founded in 1995 in Shenzhen, China. Their headquarters remain in Shenzhen but BYD has offices around the world. BYD started as a battery manufacturer for various applications and since 2003 has entered the vehicle manufacturing market (Nikkei.com, 2020). Since 2008 BYD also produces and sells buses and commercial vehicles. BYD has a vertical and horizontal strategy meaning they expand their business horizontally: diversifying product portfolio, and vertically: owning the total supply chain from mining minerals to manufacturing products and providing services to end users (Tarver, 2019). BYD calls their horizontal strategy the 7+4 full market EV strategy:

4 | Brand Level

"The BYD 7+4 Full Market EV Strategy encompasses most forms of ground transportation as well as every aspect of daily transportation needs. It comprises 7 conventional types of transportation (passenger vehicles, taxis, buses, coaches, urban logistics vehicles, urban construction vehicles and urban sanitation vehicles) and 4 specialized types of transportation (vehicles for mining, ports, airports and warehousing)." (BYD.com, 2020)

4.5 BYD purpose

"The brand purpose refers to the beliefs and the values of the brand." (Zijlstra, 2020). The purpose can be a statement or a story. In the case of BYD the brand purpose becomes clear from their brand mission and vision. BYD has published their purpose on their various websites.

The brand mission of BYD global is:

"During daytime, solar farm captures the power of sunshine. At night, energy storage systems deliver power to families. Electric vehicles on the streets, SkyRail along green belts connect the city in a zero-emissions and zero-pollution way. We are providing more possibilities for a better life. We are seeing a new energy future approaching. This is the mission of BYD, but also the green dream of all mankind." (Brand Philosophy-BYD, 2020)

The BYD brand vision is:

"By innovating technologies that use renewable energy, BYD strives to help society reduce or eliminate

its dependence on non-renewable energy, to create a more sustainable and healthier world. BYD hopes to use its green technology to drive extensive use of renewable energy and to conserve a green environment for future generations." (Brand Philosophy - BYD SINGAPORE, 2018)

The core values of BYD are:

Excellence, Pragmatism, Passion and Innovation (Figure 4.4).

It is BYD's goal to help create a sustainable future using their electric technology. The brand envisions future cities where the modes of transport are electric and clean. By investing in many types of transport BYD can become a big part of that future city.

4.6 BYD positioning

The positioning statement by BYD:

"It began with a small battery, and has since expanded to a huge solar farm in the boundless desert, an energy storage station at sea, together with SkyRail overhead and electric vehicles on the streets. It's all about the application of new energy. From innovation to application, BYD is the first company that provides comprehensive new energy solutions, as it strives to drive development of the new energy industry." (Brand Philosophy - BYD SINGAPORE, 2018)

BYD position themselves as a pioneer in making electric technology comprehensive to the public.

Excellence motivates our dreams with vitality
Pragmatism turns our dreams into reality
Passion fills our dreams with spirit
Innovation facilitates our dreams by invention

Figure 4.4 BYD core values

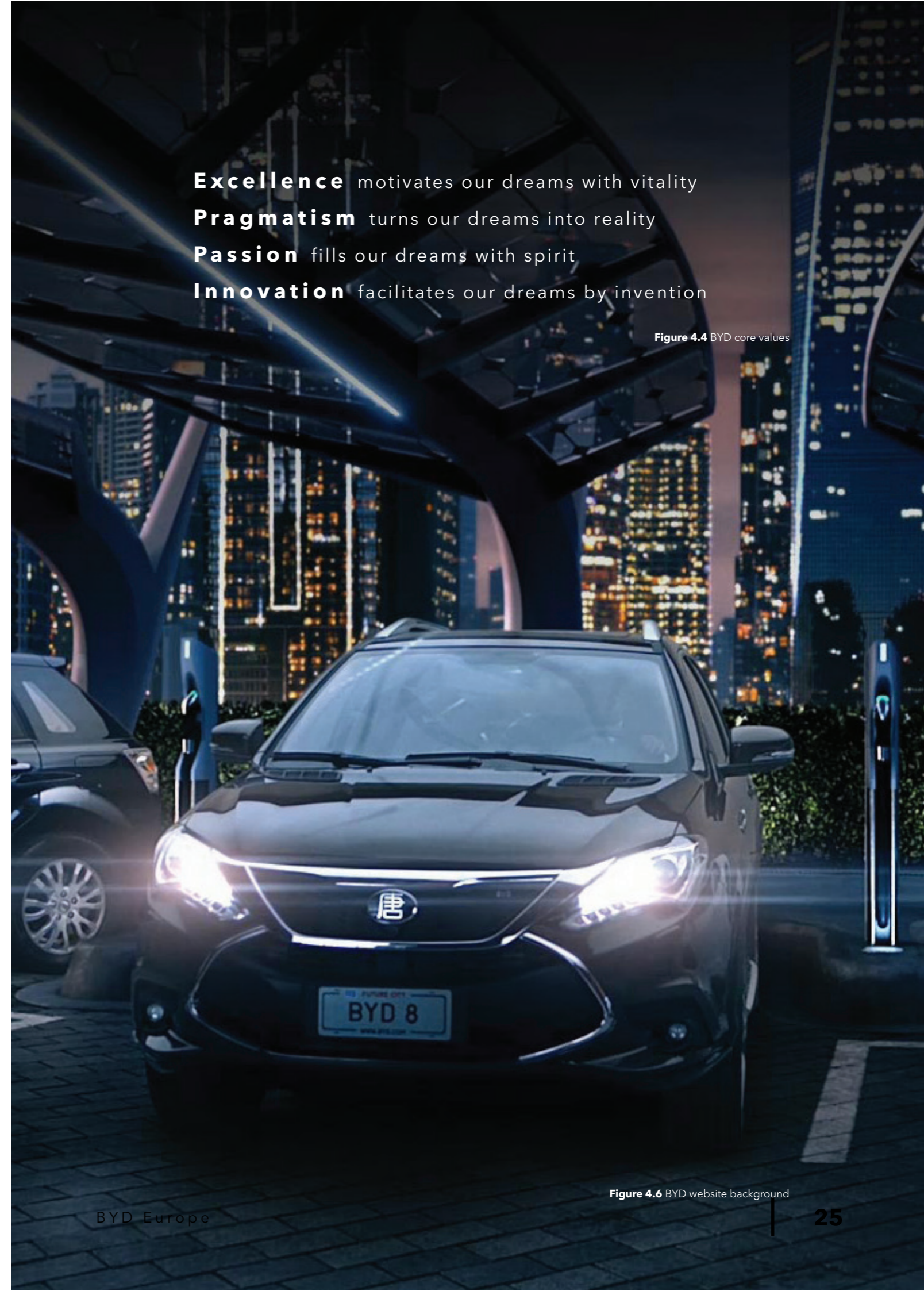


Figure 4.6 BYD website background

4 | Brand Level

4.7 BYD personality

To find out what the desired brand personality for BYD Europe would be, a creative session was held with employees from the R&D department at the BYD Europe office. In this session we discussed what personality characteristics, taken from the research by Aaker (1997) on brand personalities (Figure 4.6), would fit the BYD brand best.

The brand personality model defines five categories for brand personalities: Sincerity, Excitement, Competence, Sophistication and Ruggedness. These categories show general personalities that brands can have and their underlying personality characteristics.

In an online environment each participant was able to move Aaker's personality characteristics to the a bull's eye (figure 4.7). This exercise resulted in a clear picture of which personality characteristics would fit

the brand best, these were put closest to the center. After the session, the personality characteristics were ranked using the brand pyramid (figure 4.8). In that exercise the characteristics were organized in three types of values:

- **Unique values,**
Brand Specific values that set the brand apart and enables the customer to develop a relationship with the brand.
- **Differentiating values**
Added values that are relevant to the target group's needs, may set the brand apart from competitors but are not unique to the brand.
- **Common values**
Minimal functional requirements to participate in the market.

With that tool the personality characteristics that were ranked in the bullseye exercise were then reviewed to see what unique value could fit the BYD Europe brand. Together with the

Sincerity	Excitement	Competence	Sophistication	Ruggedness
Down-to-Earth Honest Wholesome Cheerful	Daring Spirited Imaginative Up-to-Date	Reliable Intelligent Successful	Upper Class Charming	Outdoorsy Tough

Figure 4.6 Aaker's brand personality characteristics

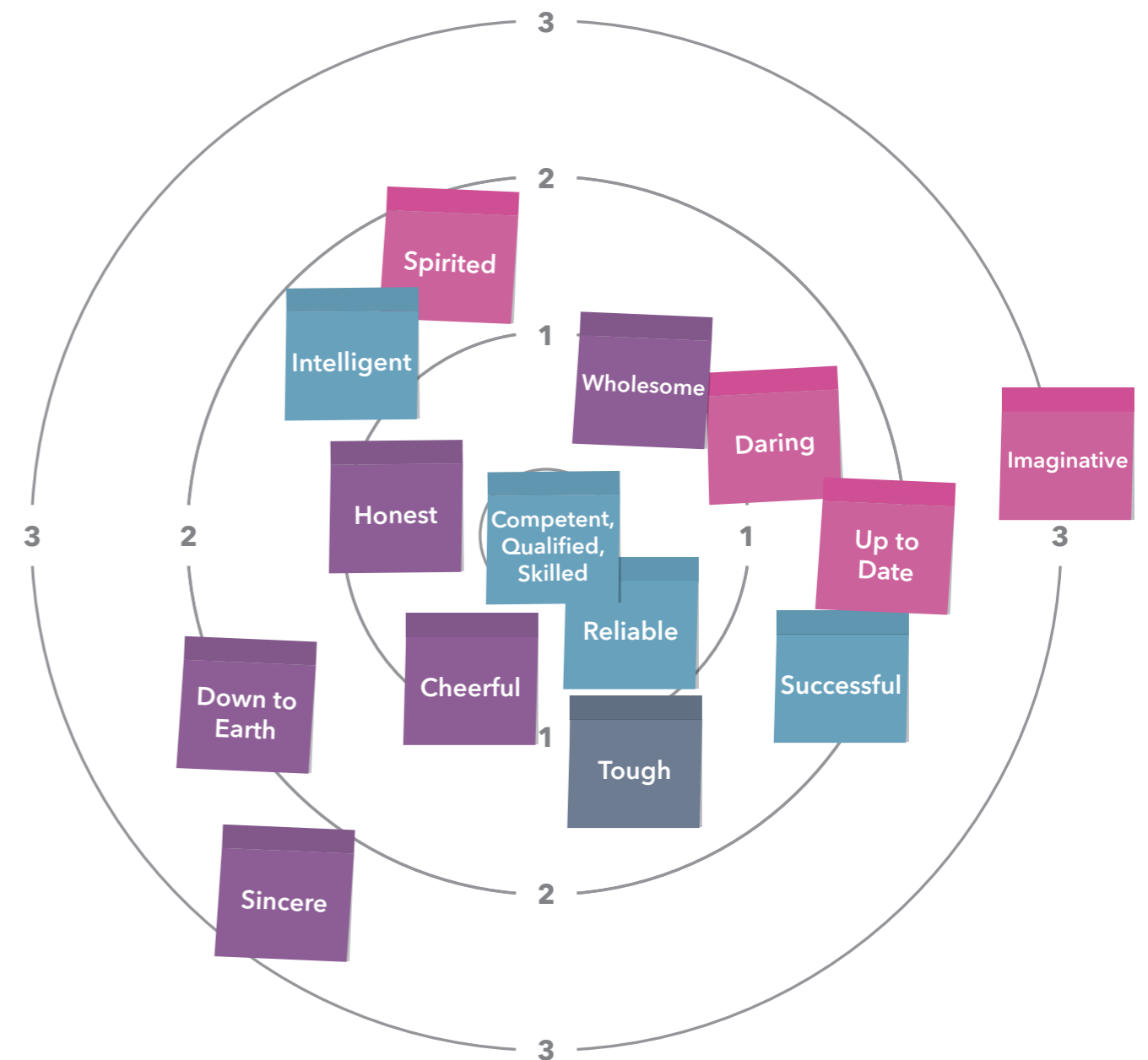


Figure 4.7 Personality bull's eye

4 | Brand Level

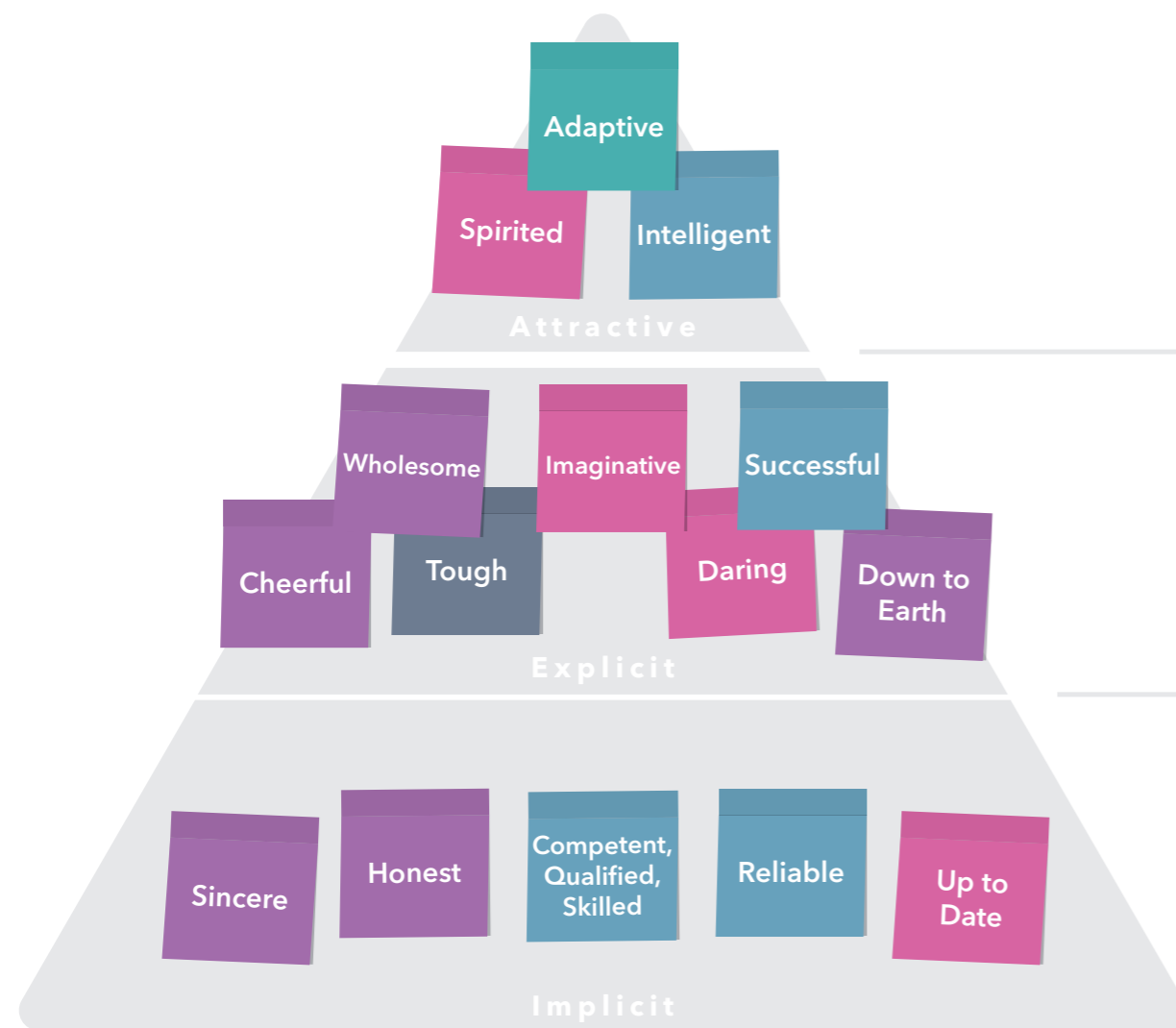


Figure 4.8 Brand value pyramid

Unique Values:

Brand Specific values that set the brand apart, and enable the customer to develop a relationship with the brand.

BYD team it was determined that the statements were not complete. Another feature, highly praised by customers, was missing. The adaptability of the company to serve every customer in a unique way. In short: Adaptability. Finally, the three personality characteristics that fit the BYD Europe brand and could be unique for the market are 'Adaptive', 'Spirited, Cool, Young' and 'Intelligent, Technical, Corporate'.

Differentiating Values

Added values that are relevant to the target group's needs, may set the brand apart from competitors but are not unique to the brand.

The adaptive, young and intelligent personality should be leading in every design and strategy choice for accomplishing a brand image that resembles this personality.

4.8 Conclusion

With the brand personality workshop the three p's of brand identity can be completed. BYD is the pioneer in comprehensive electric technology. They are intelligent, spirited and adaptive. All qualities needed to successfully strive for a bright and green future.

Common values

Minimal functional requirements to participate in the market.

The brand identity was used during this project to get a feel for the design solutions that were explored during this project. The identity frames a mindset which the final design should resonate.

5 | Product Level

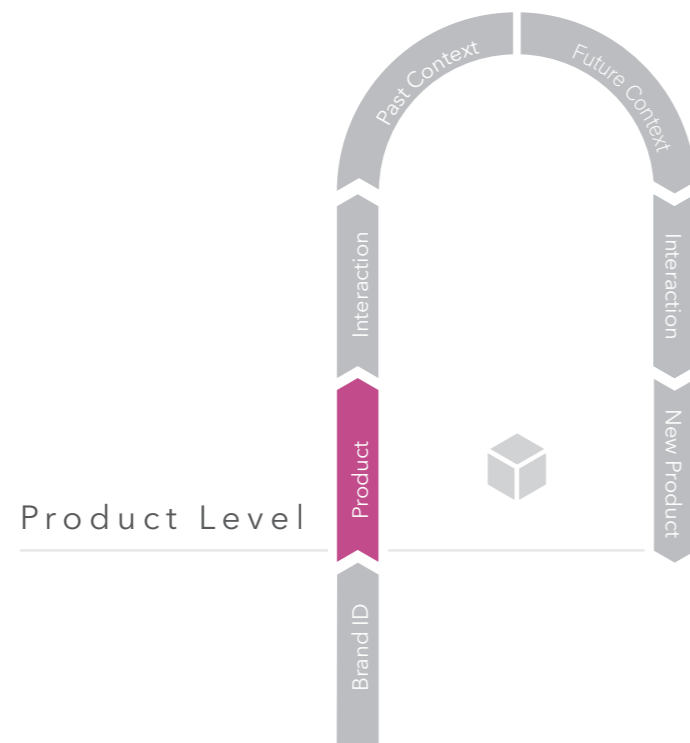


Figure 5.1 Product level

In this chapter the product portfolio of commercial vehicles by BYD is analyzed. The styling analysis is done by deconstructing the designs into key lines to discover the general theme of the vehicles.

5.1 Product portfolio deconstruction

The current BYD portfolio consists of cars, trucks, buses, forklifts, railway technology, batteries and various electronic devices.

This assignment focusses on the commercial vehicle segment. Important to note is that there are subdivisions in the commercial vehicle segment. This report focuses on the commercial vehicles of BYD (trucks and vans).

This report will not take forklift and railway technology into account. Buses are also part of commercial vehicle but are also not in the scope of this assignment.

The resulting portfolio of Commercial vehicles by BYD can be seen in figure (5.2).

What stands out is that the majority of the commercial vehicles do not have a coherent design language. It seems that the styling of trucks is done from a cost minimization point of view by using third-party manufactured parts. This results in generic vehicles that are fitted with BYD details and logo's. This is much more economical than developing an entire vehicle within one company. The downside is that there are other manufacturers selling similar vehicles.

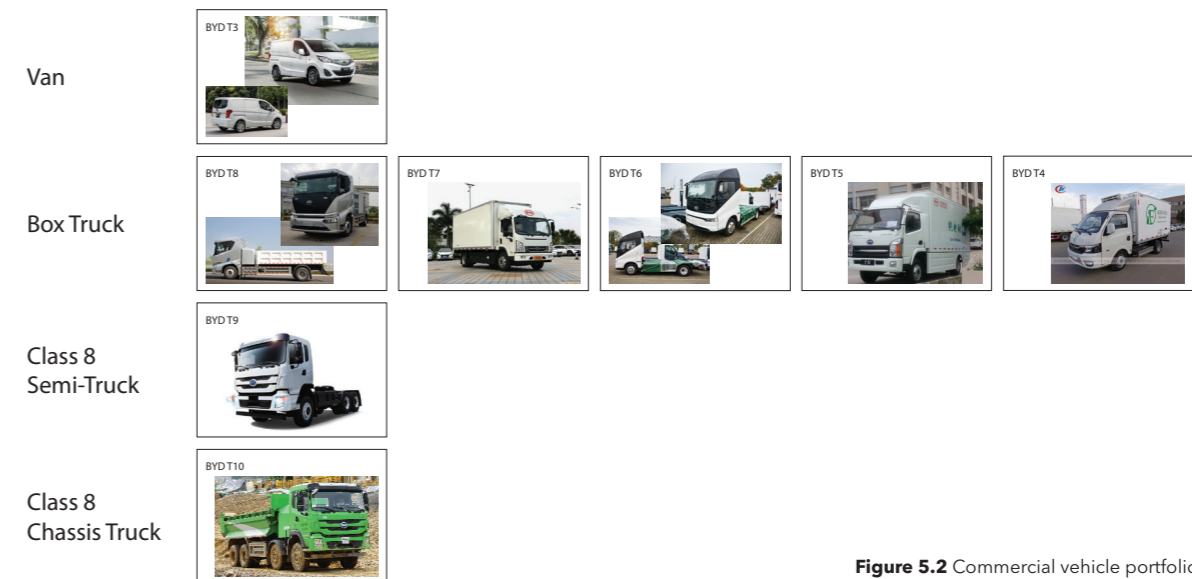


Figure 5.2 Commercial vehicle portfolio

5.2 Current portfolio strategy

BYD is planning to enter the European market with commercial vehicles. The current strategy is to introduce models like the T6 and the T8 and other larger vehicles. Focusing on 7,5-ton vehicles and larger to introduce in Europe. The T6 and T8 are the first commercial vehicles that are completely styled by BYD. Multiple BYD vehicles in their European portfolio strategy will use the same body. Vehicles like the T5 and T10 truck will have the same cabin as the T6 and T8.

