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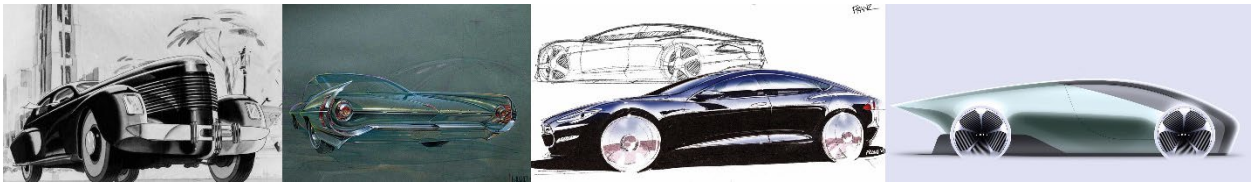
DESIGN

The Evolution of the Automotive Design Process

Introduction

The car design process has evolved as technology has evolved, from an entirely manual craft, to an almost entirely digital craft, and has evolved slightly differently in different areas and in different companies around the world, but although the tools have changed, the process is surprisingly similar to what it was 100 years ago - freehand sketching, the translation of the chosen sketch onto the package, and 3D modelling and visualization up to design freeze. The sketch is the language of the designer, and being fluent in that language is essential to explore and refine the vision, character, and the emotion that the vehicle should transmit. Whether with ink, pencil, biro, on a wacom tablet, or on a paper napkin, the sketch is the start and heart of the process. Then the designer needs to use the tools and resources at his/her disposal, to bring that idea into reality within the project constraints, and it is the success in maintaining that initial intent, that makes a car design successful or not.

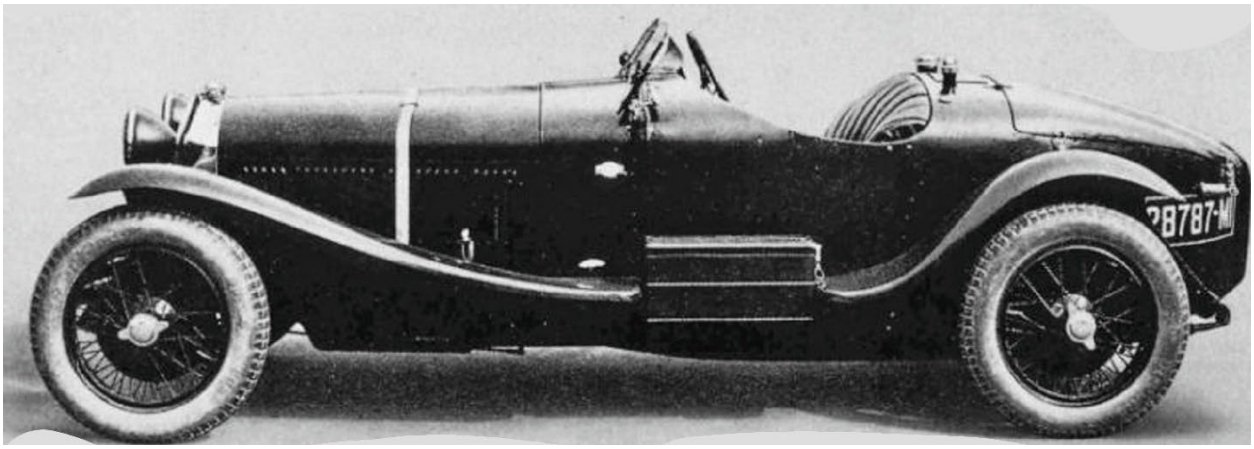


We now find ourselves at a knife edge moment in history where new technologies will disrupt the design process once again, this time though, threatening to rip the heart out of it.

The Early Years

Before the first world war, many of the bodies for early automobile companies were designed and produced by the same coachbuilders who built horse-drawn carriages, horseless car bodies were built according to traditional techniques, wooden body structures were mounted onto a chassis, with metal panels, beaten directly onto the wooden under structure. The real craftsmanship and art came from the panel beaters, bringing these vehicles to life.

Post World War I, the automobile's improved performance, initiated the coachbuilding era, where the coachbuilders started to commission artists, architects and designers, like Ghia with Mario Revelli di Beaumont, a young cultured Turin designer taking inspiration from the aeronautical industry creating vehicles like the 1929 Alfa Romeo 6C 1500 Super Sport Siluro.



