

# DESIGNING TAKAYA



A CANADIAN HYPERCAR

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BY MUSSAWER AHMED

PHOTOGRAPH BY CHERYL ALEXANDER

# WHY TAKAYA ?

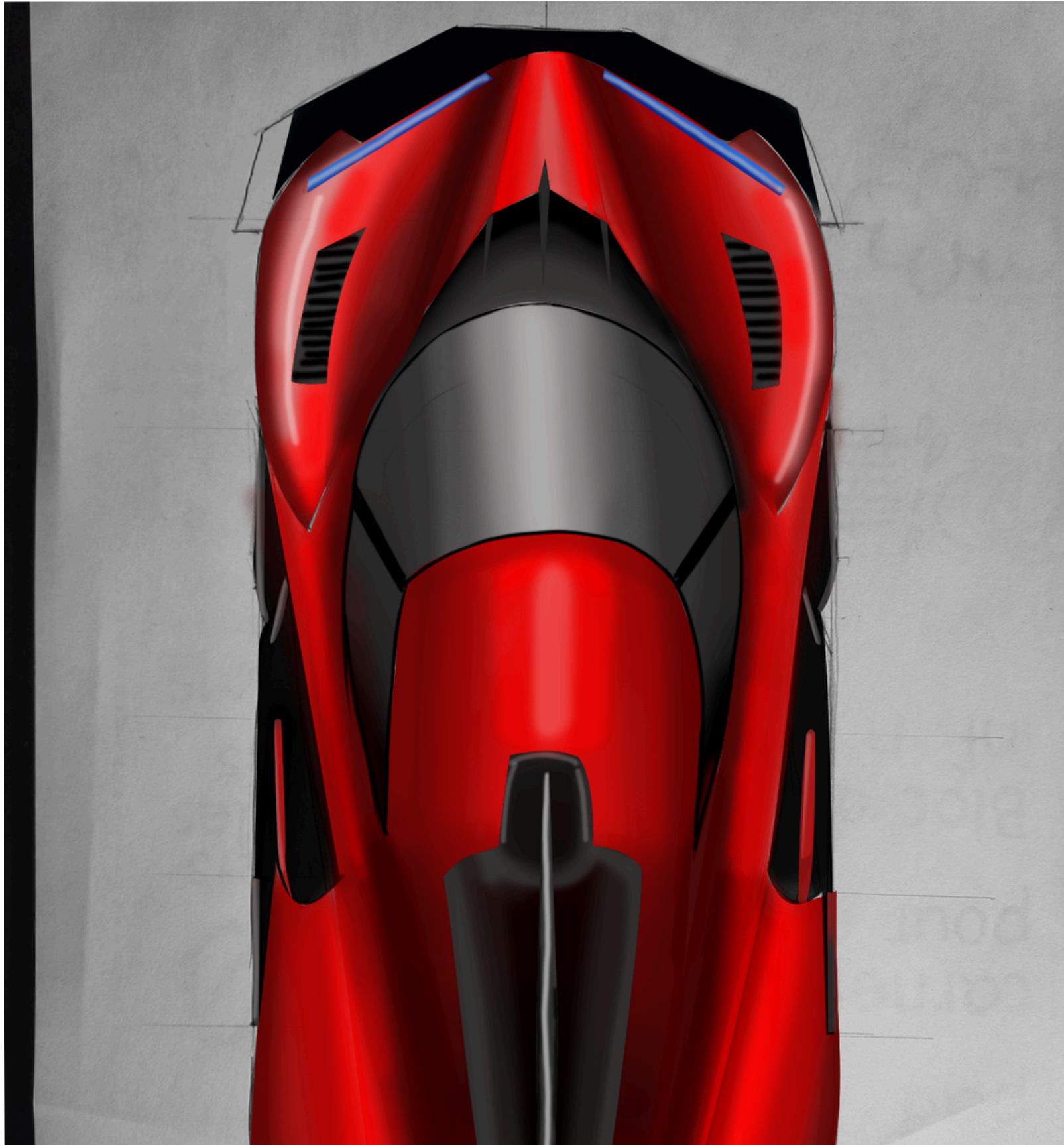


**The name Takaya was inspired by the story of the lone coastal wolf from British Columbia, whose life came to symbolize resilience, independence, and adaptation within the Canadian landscape. Rather than choosing a generic futuristic name, I wanted the project to carry a stronger sense of place, identity, and natural strength. Takaya reflects a vehicle that feels self-assured, enduring, and distinctly Canadian in character.**

## **THE STORY OF TAKAYA?**

Takaya was a real lone coastal wolf who lived for years on small islands near Victoria, British Columbia, surviving by himself in a marine environment. He became well known in Canada because his story represented independence, resilience, intelligence, adaptability, and survival against the odds. He was documented by photographer Cheryl Alexander, and his life later became the subject of the documentary Takaya: Lone Wolf.

What made Takaya special was not just that he was a wolf, it was that he lived alone, adapted to an unusual environment, and survived in a way that felt almost impossible. He swam to remote islands, learned to hunt different prey, and lived outside the normal pack structure that wolves are usually known for. That gave him a symbolic meaning beyond the animal itself: he became a kind of Canadian story about endurance, isolation, self-reliance, and surviving in harsh conditions.



# Why a hypercar?

This project began with a larger question around why Canada, despite having such a strong automotive supplier and manufacturing base, still doesn't have a globally recognized performance brand of its own.

I wanted to explore whether industrial design could help frame not just a vehicle, but a whole platform and identity around that gap.

I chose the hypercar category very intentionally, because it represents the highest level of integration between design, engineering, performance, aerodynamics, and brand identity.

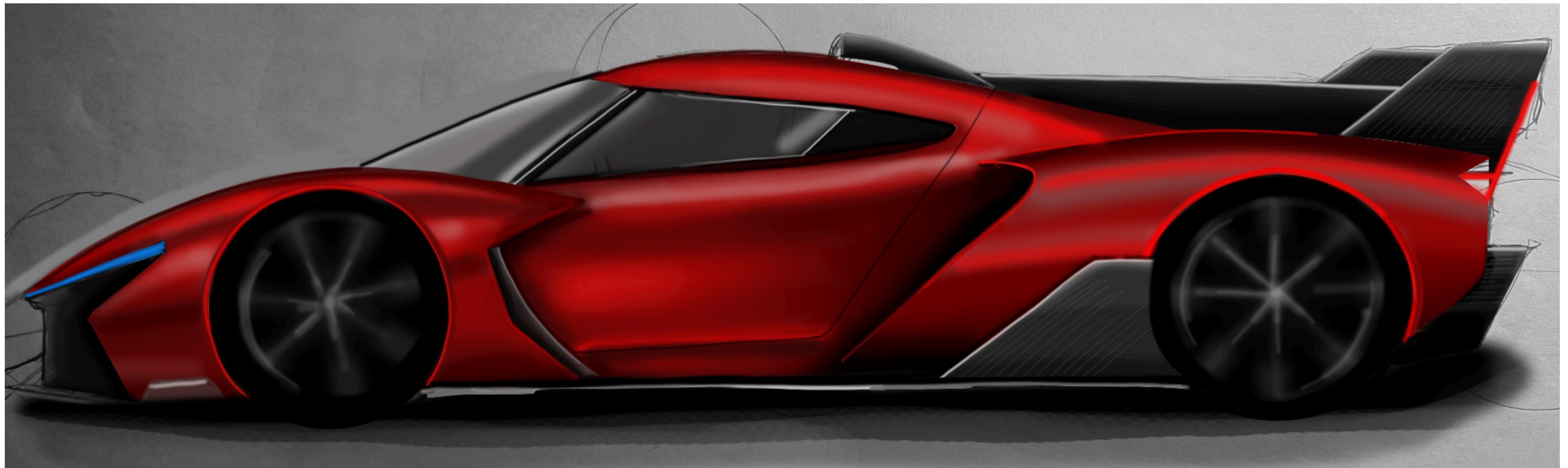
So rather than starting with a mass-market product, I used the hypercar as a strategic entry point , almost like a national flagship , to test what a Canadian performance OEM could look like

# What Makes It a Hypercar?

A hypercar is defined not only by speed, but by the integration of extreme performance, lightweight construction, aerodynamic efficiency, advanced systems, and purposeful form.

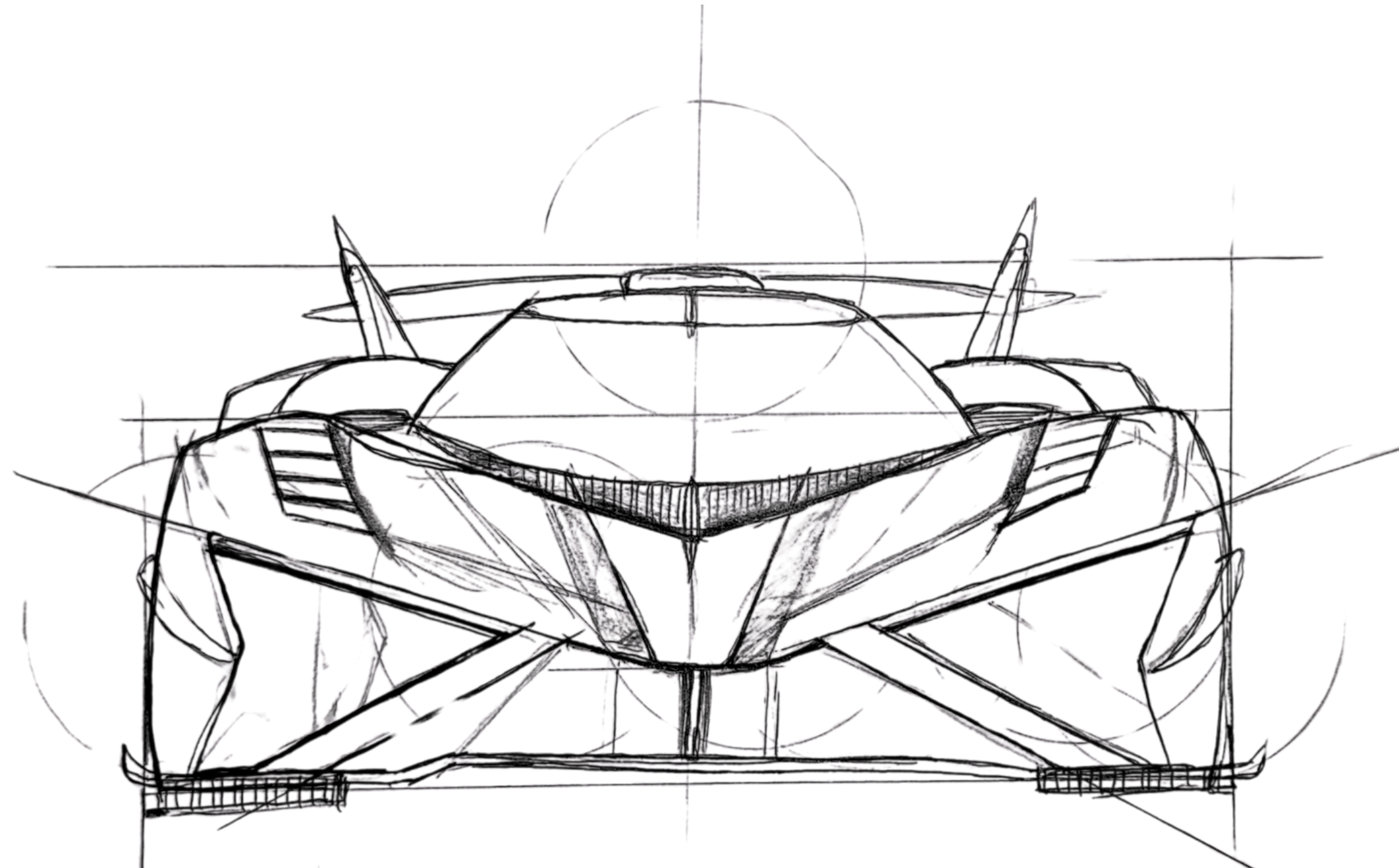
In this project, that is expressed through a sculpted aerodynamic body, controlled air intake and exit pathways, a lightweight carbon-focused architecture, track-oriented proportions, and a system layout designed around performance, cooling, airflow, and driver experience.

Elements such as the front aero channels, side intakes, rear extraction zones, hybrid powertrain packaging, and low-volume performance-focused design language position the vehicle not as a conventional sports car, but as a halo-level performance machine.



With no prior experience in automotive design, the process began by building foundational knowledge through proportion studies, design analysis, and visual research. This included learning from Berk Kaplan's automotive sketching course on Domestika, design breakdowns and talks by Frank Stephenson (former McLaren P1 designer), and aerodynamic / engineering case studies from former Mercedes-AMG Formula 1 engineers such as Kyle Engineers, alongside online design references, hypercar case studies, and books on race car aerodynamics, vehicle dynamics, and form development.

This phase focused on understanding proportion, stance, overhangs, greenhouse layout, curvature, and aerodynamic logic, forming the foundation for translating Canadian identity into a high-performance vehicle.

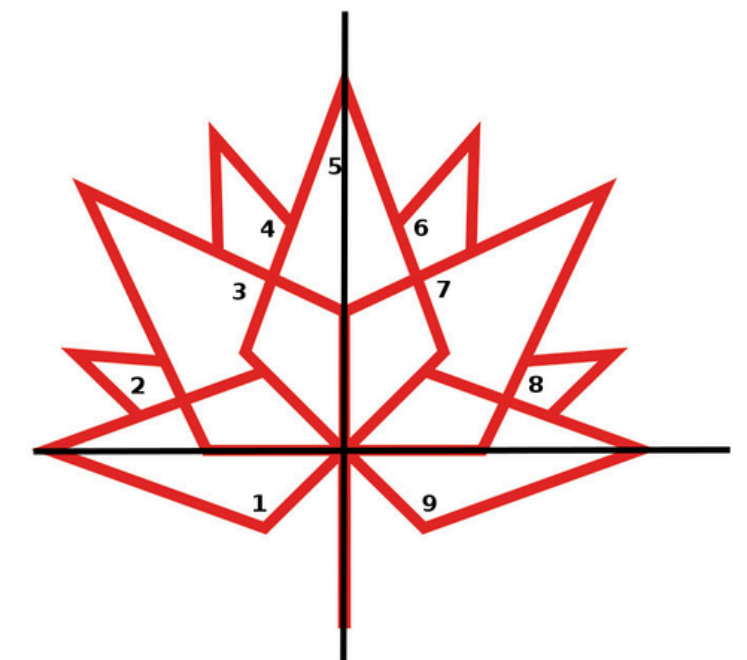
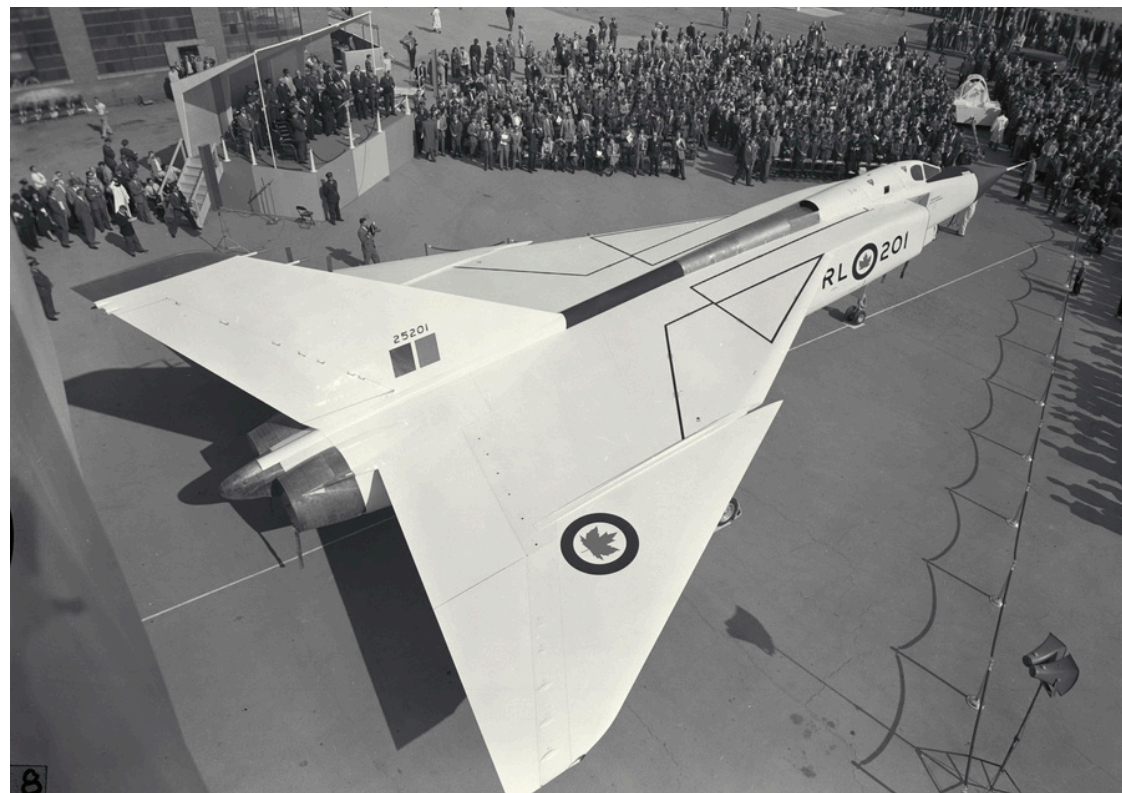


# CANADIAN INSPIRATION

The design began by exploring a uniquely Canadian identity through references such as the Avro CF-105 Arrow, the aerodynamic form of the Peregrine Falcon, and the symbolic geometry of the Maple Leaf.