After the analysis phase it became clear that it is wise for BYD to put more focus on smaller vehicles for their future portfolio. Even though BYD has vehicles with these specifications in their global portfolio, these are still heavily dependant on the third-party manufactured parts for their styling. That is why in the product deconstruction the T6 and T8 trucks are used.

5.3 Product deconstruction

There are two vehicles that have been designed entirely by BYD, the T6 and T8. These follow a new styling designed by the BYD design department. Wolfgang Egger, chief of design, describes this design language as 'origami', after the traditional Japanese folding technique and translates to body panels that seem folded.

In the design they tried to make a beautiful truck that is unlike the 'working machines' from competitors. The Truck should show the new energy technology and make the cities more enjoyable and better.

They have separated the cabin from the greenhouse with color and trim. The black part makes the greenhouse look bigger as if it were entirely made of glass. In the T6 truck the black part makes it look lighter and smaller. In the T8 truck the greenhouse is covered by a 'roof' of colored trim. This makes the effect less dramatic and it leans more towards a conventional lay-out.

5 | Product Level

The clean design of the vehicles makes them appealing to the eye. The character of the vehicles can be described as stern or strict, this is due to sharp lines and edges coupled with the slightly angry 'Dragon scratch' headlights. The downward lines and the opening on the front of the T8 truck makes it look aggressive. The T6 truck, however, has a more friendly appearance mostly due to the low bumper area and large window portion. For both vehicles the contact of the driver with their surroundings is focused towards the front. A high

shoulder line puts emphasis on the front of the vehicle which makes them 'lean' forward.

What stands out is that on a technology level these trucks still follow the conventional lay-out. The high seating position, which was caused by the position of an Internal Combustion Engine under the cabin in conventional trucks, has been copied in the T8 and T6. Even though the exterior styling of the T6 hints on a lower seating position, the position is essentially the same.

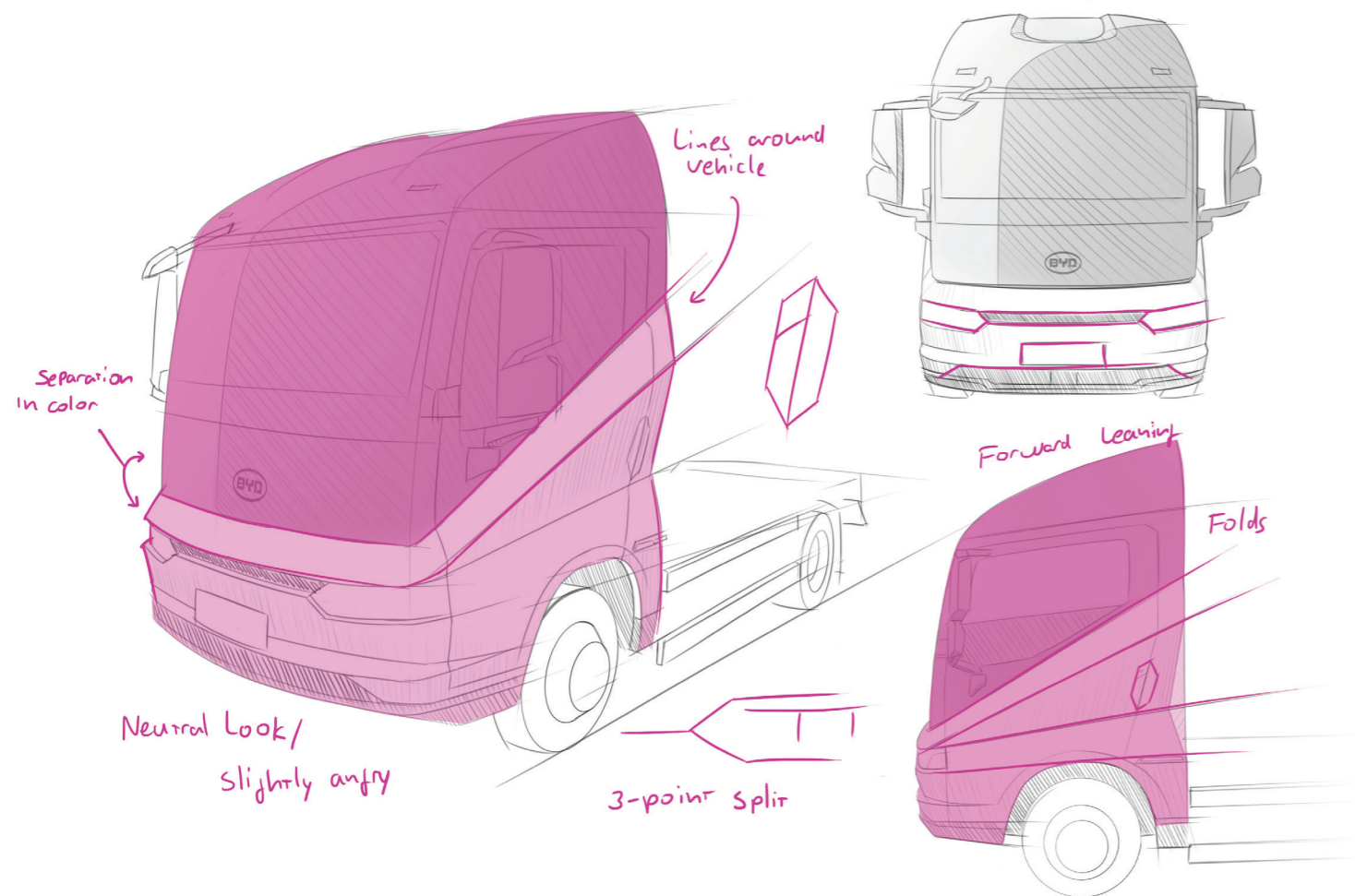


Figure 5.3 T6 deconstruction

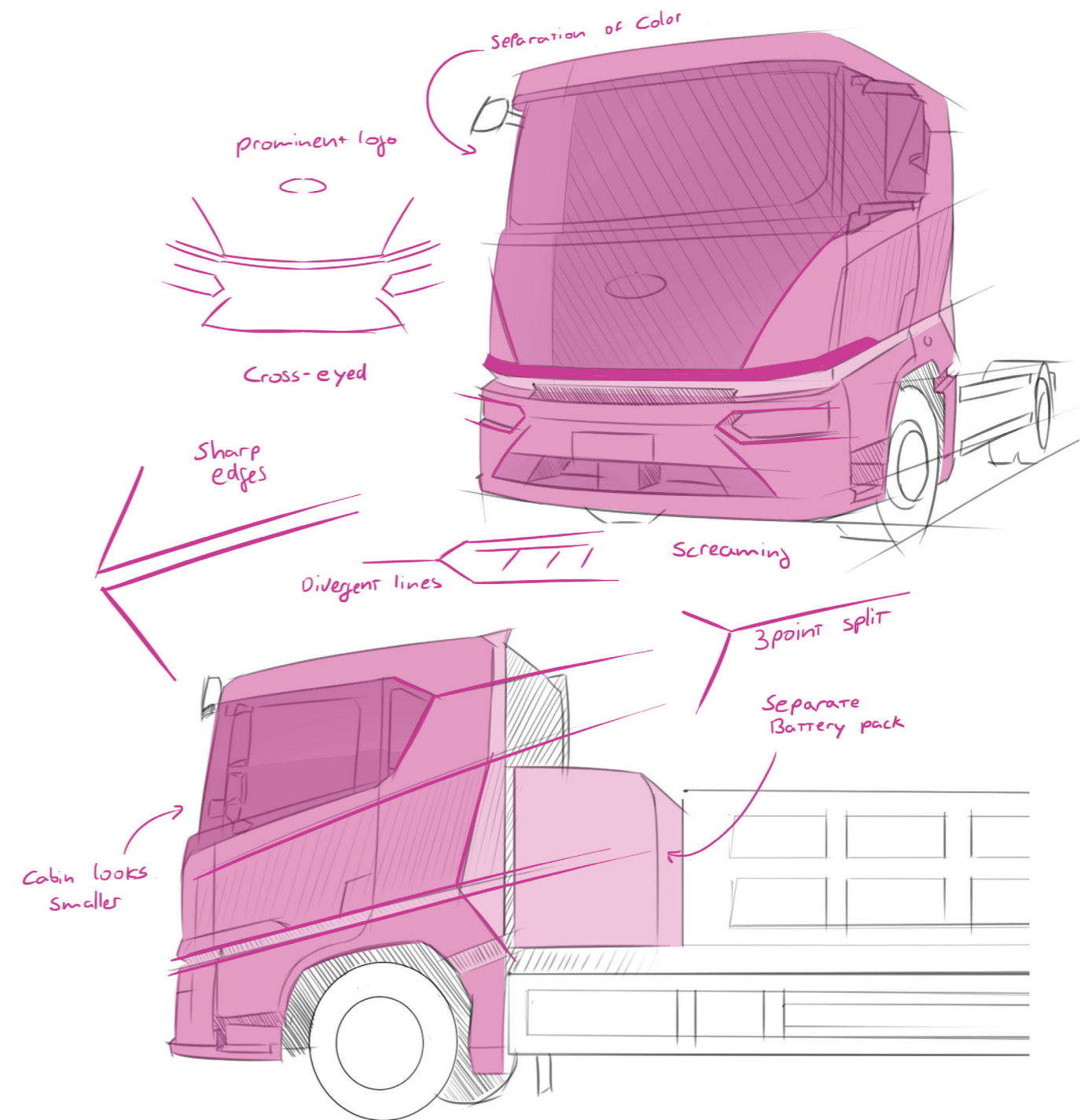


Figure 5.4 T8 deconstruction

5 | Product Level



Figure 5.5 T6 compared to Daf LF

In figure 5.5 the T6 truck is compared to the DAF LF. The vehicles have completely different technology yet the trucks have a similar volume and lay-out. This can also be seen when comparing layout pictures of the BYD T6 and T8 to a Mercedes e-Actros.

Even though Mercedes is reliant on a chassis and body initially built to house an internal combustion engine, the vehicles have a very similar structure (See figure 5.6 compared to figure 5.7 and 5.8). There seems to be more freedom in design than currently used.



Figure 5.7 BYD T6 drivetrain

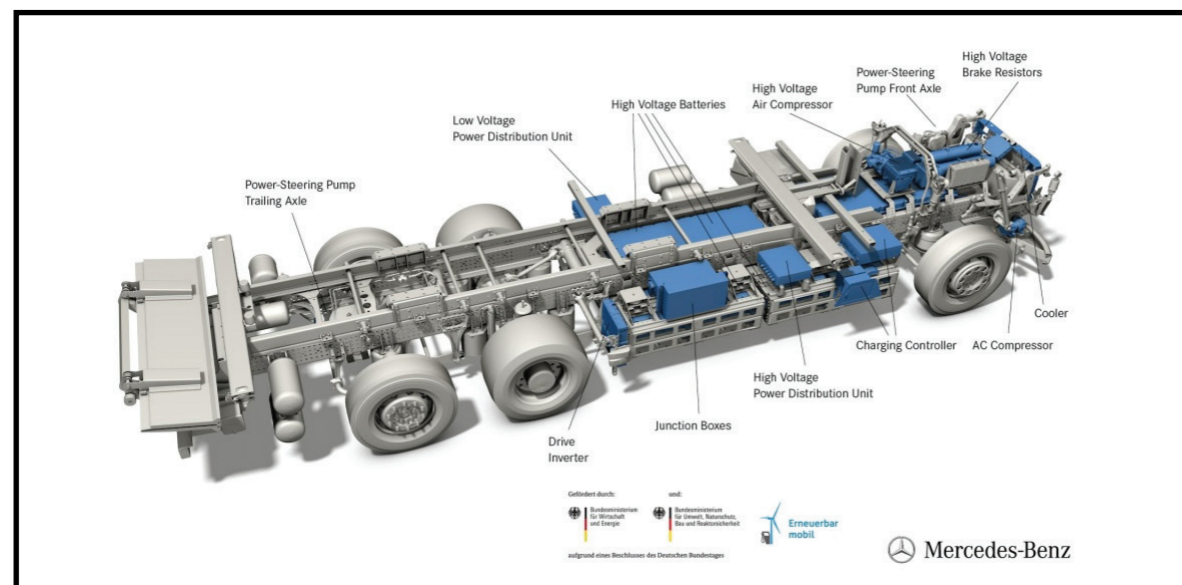


Figure 5.6 Mercedes E-Actross platform

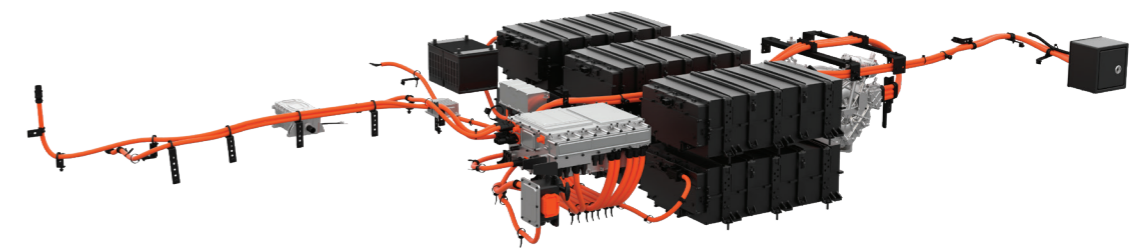


Figure 5.8 BYD T8 battery pack

6 | Interaction Level

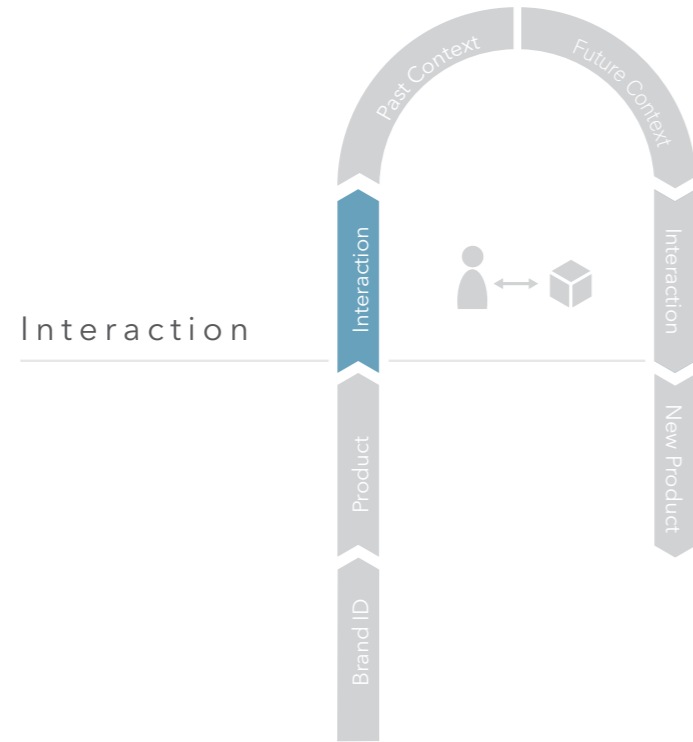


Figure 6.1 Interaction level

In this chapter the interactions with the vehicles T6 and T8 are discussed as also during the product analysis. Currently the BYD portfolio strategy includes these vehicles. That is why also for the interactions these same vehicles are used.

6.1 Interactions with BYD vehicles

The current models in the strategy are the 7,5 ton T6 and the 18 ton T8. These vehicles can be used for numerous purposes. Since these vehicles are so versatile, the interaction analysis for drivers is limited to the interaction with the cabins. The interactions with possible modules on the rear of the vehicles such as a flatbed or box are not taken into consideration at this time.

The T6 truck is aimed at short haul transport of goods that weigh less than 3,5 ton. Possible applications include two man delivery for e-commerce or retail supply. These vehicles should be allowed in city

centers even with upcoming regulations around maximum weight such as in Amsterdam (Heijden, 2021). This means that the trucks will be driven in urban areas. The T8 truck is capable of higher payloads and is also aimed at short distance transport. Possible applications include garbage disposal and construction.

6.2 Driver interaction

Typically, the driver gets out of the vehicle on the side of the road. He/she then must walk around the vehicle to get to the opening of the cargo container on either the back or side of the vehicle. They then unload the cargo and walk to the destination. To return to the vehicle the route is typically reversed to close doors and return to the driver's side of the vehicle.

This interaction can be tedious. Especially with larger vehicles which typically have a higher cabin, getting in and out of the vehicle can be difficult. Entering the cargo area is also more difficult when the vehicle is higher



Figure 6.2 Delivery man stacking boxes

with drivers having to 'climb' in. This is often a problem with box vans. Typical clients of commercial vehicles are logistics companies such as DHL, UPS and FedEx. In their search for optimization they have put an emphasis on time management which leads to time pressure for the drivers. Tight schedules result in stressed and rushed drivers. This has a negative effect on both the 'employee-happiness' as well as the safety of the driver and their surroundings.

6.3 Road - user interaction

The public perception around commercial vehicles is mostly negative. Other road users are complaining about increased traffic due to commercial vehicles and unsafe situations. People living or working in cities are victim to air pollution which is caused by the increased traffic. Commercial vehicles are often to blame as they are very visible. 11,4% of the total amount of vehicles on the road are commercial vehicles. Of which 81% are vans (Centraal Bureau voor de Statistiek, 2019). Vehicles owned by large logistics companies are easily recognized by color and branding. Together with the often larger size of the vehicles this results in more visibility of the vehicles than personal vehicles. Delivery vehicles that deliver at multiple time-slots can be seen two or three times per day in the same street, giving the impression that there are two or three times more vehicles than in

reality (Appendix B3, Eduard Veen, 2020). This leads to the negative perception around commercial vehicles.

2020 was a year that saw a peak of online sales, therefore more home deliveries and thus more commercial vehicles on the street. This resulted in a record number of complaints about these vehicles. In the Netherlands alone 67 people die per year as a result of an accident with a commercial vehicle. This is 10% of the total number of fatal accidents (EenVandaag, 2020).

All together commercial vehicles are seen as dangerous and polluting objects that are intrusive to historic city centers. Road users have to be vigilant around these large vehicles, avoiding blind spots and keeping within the vision of the driver. This is difficult as drivers are often rushed and might pay less attention and drive faster. The interaction of other road users with the current commercial vehicles can be described as 'threatening'.

6.4 Client interaction

From interviews with fleet managers of both PostNL and DHL it became clear that it is good when the company can show they use electric technology. The vehicles are moving billboards. This is not only true for the companies that use the vehicles but also for BYD as a manufacturer.

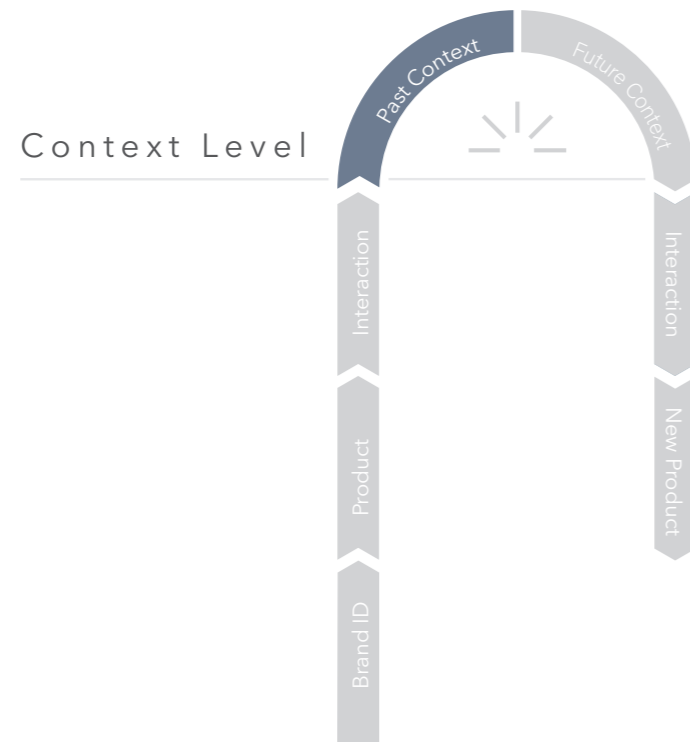


Figure 7.1 Context level

In this chapter the context in which the products by BYD were designed is analyzed. Being able to speak to Wolfgang Egger, chief of design and thus responsible for the design of the T6 and T8 trucks, helped with formulating this context. The context is formulated using context factors. These factors are the result of an interview with the designer, information from the BYD team in Europe and research.

7.1 Chief of design Wolfgang Egger

The styling of the current vehicles was done by the BYD Design Center under the lead of Chief of design Wolfgang Egger. Researching the context in which a designer has designed the product means envisioning how the designer works and how the design was created. Luckily during this assignment

it was possible to speak to the Chief of Design about the creation of the product and what, according to him, the most important aspects are to consider when designing. He mentioned several things that were taken into account when creating the styling for the vehicle.

Research stakeholder needs

First, it is important to research stakeholder needs. The driver, the city and other road users have different needs. It should be taken into account that the vehicle will go through crowded areas in the city. The vehicle should become part of its environment.

Make it look beautiful

Second, it is important that the vehicle is not a conventional truck that is styled as a working tool. The vehicle will be seen on the streets and BYD wants their vehicles to look beautiful and leave a good impression. Thus, styling is very important.

Show it is green

Third, the vehicle should show that it uses new technology. The idea is that electric mobility is better for the environment than ICE mobility, making cities more enjoyable. This should show in the design. Show it is green.

The vehicles by BYD are electric which means it is not bound by the same technology as conventional design. There are certain parts of the vehicles like a grille that are no longer required. There is much more freedom in designing an electric vehicle than in designing a vehicle with an internal combustion engine.

The BYD design department does not want the trucks to resemble the personal vehicles by BYD. However, it should be clear it is a BYD vehicle. That is why they have incorporated styling cues from their personal vehicles into the design of the trucks.

minor changes to the design before it is launched. From a European perspective this seems illogical. It would be preferred if the vehicles could be designed specifically for the European market, following the needs and requirements from Europe instead of adapting an existing design.