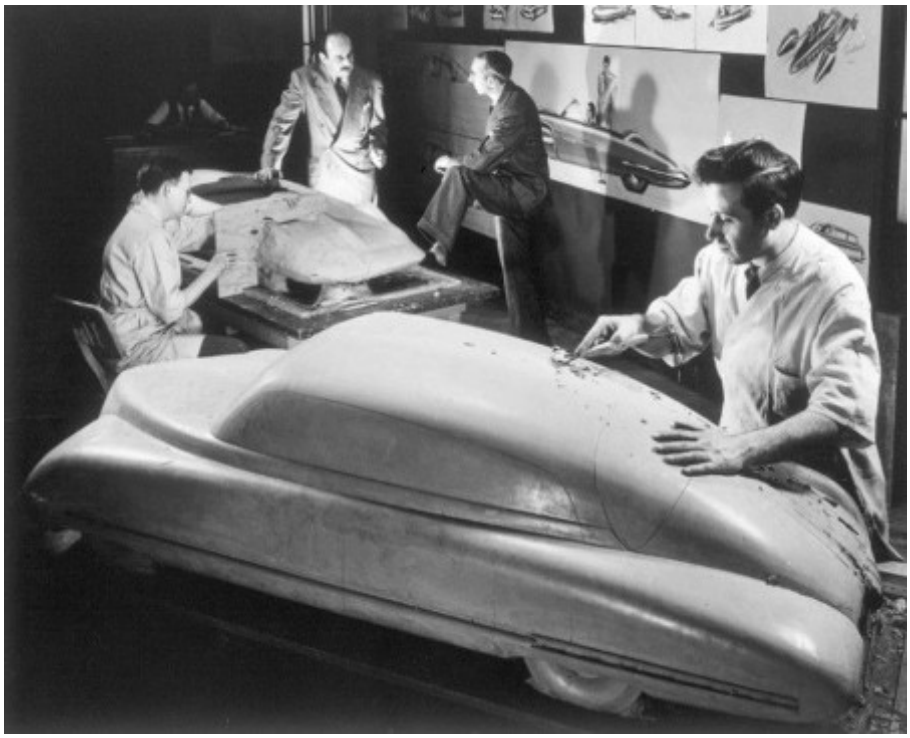
The automobile became the ultimate status symbol, a work of art and craft inspired by the art deco and "streamline modern" movements expressing power, speed and elegance. As the great depression hit in the 1930s, car production declined, but the one off bespoke industry grew, and created some of the most beautiful cars ever made from companies like Bentley, Alfa Romeo, Talbot, Delahaye, Studebaker, Duesenberg and this 1930s Bugatti Atlantic below.

Influences from the US

In 1913 the Ford Motor Company implemented the moving assembly line in the automobile manufacturing process, reducing costs, and increasing production capability, but the depression of the 30s reduced demand, so to maintain unit sales, General Motors head Alfred P. Sloan Jr. suggested annual model-year design changes to convince

car owners that they needed to buy a new replacement each year, a strategy called planned obsolescence, still prevalent in the auto industry today. Henry Ford did not initially like this strategy and GM surpassed Ford's sales in 1931 and to become the dominant company in the industry. To keep up with the model year changes, GM appointed Harley Earl as Director of Design, who created the first comprehensive in-house design studio, known initially as the Art and Color Section, and later as the Design and Styling. Here he introduced the car design process that remains relevant today nearly 100 years later: “freeform” drawing working alongside the draftsmen, Clay modeling (or clay model making) for design models and a colour and trim department, he also introduced testing in the marketplace for the designs.

The use of a synthetic clay – or automotive clay introduced by Harley Earl (he would model cars with his brothers when a youngster out of natural clay) is smeared onto a model when heated, then the surfaces can be sculpted by scraping off the clay with various clay tools when the clay cools and hardens, leaving almost perfect surfaces when modelled by skilled hands.



Other influences from American automotive studios was their eye catching rendering and illustration style. The quality of the design proposal sketches and renders helped to sell the design studio vision to upper management, and became a competitive advantage to the individual designer to get their proposal selected. Flashy gouache paintings, canson and later velum paper renders became the core craft of the designer. The trends of sketching and rendering spread across the world as designers moved from studio to studio, trends developed in the design schools that were emerging in the 1960s and through publications and car design magazines like Auto and Design founded by Fulvio Cinti in 1979.

The quality of car design illustration got to such a high level that these renders and illustrations became pieces of art and an art form in itself, with notable designer/illustrators like Syd Mead (Blade Runner 1982), Camilo Pardo, and Daniel Simon, all making a living from their illustrations.

Once a design theme was selected from the freehand sketches, the design intent was put on the package. Post WW2 tape drawings allowed designers to refine the proportions, lines and details in full scale. Automotive tape of varying thicknesses gives the tape more or less flexibility and was an excellent way of creating high quality curves and to refine the design. This was applied onto stretched milar paper which was held down under tension.