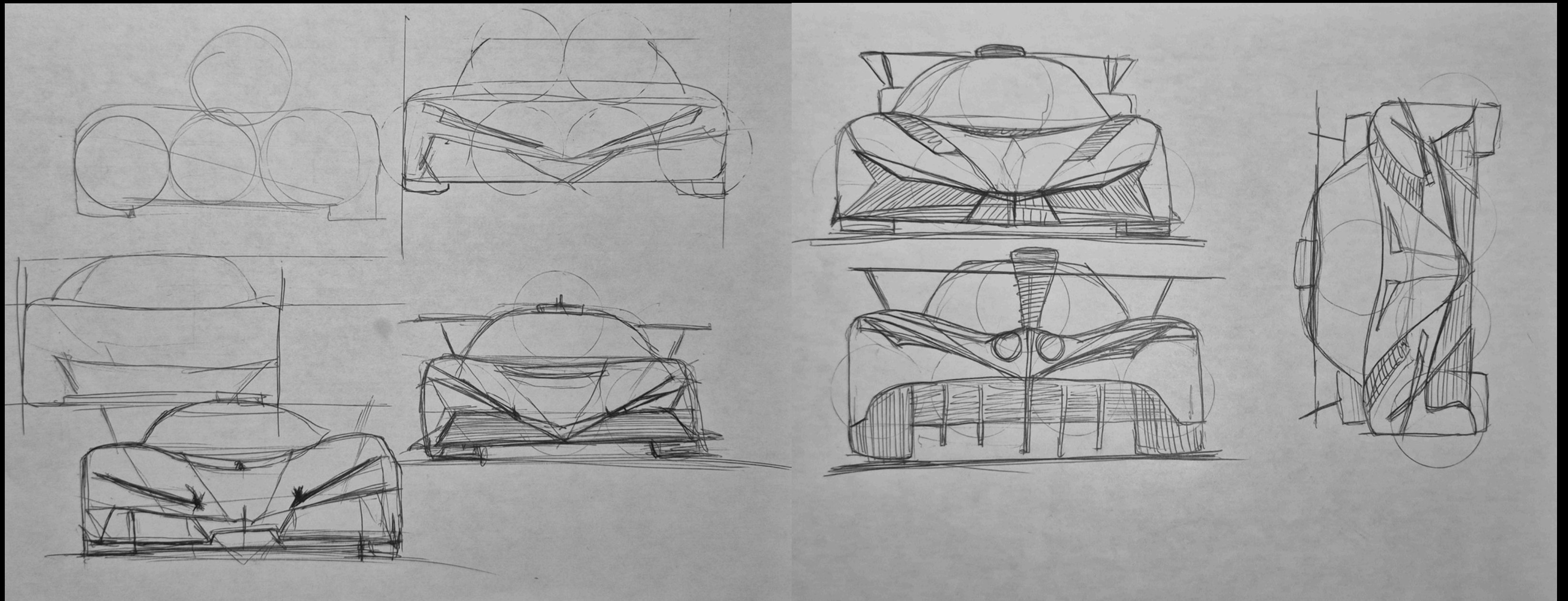
Together, these references helped frame an initial visual language around speed, precision, engineering ambition, and national character.

Rather than applying Canadian symbolism literally, the goal was to translate these influences into a performance-oriented design language through proportion, stance, surfacing, and aerodynamic expression.



The early sketch phase focused on understanding what makes a hypercar feel aggressive, fast, and performance-oriented at first glance. I initially explored visual aggression through deep-angled headlights, sharp leading edges, low front stance, wide proportions, and triangular surface language. However, as the sketches developed, I realized that the forms began to feel visually unstable and proportionally unresolved.

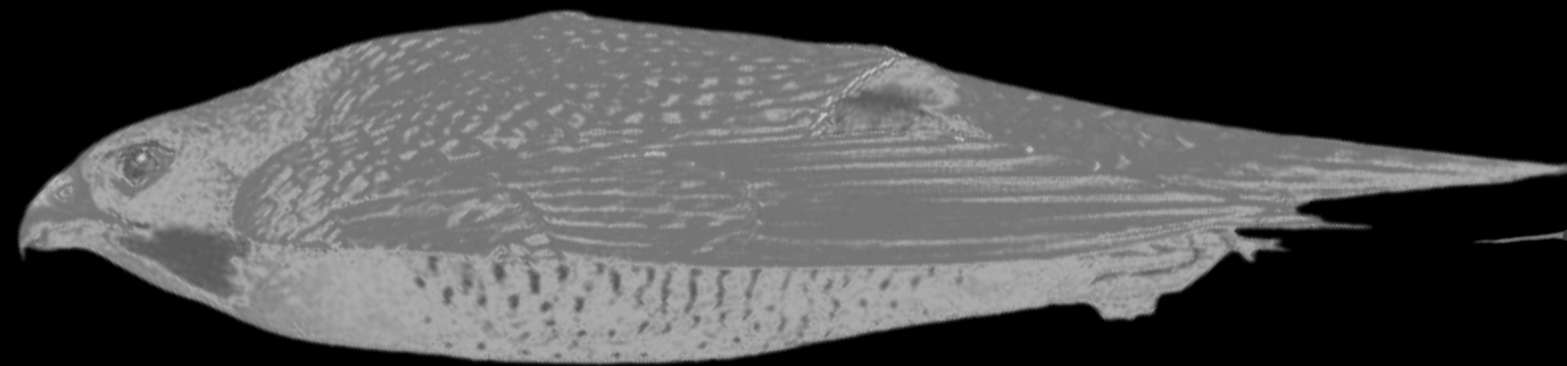
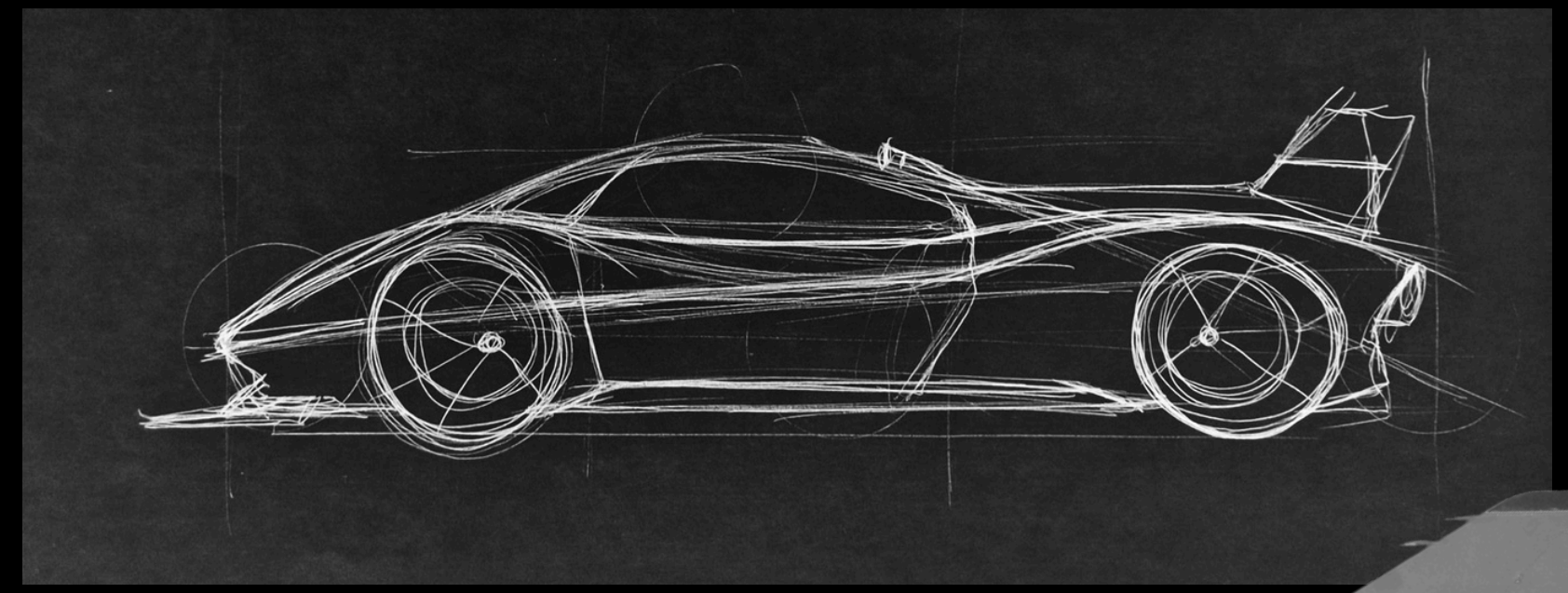
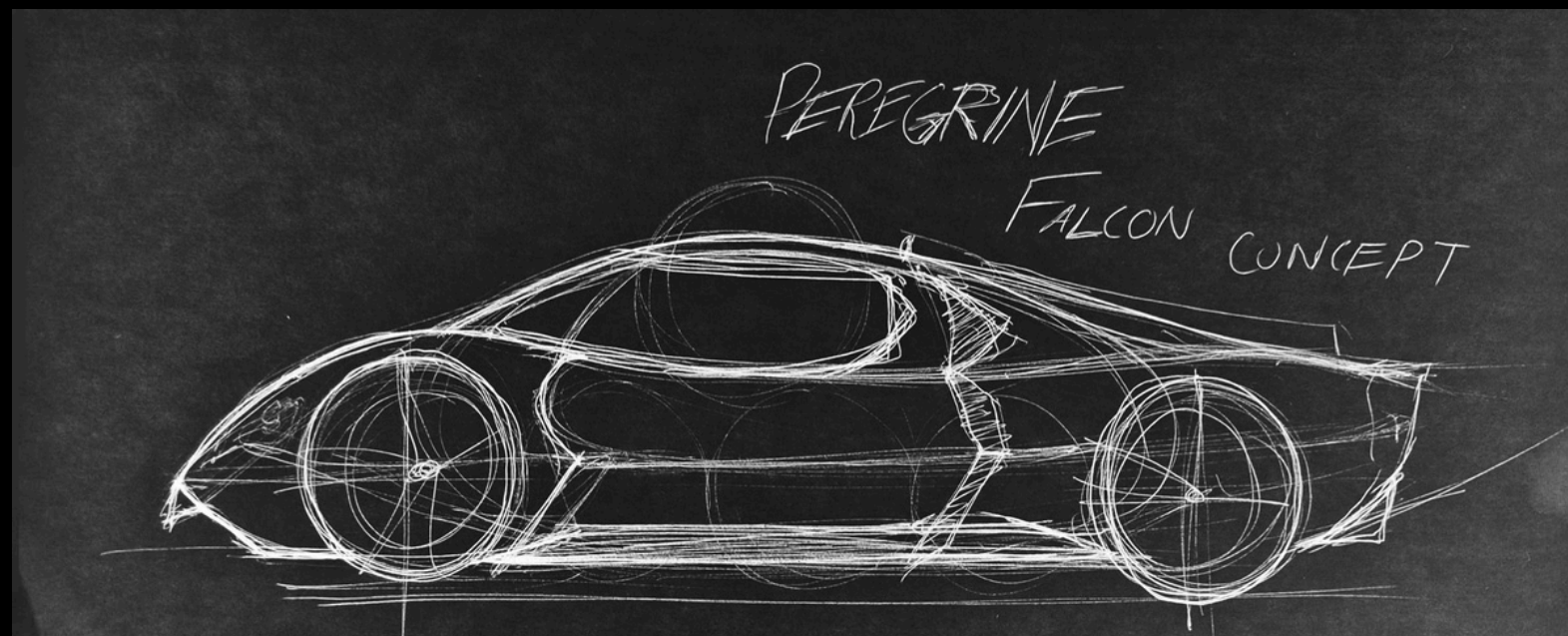
This led to an important shift in the process: before refining details, I needed to first establish a stronger overall silhouette and volume balance. This stage helped identify the difference between surface aggression and a more convincing, performance-driven form language



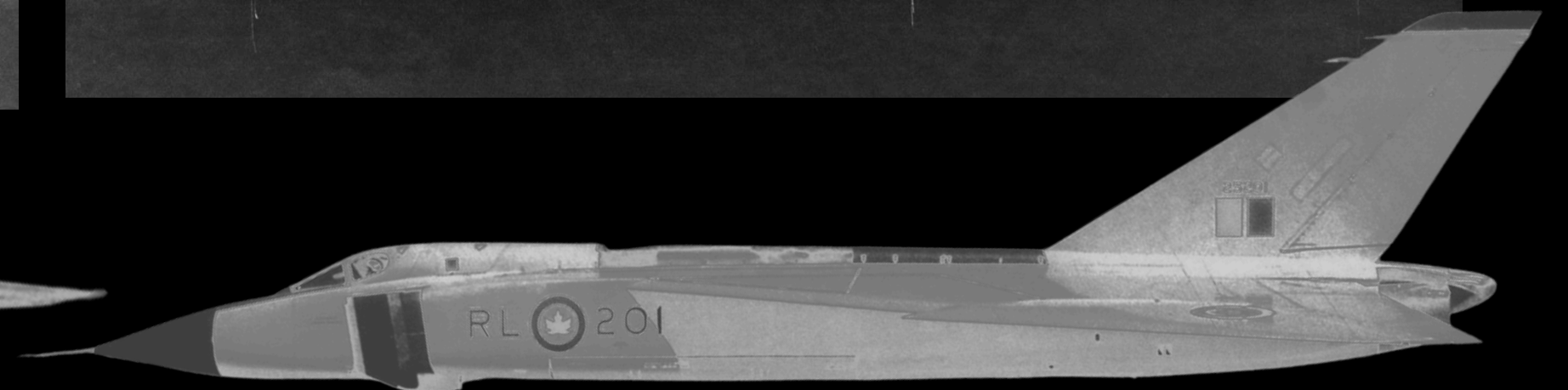
After the initial front-end explorations, I shifted my focus toward the overall stance and silhouette of the vehicle.