Maximizing capacity

Much of the design language of trucks comes from the need to maximize capacity. Clients of truck manufacturers need vehicles to carry as much as possible given size limitations. The result is that in practice only a quarter of the vehicles is 'designed' since the other three quarters are part of the cargo 'box' which looks industrial. This does not aid the perception of commercial vehicles as blunt and dangerous. Maximizing capacity also means minimizing the weight on the rear axle. As much weight as possible is put in the front of the vehicles. This is evident from the stance of the vehicles when unloaded.

Economical approach


Total Cost of Ownership (figure 7.2) is an important factor in commercial vehicle design and has been leading design and styling decisions. To put it bluntly, the vehicles must be cheap. Cheap to buy, cheap to own and cheap to drive. A company will assess the TCO by adding the costs and subtracting the remaining value after the product's lifetime (www.graco.com, 2021). This results in the use of cheaper materials and limitations of complexity of bodywork. Therefore, the economical approach impacts the design of the vehicles.


7.2 Additional context factors


From China to Europe


The development of the vehicles is done in Shenzhen, China, with a global perspective. A strategy for launching vehicles in Europe is then constructed and this is sent to the BYD Europe headquarters in Schiedam. The R&D team in Schiedam evaluates the vehicles and finds a suitable fit for the vehicles within the European market. At this stage the vehicle is 90% or completely finished and the European R&D team can only make

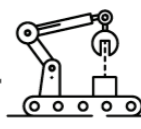
$$\text{TCO} = \text{I} + \text{O} + \text{M} + \text{D} + \text{P} - \text{R}$$


I
 Initial Cost


O
 Cost of Operation


M
 Cost of Maintenance


D
 Cost of Downtime


P
 Cost of Production



R
 Remaining Value

Figure 7.2 TCO explained



Design Phase

The Design Phase follows the same steps as the Analysis Phase but in reverse. It starts with defining a future context. Then the desired interactions and finally the desired product qualities are determined according to the formulated context. After the VIP design phase a set of guidelines is clear for constructing the styling strategy.

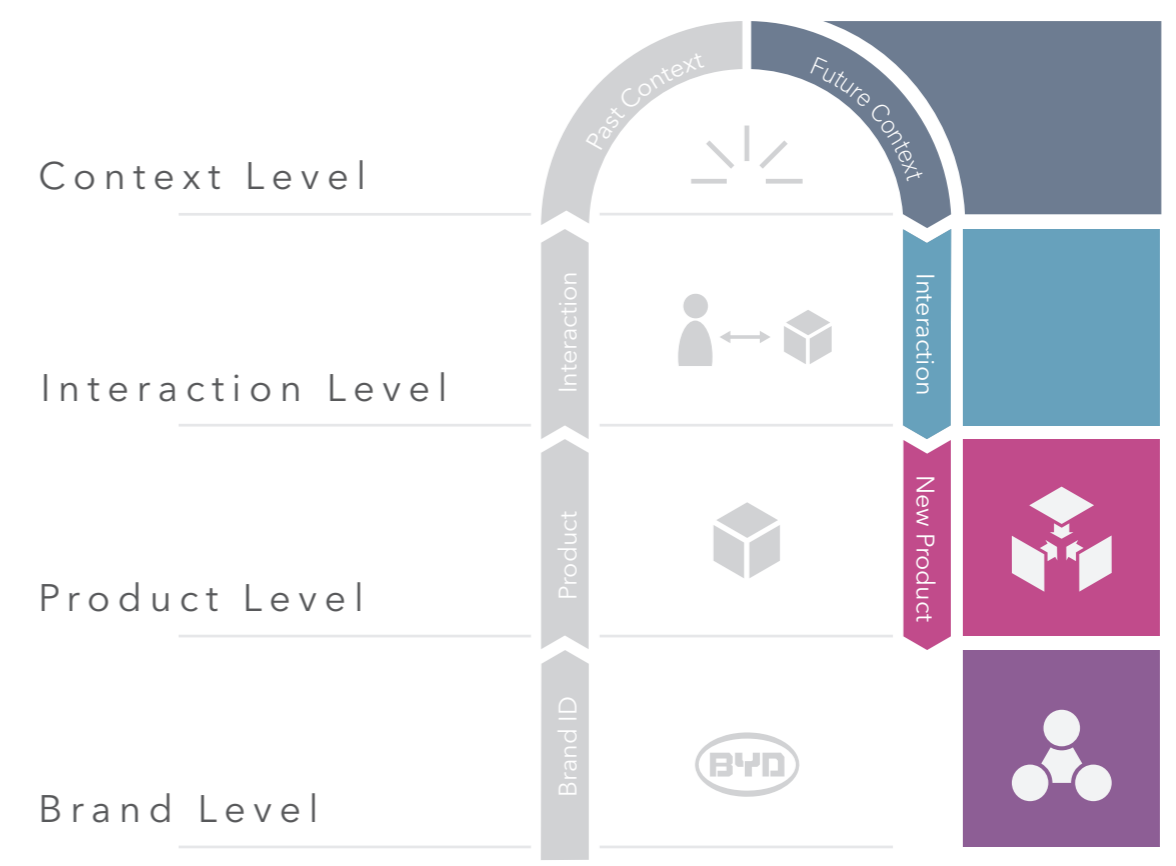


Figure 8.1 Design phase vip process

8 | Future Context

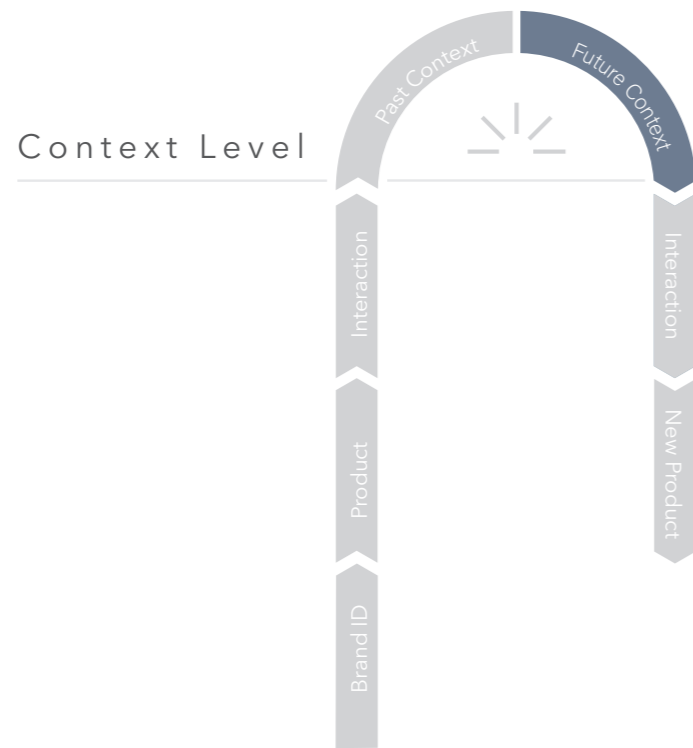


Figure 8.2 Context level

In this chapter the future context is discussed. The future context is a result of trend research, interviews with fleet managers and experts on logistics. The information was clustered into context factors. From the research it was concluded that there is a need for smaller electric vehicles by BYD and that styling of commercial vehicles is increasingly important. The context factors are later used to formulate a desired interaction and the desired product qualities. The context level is concluded with a domain, future context and a mission statement.

8.1 Domain

The assignment was to design a styling strategy for BYD trucks in Europe. The domain limited the project to the Electric Truck division of BYD Europe. For the design phase the domain was rephrased as:

“Exterior Styling for European Urban Cargo Mobility in 2026”

8.2 Research question

The domain of the research is the commercial vehicle market and logistics market in Europe. The reason why the research focuses on the logistics market is that it is a large potential market for BYD. Large logistics companies buy many vehicles at once and have the resources to transition to electric technology. Therefore, the logistics market is likely to give a good insight in the best applications for BYD vehicles. The goal of the research was to get a better understanding of how the commercial market is developing. Therefore the main research question was: What are the trends and developments in the commercial vehicle and logistics market in Europe?

8.3 Trend research

The trend research was conducted by doing a general internet search and reviewing scientific papers and trend reports. Some large logistics companies offer trend books in which they try to predict the future of logistics. One example is DHL's trend radar (Toy, Gesing, Ward, Noronha & Bodenbenner, 2020) which is published every year. Other sources include governments and consultancy agencies. The information from the trend reports was clustered to reveal underlying themes that are present in multiple reports. These themes could also be coupled to the trends found during the interviews.

According to trend reports from PwC (2019), Roland Berger (2018) and the DHL trend radar (2020), e-commerce is a growing market, demanding more vehicles in the future. Meanwhile, there is an increase of regulations, in mostly cities, on emission by (local) governments (Roland Berger, 2018). This acts as the main driver for logistics companies to transition to electric technology (PwC, 2019). Because these regulations mostly affect city infrastructure, the companies experiencing the most pressure to transition to emission free driving and thus electric vehicles, are e-commerce logistics companies. Therefore, the e-commerce logistics market is interesting for further research. Consequently, interviews with fleet managers from DHL and PostNL were conducted.

8.4 Interviews

To gather insights in the commercial vehicle market interviews with experts were conducted. In total four experts on logistics were spoken with. Wout Zellenrath: Fleet manager at DHL, Eduard Veen: Fleet manager at PostNL, prof. dr. Walther Ploos van Amstel: lecturer and expert on city logistics, Mike Levens: EV Specialist and Technical Sales Engineer at Bluekens EV. The interviews were semi-structured interviews where the conversation was steered with general questions but was open to other topics as well. In this way the interviewee could also share his own ideas and provide extra information that otherwise would not be shared. The interviews and leading questions can be found in appendix B.

8 | Future Context

8.6 Future Context Factors

After clustering a set of 12 context factors were identified for the future context. These are a combination of the findings from the trend research and the interviews and describe the context in which BYD will be operating.

1. Electric technology is the future

Electric technology is treated as being the future of transport. According to Roland Berger (2018) there will be an increasing need for more low/zero emission buses and inner-city vehicles which is driven by regulation and local emission optimization. The large logistics companies DHL and PostNL are aiming at zero emission for 2030 in the last mile according to their fleet managers Wout Zellenrath and Eduard Veen. DHL is aiming at being completely emission free with the entire fleet before 2050. Even though there are multiple options for emission free or green energy such as hydrogen and biofuel, battery powered vehicles are more widely implemented. However, biofuel and hydrogen power are not fully developed yet and electric technology is now the easiest solution to counter the stricter rules and regulations around emission in Europe. Because the TCO of electric vehicles is expected to reduce to the level of ICE vehicles in 3,5 years (PWC, 2019), more businesses will choose to electrify their fleet. For light commercial vehicles, such as vans and light trucks, the TCO Parity is already reached in Europe (Heid, Hensley, Knupfer & Tschiesner, 2018).

2. Safety most important

Safety is the most important factor to consider with Truck design. 10% of all road accidents in the Netherlands involve vans (EenVandaag, 2020). 25% of all road fatalities are with commercial vehicles of which accidents with trucks are most lethal with 15% of all traffic fatalities caused by trucks

(Vracht- en bestelauto's | SWOV, 2020). What stands out from the numbers is that most victims were not driving the vehicle but were other road users (figure 8.4). Trucks might be safe for the driver but not for its environment. There is a link between size and safety for personal vehicles found by Jakobsen (2018). They state that even though larger cars are safer for their passengers, they are more dangerous for others. The same link seems to exist for commercial vehicles with trucks being more deadly on the road than vans.

The safety concerns with commercial vehicles are why big companies like DHL have safety as a priority and will always choose a safer model over a cheaper one according to fleet manager Wout Zellenrath. BYD should consider this in their vehicle design and make it more visible that the vehicles are safe. Because of the electric technology BYD has the freedom to design with driver safety as leading feature.

3. E-commerce continues to grow

The market of e-commerce is growing and will continue to grow (PWC, 2019). The e-commerce is expected to account for 30% of all retail sales in 2030 (Topsector Logistiek, 2017b). An increase of governmental

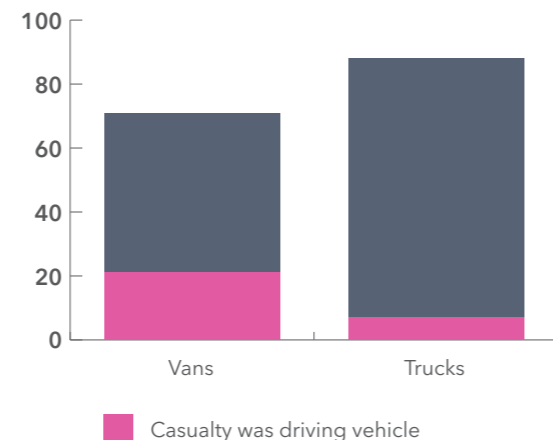


Figure 8.4 Fatalities caused by vans and trucks

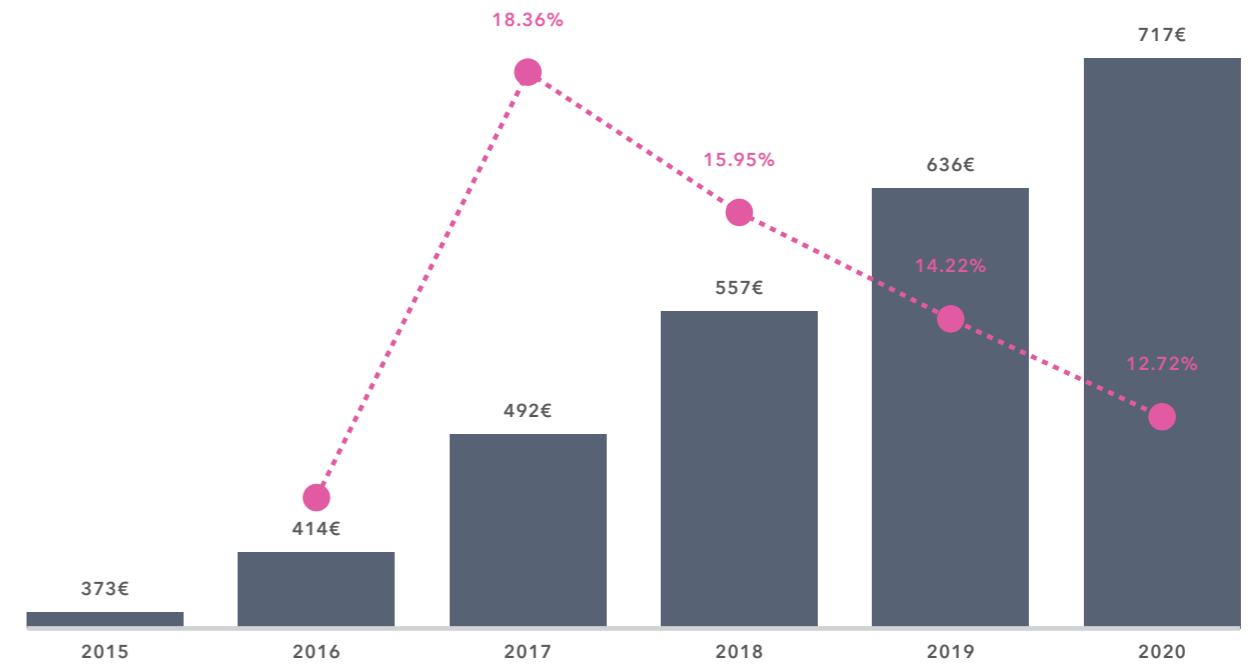


Figure 8.5 E-commerce turnover and growth rate in €BN, Europe

regulations forced upon last mile delivery, and therefore e-commerce, accelerates the need for electric vehicles in this sector. Furthermore, the large logistics companies have many resources and are often front runners in the transition to emission free transport. This makes them an important potential customer for BYD. (See figure 8.5).

4. Congestion due to commercial vehicles

The growth of the e-commerce market has its downside, the increasing amount of light commercial vehicles is causing congestion (Topsector Logistiek, 2017a).

A study from London in 2016 revealed that even though the number of personal vehicles on London's roads was decreasing there was more congestion in the city. This is most likely due to the increased number of commercial vehicles. Between 2012 and 2015 the amount of delivery vans had increased with 7,7% to 17% of all vehicles (Commercial Fleet, 2016).

Congestion causes low air quality, unsafe situations and noise. People living and working in cities tolerate less and less impact on public space, they demand a green and

healthy environment, low noise levels, safety and clean air. This generates pressure from politics on logistics companies to reduce their impact on the infrastructure (Topsector Logistiek, 2017b).

5. Governmental regulations

There is an increase of political and societal pressure to reduce emissions (Topsector Logistiek, 2017b). The European Union's target for 2030 is a 31% reduction in CO2 emission for vans (European Union, 2017). Many European cities are pushing for more reduction with some implementing regulations to reduce CO2 with 40% by 2030 (Euro Cities, 2019). This is due to highly polluted air in cities which cause health problems and affect the well-being of citizens.

"People living and working in cities are tolerating less and less impact on scarce and precious common city resources (space, a green and healthy environment, low noise levels, safety, clean air). This puts (political and social) pressure on supply networks to innovate and do more with less consumption of these scarce resources. This demand

8 | Future Context

goes beyond low-carbon emissions; it also involves low noise, less congestion, high safety and less space for city logistics." (Topsector Logistiek 2017b).

To make cities a better work and living environment, local governments are implementing regulations limiting CO2 emission and weight (Heijden, 2021). Many city centres in Europe even have car-free zones (Riva Ras, 2018). The governmental regulation force last mile delivery to use smaller and emission free vehicles.

6. Driver shortage

There is a shortage of truck drivers in Europe (IRU, 2018). This is a problem for logistics companies because they heavily rely on them. The reason why there is a shortage is because being a truck driver is a decreasingly popular career choice. It is often a physically demanding job and sometimes even dangerous. That is why European logistics companies should try to improve working conditions, safety and security for drivers. Innovations in truck design could help make truck driving a more appealing career choice.

Logistics companies are hiring more and more delivery men and women with a standard driver's license. These people drive large vans instead of trucks. By not only focusing on drivers with a truck driver's license, the logistics companies expand their potential driver pool. The resulting effect is more demand for vehicles below the maximum size and weight limits given by the standard driver's license.

7. Democratization of logistics companies

European companies become increasingly democratic. Employers have more say in what a company is doing. To the transport market this translates to driver input. Because drivers are scarce, they have become more empowered and can now offer input for the purchasing of vehicles. Both DHL and PostNL

have driver committees where drivers can deliver input (see appendix B). Even though the fleet manager still has the final say in what vehicles are purchased, the complete rational way of thinking and sole focus on TCO by fleet manager, is changing. Look and feel are becoming more important. Driver comfort and safety are priority. All to ensure that driving will be a more desirable career choice.

8. Reluctancy to transition

There is no question as to whether logistics companies have to transition to electric technology for their fleets. From interviews with the fleet managers of both DHL and PostNL, it became clear that both companies have the goal to be fully emission free in last mile delivery by 2030.

However, for most companies the reason to transition is often outside force. Mike Levens from Bluekens Truck & Bus stated that for most of their clients the driving force to transition to electric comes from the clients of the clients and/or their buyers. Rarely clients transition because they want it for themselves. In the report by Roland Berger (2018) it was stated that there is a limited pull effect from companies due to a higher TCO for electric vehicles.

This reluctance is due to a lack of knowledge about electric technology which results in fear, according to Mike Levens. Companies struggle to oversee the impact and how processes must change. It will become essential that Truck manufacturers offer end-to-end solutions to their customers. In design this means BYD must make sure the electric technology is clear and easy to use.



Figure 8.6 Democratization helps drivers gain influence on purchasing decisions

9. Autonomous driving

Multiple sources report on autonomous driving to be a part of the future for commercial vehicles. Roland Berger (2018) mentions it as one of four main trends in the bus and truck market. Also, Walther Ploos van Amstel, who was interviewed for this project, expects autonomous driving to be implemented in most cities in The Netherlands.

Within the 5-year scope of this project it is unlikely that autonomous driving will be fully implemented in commercial vehicles. According to Future Agenda (2020) full autonomous vehicles (Autonomous in all road conditions and areas without needing human intervention. See Appendix D for levels of autonomous vehicles) will start to be widely implemented in 2030. However, since the vehicles that are now designed for 2026 will likely still be manufactured in 2030, it is important to keep the autonomous technology in mind when designing these vehicles. For instance, thinking about positioning sensors and camera's around the vehicles. According to Mike Levens it is easier to make electric cars autonomous than it is



Figure 8.7 BYD autonomous vehicles

to make diesel cars autonomous because electric motors are more predictable. The transition towards electric driving in the logistics industry could speed up the development of autonomous driving. Autonomous driving is also expected to make driving safer. In 2018 BYD announced that they would have autonomous vehicles within three years (Bevacqua, 2018). No further communication about the subject could be found.

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10. Freedom in design

Because electric technology does not require an ICE, the architecture of the vehicles can be completely different. This offers more freedom in design which is until now rarely optimally used. Many electric vehicles seem to be based on an ICE lay-out which is not logical for electric vehicles. The reason many traditional car companies use ICE lay-outs for their electric vehicles is because they have invested in platforms and packaging around the ICE technology and investing in a new electric platform can be very costly. Especially when a company produces a small number of electric vehicles (Shahan, 2019). This offers an advantage for electric vehicle manufacturers without the ICE heritage over manufacturers that are producing electric vehicles alongside an ICE range.

11. Disruptive companies

As a reaction to a changing market due to regulations, many companies are constructing new business models. Disruptive startups are also emerging in the transport sector (Trends in the truck & trailer market, 2018). Large tech companies like Sony (figure 8.8) and Amazon (through the startup Rivian) are also entering the automotive market (Schmidt, 2021). Because electric cars are easier to design than cars with internal combustion engines, the threshold to enter the automotive industry is much lower (Ewing, 2020). The success story from Tesla inspires others and creates more competition in the automotive industry.

In the logistics sector new business models are emerging. Due to problems with congestion and emission & weight restrictions by governments, companies are trying to find new ways to remain profitable. These business models disrupt the logistics companies by re-designing supply chains.