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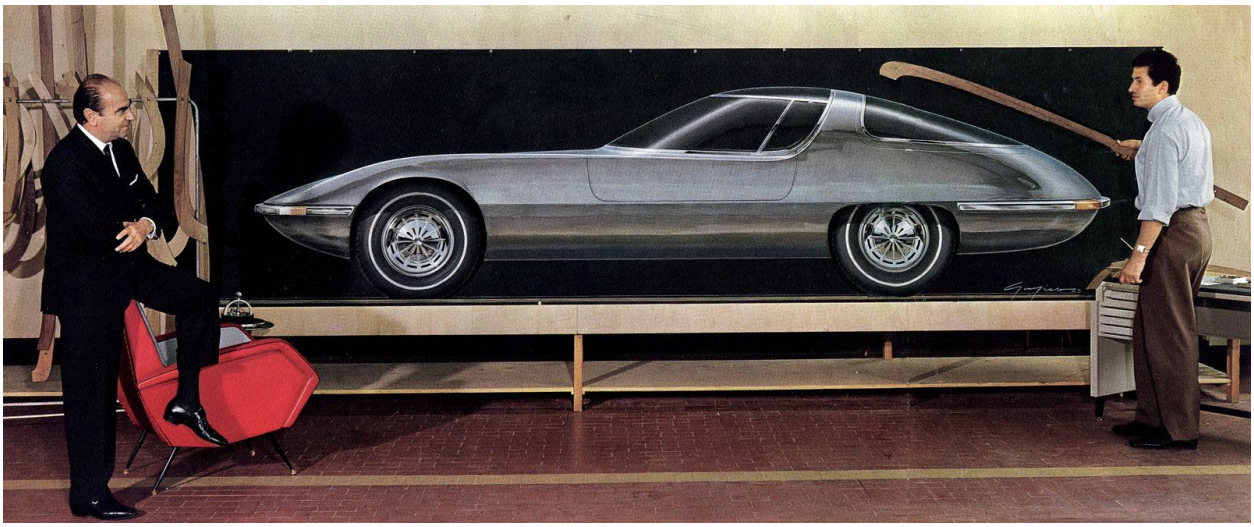
Carrozzerie Italiane

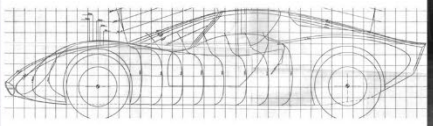
In North Western Italy, during the coachbuilding era after the first world war, infamous carrozzerie emerged like Bertone, Zagato, Isota Fraschini and Farina, later to become Pininfarina. After the second world war the coachbuilders transformed into design studios catering to automakers around the world having a huge influence on car design trends up until the 1980s. This continued in the 1990s when the Japanese and Korean manufacturers sourced designs from these styling studios, and in the 2000s from the Chinese manufacturers.

An intriguing example of this Italian design influence was the Healy Nash Roadster by Pininfarina, which had a drivetrain and some chassis components from Nash, Body work from Pininfarina, and then finished off and assembled at the Healy factory in the UK, (where our studio is currently located.)

The reason for this success and the global influence, was due to a number of factors:
There were various engineering, design and technical schools in Turin turning out designers and draftsmen on a large scale after WW2.
There was an abundance of skilled craftsmen, building the models, prototypes and limited series cars, most of whom came from the South of Italy.
But I think most importantly, there has always been a culture and passion for style which permeates all aspects of Italian life, design and fashion, fueled by excellent food, wine and plenty of café ristretto.
These Italian coachbuilders and studios studios commissioned and bred designers who's services were sought globally including Giovanni Michelotti, Ercole Spada, Bruno Sacco, Marcello Gandini, and below Giorgetto Giugiaro when working at Bertone.



The process of design in Italy evolved relatively slowly but methodically, picking up influences from the US and the rest of Europe. The rendering style of choice up until the 80s were orthogonal drawings on canson paper, to illustrate the design intent. This would then be taken by the "piano-di-forma" team (draftsmen) who would draw out the car in 1:1 scale with cross sections and longitudinal sections, which would then be used to create a wooden "buck" which was put together and refined by skilled wood workers with hand lathes, and was used to panel beat out an model, prototype or limited series car.



The Italian studios used different modelling materials in the different studios which all affected the final design. The Ghia studio took on clay modelling as it was bought by Ford, but most Italian studios like Pininfarina used an epoxy-based resin called cibatool, as they could continue to use the wood hand lathes to fine tune the surfaces, whereas Bertone used plaster, which had to be "smeared" onto the model using wooden sections. It became quite obvious looking at the final designs which modelling material had been used. The models developed in clay tended to be more organic, the hard epoxy resins generated more structured form, whereas the Bertone plaster modelling technique often lead to an extruded look.