At this stage, I began combining references from the Peregrine Falcon for body flow and poised stance, and the Avro Arrow for directional sharpness and aerospace-inspired tension. This helped move the design away from overly graphic aggression and toward a more resolved hypercar proportion and body language.

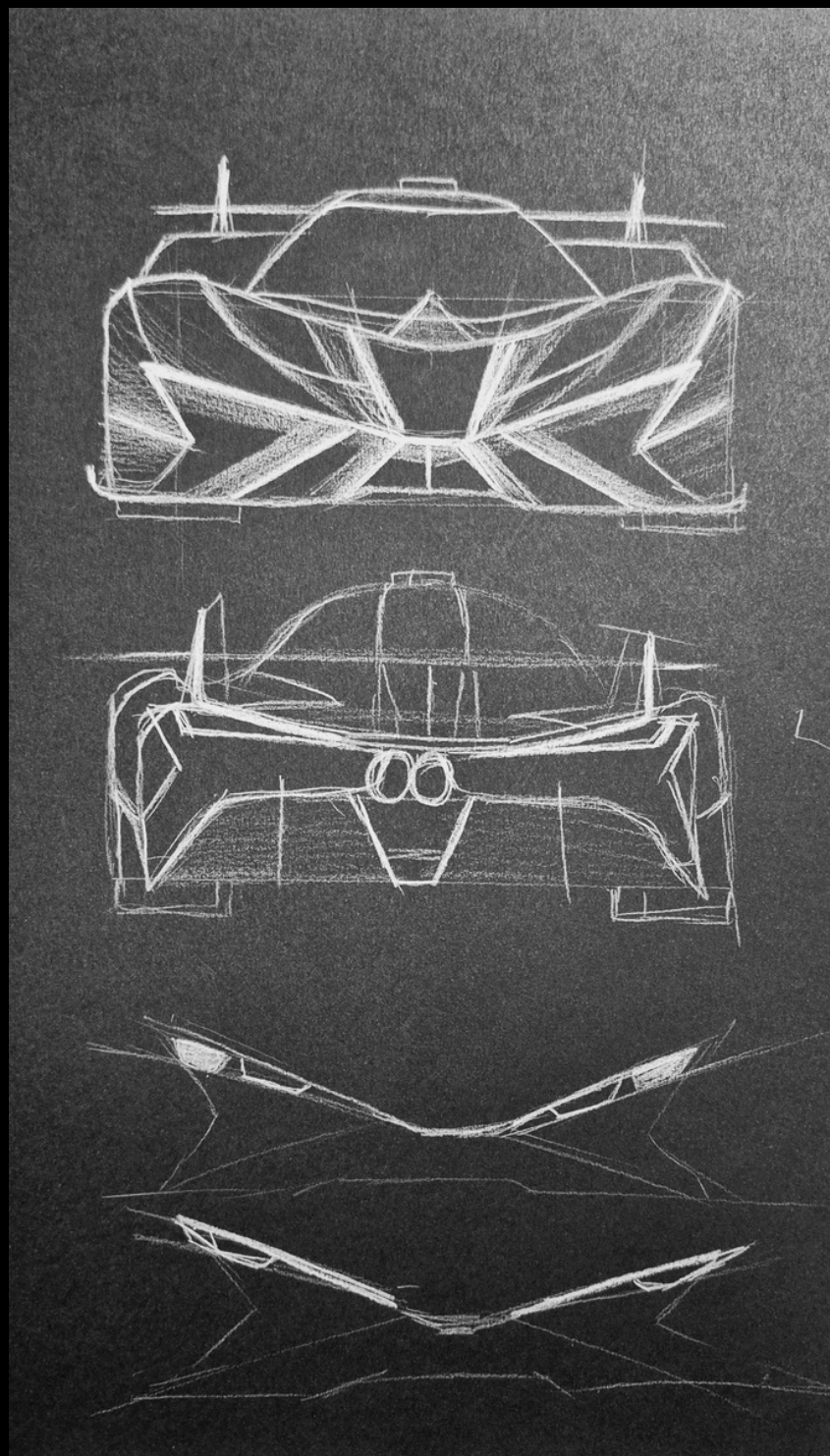
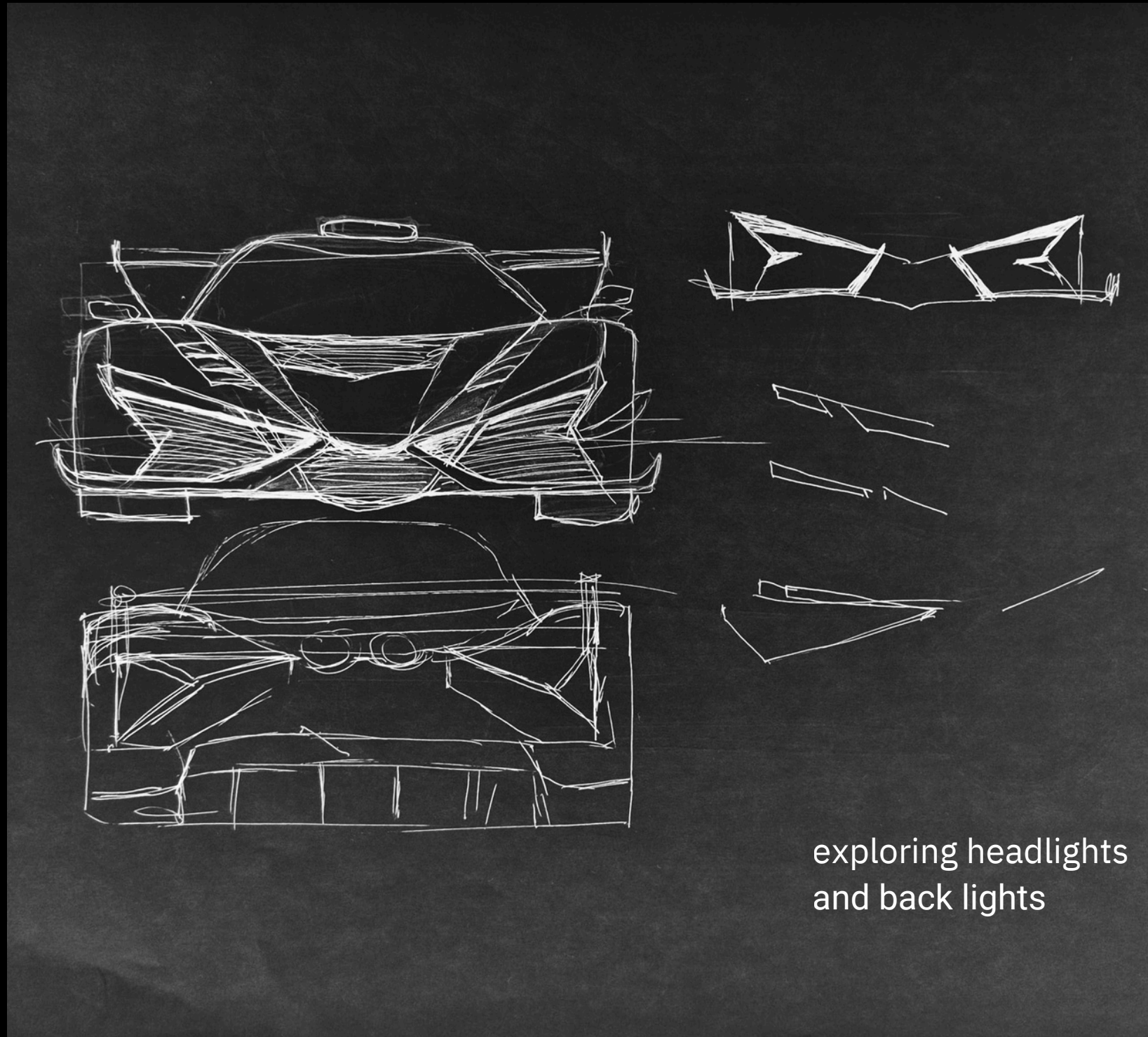
The falcon-inspired form introduced a more curved, aerodynamic, and predatory body, while the aerospace references helped maintain a sense of precision and forward intent. Through peer feedback and informal user testing, this direction was consistently perceived as more aggressive, more believable, and more hypercar-oriented.



Peregrine Falcon



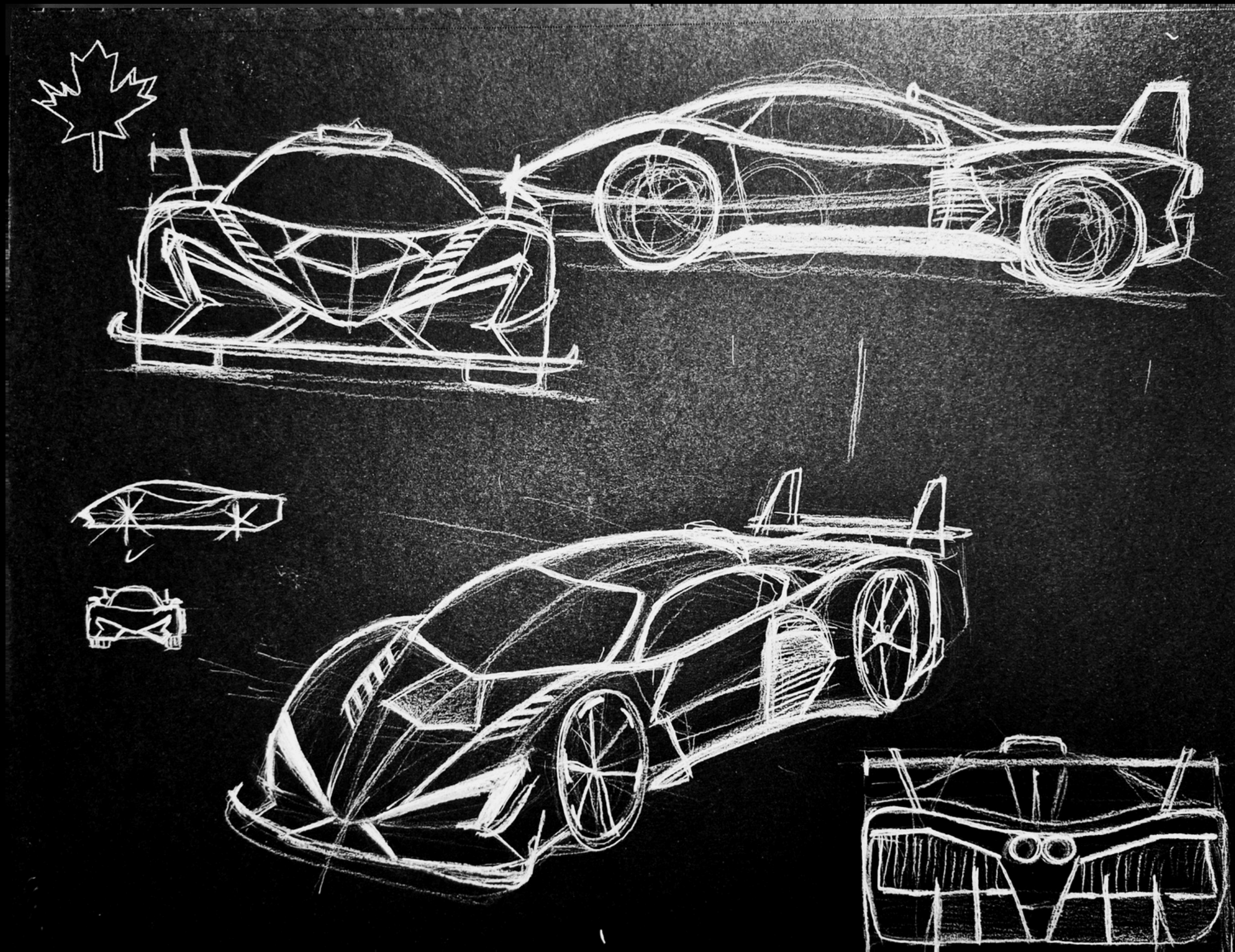
Avro Arrow



Following the development of the overall silhouette, I shifted focus toward defining a distinct front-end identity.

At this stage, I explored the geometry of the Maple Leaf as a guiding framework for the headlight signature and front surface language. Rather than applying it literally, the geometry was abstracted into sharp, angular lighting forms and intersecting lines, creating a recognizable and cohesive visual identity.

This approach marked a key turning point, where the design began to feel less generic and more representative of a Canadian performance brand, combining aggression with symbolic meaning.



At this stage, I began exploring how the major design references could work in unison rather than as separate inspirations.

Elements inspired by the Avro Arrow, such as vertical fins and aircraft-like rear surfaces, were tested alongside the body dynamics of the Peregrine Falcon, which influenced the curvature, muscular tension, and aerodynamic flow of the vehicle.

Simultaneously, the Maple Leaf geometry continued to shape the front identity and surface intersections, helping tie the design back to a Canadian visual language.

While the rear design was still unresolved at this point, this phase was critical in building a more unified and intentional form vocabulary across the vehicle.

As the design progressed, I felt a strong pull toward making the vehicle more aggressive, futuristic, and visually intense.