12. Bundling Shipments

A major cause for concern in cities is congestion. Congestion leads to noise, pollution and unsafe situations. One of the causes of congestion is the increasing amount of light commercial vehicles (Topsector Logistiek, 2017). PostNL is working on a solution where they could combine Business-to-Business shipments from multiple companies into one vehicle that directly delivers to one customer. This could be useful for office buildings that need a variety of copying paper, toilet paper, coffee, etcetera. and would otherwise be serviced by at least three different companies and their vehicles each week. By combining the shipments this can be decreased to one vehicle which would have less impact on city logistics (Appendix B). Business models like this where shipments are combined could decrease costs and carbon footprint of companies. (Toy, Gesing, Ward, Noronha & Bodenbenner, 2020).



Figure 8.8 Sony , from electronics to cars

8 | Future Context

8.7 Conclusions

From the research two main conclusions can be drawn. The first conclusion is that the current BYD portfolio strategy for Europe does not align perfectly to the needs of the European market. The second conclusion is that look and feel of commercial vehicles will be increasingly important. This is relevant for BYD when introducing new electric vehicles to the European market which have to compete with established European brands as well as many electric newcomers to the market. The conclusion that styling is becoming more important, serves as justification for a styling strategy for commercial vehicles. This means the project could focus on constructing that strategy. Therefore, the context factors were re-evaluated to be used for a styling strategy.

Focus on smaller vehicles

The general trend regarding commercial vehicles in Europe is more focus on smaller vehicles. City regulations in Europe (PWC, 2019) restrict size, weight and emission further and further to increase safety, protect the classic city centers and decrease air pollution which leads to health benefits.

A shortage of drivers (Centraal Bureau voor Statistiek, Sector Verkeer en Vervoer, 2018) is forcing logistics companies to expand the potential driver pool and make driving an attractive profession. Companies make the distinction between drivers with a truck license and drivers with a standard license. For operating smaller vehicles the standard license is sufficient. If logistics companies operate with smaller vehicles, there are more potential drivers for them.

From business perspective smaller vehicles are in demand due to a rise in e-commerce. In the last few years e-commerce has grown, especially during the Covid-19 pandemic. The demand for fast delivery increases the need for last-mile delivery vehicles. These vehicles are typically smaller.

Larger trucks are useful for long haul transport. However, long haul electric transport still technologically difficult. Most electric trucks have a maximum range of around 300 km which is not nearly enough for long haul transport. Adding this to the high costs of larger long-haul electric vehicles, makes them an unviable option (Will electric trucks be in it for the long haul?, 2018). It is expected that electric long haul (500km) vehicles will have a comparable TCO with diesel vehicles in 2031 (Heid, Hensley, Knupfer & Tschiesner, 2018). This is outside the 5-year scope of this assignment.

Larger vehicles are less safe to drive than smaller vehicles. Especially in busy city centers and under time pressure for deliveries. Statistics show that smaller vehicles cause less deadly accidents than larger vehicles. Possible causes could be lack of visibility or driver ability. For logistics companies this results in a difficult situation where on one hand they need to maximize the load capacity per vehicle and on the other hand want safer (smaller) vehicles.

At this moment the BYD launch strategy focuses on larger vehicles with the 7,5 ton T6 truck being the smallest. However, the BYD Europe portfolio seems to be able to adjust to the needs of the European market as there are suitable vehicles in the global portfolio to fill the gap.

One possible market for larger electric vehicles does exist. According to Mike Levens from Bluekens Truck & Bus, a dealer of BYD vehicles (Appendix B1), construction companies have a growing need for electric or emission free vehicles. Because the distances traveled in construction are smaller than in long haul transport, larger electric vehicles are a plausible solution in this market.

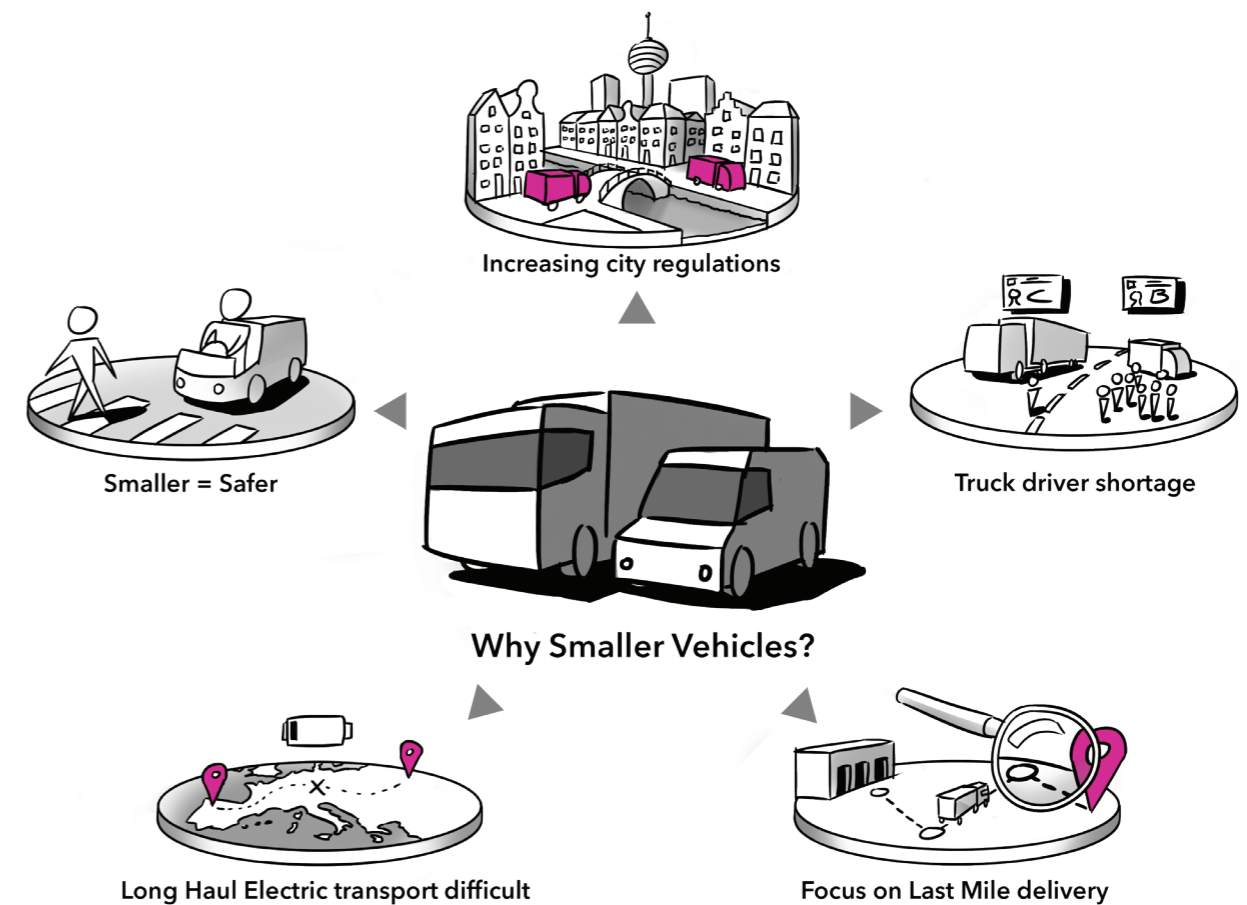


Figure 8.10 Reasons for smaller vehicles

Look & feel important for BYD commercial vehicles

Drivers have more influence on vehicle purchasing in large companies and their motivations for preferences for certain vehicles are different from the motivations of the typical fleet manager. The solely TCO based decision making needs to make room for a more emotional approach from the drivers. Eduard Veen, fleet manager at PostNL, mentioned that they faced a backlash from drivers after switching from Mercedes to Fiat vehicles. Even though they worked the same, the drivers did not like the look and feel of the Fiat compared to the Mercedes. They felt the Fiat was of lower quality. Fleet managers will need find a balance between TCO 'reason' and the wishes of their drivers to keep everyone happy.

This means look and feel need to be focus points for the BYD vehicles. According to Mike Levens the BYD vehicles are of high quality on technology level. But both fleet managers, Eduard Veen and Wout Zellenrath, and Mike Levens noticed that the quality perception of the T6 concept trucks that were stationed at Bluekens Truck & Bus was not on the level of its competitors (Appendix B1). It will be essential for all commercial vehicles to have a certain level of quality and styling that fits the European market and that resonates with drivers.

8 | Future Context

“The design should make people feel confident at work and trust their (electric) equipment.”

8.8 Mission statement

The mission statement was formulated by clustering the context factors into 6 statements which are important for a design within the context. Together with the brand identity of BYD in mind, these were used to create a mission statement for the final design.

From the context factors it became clear that there is a lack of trust and confidence regarding (electric) commercial vehicles. Road users do not trust commercial vehicles and see them as threatening. Businesses lack trust and confidence in electric technology as

it is often unclear how to use the technology and how much that would cost. Drivers lack the confidence in electric vehicles, preferring ICE vehicles which results in electric copies of diesel trucks. However, the world is changing and electric technology is the future. BYD wants to become the shepherd, guiding the world into zero-emission and clean mobility. The only way people will follow BYD is when they trust the company and trust the technology. That is why the mission statement for this styling strategy is: In the domain of Exterior Styling for European Urban Cargo Mobility in 2026: “The design should make people feel confident at work and trust their (electric) equipment”.

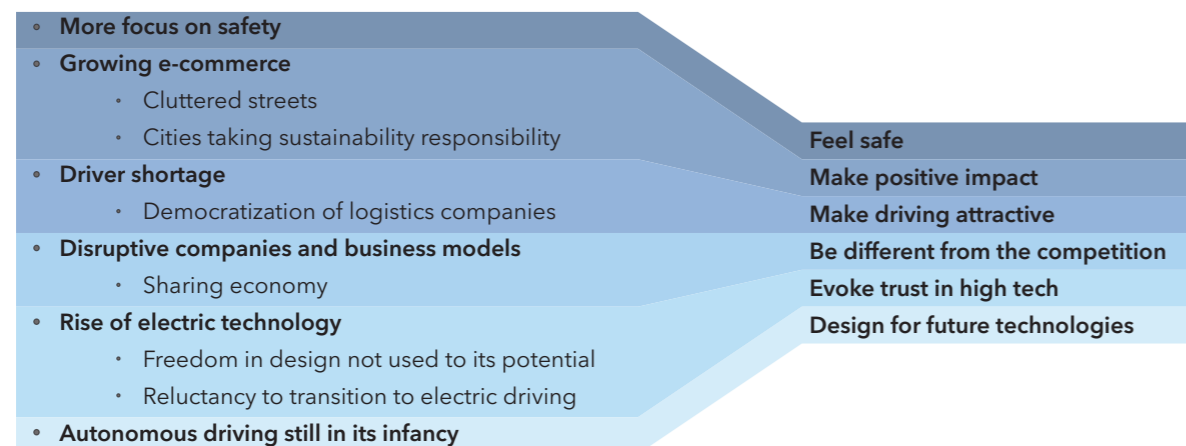


Figure 8.11 From context factors to mission statements



The analogy here is divers completely trusting their equipment. Diving can only be fun if this trust exists. Only if when divers are relaxed their heartrate will stay low and their oxygen use is minimal. This increases time underwater and therefore fun.

Figure 8.12 Two divers

9 | Desired Interaction

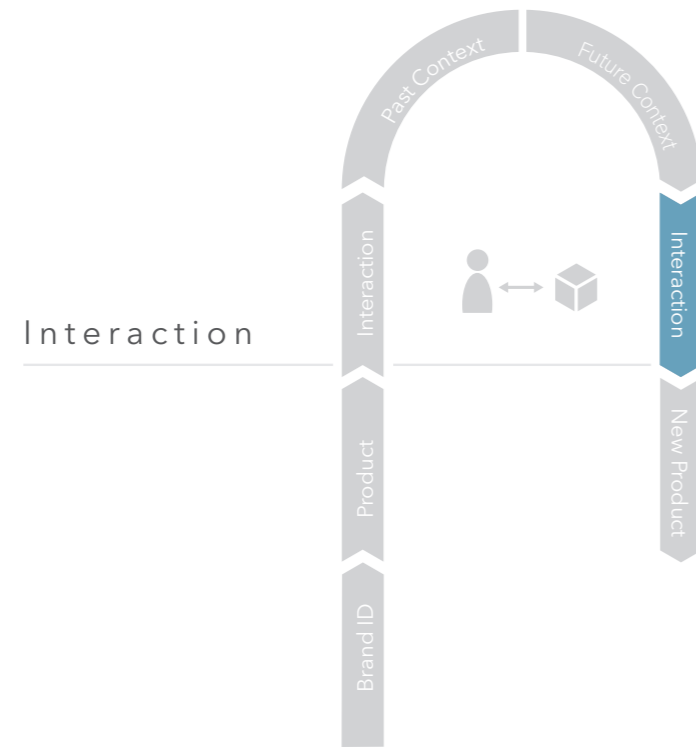


Figure 9.1 Interaction level

Formulating the desired interaction is the next step in the method. The interactions should make clear what feeling the product should evoke when it is experienced. In this case the interactions are not limited to the user of the vehicle. Other road users should have positive experiences around BYD products.

9.1 The desired interaction

BYD vehicles should be used as the ideal tool for the job. It should be entirely clear and logical why one would choose a BYD vehicle. On an interaction level this should be similar to the interaction many people have with power tools. A power tool, provided it being from the right (high-end) brand, evokes a certain feeling of confidence. Buying or owning a professional tool evokes pride and the high product quality makes the user enthusiastic to start working on a project. This is also the ideal interaction with a BYD vehicle. The interaction should be characterized by 'enthusiasm', 'pride' and 'efficiency'.



Figure 9.2 The power tool as analogy

10 | Product Design

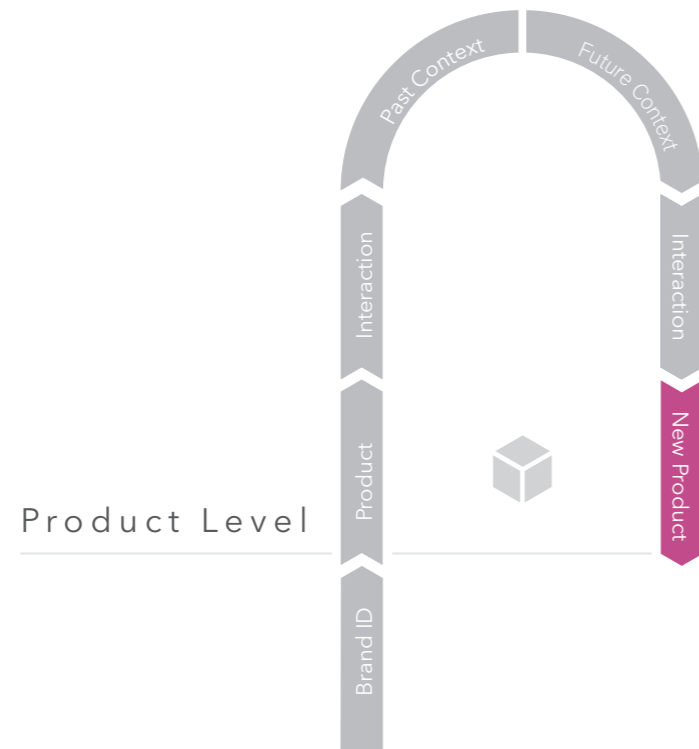


Figure 10.1 Product level

This is last step in this ViP process. In this chapter the desired product qualities as well as the desired product portfolio to fit the European context are explained.

10.1 Desired product qualities

Product Qualities are characteristics the products should have. These product qualities are the result of a process in which solutions to context factors were combined with desired interactions. The three resulting qualities should fit the brand BYD and fit in the European context. The new product qualities were determined to be:

1. Lightweight - compact
2. Wholesome - safe/unthreatening
3. Professional - skilful

Making the vehicles look lightweight, counters the large footprint commercial vehicles tend to have and minimizes the impact on the road. Making the vehicles look Wholesome evokes a feeling of safety, both for the driver and other road users. The Professional character evokes trust and fits with the intelligent nature of the BYD Europe brand.

▼ Lightweight

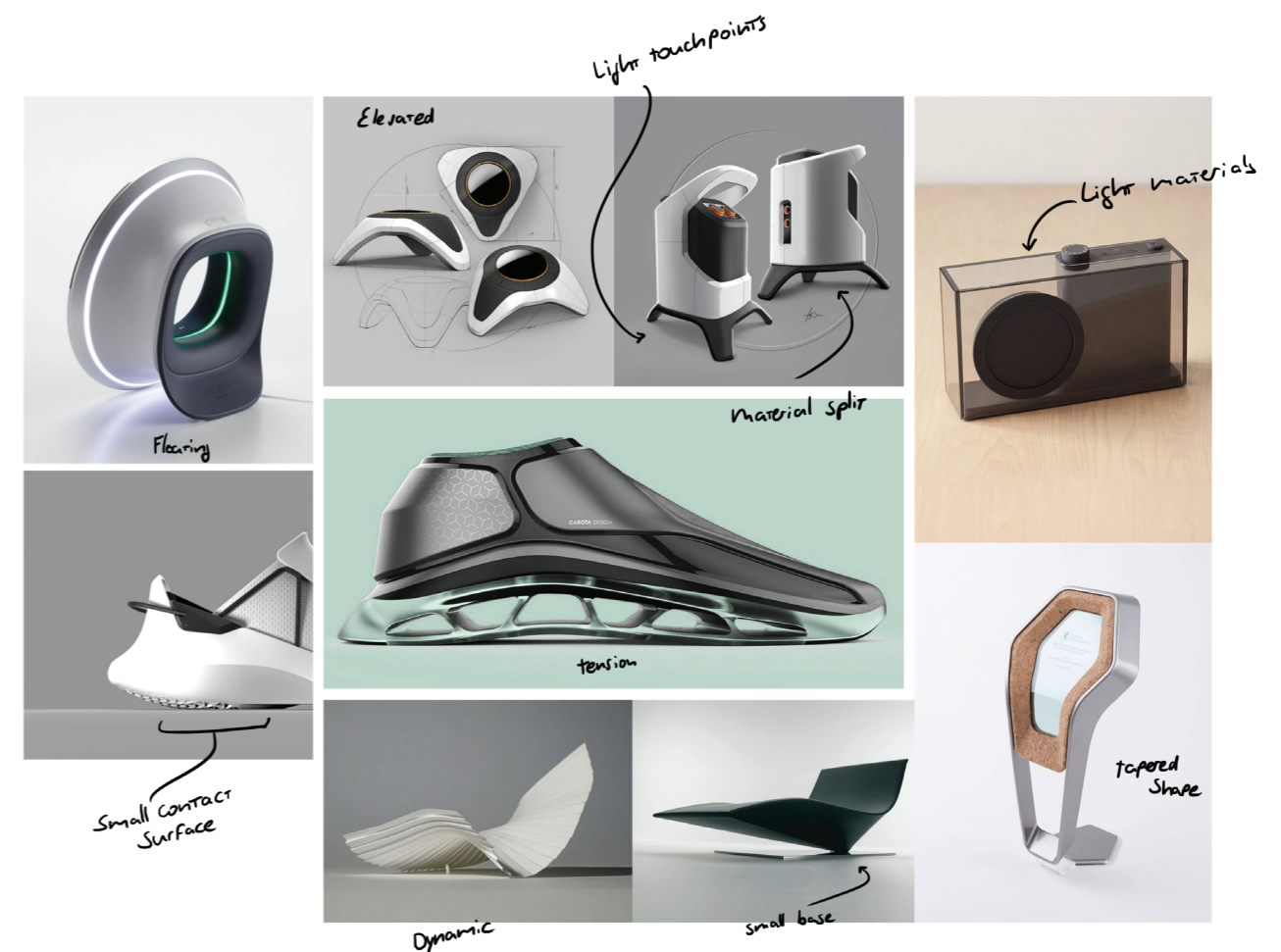


Figure 10.2 Collage 'Lightweight'

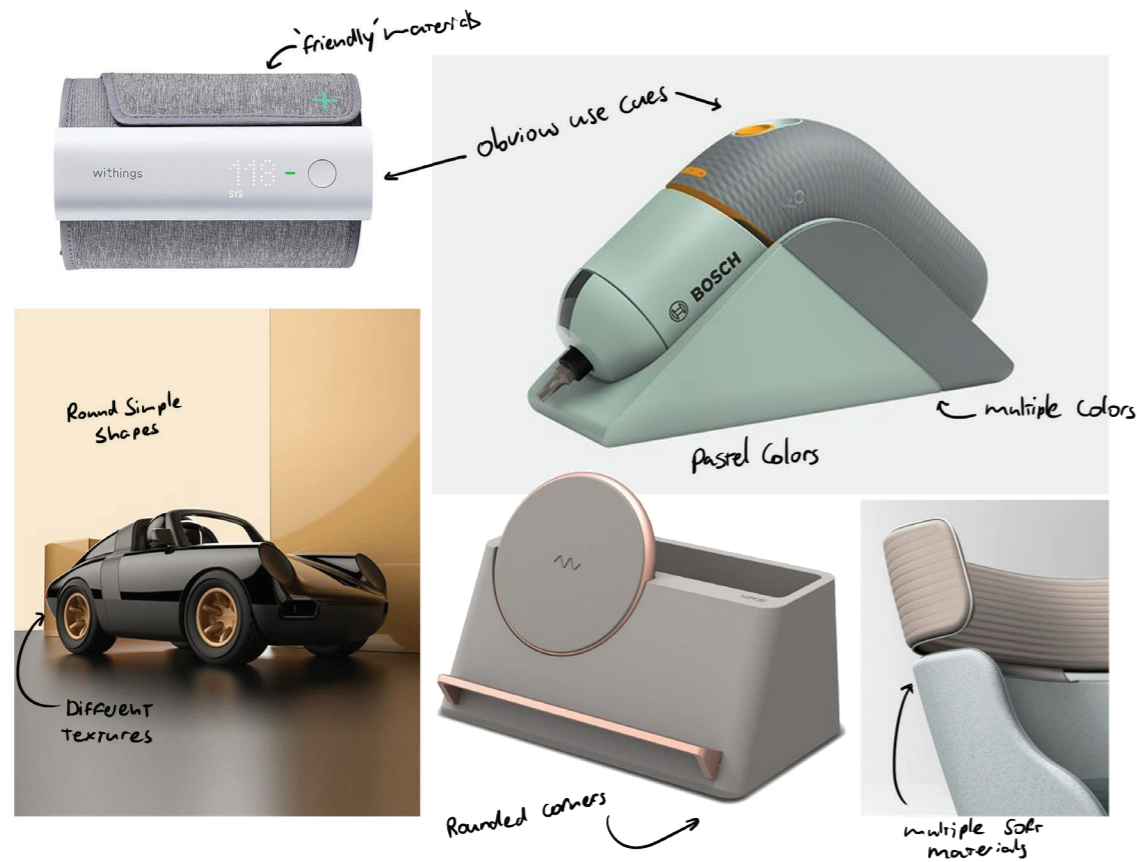


Figure 10.3 Collage 'Wholesome'

▲ Wholesome

▼ Professional



Figure 10.4 Collage 'Professional'

10.2 Is a new strategy needed?

The order is important. A rule in (graphic) design is the 3-30-300 rule. Every design has a message which is clear within 3 seconds. Upon further inspection, 30 seconds, secondary messages become clear. And after thorough evaluation, 300 seconds the total image is clear. The same goes for the vehicle's design. When approaching the vehicle it should at first glance feel lightweight. This helps to minimize the visual impact and therefore one of the main negative effects of commercial vehicles: The perceptions that vans cause congestion and are blunt.