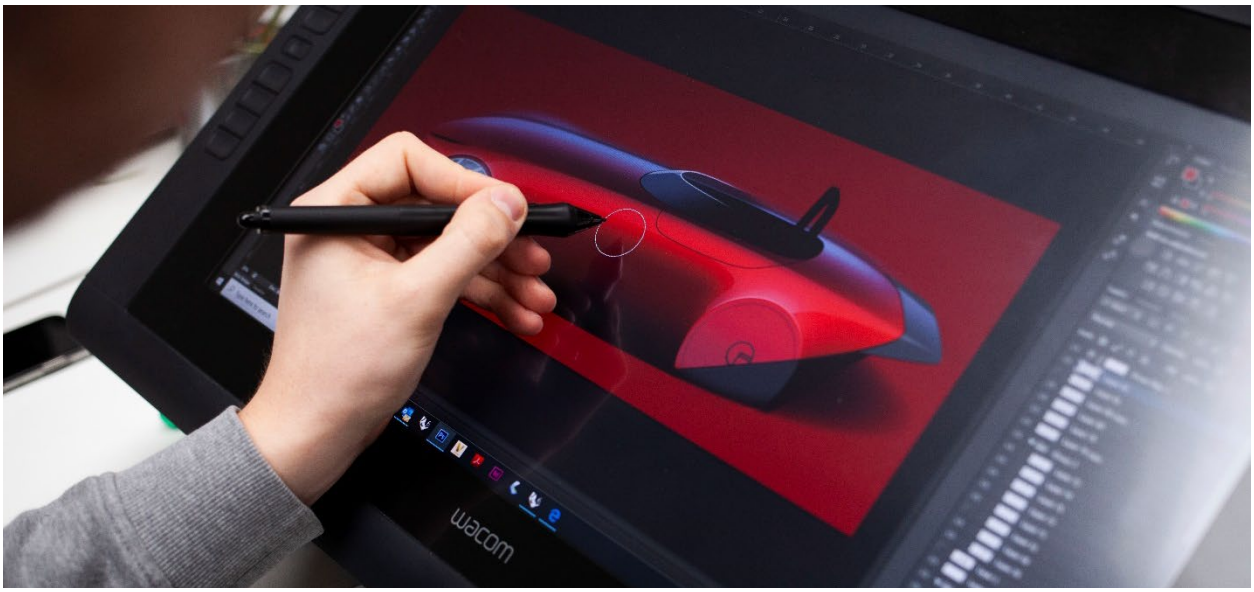
Great Britain was Europe's leading manufacturer of automobiles until the late-1960s. Car design in Britain was different from other European designs largely because British designers were not influenced by other European art or design movements, and the independent development of design tools, like the sweep set. Skilled British designers, panel beaters, and clay modelers have been prevalent in studios across the globe, partly due to their involvement with the motorsport industry, and because of UK recruitment companies subcontracting resource across the automotive industry.

Design Schools

Design Schools have played a key role in developing the automotive design process, and in developing designers, design styles and trends across the industry.
The first Industrial Design School was in Germany - Pforzheim, which today has a leading undergraduate transportation design department, founded on Bauhaus principals, this school has played a key role in shaping the Teutonic German design, complementing their highly engineered cars. CCS Detroit and Art Center College of Design California have been hugely influential on the design process globally, instilling high standards of illustration and modelling.
The Royal College of Art London has a post graduate course, a melting pot of graduates from around the world, it has a less structured approach, but many of its alumni have gone on to be influential leaders in the industry. Most countries with an automotive industry now have valid transportation courses on offer.

The Digital Revolution

In the late 80s and early 90s CAS (Computer Aided Styling) alongside various rendering plug-ins started to be used in the car design studios, and 2D visualization software were used to render hand sketches.
By the turn of the century, apart from the initial sketch phase the computer started to take over the process. Faber-Castell pencils, Markers, chalks, fixative spray, gouache, velum, mylar and automotive tape was replaced by the wacom tablet and 1:1 scale projection, many of the hand modelling teams were transferring onto Computer modelling software, as the clay models were being milled. Many OEMs still stick with clay mainly because a physical model is easier to evaluate especially by the senior managers.



Over the last 10 years, improved processing power, the gaming industry, algorithm based software, VR, AR and now XR, have started to have an impact on the process, reducing time scales and improving the rendering quality which can now be animated in real time.