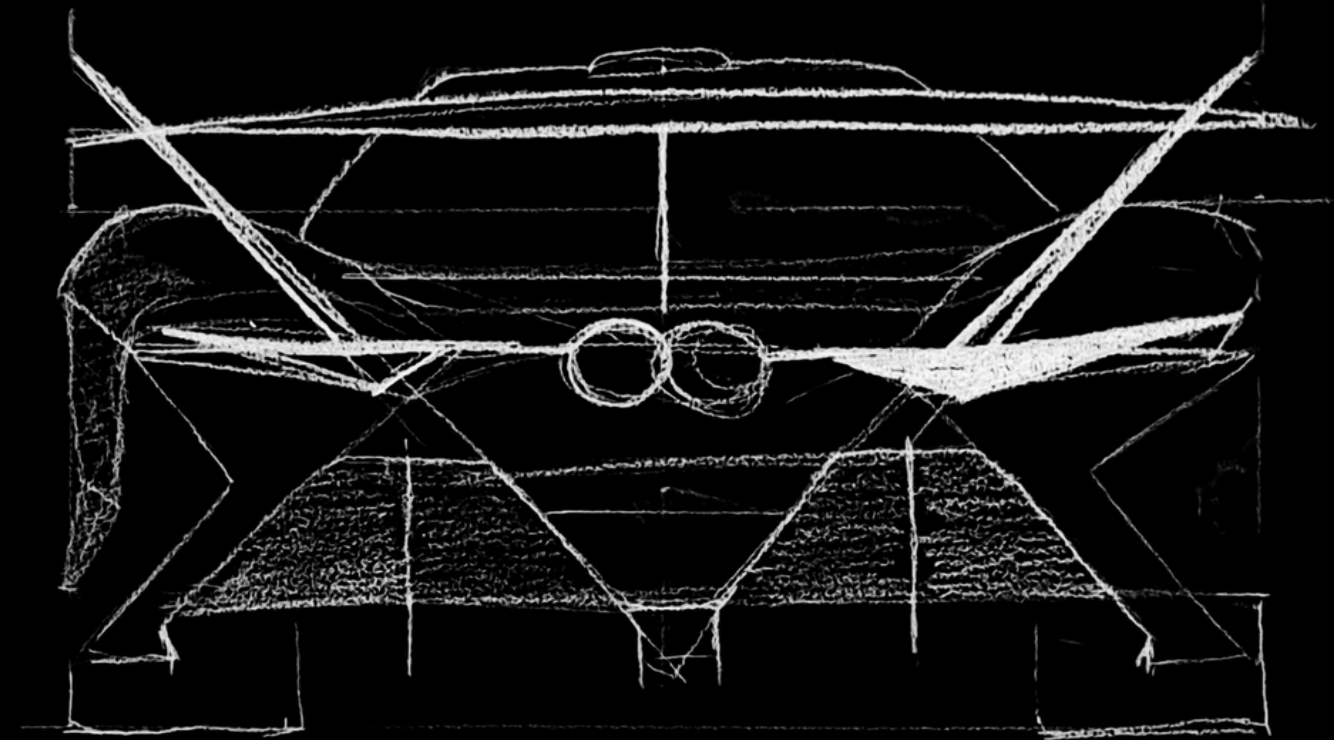
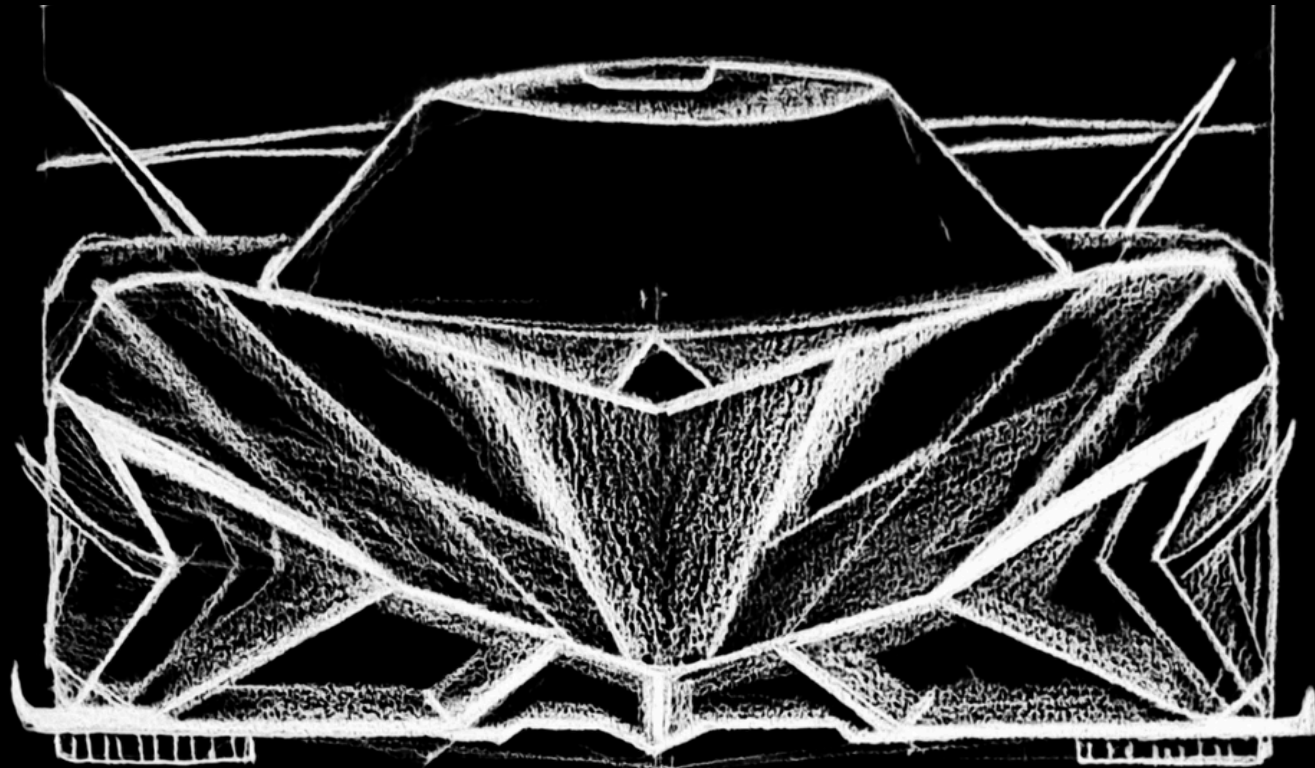
To control this direction, I introduced a structured grid system based on the golden ratio, drawing from my background in architectural thinking to organize proportions and key surface relationships.

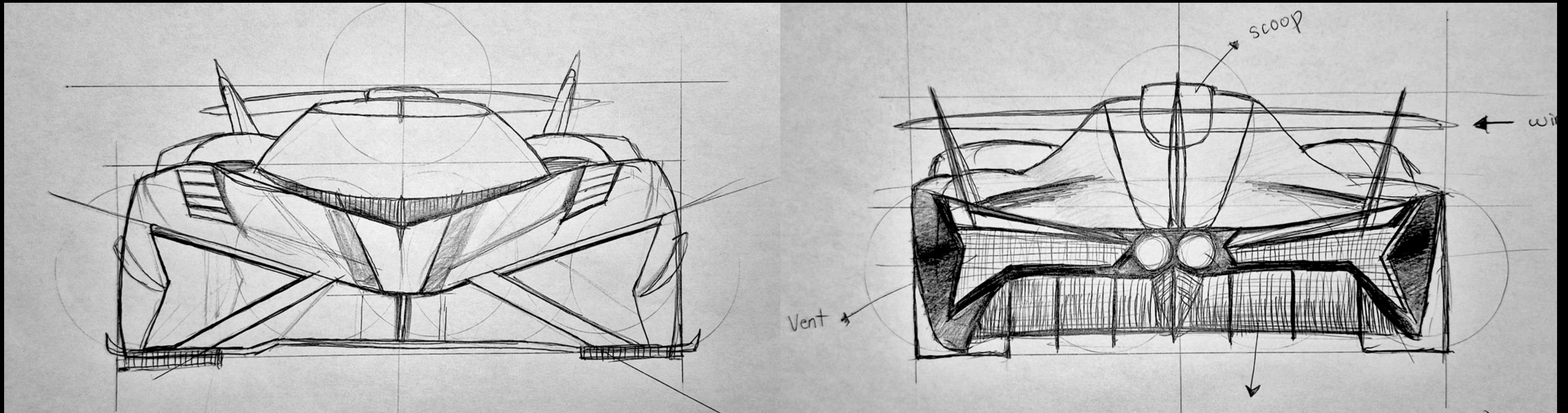
I also began using the same guiding lines established in the front headlight signature, but pushed them into a more radical and geometric direction to explore how far the visual language could evolve.

This phase focused on creating a design that was highly controlled, geometric, and visually striking, where surfaces and intersections were defined through sharp angular relationships and symmetry.

While this direction was personally very appealing and visually exciting, I realized that it began to feel overly rigid, less aerodynamically natural, and slightly disconnected from the Canadian identity I was trying to establish.

As a result, I chose to step back from this more extreme direction and continue refining the more balanced form language, which better preserved both the performance intent and the emerging Canadian brand identity.





At this stage, I began refining and consolidating the front and rear geometry, resolving the overall visual language of the vehicle and establishing a more finalized design direction.

This phase focused on clarifying the core identity of the car, its front signature, rear architecture, and the balance between aggression, symmetry, and brand recognition.

Once the overall form language began to feel resolved, the project naturally shifted from styling and visual expression into aerodynamic development, where I started exploring how the form could also function as a high-performance system.

This included investigating the logic of front air intakes and exits, side cooling pathways, engine cooling intake placement, roof scoop packaging, rear venturi tunnel/diffuser behavior, and overall airflow management across the vehicle.

# AERODYNAMICS

The aerodynamic development of Takaya focused on balancing downforce, cooling, airflow cleanliness, and performance-driven form. Rather than treating aerodynamics as an afterthought, the body was shaped as an active performance system, where air is guided, accelerated, cooled, redirected, and extracted through specific zones of the vehicle.

The design process was informed by key aerodynamic principles used in motorsport and modern hypercars, including:

- Laminar airflow
- Dirty air and wheel wake management
- Air entry and exit pathways
- Cooling efficiency
- Pressure management
- Ground effect / Venturi tunnels
- Drag reduction
- High-speed stability

Before refining the form, I had to understand how airflow actually behaves around a high-performance vehicle. So instead of designing only for appearance, I began studying how air should enter, move through, and exit the vehicle in a way that supports cooling, downforce, and stability. This helped me treat the car not just as a sculptural object, but as a system shaped by airflow.

# FRONT-END AERODYNAMIC & DESIGN OBJECTIVES

The front end became one of the most important parts of the project because it sets up almost all of the airflow for the rest of the vehicle. My goal was to create a front architecture that looked aggressive and distinctive, but also had believable aerodynamic logic behind it. So instead of designing random sharp forms, I started focusing on how air would enter, move, and be redirected from the very first point of contact.

Main goals:

- Generate front-end downforce
- Reduce front lift through pressure management
- Cool front brakes and manage wheel wake
- Guide airflow cleanly around and over the body
- Create a recognizable Canadian performance identity

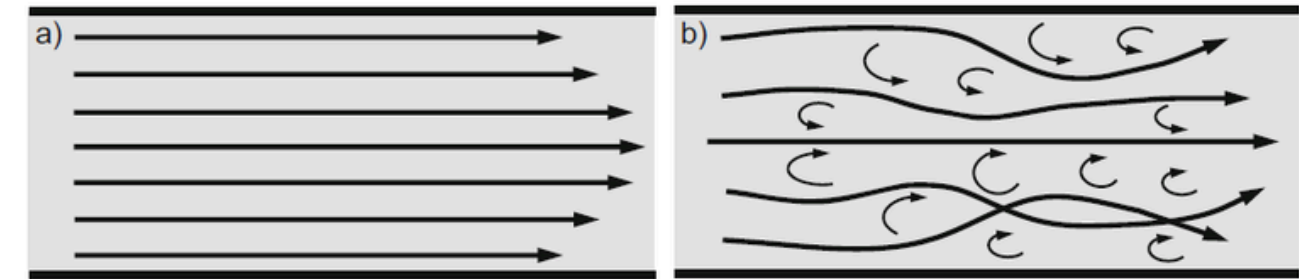


Fig. 6.23 (a) Laminar flow, (b) Turbulent flow

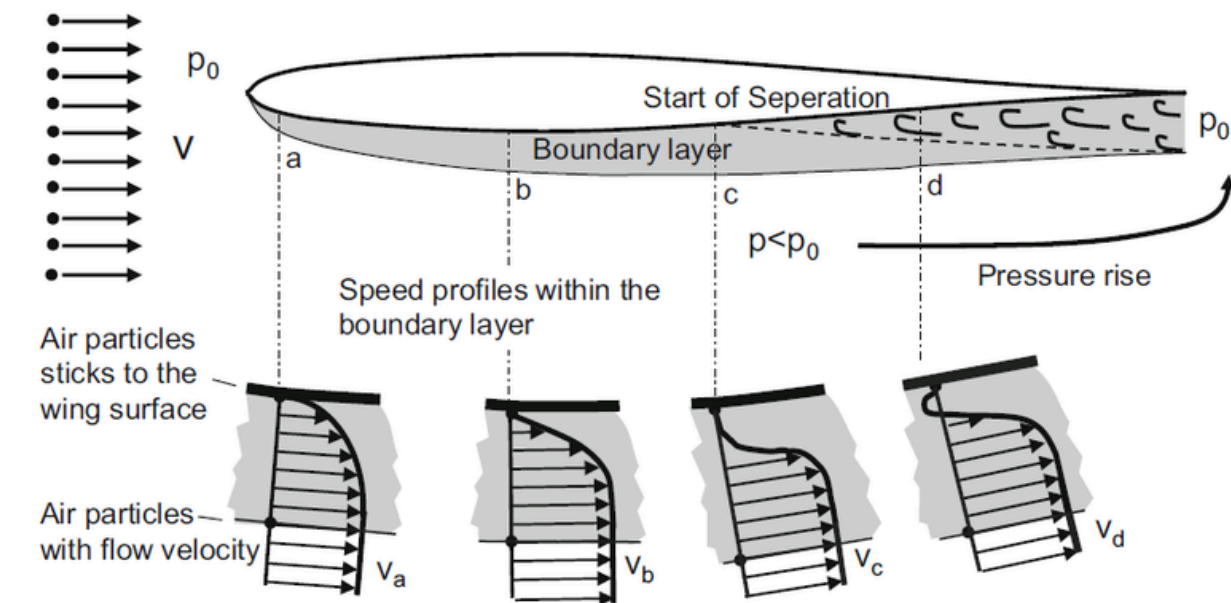


Fig. 6.24 Boundary layer and separation on a wing profile in the wind tunnel

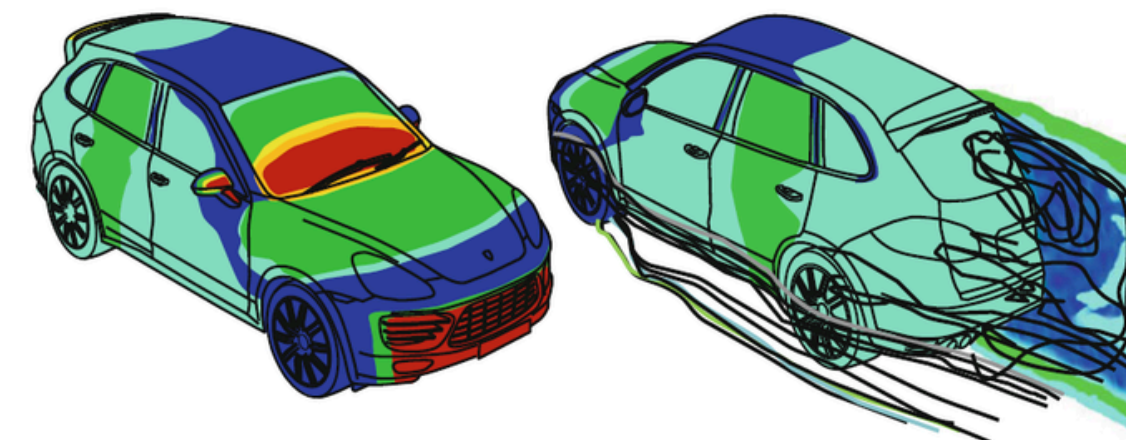


Fig. 6.29 Stagnation zones and wake area of a Porsche Cayenne

### S-Duct / Upper Air Management

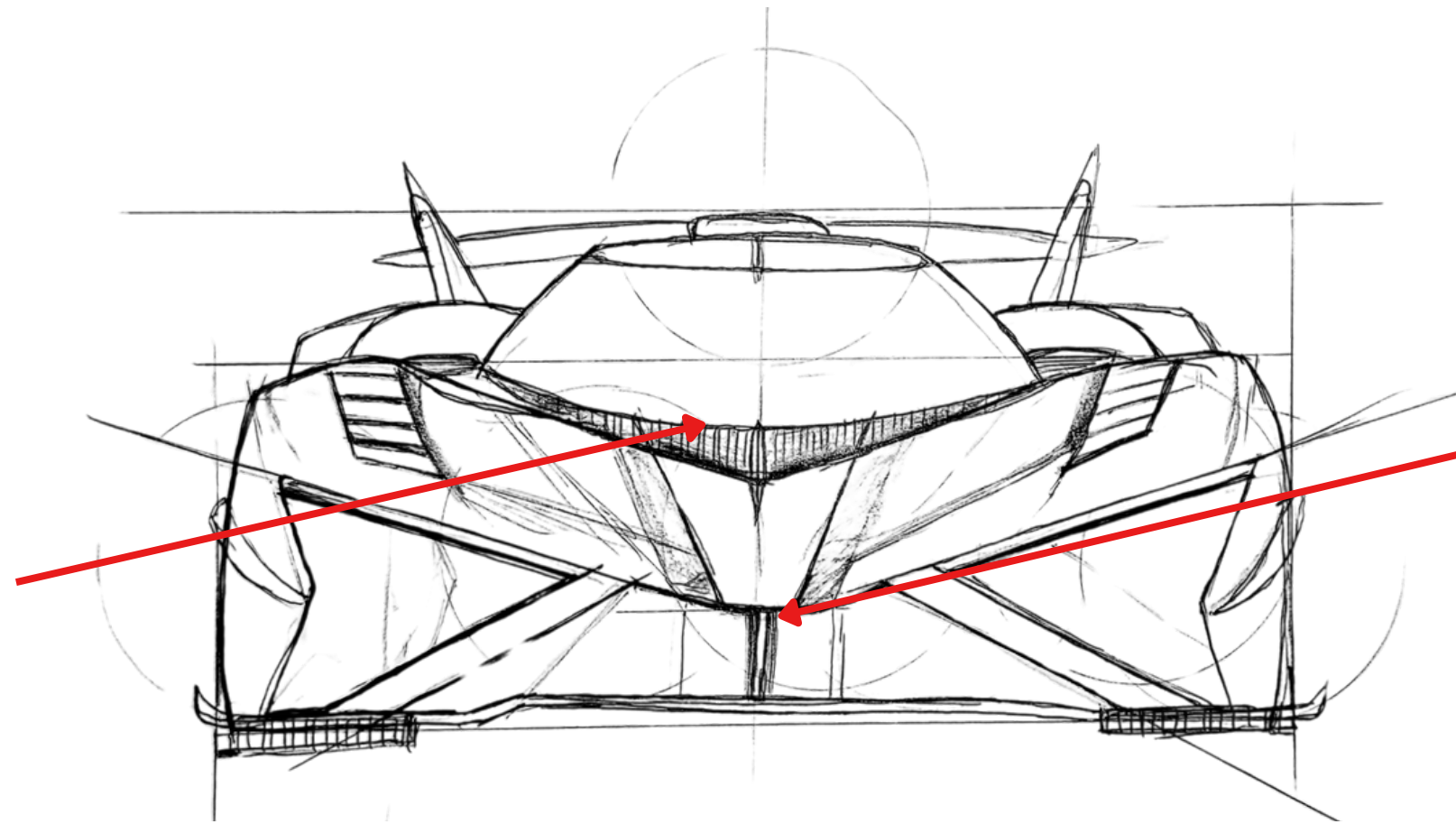
- reduce front pressure build-up
- smooth airflow over canopy
- support cleaner airflow toward the scoop