The current styling strategy for commercial vehicles by BYD, called Origami needed to be tested according to the identified product qualities BYD Products must have. The Origami concept focused on lightweight while also making the light truck more cute and friendly. Cute and friendly are not the same as Wholesome which takes other road user's attitudes towards the vehicle into account and puts a focus on improving the sense of safety around the vehicle. Furthermore, the friendly nature of the T6 Truck is lost in the design of the T8. Therefore, the current styling strategy only partially fits the 3 product qualities found during the ViP method and a new strategy, or adaption, is needed.

When the vehicle comes closer the second quality it should show is wholesomeness. The vehicle is non-threatening to other road users and it feels safe to be close to the vehicle. Nowadays vehicles can look intimidating and dangerous up close. People get scared of blind spots and swinging rear ends. It is important to counter that negative feeling and build the vehicles to be wholesome and friendly.

At further inspection the vehicle should feel professional and of high quality. This quality is especially noticeable by the drivers. They are the ones experiencing the vehicle in how it performs. On a detail level and in the interior the design should feel like a professional tool.

10 | Product Design

10.3 New portfolio strategy

A conclusion of the ViP method was that BYD should focus on smaller vehicles next to their planned launch of the 7,5 and 18 ton trucks.

The portfolio gap to fill is that of lighter commercial vehicles. Especially the e-commerce sector shows a need for this type of vehicle as the challenge is to bring as much cargo into urban areas as possible while governmental regulations limit size and weight. In some cases an ultra-light vehicle is needed to enter areas that are prohibiting cars and trucks to enter.

The proposed portfolio strategy is launching four vehicle types. two types are already in the current strategy: the T6 and T8 truck. The new strategy adds two smaller vehicles. A light commercial vehicle setup and an ultra-light commercial vehicle. For each of the vehicles a specific range can be designed with different wheelbases or capacities. The reason to only add two types of vehicles is to keep it simple and comprehensive.

The Light Commercial Vehicle will most likely be sold in the greatest numbers due to high demand in e-commerce. Meanwhile, it will also reach smaller businesses like contractors or shops. Eventually, the light commercial vehicles could also become suitable for a B2C market. By making the light commercial vehicle leading in the styling strategy, BYD will build their brand image with the most represented vehicle in the lineup. Figure 10.6 shows the proposed product portfolio with alternative versions of each model and the Light Commercial Vehicle as flagship model.

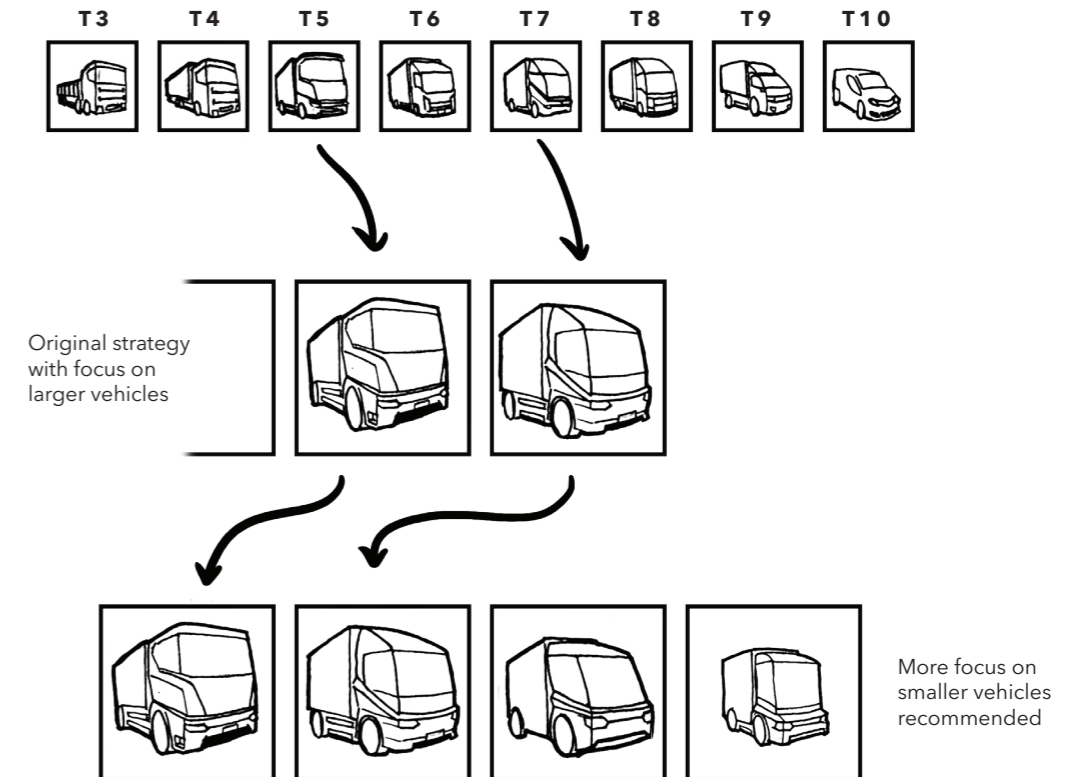


Figure 10.5 Proposed portfolio strategy

	Truck	Light Truck	Light Commercial Vehicle	Ultra- Light Commercial Vehicle
Base Model				
Conversion				
Alternative Wheelbase				

Figure 10.6 Portfolio strategy & light commercial vehicle as flagship model



Styling

The Brand Identity and Product Qualities are now determined. In the following chapters a theme is determined and the design is made tangible by translating the product qualities: Lightweight, Wholesome and Professional to character lines and a leitmotif.

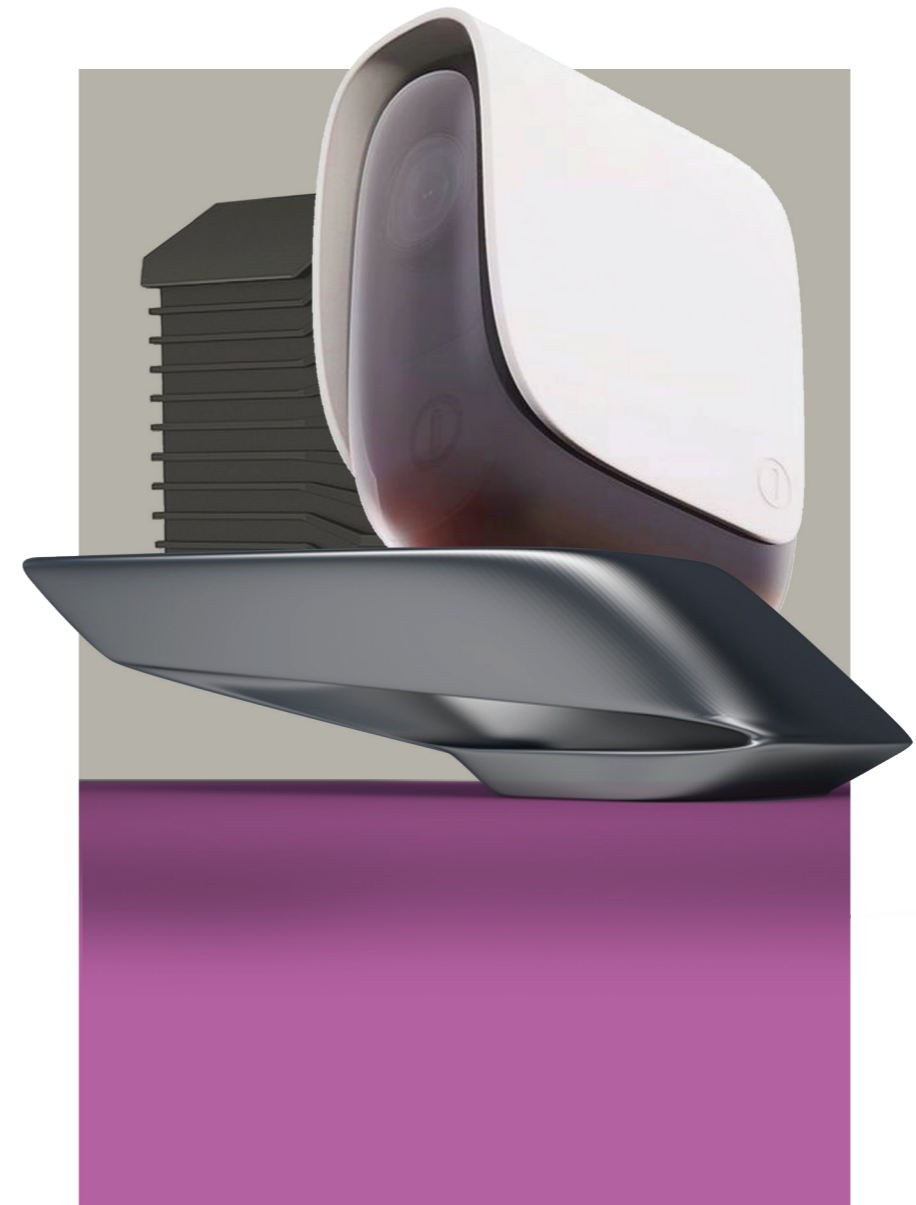


Figure 11.6 Collage of the product qualities: lightweight, wholesome and professional

11 | Theme Design

This chapter discusses the theme that needed to be determined to complete the styling strategy. This theme will be leading in when styling the vehicles.

11.1 Designing a styling strategy

A styling strategy consists of three ingredients: the brand heritage or identity, the desired product qualities and a theme combining the factors. During the ideation phase this theme has been developed. With the expertise of VanBerlo it was possible to host sketching sessions with professional designers to figure out what theme would fit this strategy best.

The new product qualities and brand heritage/identity were determined during the research. The theme was developed during the design phase. The theme should serve as inspiration. It should inspire the design team from BYD to come up with beautiful new designs.



Figure 11.1 Ingredients for a styling strategy



Figure 11.2 Bell 47G-4A

The first idea for a theme came from the analogy made by one of the participants of the sketching session. To him, the product qualities, combined with a user centred approach and focus on safety though visibility, could be best described by using the analogy of a helicopter. In particular a bubble window type helicopter such as the Bell 45G4A (figure 11.2).

Resulting sketches kept leaping back to the bubble type front. Technically the large bubble window adaption to vehicles helps make the shape more approachable, safe and therefore wholesome. However, the sense of professionalism and pride is lost because the shape lacks a certain 'cool factor'. The analogy needed to be changed to fit the design brief better.

11.2 Sketching sessions with VanBerlo

During the design phase two sketching sessions with the design team of VanBerlo took place. VanBerlo is a strategic design agency in the Netherlands who offered their expertise during this project. The goal of the sketching sessions was to find out what the theme of the styling strategy should be. To inspire the designers they were shown the mood boards made for each product quality and were shown the results of the brand identity workshop. The domain for the sketching session was limited to designing a light commercial vehicle. (See Appendix H for more images and sketches)

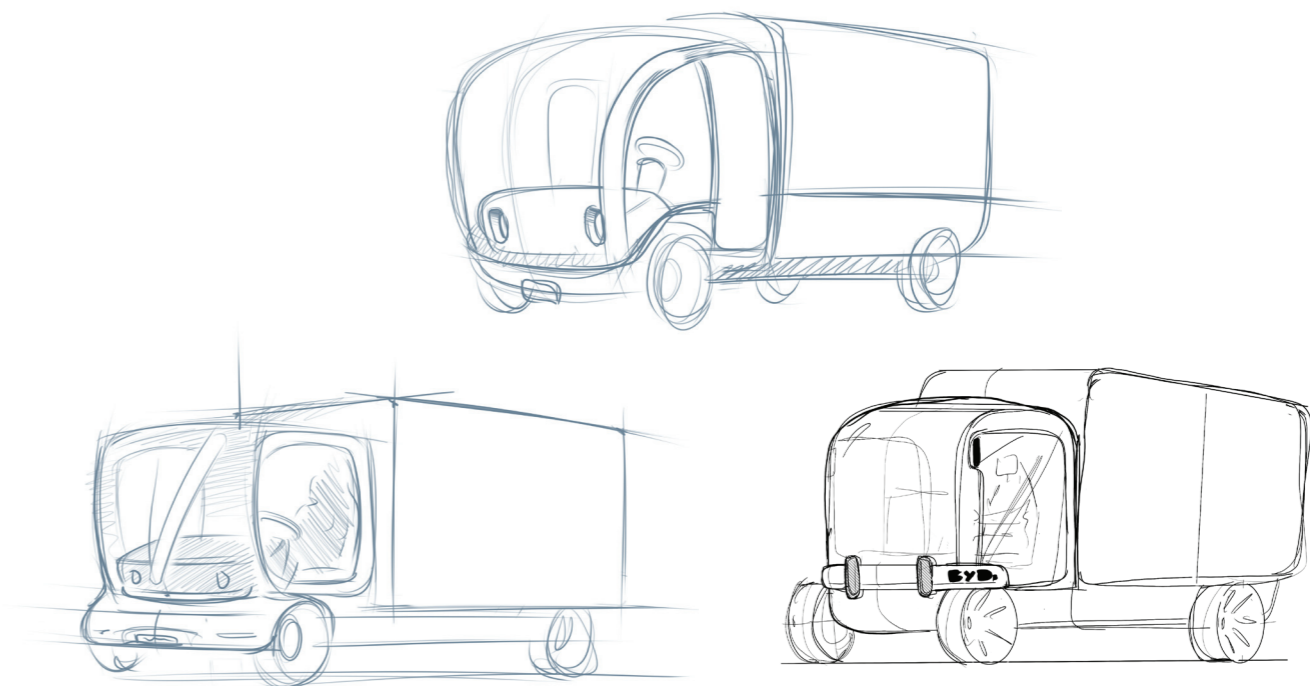


Figure 11.3 Bubble cars from first sketching session

11 | Theme Design

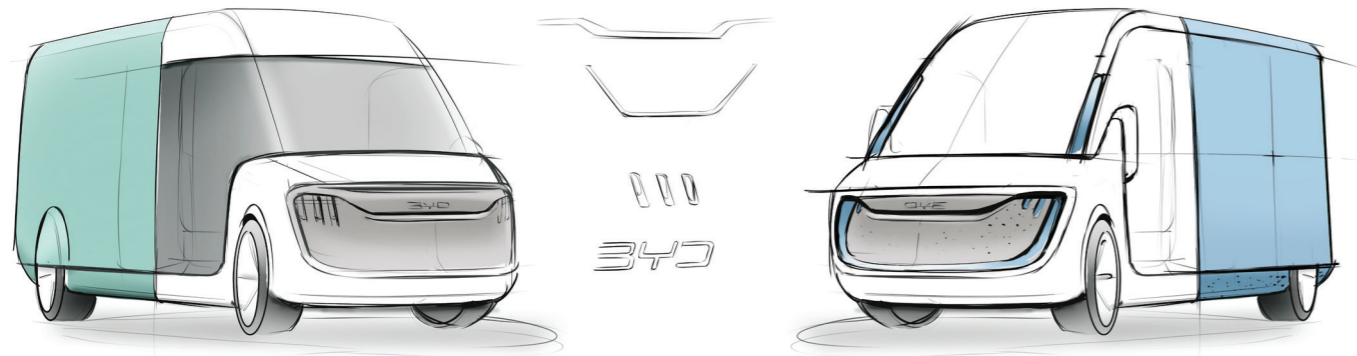


Figure 11.3 Framing the face makes it friendlier

A second session was conducted. This time the designers were told not to focus too much on changing the package of the vehicles but instead stay close to the original design of light commercial vehicles. They were also instructed to forget the helicopter theme for now. The focus was put on designing certain key elements that would fit the desired product qualities and BYD brand identity. The results were much better.

What was particularly interesting, was the idea to frame the face of the vehicle. The front of the vehicle with the lighting element and the logo is a great place to communicate

the BYD brand Identity. The only issue with this is that the brand heritage incorporates what BYD calls: 'Dragonface'. Which translates to frowned 'eyebrow' and 'dragon scratches' as headlight elements. These elements are aiding the aggressive look that is aimed for in passenger vehicles by BYD. However, for the commercial vehicles a more friendly look is desired. By framing these elements with bodywork, the vehicles becomes wholesome.

Another design element that sparked imagination was the idea not only to frame the face but also to put it behind glass. By prolonging the windshield to cover the nose

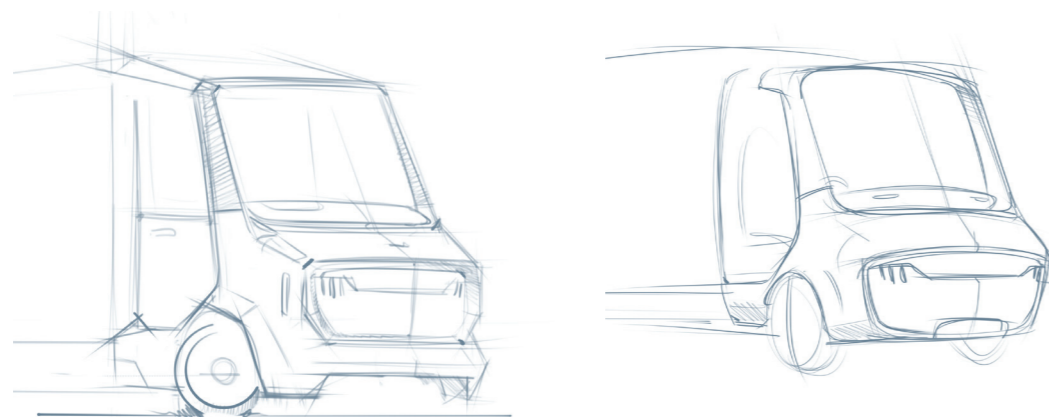


Figure 11.4 Sketches from second sketching session

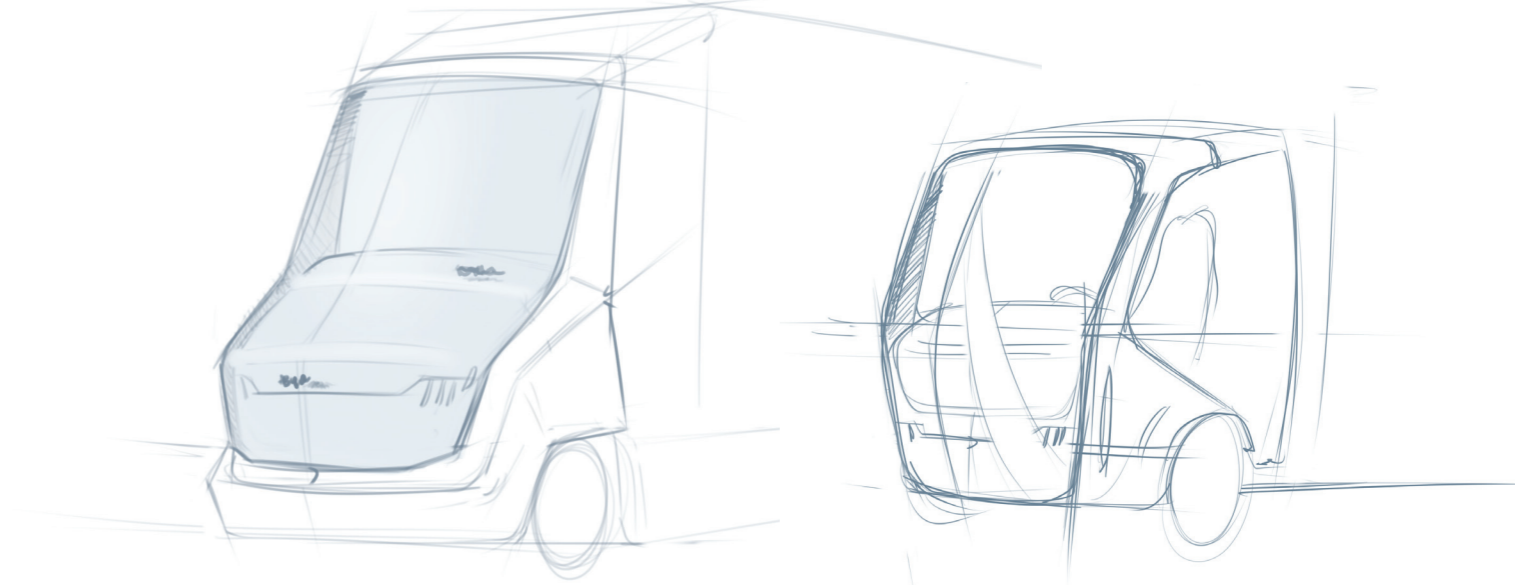


Figure 11.5 Face of BYD behind glass

and former grille area as well, the feeling of wholesomeness is further enhanced. Meanwhile by having the headlights and signature line behind or embedded in the glass, a more intelligent look is created fitting with the BYD brand personality.