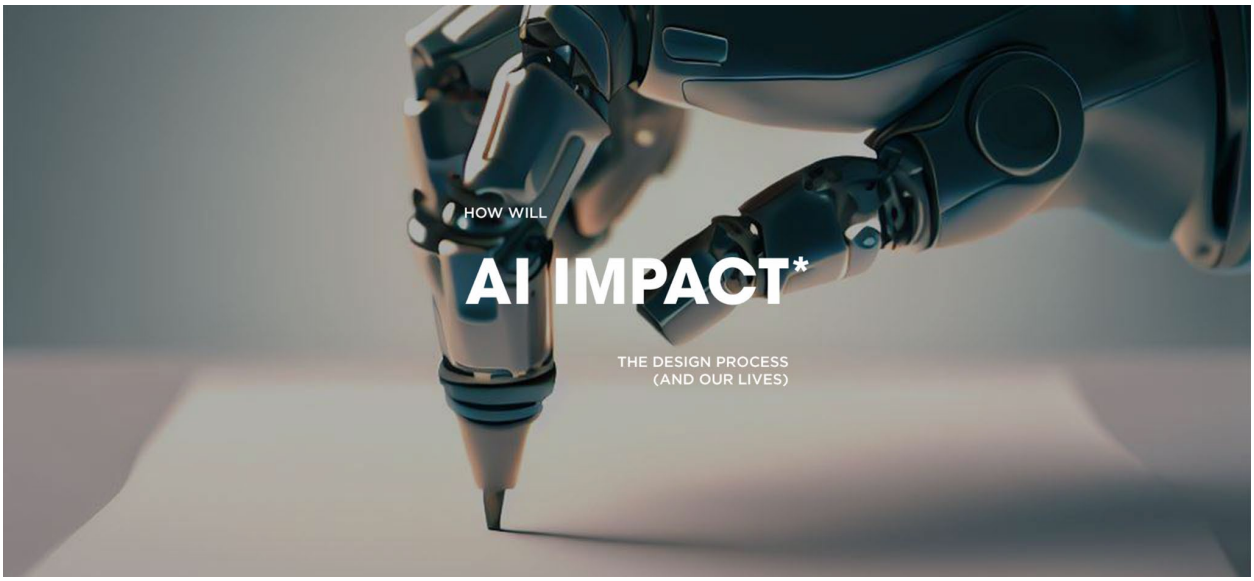
In-House vs Consultancy

I have lead both consultancies and in-house design teams, and they both have certain advantages and disadvantages. In the 90s the OEMs brought the design in-house, as design became a strategic key differentiator in a very competitive market and a challenging economic climate. The advantages of in-house design, is that a company can invest in resource that suits the product development needs. Working for one brand means that the team get a deep understanding of the Brand positioning, the target customer and the manufacturing technologies and constraints. To ensure a breadth of proposals and a healthy competition, OEM's opened satellite studios in strategic areas around the world. The in-house processes tend to become standardized, and resource allocated to a specific part of the process to maximize efficiencies.
The advantage of the consultancy is that they are unencumbered with the daily issues and politics of a large company and come in with a fresh eyes approach. They have diverse experiences cross pollinating ideas from different sectors. They are more flexible and dynamic, and can be used only when needed. The design process in a consultancy will flex to suit the client, and the resource also needs to be more flexible as they work across more phases of the process.
Here at Astheimer Design, we are generally commissioned to bring ideas to market as quickly and efficiently as possible, with clients that require visionary design with practical engineering.

So, we move quickly into 3D development from initial sketches and renders, using sub-d software, and then refine the chosen direction with nurbs modelling up to design freeze. We will mill in-house ¼ scale models, and full scale ergo models, for final design validation. We then work with an engineering provider to develop the data for manufacture of the interior and exterior body parts, user interface and all other touch points of the product.

The Future of the Design Process

AI will play a role in nearly every aspect of the design process, it will create a step change in the way we interface with computers and in the way they interface with us, it will be a powerful tool helping to bring ideas to life, increasing productivity. It will expedite the manual processes, sketch to render, render to 3D, 3D to DFM? But the models are already playing a role in the "heart" of the creative process, and although AI can spew out hundreds of iterations, which can be useful, especially on the days when inspiration is lacking, it is also a distraction, as there is a lack of meaning to what it does no matter how careful you "prompt" the models, there is also an air of familiarity to the iterations it creates, as these come from a combination of existing data.



I don't believe that visionary Design can be achieved through a mathematical equation, if it could, that will be the end of the art and craft and passion that has fueled the design process over the last 100 years. So, my advice to all budding car designers, is not to cut corners, but to learn your craft, become a great drawer, so you can explore ideas and refine them, and then use the tools at your disposal to develop your thoughts as well as you can.

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