The nose was also developed around an S-duct logic, where high-pressure air at the front can be relieved upward and guided over the body. This helps improve front-end stability while feeding cleaner airflow across the upper body and toward the roof scoop.

### Sculpted Central V / Pressure Spine

- visually divides airflow
- reinforces central body axis
- creates stronger forward motion
- gives the front a technical / aerospace character

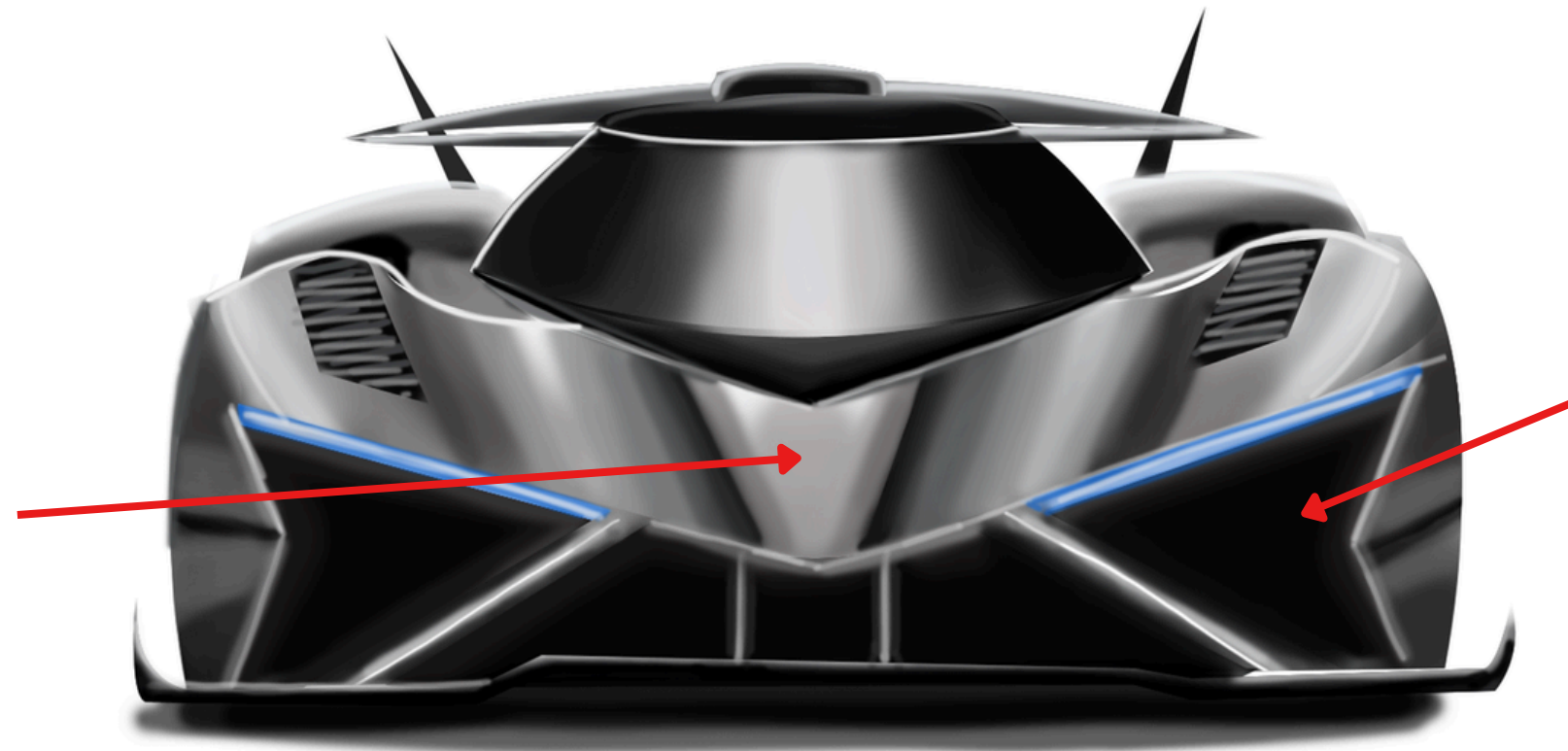
It also helped connect the front graphic identity to a more aerospace-inspired surface language.



### Low Central Nose

- acts as the main airflow splitter
- visually creates a focused, race-car stance
- inspired by Formula 1 and Le Mans prototypes

The low central nose was developed to act as the first clean point of airflow separation. Similar to many Formula 1 and endurance race cars, a narrow nose helps organize air early and reduce unnecessary frontal bulk.



### Maple-Leaf Inspired Front Intakes

- brake cooling
- airflow redirection around the front wheels
- brand identity
- visual width and aggression

The large triangular front corner intakes were inspired by the abstract geometry of the Maple Leaf. They were intended to support brake cooling while also helping redirect turbulent airflow away from the front wheels and along the vehicle flanks.

## Wheelhouse extraction VENT

- reduce pressure build-up over the front wheels
- reduce front-end lift
- clean up turbulent wheel wake
- improve airflow transition toward the side body

Air is relieved upward from the front wheelhouse area to reduce pressure build-up and improve airflow cleanliness around the front axle.

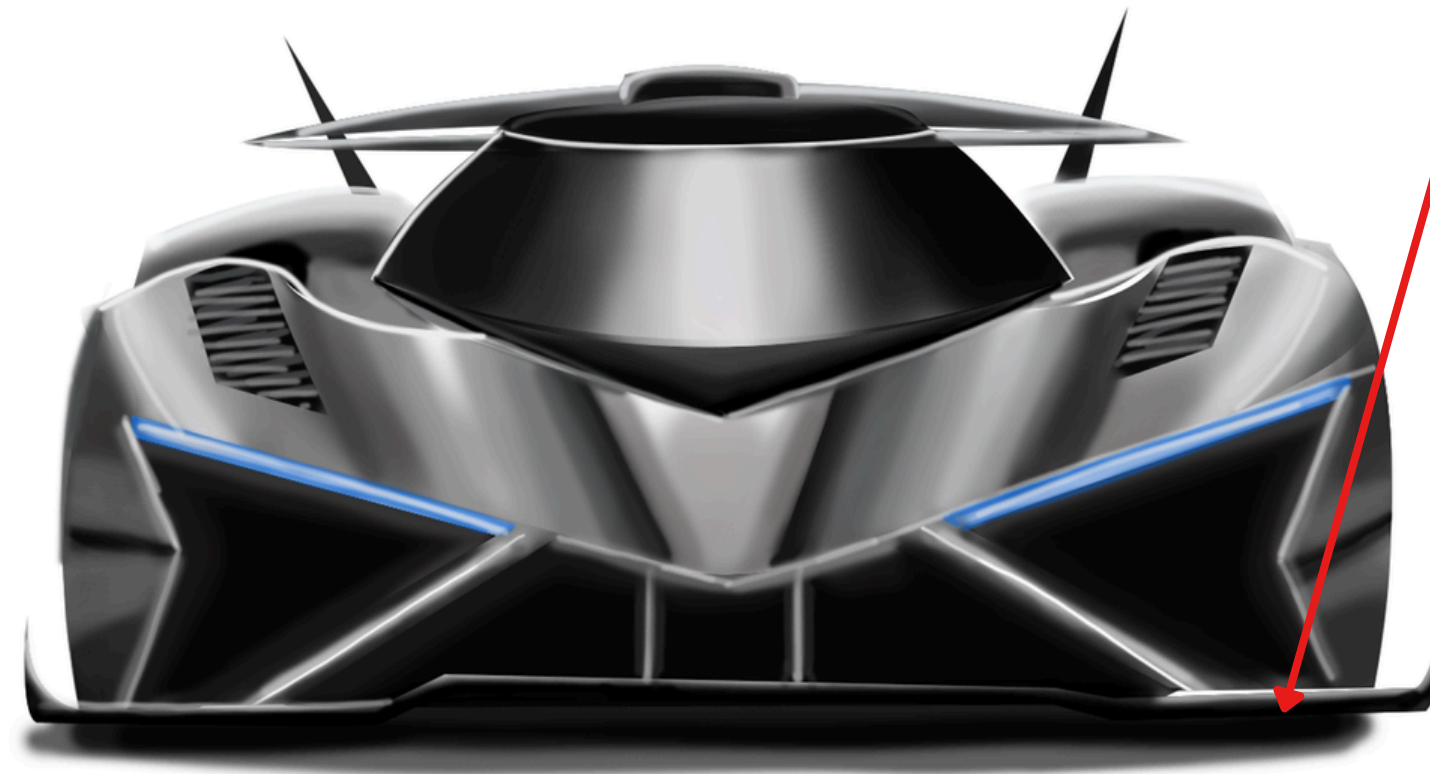
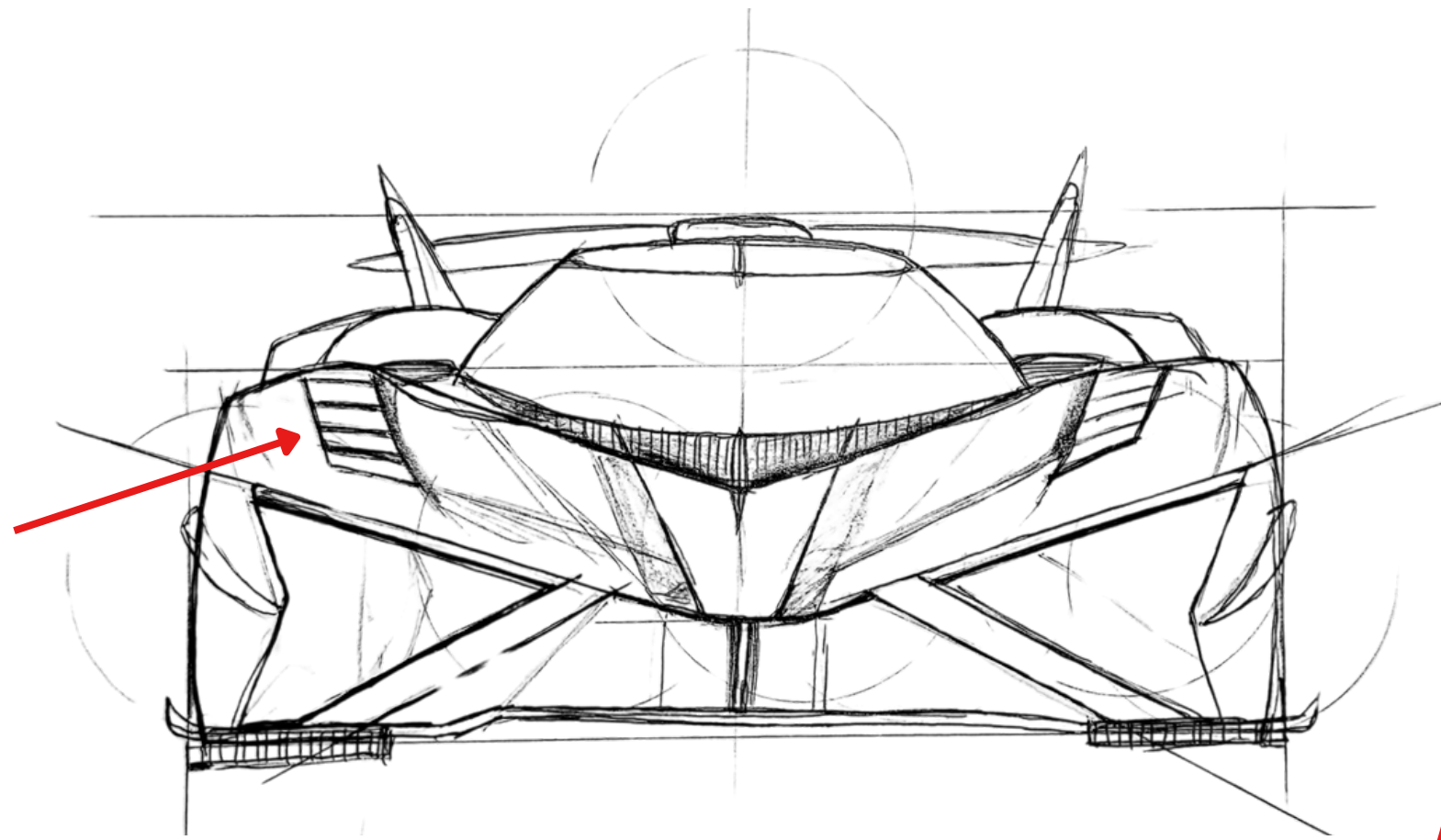
228

6 Aerodynamics



Fig. 6.99 Wheelhouse venting through Louvers. (Photo at right courtesy of © Audi AG 2018. All Rights Reserved)

body (Fig. 6.99). The overpressure in the wheel arch decreases. The air flowing out of the wheel arch disturbs the flow over the top of the body, which reduces the negative pressure prevailing there. Both of these effects reduce axle lift or create a downforce. However, this comes at the cost of an increase in aerodynamic drag, as the resulting turbulence increases frictional resistance.



## Wide Lower Splitter

- organize lower airflow
- reduce lift
- visually lower the car
- support underbody airflow

The lower splitter was used to define the front aerodynamic edge of the vehicle, helping control airflow around and beneath the chassis while visually anchoring the car with a low, track-focused stance.