11.3 The theme

The creative sessions had sparked creativity around the helicopter theme. However, the helicopter theme did not fit the desired product qualities and brand identity completely.

The helicopter theme could be interpreted in different ways. Helicopters come in all shapes and sizes and an exact definition of which

type would be needed to use the analogy was without misunderstandings. For example, when the designer thinks of an Apache combat helicopter the outcomes are very different from when he/she thinks of a police helicopter. (figure 11.6)

Furthermore, a helicopter is not perceived as wholesome or unthreatening. They are loud and aggressive, even the more sleek luxury versions. That is why the analogy of a helicopter, though promising, did not work for the theme of the BYD commercial vehicles. When refining the helicopter theme a new and better theme emerged which shares many of the qualities of the former analogy but is not at all threatening: The dragonfly.



Figure 11.6 Different types of helicopters

11 | Theme

11.4 Dragonfly

A theme for styling should inspire. The analogy should be simple and comprehensive. The challenge was to create the perfect analogy to fit the product qualities: Lightweight, Wholesome and Professional. While also fitting the brand identity and personality characteristics: Adaptive, Intelligent and Spirited.

Silently flying. Moving from one position to the other with high precision and elegance. Each time hovering for a few seconds then silently moving again before settling down on a nearby branch. Touching down with the slightest touch, the branch barely moving while supporting its featherlight weight. The large eyes capture everything in their environment and it easily evades any obstacle or threat coming her way.

In China the Dragonfly is seen as bringer of prosperity and hope. They believe that when a Dragonfly arrives at your doorstep, a fruitful and successful year awaits you.

Like the Dragonfly BYD commercial vehicles move silently through the city. With minimal impact on the environment they drive from location to location always greeted with enthusiasm when arriving at doorsteps.

The Dragonfly theme is a strong and easily recognizable theme. It sparks the imagination of designers. The theme flawlessly aligns with the desired product characteristics and the BYD Europe brand values.

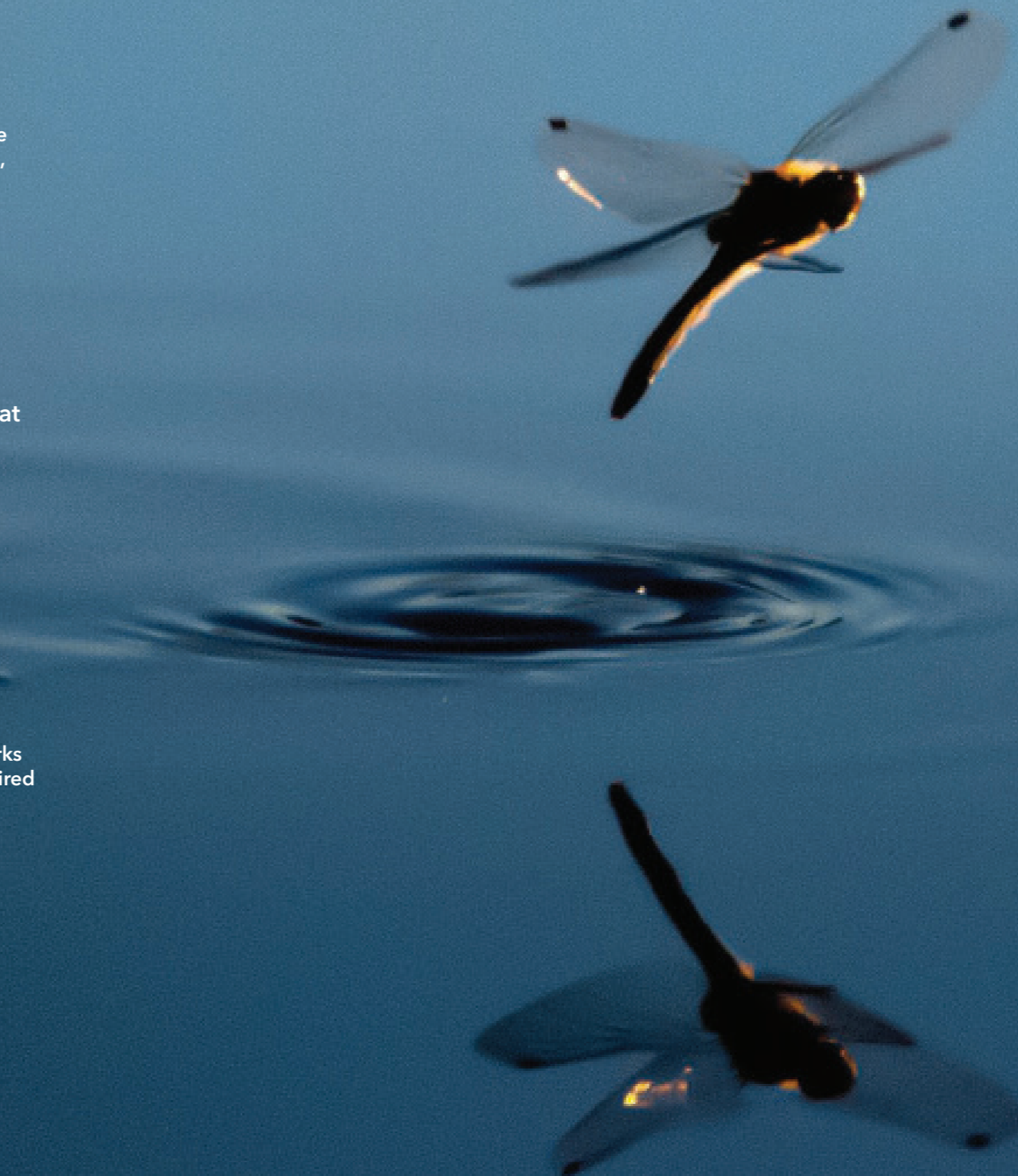


Figure 11.7 Dragonfly tapping water to lay eggs

12 | Ideation

In this chapter the ideation phase is discussed. This phase started with sketching, then 3D design with clay and finally digital drawing, gradually working towards the design of the styling strategy.

12.1 Leitmotif

Leading for the styling strategy is the leitmotif that follows from the Dragonfly design theme. A leitmotif is a set of signature elements that make the vehicles instantly recognizable. Examples of elements of leitmotifs in other brands are the BMW kidney grille and the Volkswagen wrap around line.

Since BYD is a relatively young company and has little brand awareness in Europe, it is important to find a signature for the vehicles which is instantly recognizable. Meanwhile many established brands have built their design heritage around an element which is obsolete in electric vehicles. Brands such as



Figure 12.1 2015 Tesla Model S

BMW, Alfa Romeo and Jeep have built their design around an iconic grille. And since it is such a strong design element the grille is often added to electric vehicles anyway. Examples are the BMW I series and the Volvo Polestar. Even on the first Tesla's the grille occurred, even though Tesla does not have a heritage with ICE vehicles. The search for a leitmotif focuses on finding elements that could become iconic for the brand and are relevant in the future and for the electric vehicles from BYD.

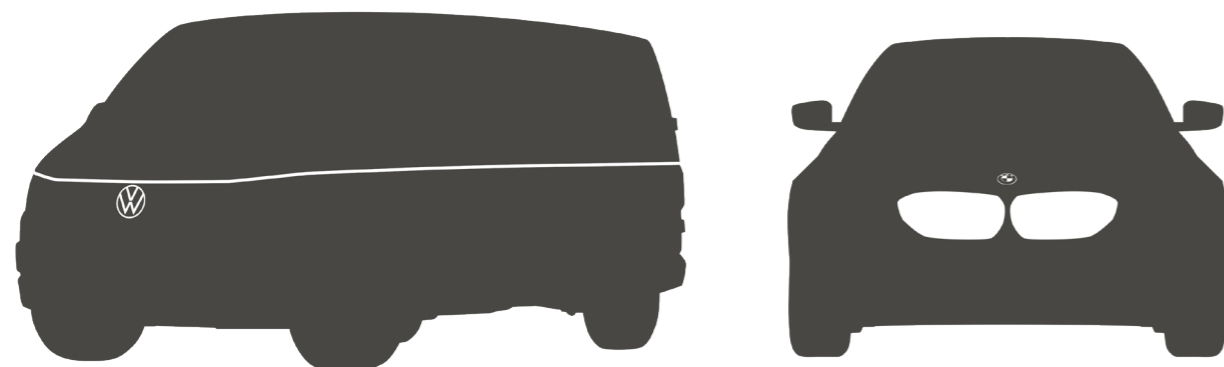


Figure 12.2 The wrap-around Line from Volkswagen and the BMW kidney grille are characteristics of their Leitmotifs

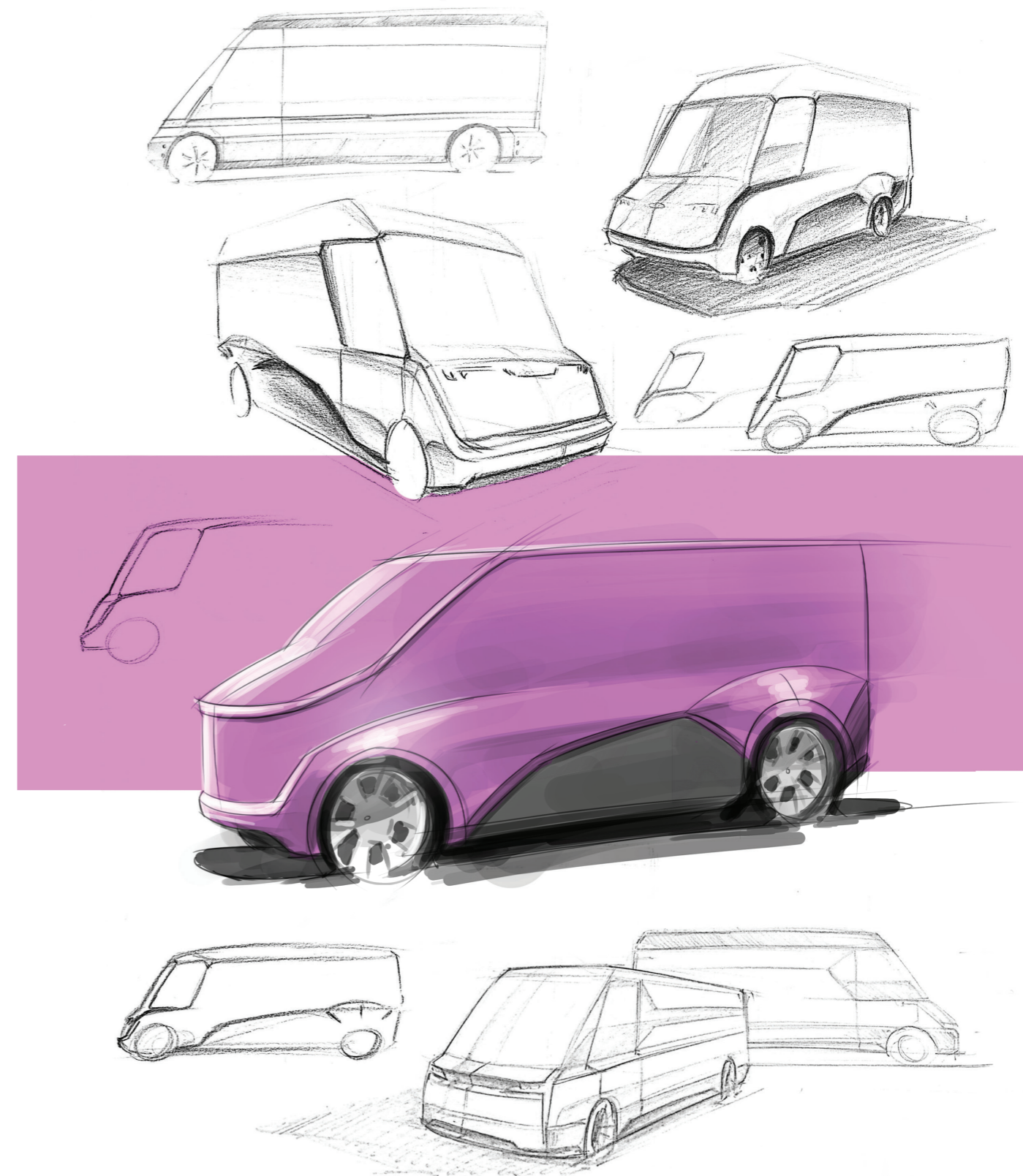


Figure 12.3 A collection of ideation sketches from several stages of the design process

12 | Ideation

12.2 Sketching

Normally the design for a vehicle starts with determining the platform and package for the vehicle which have a big influence on the design of the vehicle. The Dragonfly design theme needs to fit multiple platforms and packaging such as vans, box trucks and ultra-light commercial vehicles. Therefore, during the design theme one vehicle was chosen as 'flagship' model. This is the vehicle which will set the example for the other vehicles. The starting point in this case is a 3,5 ton van: the Light Commercial Vehicle.

With the Dragonfly as starting point several character lines were tested on the commercial van. Key features of the Dragonfly include the forward lean and the large eyes. These can be simulated by adding a large windshield and a signature line that dips towards the front.

One of the findings was that the volume should be made to look smaller than it in reality is. This makes the vehicle look lighter and smaller. There are multiple ways to achieve this but splitting the volume in color and trim seemed to be very effective.

For the front, solutions from the sketching sessions with VanBerlo were further explored. What seems to work well is to frame the face of the vehicles. With a bumper that wraps around the front. This helps to create a more friendly face. The windshield design was also explored. Enlarging the windshield helps the vehicle to look more approachable. Different designs with glass panels continuing over the hood section and even across the entire height or length of the vehicle were explored.

For the rear of the vehicle it is difficult to create a design that shows wholesomeness. For other road users the rear of large vehicles is typically an area to avoid. Some key features improve user friendliness such as: a low entry and large doors. Other features such as large taillights would improve safety and features such as large windows could benefit a more wholesome appearance.

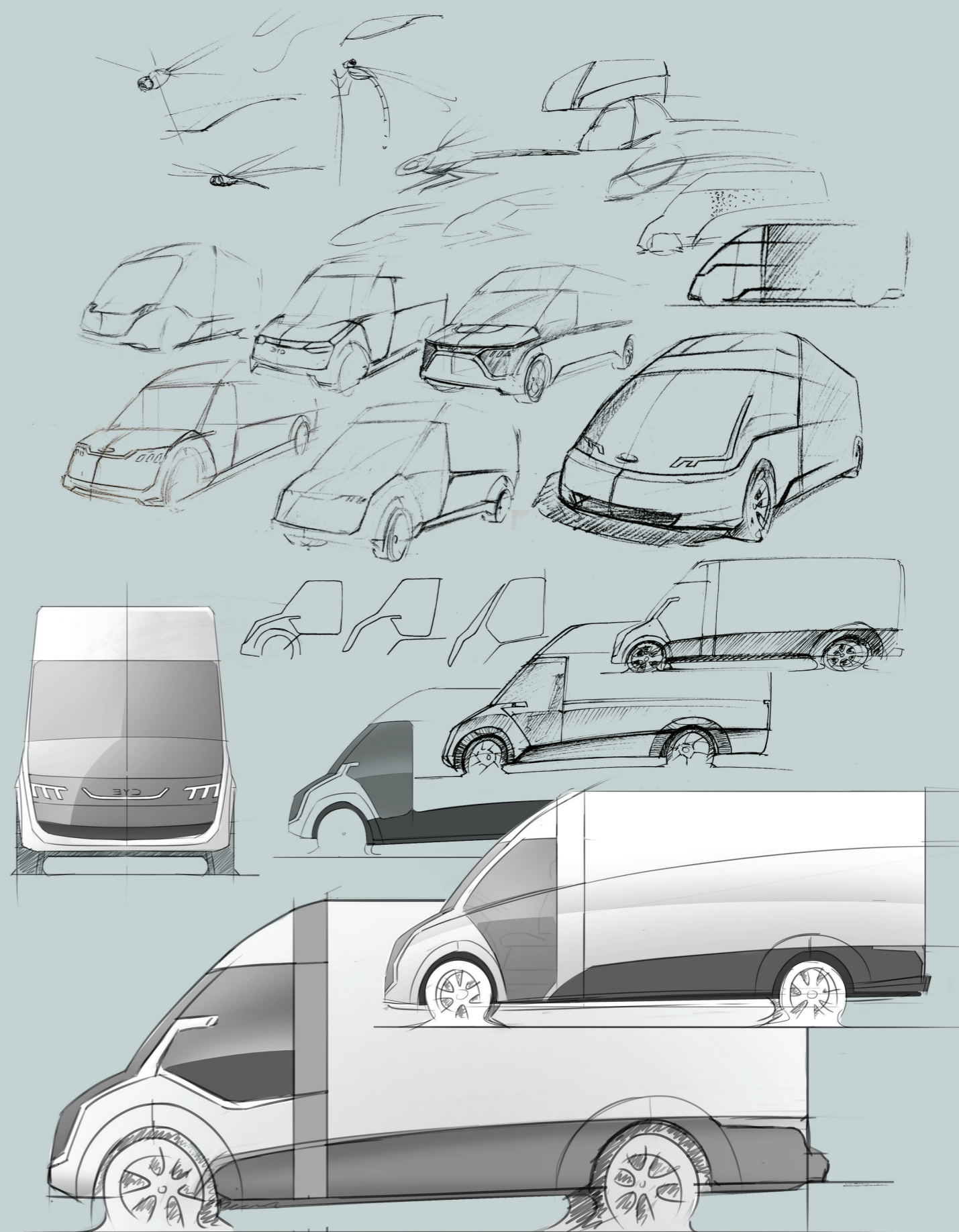


Figure 12.3 Sketches

12 | Ideation

12.3 Silhouette

The vehicles should be instantly recognizable. Simplifying the silhouette in basic shapes helped to determine what rough shapes would work on the vehicles. On paper, simple shapes were tested on rough proportions. The effect should be similar as looking at the vehicle while squinting. The silhouette is especially challenging because the rear of the vehicle is a long extruded shape which needs to offer enough space for cargo, essentially a box. The results from sketching proved still unsatisfactory and therefore another medium was tried: Working with clay.

12.4 Clay models

Sketching alone proved not to be enough to come to a conclusive result. The findings from sketching needed to be tested in 3D. Therefore clay form study models were

made testing multiple shapes to achieve the desired result. Working with clay forced an order to the design process similar to the 3-30-300 rule in design. The first day of using the clay only rough shapes can be formed. The first rough shapes should convey the lightweight quality. The second day these rough shapes can be smoothed, refining curves and adding a greenhouse, aiming for a wholesome effect. The third day the clay has almost set and further detailing can be added. Sharper lines can be achieved and the end result should look more professional. However, working on a scale of roughly 1:24 made it difficult to add details that would be considered detail level on a full scale model.

From the clay models a set of four were selected. Each model has element that are interesting to develop further. The clay models were analysed and the successful elements were combined to form the leitmotif.

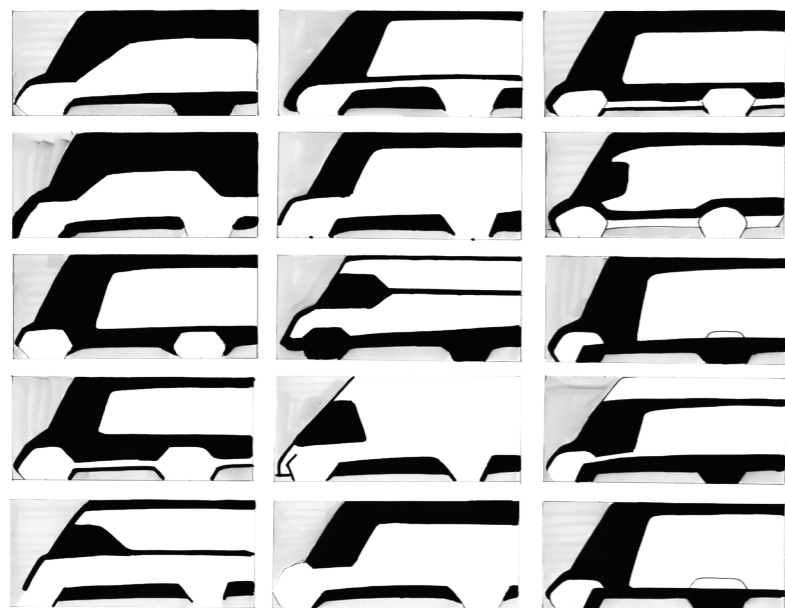


Figure 13.4 Silhouette sketches

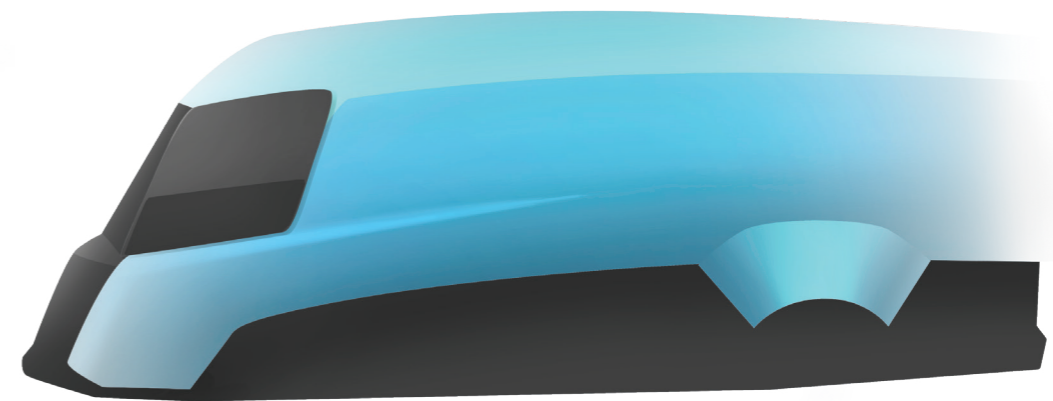


Figure 12.5 Resulting key sketch from clay models

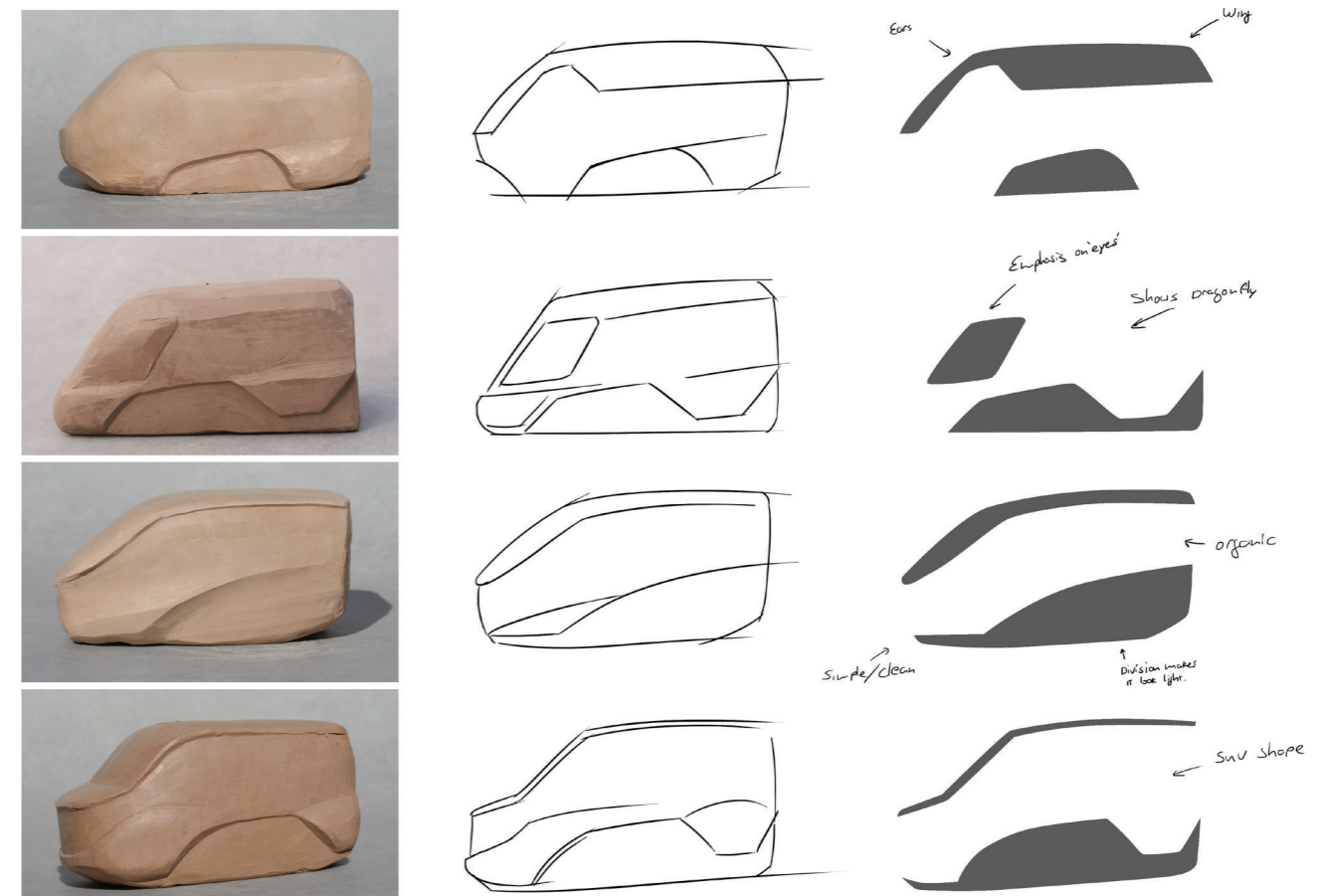
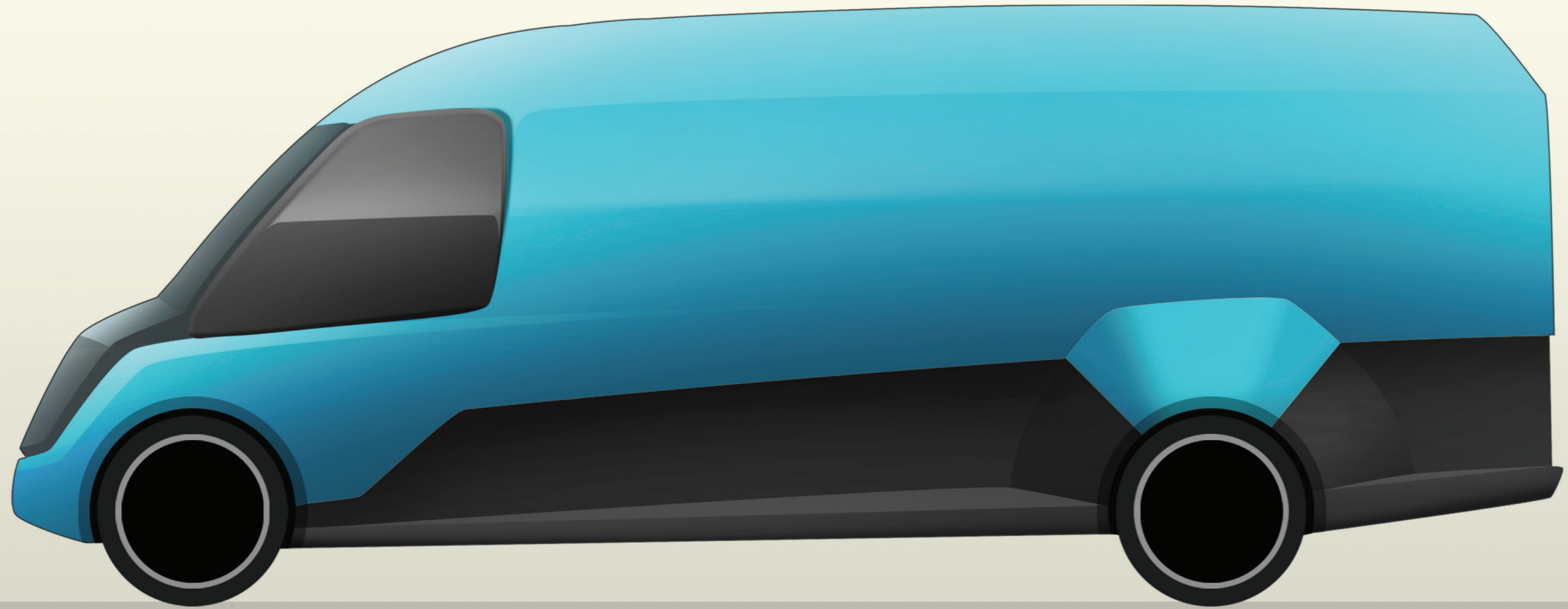


Figure 12.6 Clay models



Leitmotif

From a key sketch as a result of combining the elements from the sketches, silhouettes and the clay models, a leitmotif was distilled. There are key elements for the silhouette, front and rear of the vehicle.

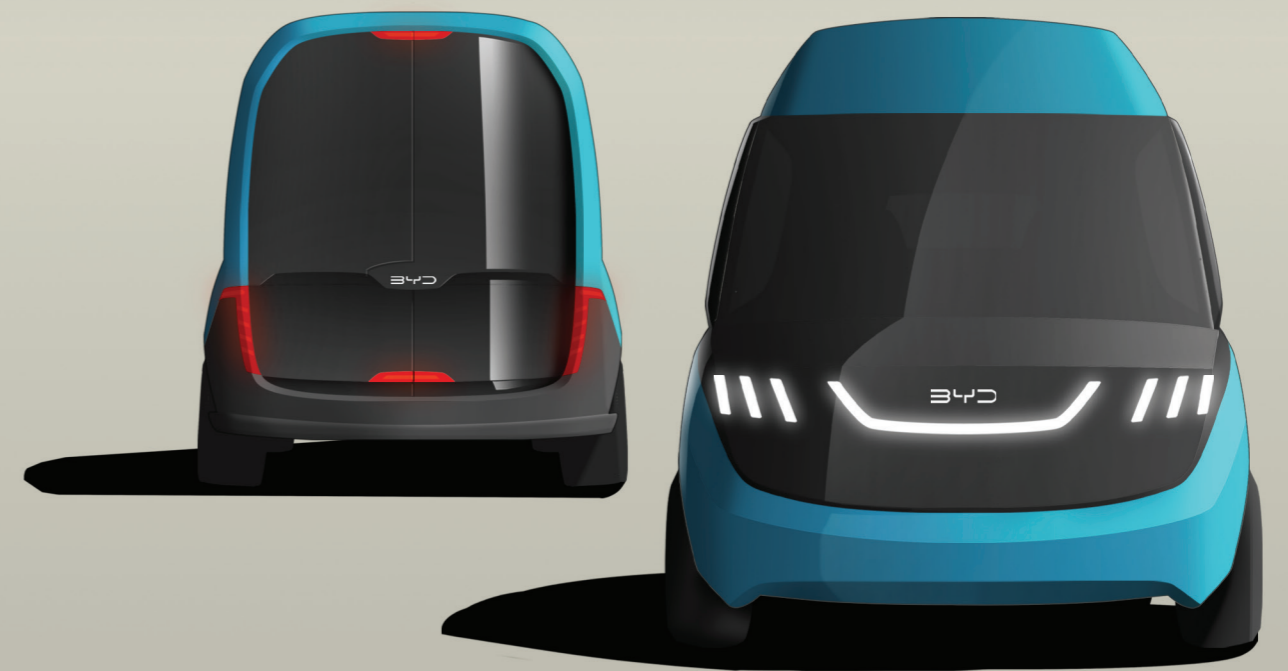


Figure 13.1 Leitmotif side, front and rear

13 | Leitmotif

13.1 Key elements in sideview

Large Disassociated Side Windows

Instead of having windows flush with the body panels, these windows are separated from the body. This emphasizes the size of the windows while being reminiscent of the large eyes from a Dragonfly.

Low shoulder Line

By lowering the shoulder line for the side glass, the driver gains visibility and contact with the environment. This helps the design achieve a more wholesome look. The shape of the shoulder line is reminiscent of the tapered body of the Dragonfly.

The Color Split

The body is separated in two colors along the length of the vehicle starting after the front wheel and slowly increasing in height towards the rear. This gives the vehicle a lighter appearance

Touchdown Points

The body which is separated by color and material needs connection to the wheels and therefore the ground. This helps the design to look nimble. The front wheel arch is embedded in the body, the rear wheel arch connects the higher rear to the ground. Together they form the signature stance characteristic for the Dragonfly design.

Top Highlight

The top of the vehicle is angled allowing it to catch light. This reduces the volume of the vehicle even further. Together with the split in color this line tapers the vehicle towards the rear, resembling the tail of the dragonfly.

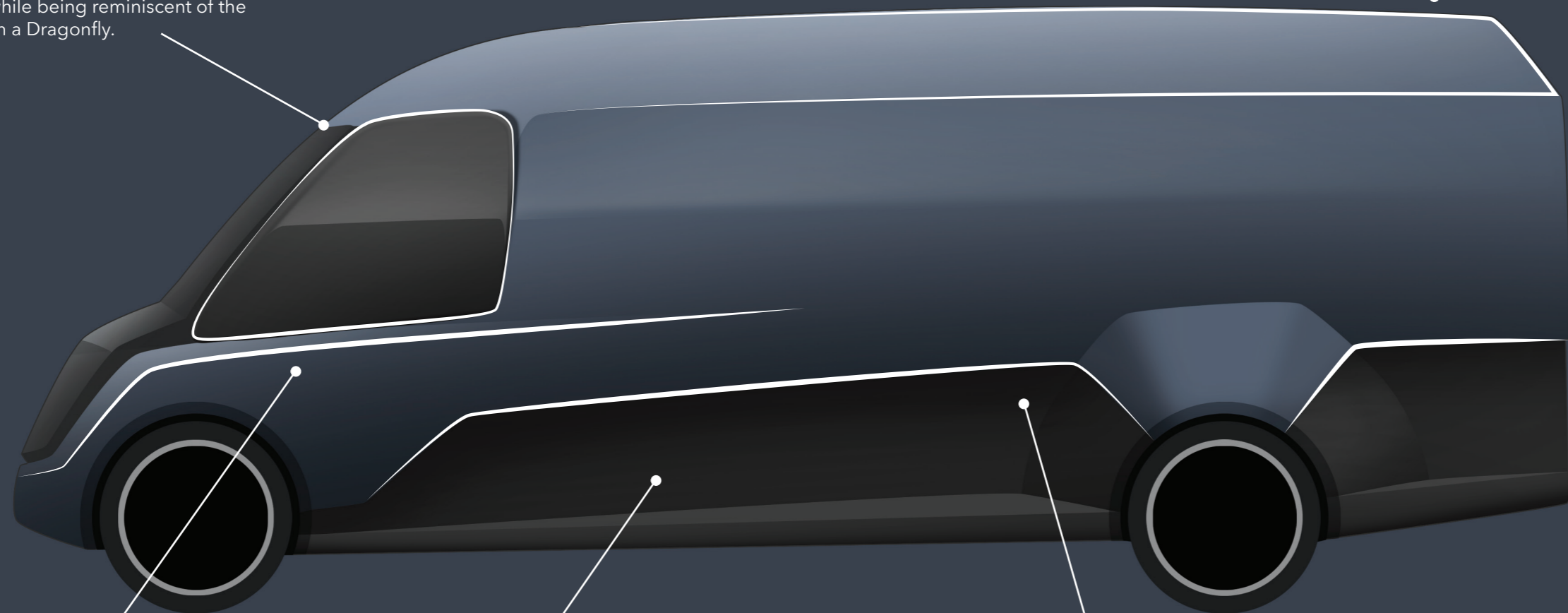


Figure 13.2 Leitmotif side explained

13 | Leitmotif

13.2 Key elements in front view

Extended windshield

The windshield is extended to cover the nose of the vehicle. BYD Brand elements are placed behind that glass. This makes the vehicle look more intelligent with a high tech feel.



Framed Face

The face of the vehicle with the BYD brand elements is framed by a bumper that wraps around the vehicle. The result is a friendlier and therefore, more wholesome appearance.

BYD Brand Elements & Lighting

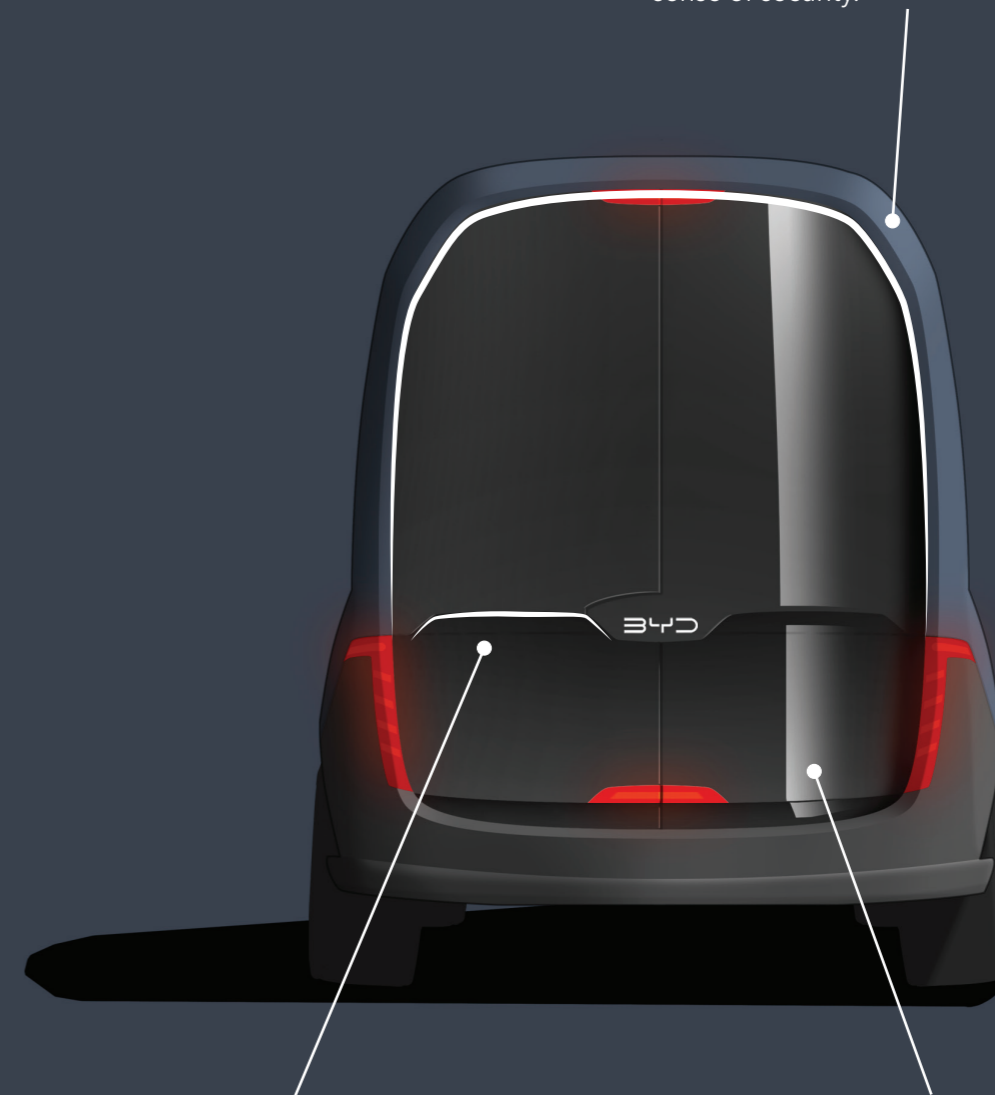
BYD's brand elements are added to the vehicle, making it part of the BYD family. The elements have been modified and simplified. The 'Dragon scratches', how BYD calls their signature lighting, are redesigned as three separate lines. The grille signature featured on many BYD models has been modified and the 'eyebrows' were removed to achieve a more friendly appearance.

Figure 13.3 Leitmotif front explained

13.3 Key elements in rear view

Frame

The bodywork frames the glass similar to how the front of the vehicle is framed by the bumper. In this case the top is framed, evoking the same wholesomeness through a sense of security.



BYD signature lines

The BYD brand identity shows within the frame created by the body. Signature lines are repeated around the brake light and bottom lights (for extra safety when the door is opened). The BYD logo sits within the same line shown on the front of the vehicle.

Large windows

To enhance the feeling of contact with the driver the glass section is extended to the bottom of the vehicle

Figure 13.4 Leitmotif rear explained

13 | Leitmotif

13.4 Leitmotif styling applied to portfolio

On each type of vehicle in the proposed European portfolio, the styling theme has been applied to test whether it would work on that specific package. Each vehicle should follow the product qualities: Lightweight, Wholesome and Professional. Yet, each type of vehicle has its own characteristics embedded in the platform and package.

For example: An ultra-light commercial vehicle already has the product quality Lightweight. Adapting the Dragonfly theme to that vehicle would mean putting more focus on a professional appearance, which is harder to achieve in such a small vehicle. Another example is the Truck which, due to its size, already looks more professional. Adopting the Dragonfly theme would put more emphasis on making the vehicle look Lightweight and Wholesome.