226

6 Aerodynamics



Fig. 6.96 Audi RS5 DTM with front splitter and louvers. (Courtesy © Audi AG 2018. All Rights Reserved)

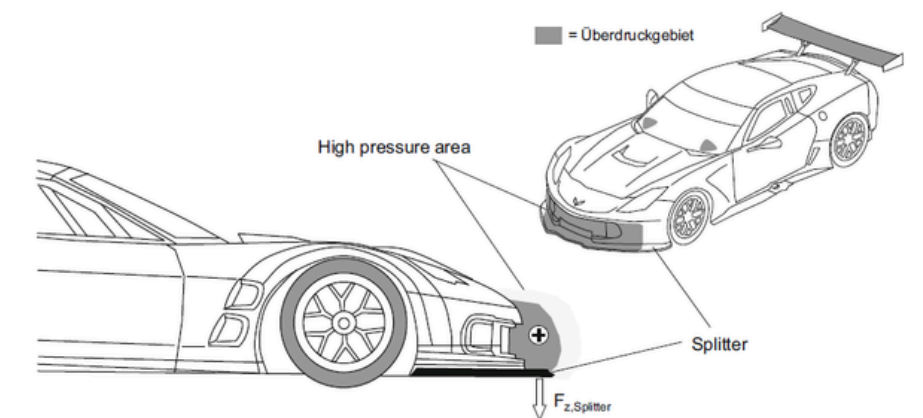


Fig. 6.97 Functionality of a front splitter

### S-Duct / Upper Air Management

- reduce front pressure build-up
- smooth airflow over canopy
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### Sculpted Central V / Pressure Spine

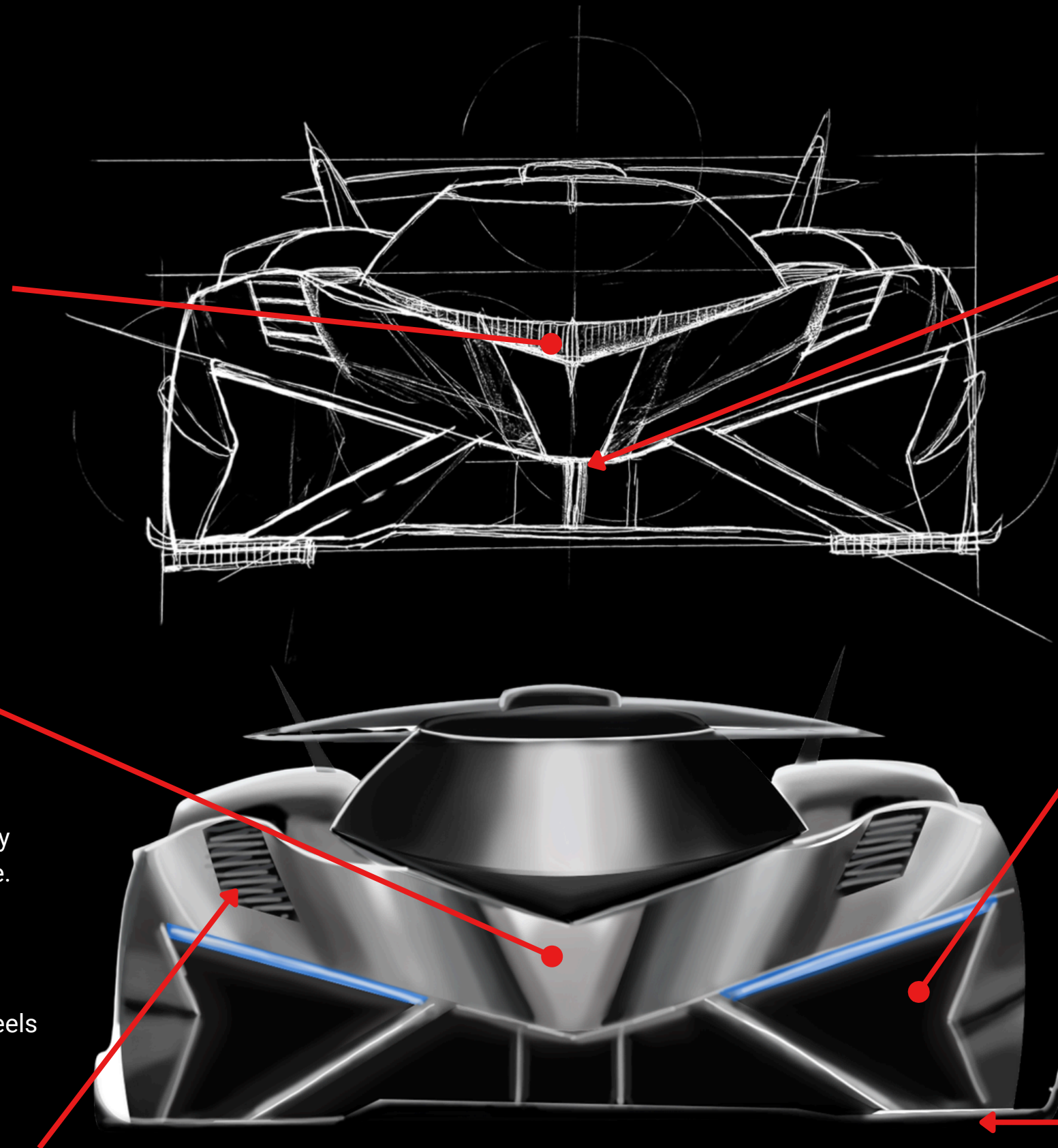
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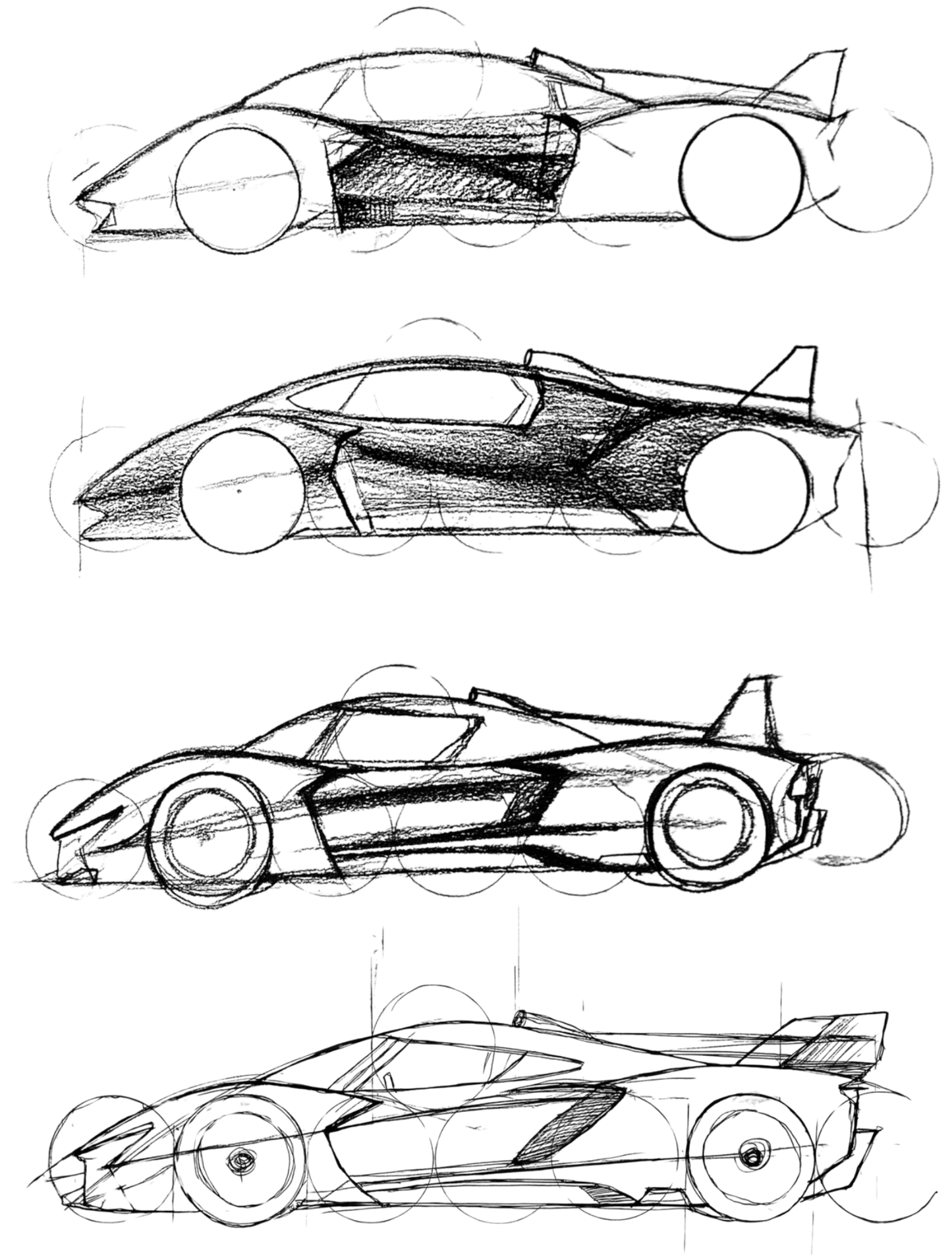
# SIDE VIEW (SILHOUETTE)

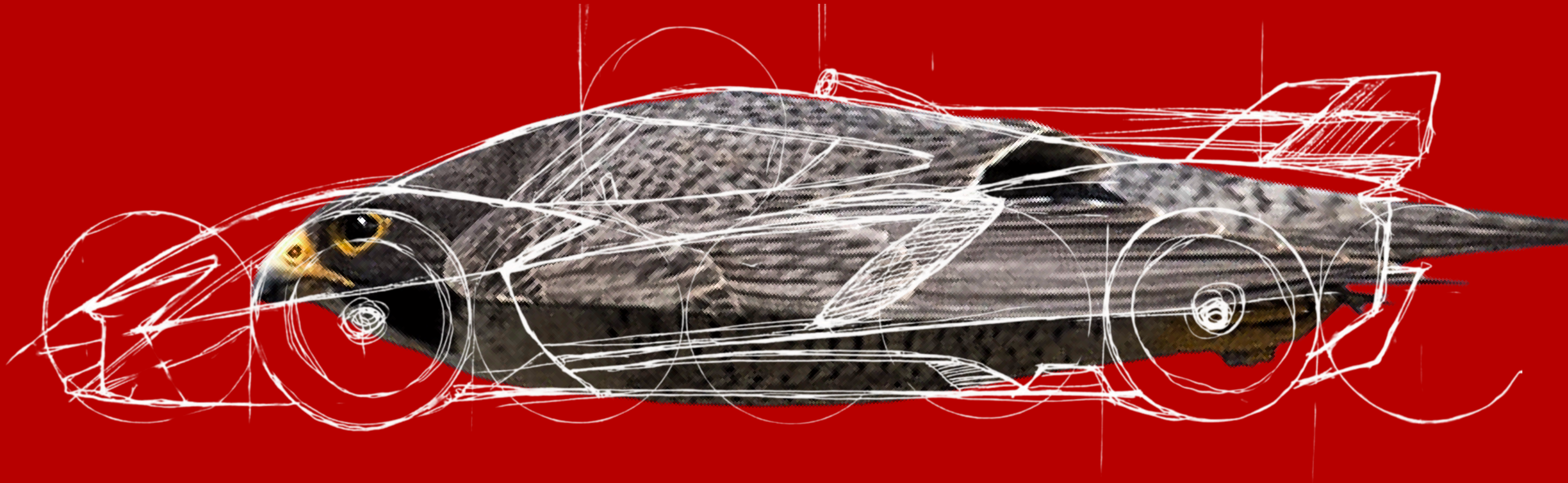
## AERODYNAMIC & DESIGN OBJECTIVES

The side profile was developed as a continuous aerodynamic pathway rather than a purely stylistic silhouette. The form guides airflow from the front axle toward the rear aerodynamic systems, while also integrating cooling, packaging, and visual identity. Features such as the raised front wheelhouse, carved side intake, tapered waist, and roof scoop were used to manage airflow more intentionally and support the vehicle's overall aerodynamic balance. While the side body is not the primary source of downforce, it plays a critical role in conditioning air for the splitter, underbody, diffuser, and rear wing.

### Main goals:

1. Guiding air cleanly along the body
2. Feeding cooling and performance systems
3. Preparing airflow for the rear diffuser and wing



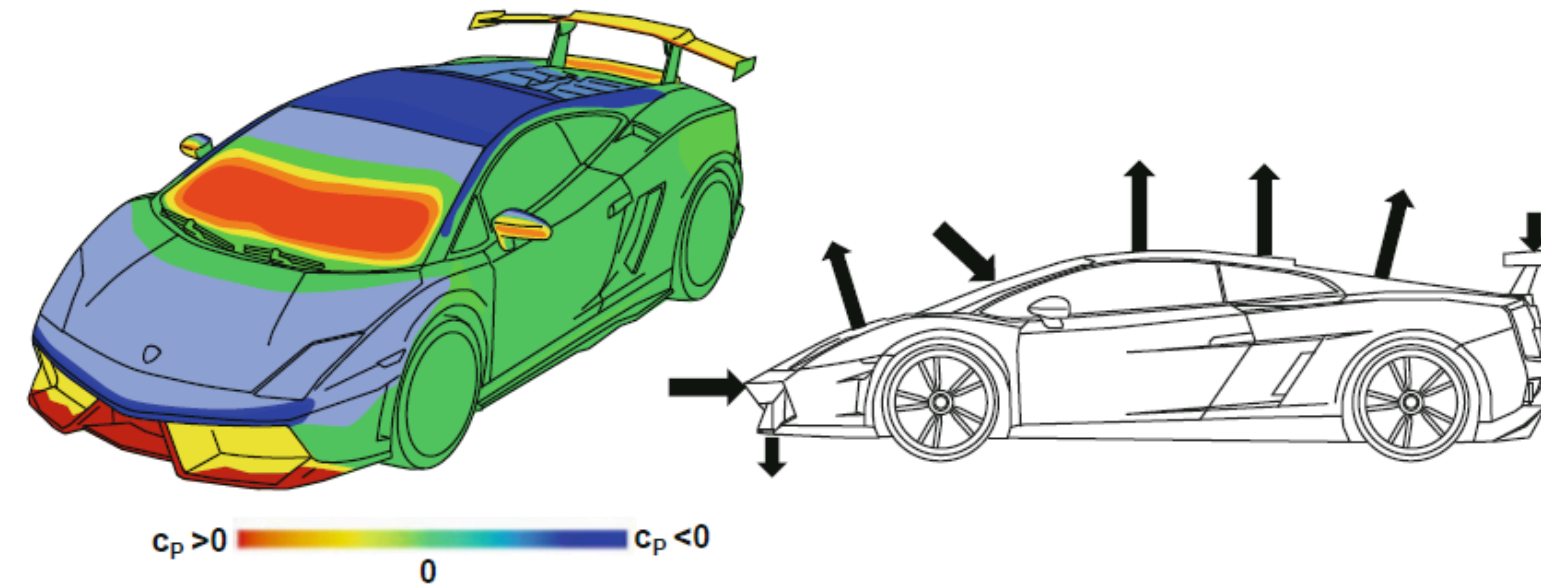


The Peregrine Falcon was used as a key inspiration for the side profile due to both its symbolic and aerodynamic significance. As one of the fastest animals in the world, and a species found across Canada, it represents precision, speed, and controlled power—qualities central to the Takaya hypercar. During its high-speed dive, the falcon maintains a tightly streamlined body, minimizing drag while preserving stability and control. This behavior informed the vehicle's side silhouette, particularly the smooth canopy transition, compressed body proportions, and tapered rear form, all of which aim to maintain more laminar, attached airflow while reducing turbulence. Rather than mimicking the bird literally, the design translates its aerodynamic efficiency and poised aggression into a performance-driven automotive form.

### LOW NOSE + LOW FRONT BODY

- reduces frontal blockage
- helps air meet the car more cleanly
- supports airflow toward:
  - splitter
  - underbody
  - side body

The front section was kept low and tightly packaged to reduce frontal blockage and encourage cleaner airflow into the aerodynamic surfaces that follow.

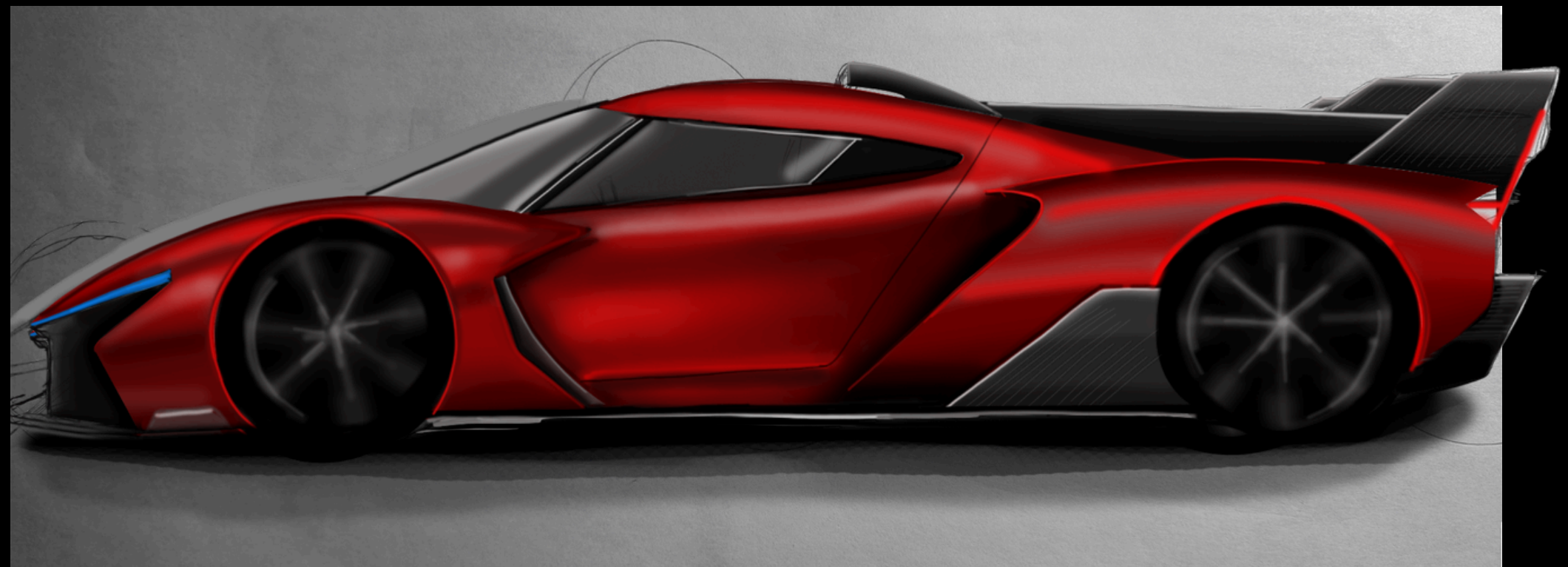


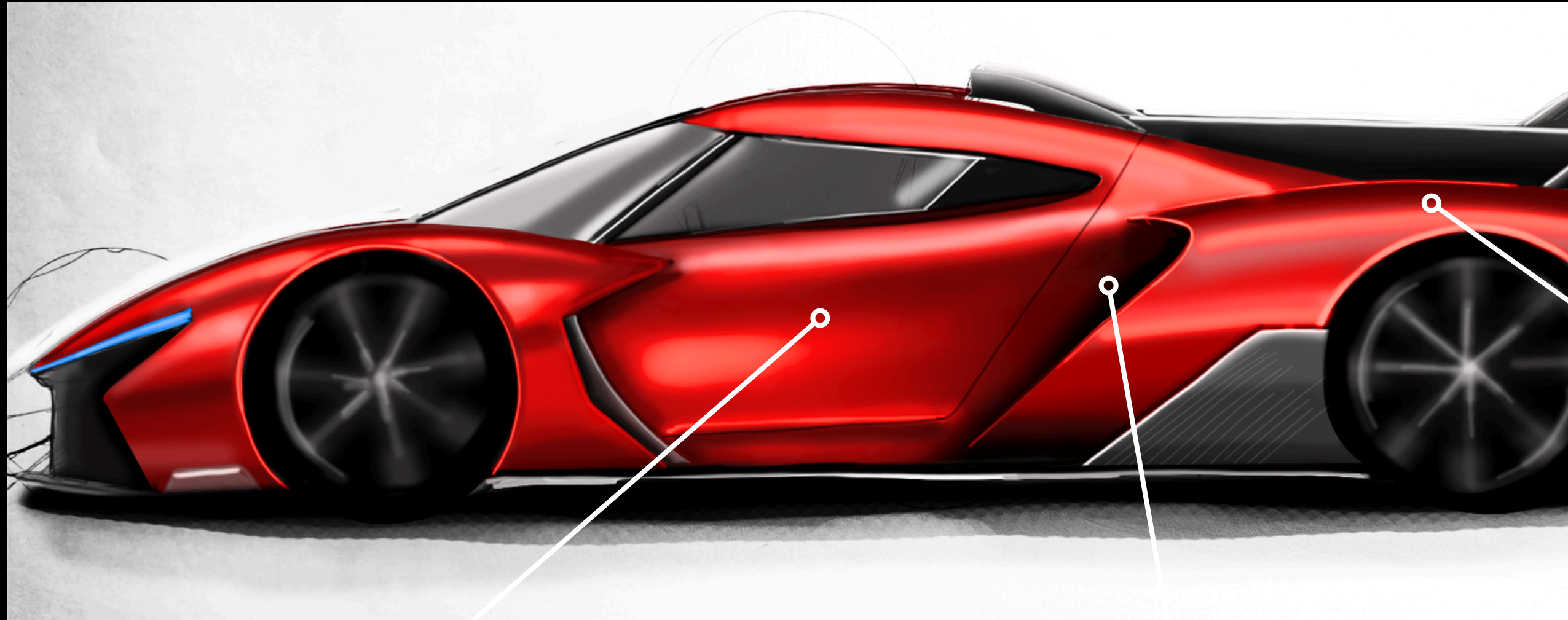
**Fig. 6.22** Pressure coefficient distribution and aerodynamic forces on a Lamborghini Gallardo LP570 Supertrofeo Stradale 2011

### FRONT WHEELHOUSE / FRONT FENDER VOLUME

- visually expresses the front tire volume
- allows room for wheel / suspension packaging
- creates a defined aero shoulder
- its separated from the main body has cavity
- helps organize airflow around the wheel wake
- can help separate “dirty” rotating wheel air from cleaner body airflow

The raised front wheelhouse was designed as both a packaging and aerodynamic feature. Because the front wheels generate some of the dirtiest airflow on the car, the fender volume helps define and contain this disturbed air while preserving cleaner airflow paths along the upper and side surfaces.





### THE SIDE CUT / CARVED CHANNEL/ Coke Bottle

What it does:

- visually narrows the body
- creates a controlled path for airflow
- helps move air rearward in a more intentional way
- supports the “coke bottle” taper effect

The body tightens through the mid-to-rear section in a coke-bottle style taper, reducing blockage and helping direct airflow more effectively toward the rear aerodynamic surfaces.

### SIDE AIR INTAKE

feeds cooling air to:

- engine bay
- hybrid systems
- radiators / intercooling
- helps shape the side body
- creates an “air catch” zone

The side intake was integrated as a functional cooling and airflow management feature, feeding air toward the vehicle’s mid-body systems while also helping carve the side profile into a more aerodynamically efficient form.

### REAR HAUNCHES / MUSCLED REAR SHOULDERS

What they do:

- house rear wheel / suspension / body width
- create visual power
- help shape the airflow approaching the rear
- transition the body into the rear aero zone

The rear haunches were exaggerated to visually communicate traction and mechanical power, while also serving as transitional surfaces that guide airflow into the rear aerodynamic architecture.



Fig. 6.36 Porsche 911 GT3 and Porsche 919 Hybrid, 2014. (Courtesy of © Dr. Ing. h.c. F. Porsche AG 2018. All Rights Reserved)

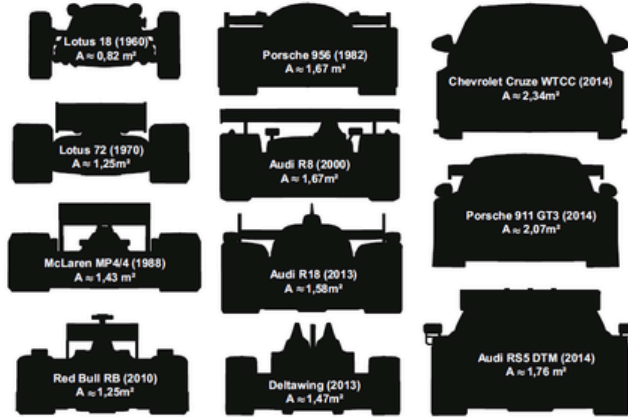


Fig. 6.37 Frontal areas of various racing vehicles. (Own estimates)

## ROOFLINE / CANOPY / FLOW TO SCOOP

What it does:

- keeps the car visually fast
- supports attached airflow over the roof
- feeds air toward the scoop
- avoids abrupt roof separation

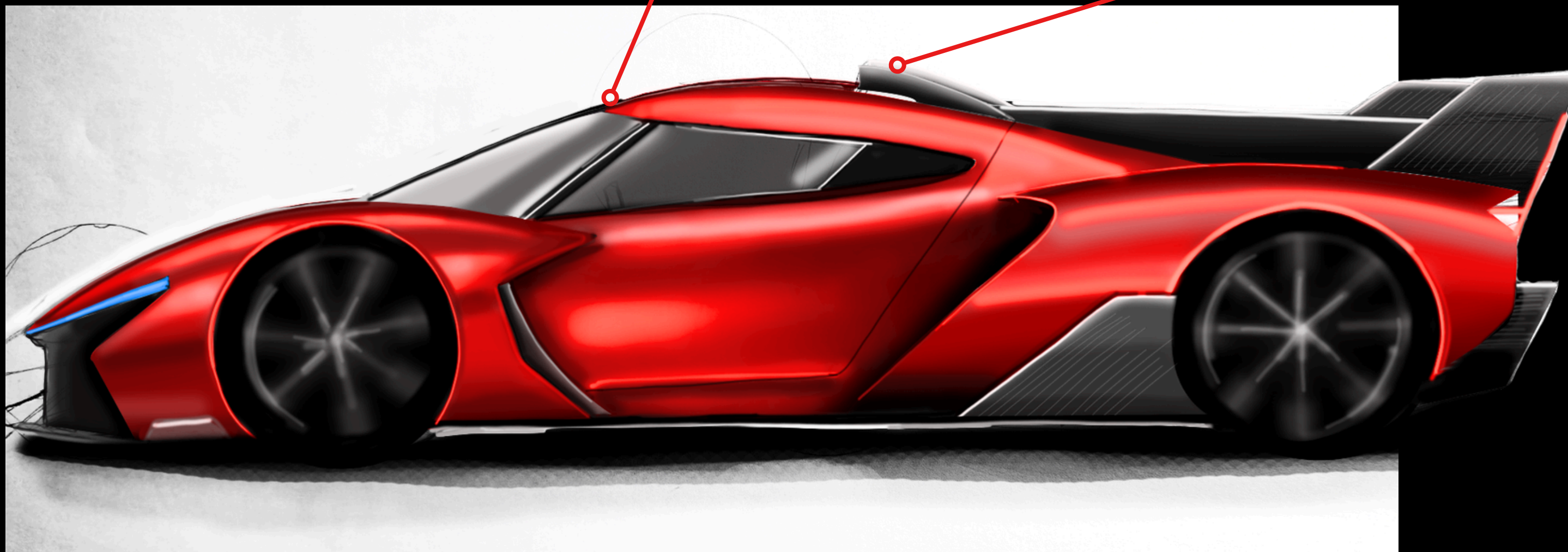
The roofline was kept smooth and tightly tapered to encourage attached airflow over the canopy and toward the roof scoop, reducing unnecessary disruption to the upper flow path.

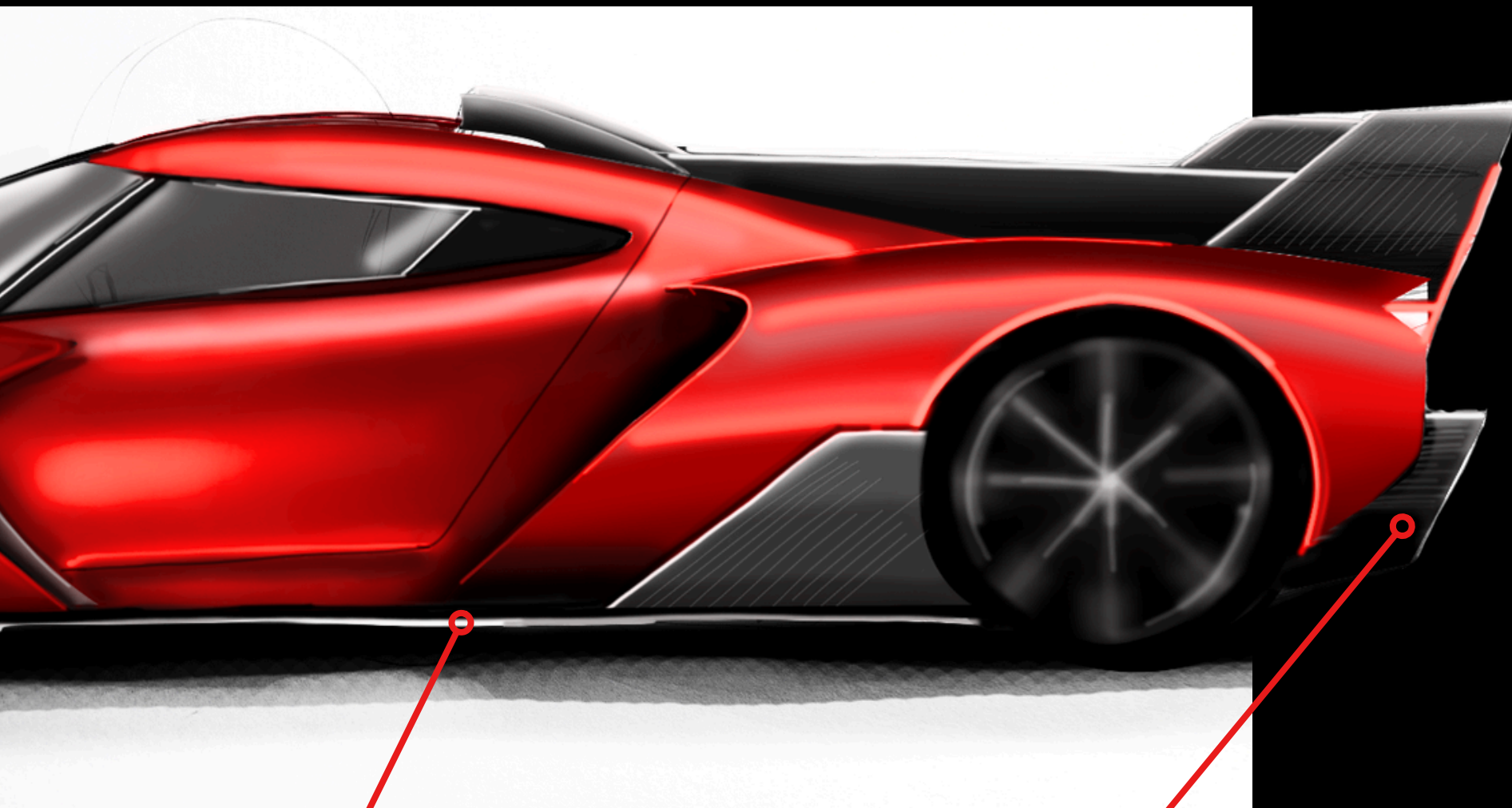
## SCOOP

What it does:

- channels airflow to upper intake / powertrain / cooling system
- creates top-side air capture
- adds motorsport identity
- reinforces centerline

The roof scoop was introduced as a central airflow capture element, helping direct clean upper-body air toward the vehicle's intake and cooling architecture while reinforcing the car's motorsport character.