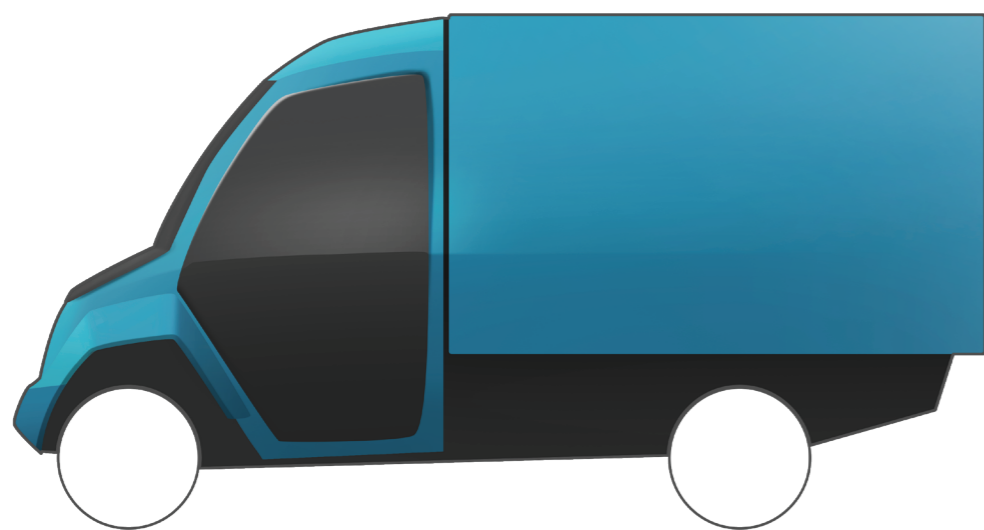


Figure 13.5 Leitmotif on a Ultra-Light Commercial Vehicle

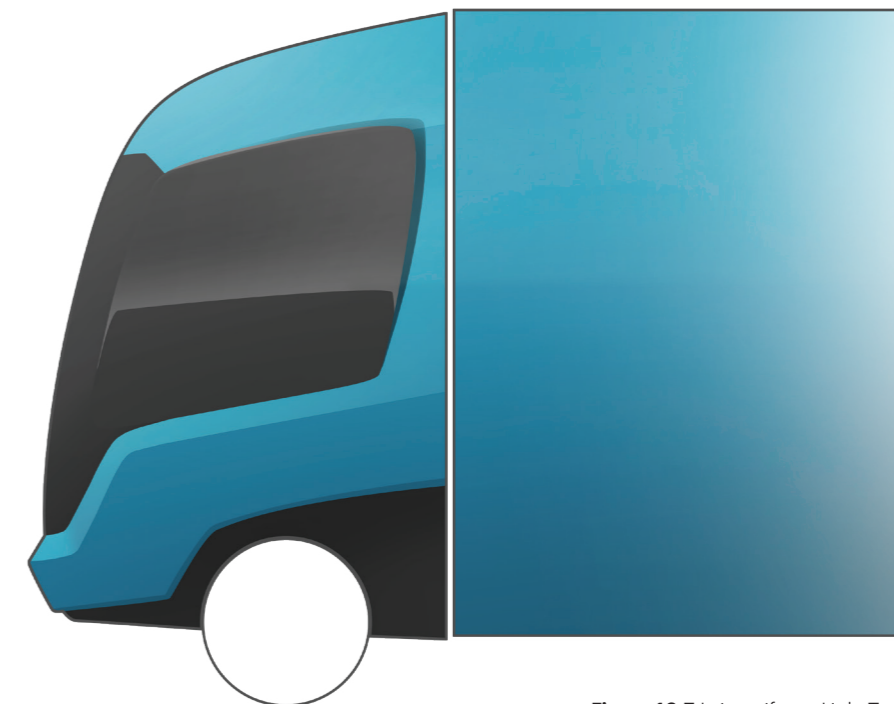


Figure 13.7 Leitmotif on a Light Truck

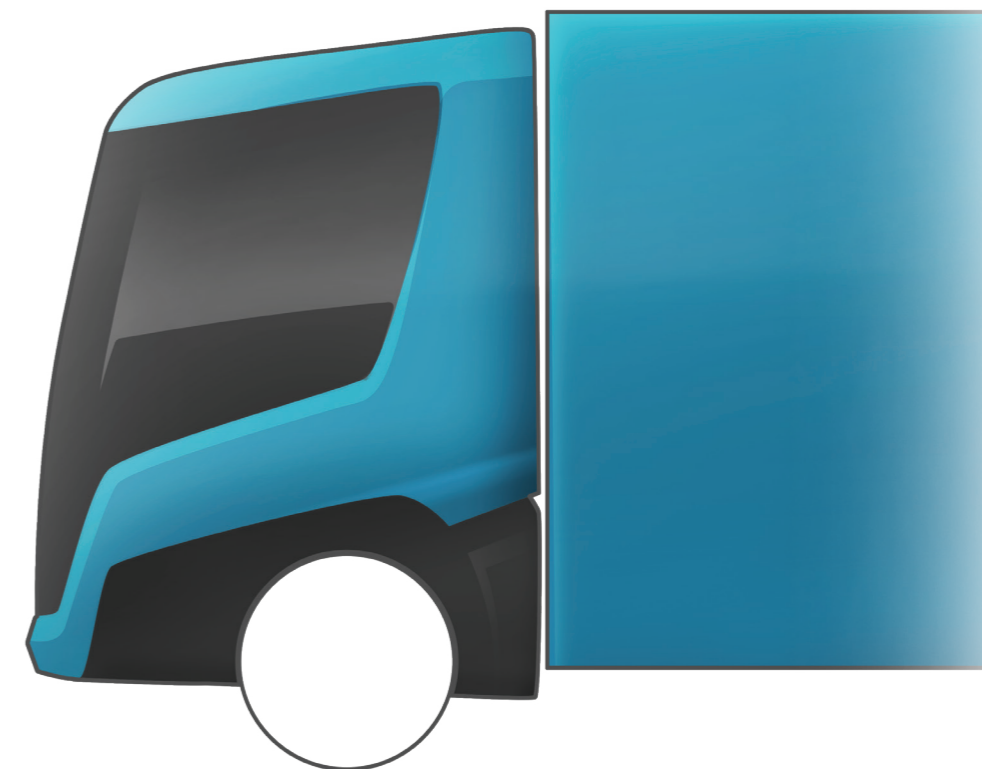


Figure 13.7 Leitmotif on truck

Strategy

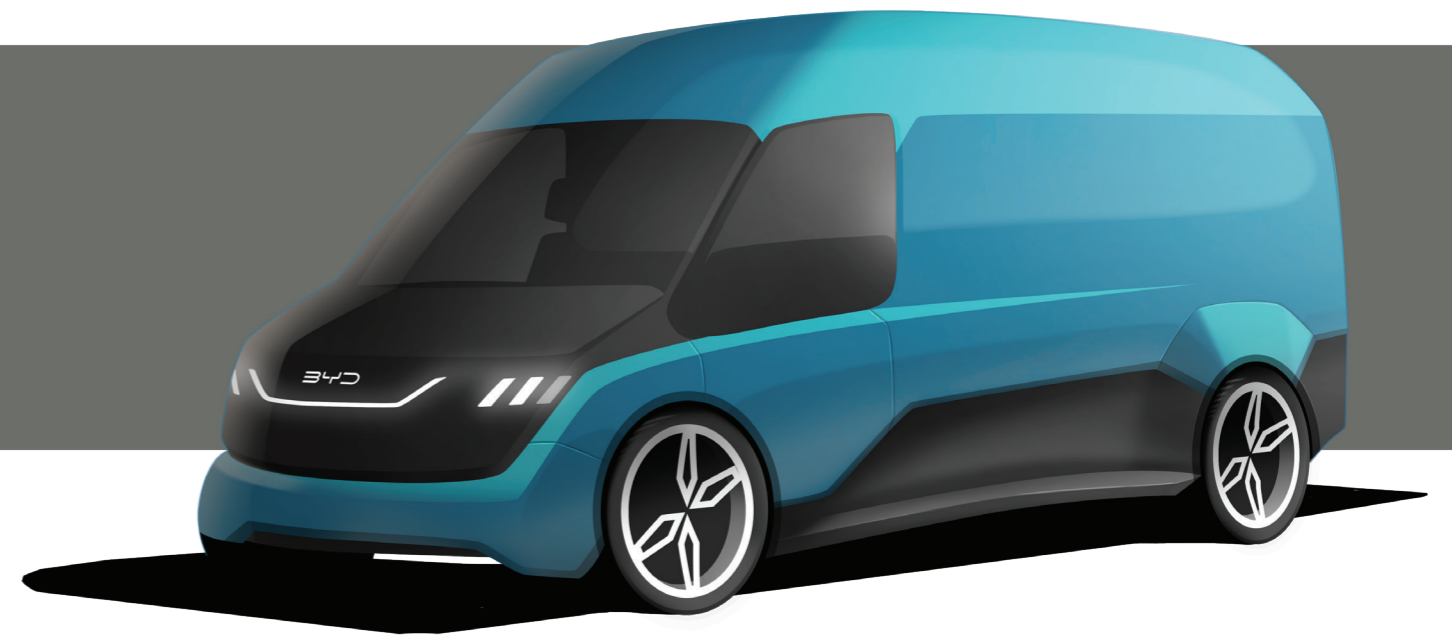


Figure 14.1 Artist impression of the leitmotif on a Light Commercial Vehicle

14 | Styling Strategy

This chapter is a summary of the proposed strategy for the European market.

14.1 The Strategy

The proposed styling strategy following the research and design phase is as follows: The portfolio will consist of four vehicle types which suit different segments of the market. Two vehicles, the light truck (7,5 ton) and the truck (18 ton) are similar to the T6 and T8 models currently in the line-up. There are two model types added: An ultra-light commercial vehicle and a Light commercial vehicle. The light commercial vehicle will serve as the flagship model of the range. This model will be the first to launch and demonstrates the Dragonfly design.

The portfolio remains comprehensive by only using four base models. To accommodate multiple clients, variants of each model can be added. For the light commercial vehicle a conversion to a box-truck model and a shorter wheelbase model can be designed. The theme is designed in such a way that the product qualities remain visible even without the rear section of the vehicle.

Styling

The Dragonfly theme is leading for the styling. Designers of new vehicles should use the theme to achieve the three desired product qualities: Lightweight, Wholesome and Professional. The design shown in chapter 13 serves as a rough underlayer. The design elements shown are guides to achieve a certain character for the vehicle. The designer is free to move lines, adjust volumes and add details provided it is still recognizable as the Dragonfly theme.

Target sectors

For each of the vehicles there are examples of target sectors where the vehicles could be applied. The truck could be useful for retail supply and construction, for instance as a quiet cement truck. The Light truck could be used for inner-city retail supply and larger e-commerce shipments such as appliances and large furniture. The Light commercial vehicles is in high demand for e-commerce shipments as package courier but can also be used in construction by contractors, municipalities or even as rental. Another possibility for the Light commercial vehicle is personal transport. The ultra-light commercial vehicle can be used as inner city delivery vehicle for hard to reach places or by municipalities for maintenance works.

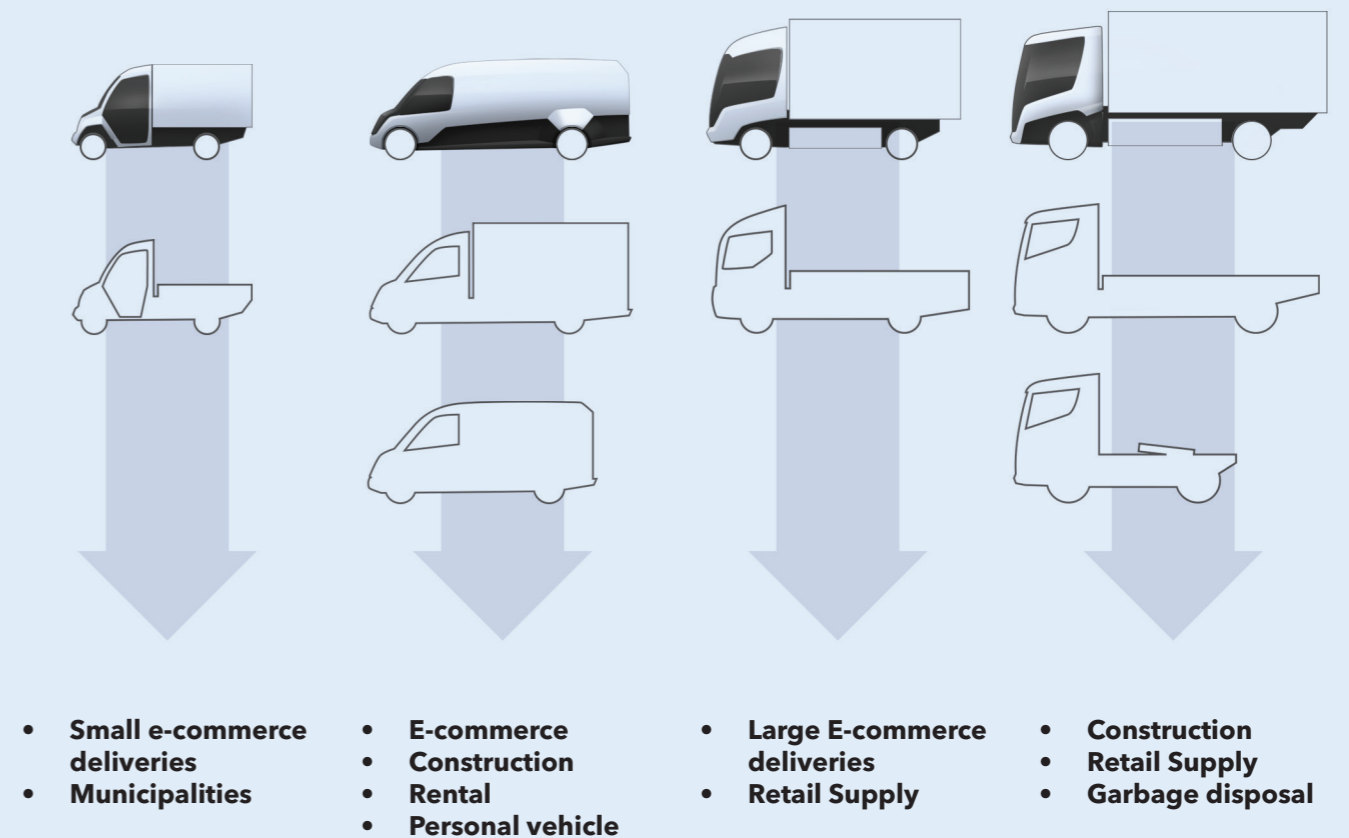


Figure 14.2 Possible applications of BYD vehicles

15 | Overview

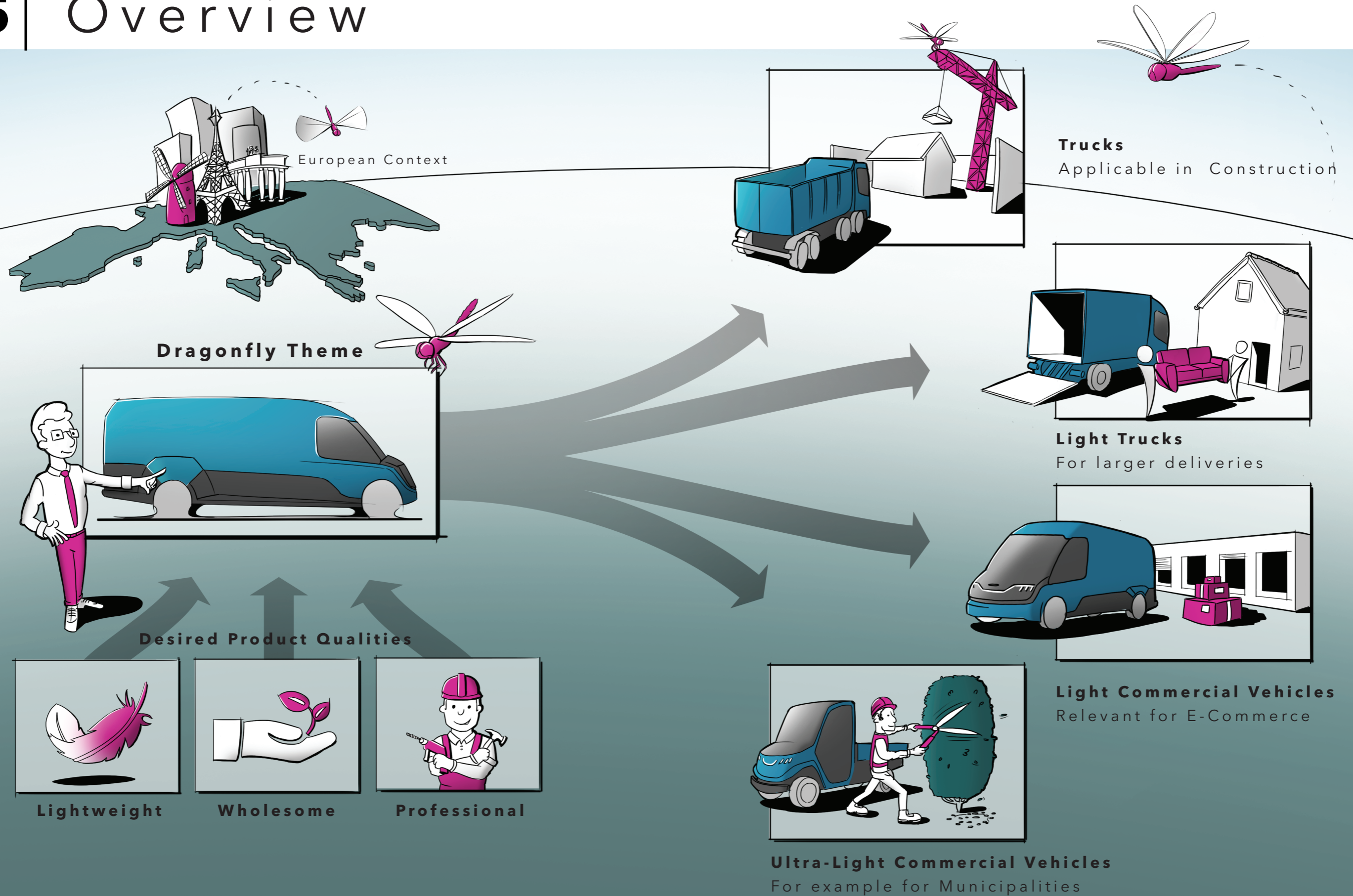


Figure 15.1 Overview of the styling strategy

16 | Discussion

This chapter concludes the report with recommendations and an evaluation of the project.

16.1 Recommendations

Continuing design process

This project was focused on a styling strategy. The result of this was the Dragonfly theme. The theme was then applied to the vehicles. The resulting sketches are an example and impression. The main recommendation is to further develop how the Dragonfly theme would look on the vehicles of BYD.

Validation of Dragonfly styling strategy

The styling strategy and whether the theme and leitmotif have a positive effect should be validated. Since styling research is time consuming, this was not part of this thesis.

Launch strategy

What is not yet defined is the exact launch strategy. It is recommended to launch a flagship model first to showcase the design. The flagship model will subsequently be the most sold model of the range. This helps for a successful launch. The exact moment to launch and when to launch the other vehicles is not yet specified in this thesis.

Further develop signature lighting

The frame created by the bumper and the glass front creates a free space to be filled in by lighting and brand elements. This blank canvas can be filled in by BYD. The shown design gives an example by adjusting the current BYD styling strategy to become more wholesome and friendly. However, this is only an example and it is recommended to develop a (new) brand signature for the commercial vehicles.

Additional Research

More research is recommended around the applications of the vehicles. In this thesis, four possible sectors are mentioned as potential customers for four types of vehicles. Further research on the exact types of vehicles needed within these sectors and the customer potential could give more insight in feasibility and viability.

Competitor Analysis

It is recommended to do a competitor analysis both for styling and for portfolio. A competitor analysis although conducted briefly has not been an inherent part of this thesis. The strategy that is a result of this project does not yet take the competitors into account. The European context formulated in this project is based on market research on needs that are apparently not met yet. Further competitor research can give insights in whether other companies will be meeting those needs in the future.

Assumed Brand Awareness

An assumption made in this thesis is the lack of brand awareness around the BYD brand in Europe. Since BYD has already launched buses in Europe, a certain brand awareness might exist. Further research on this brand awareness could improve the brand analysis.

Research Country of Production Effect

The country of production can have an effect on the perception of products. When there is a negative stigma about the COP, this can negatively affect brand image, trust and perceived quality (Ar & Kara, 2014). This is particularly true for the automotive sector: According to Kreppel & Holtbrügge (2012) people see Chinese electronics as better quality than Chinese Automotive products and in Germany the quality, performance, appearance and attractiveness perception

is worse for Chinese car brands than brands from other countries (Holtbrugge & Zeier, 2017). The fact that BYD is a Chinese company might impact the brand image in Europe. The recommendation is to research how this will affect the brand image of BYD and what to do to counter possible negative effects.

More Local product development

There is a need for more local product development by BYD. At this moment the products of BYD are developed and designed in China and then tested by the R&D team in Europe for the European market. By designing specifically for the European market and preferably by a design team located in the Europe close to the context, the time needed for design could be decreased and the result better fitting for the European market. Improving communications between the office in Europe and the offices in China could also benefit the design process.

Innovative platforms

This thesis is a study on the effect of styling and how styling can be used to create a certain image. However, styling is focused on appearance while the vehicles also need to be functional, safe, feasible and viable. To truly revolutionize vehicle design and move forward in the development of electric vehicles I recommend not to redesign current platforms and packages but to develop a new package specifically for commercial vehicles. Think about different driver cabin layouts and modular design solutions.

16.2 Project reflection

It has not been easy to find the right method to use. In retrospect the project could have been more focused on the ViP method from the beginning or a different method might have worked better. This was the first time I used this method for a large project. At the start of this project I immediately started research to determine the scope and get acquainted with the subject. However, according to the ViP method I should have waited for the context phase and focus on starting at product level. After learning more about the ViP method and starting with the first steps, some research had already been done and then needed to be fitted to the ViP structure. Luckily this worked well and I did not find inconsistencies in the story or the research. However, I do believe that I either follow a method as intended or, follow my own personal 'design reflex' which is the standard linear design process: Research - Ideation - Concept - Design.

Covid-19

This project was done during the Covid-19 pandemic. This results in some limitations for the project. It was impossible to visit the BYD Europe office in Schiedam and all research conducted has to be done from home. This has influenced the project since face to face meetings or interviews were impossible and it was difficult to get fully immersed in the BYD work environment. The pandemic made it difficult to get in contact with people. Normally there would be more moments of feedback during the day, through coffee breaks or other moments where people meet. Those moments are great to get some feedback on ideas, and led to new insights. Due to Covid-19 this project was fully done from home. This meant that feedback was limited to one or two times per week as part of mostly formal meetings.

16 | Discussion

Communication

All formal communication with BYD, the TU Delft and VanBerlo was digital. This is not ideal and therefore I have to say I am grateful for all the effort put in by everyone helping me during this project. They were always on stand-by and I was able to reach them and arrange meetings within a weeks' time. Everyone has been very enthusiastic about the project and was eager to help. I am especially grateful since I personally found it difficult to manage setting up meetings. I was often unsure what to ask or to present. Preparing meetings can be improved. One of my personal learnings is that I need to structure and prepare them better. Starting with setting a goal for each meeting, the lack of which sometimes lead to miscommunications. Overall though, I am very pleased with the communication.

16.3 Personal reflection

One of the main challenges was to form a designer opinion. Throughout the process it was difficult to voice my own opinion and recommendations around the design. I did not expect this to be a problem when the project started since I am known to have an outspoken opinion. However, during this project I felt insecure and tried to follow advise from BYD, VanBerlo and the TUDelft as best as I could, even though the feedback was sometimes conflicting. This sometimes led to a lack of ownership over the project and meant I was not 'leading' the project and could not present a clear advise in the form of: 'I would...'

Working from home has been a challenge. Even though I was thrilled to have this assignment I found it difficult to motivate myself. Being constrained to a 20 square meter space for working, living and sleeping made working on this assignment feel like 'homework'. I would have loved to be able to work on location and see the BYD office. I would have loved to meet the people with whom I worked and learn about their way of working. However, the enthusiasm of everyone involved made up for this and motivated me.

I am pleased with the final result. I believe that my view of the nearby future is plausible, and that I have accurately described the European context. Translating that into a design language is challenging but a lot of fun, even though I know that I have a lot to learn when it comes to vehicle design. A personal objective for me was to prove that styling is a big part of design. When I started my education I had a very romantic image about design. Famous designers such as Dieter Rams and Giurgetto Giurgiaro inspired me. However, during my study I found that there is less and less attention for the styling aspects of design. Especially during the master Strategic Product Design appearance is not at all taken into account. My personal goal with this thesis is to prove the strategic value of design. In the automotive industry the importance of styling is very clear but often also very superficial. I have tried to make it less superficial and approach styling with a strategic mindset to answer the question: Why something looks the way it looks. I hope this thesis proves styling can be used strategically and should therefore be a substantial part of Strategic Product Design.

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