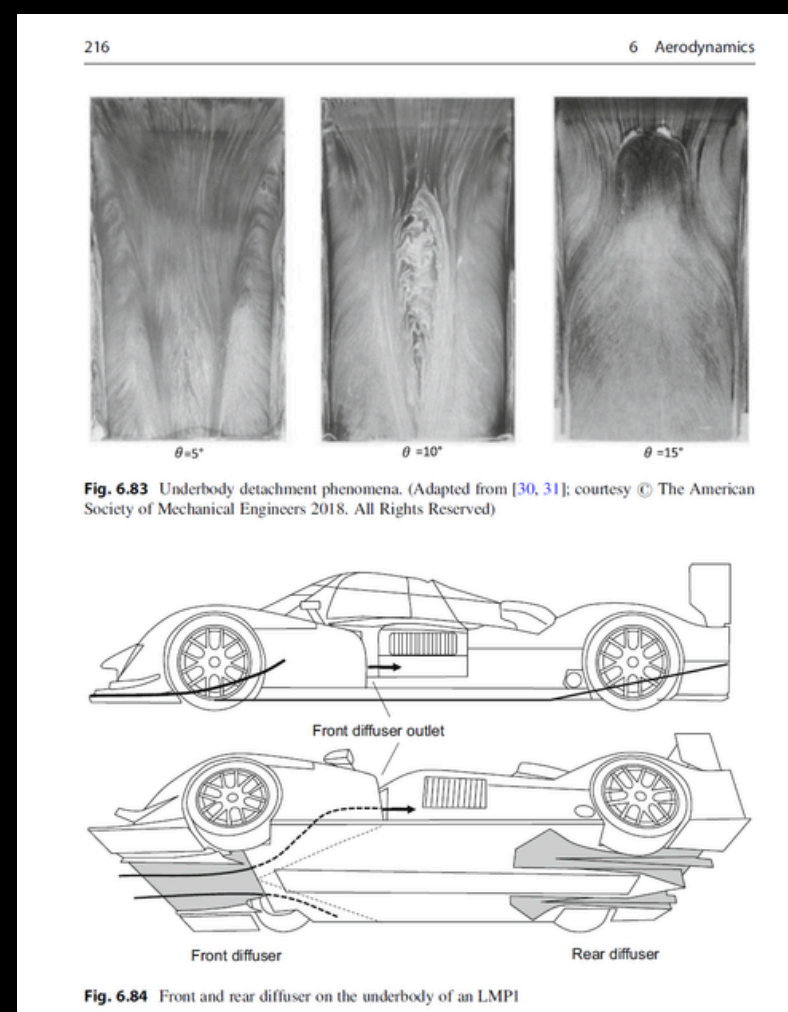


The lower side body was kept visually tight and grounded to reinforce the aerodynamic lower edge of the vehicle and support underbody airflow management.

### REAR EXIT / DIFFUSER PREPARATION

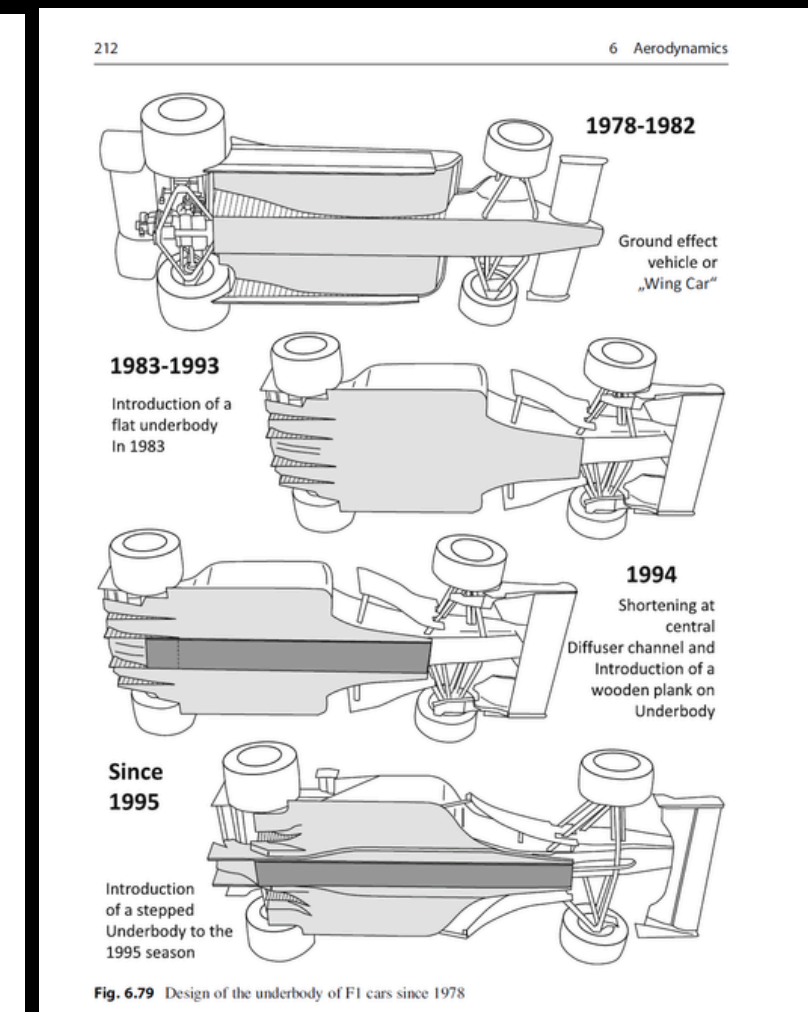
- prepares air for: rear diffuser, rear venturi exit, rear wing zone
- ensures the car “finishes” aerodynamically

The side profile ultimately compresses and prepares airflow toward the rear of the vehicle, where the diffuser and wing complete the aerodynamic cycle.



- Air speeds up under the floor
- Faster air = lower pressure
- Rear diffuser expands airflow more gradually
- Supports downforce + flow stability

As airflow moves beneath the car, the underbody geometry encourages it to accelerate, which lowers pressure underneath the vehicle and contributes to downforce. The rear diffuser then allows this accelerated air to expand more gradually, helping maintain flow attachment and improving the efficiency of the underbody aerodynamic system.



# TOP VIEW

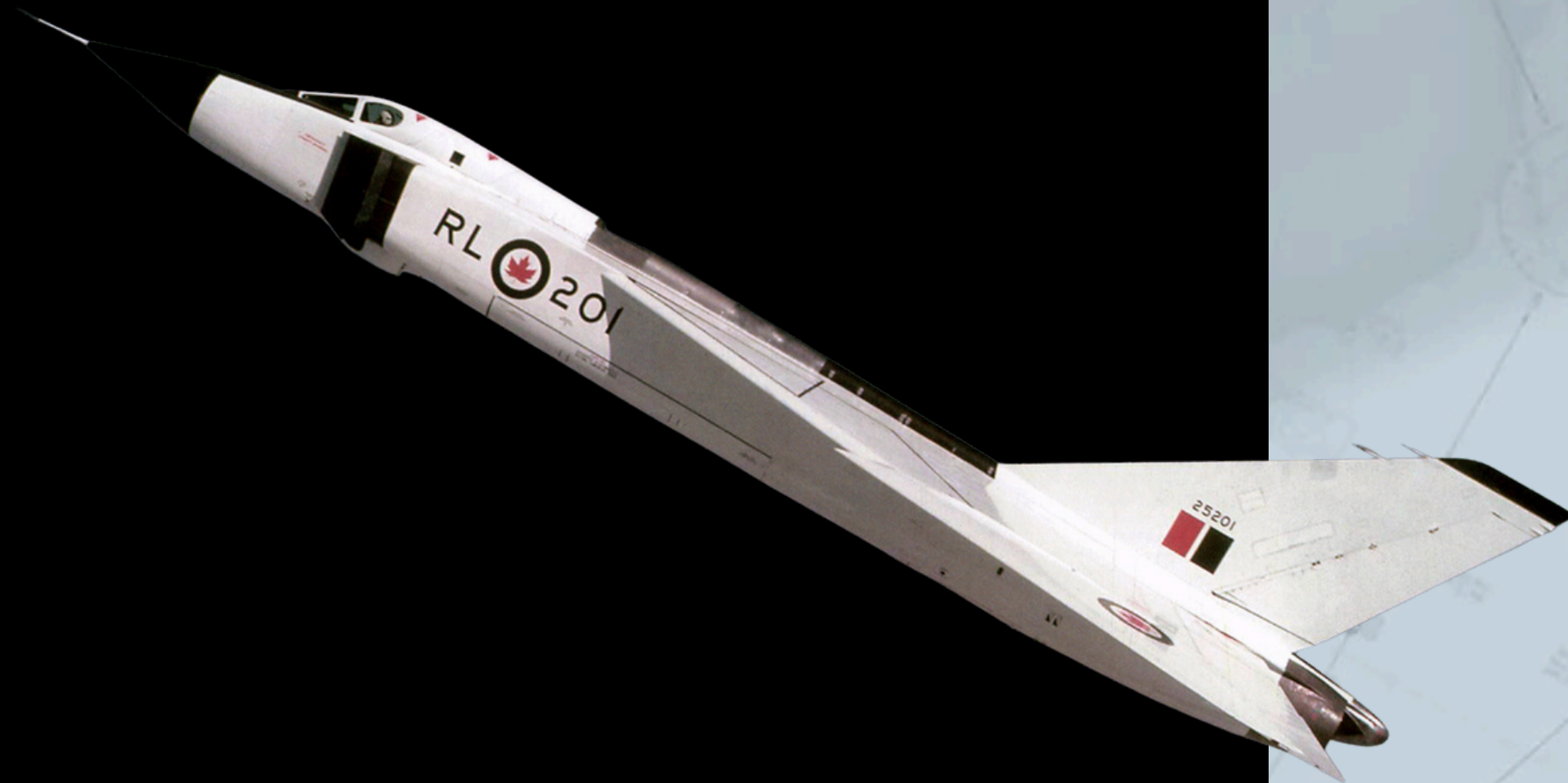
## AERODYNAMIC & DESIGN OBJECTIVES

The top view became important because it allowed me to stop thinking about the car only as a silhouette and start thinking about it as an airflow system across its full width. This is where I could study how air would split around the nose and canopy, how it would be directed toward the side shoulders and scoop, and how the body could prepare cleaner, more stable airflow for the rear aerodynamic package. Unlike the side profile, which focuses on flow attachment and silhouette efficiency, the top view helped define how air is split, compressed, accelerated, and directed around the canopy, side shoulders, cooling zones, and rear aerodynamic surfaces.

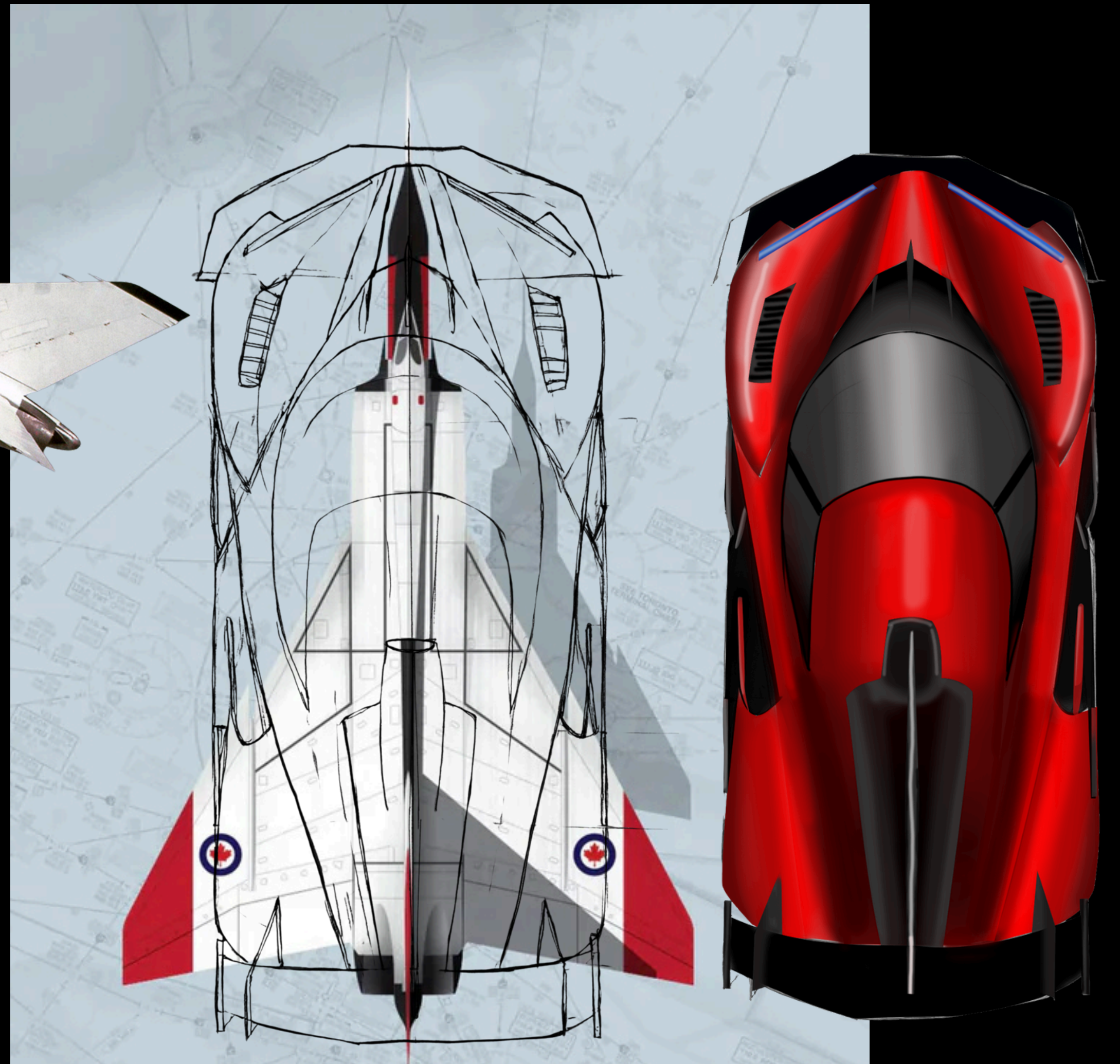
This stage focused on balancing:

- symmetry
- airflow organization
- cooling entry points
- centerline stability
- rear aero preparation





In developing the top view of the vehicle, I began looking at Canadian aerospace references, particularly the Avro CF-105 Arrow, as a way to root the design in a distinctly Canadian engineering legacy. The Arrow represents one of Canada's most ambitious moments in design, speed, and aerodynamic innovation, making it a strong symbolic and formal reference for the project. What stood out most was its tapered central cockpit, clean fuselage-like body, and angled stabilizing surfaces, all of which informed how I began shaping the vehicle from above. Rather than directly copying the aircraft, I used it as a visual and conceptual guide to explore how a Canadian performance car could express precision, speed, and aerodynamic purpose through its plan view. This stage helped establish the vehicle's overall stance, cabin integration, and directional body language before moving into more detailed aerodynamic refinement.



### WHEEL HOUSE OVERBODY CHANNEL

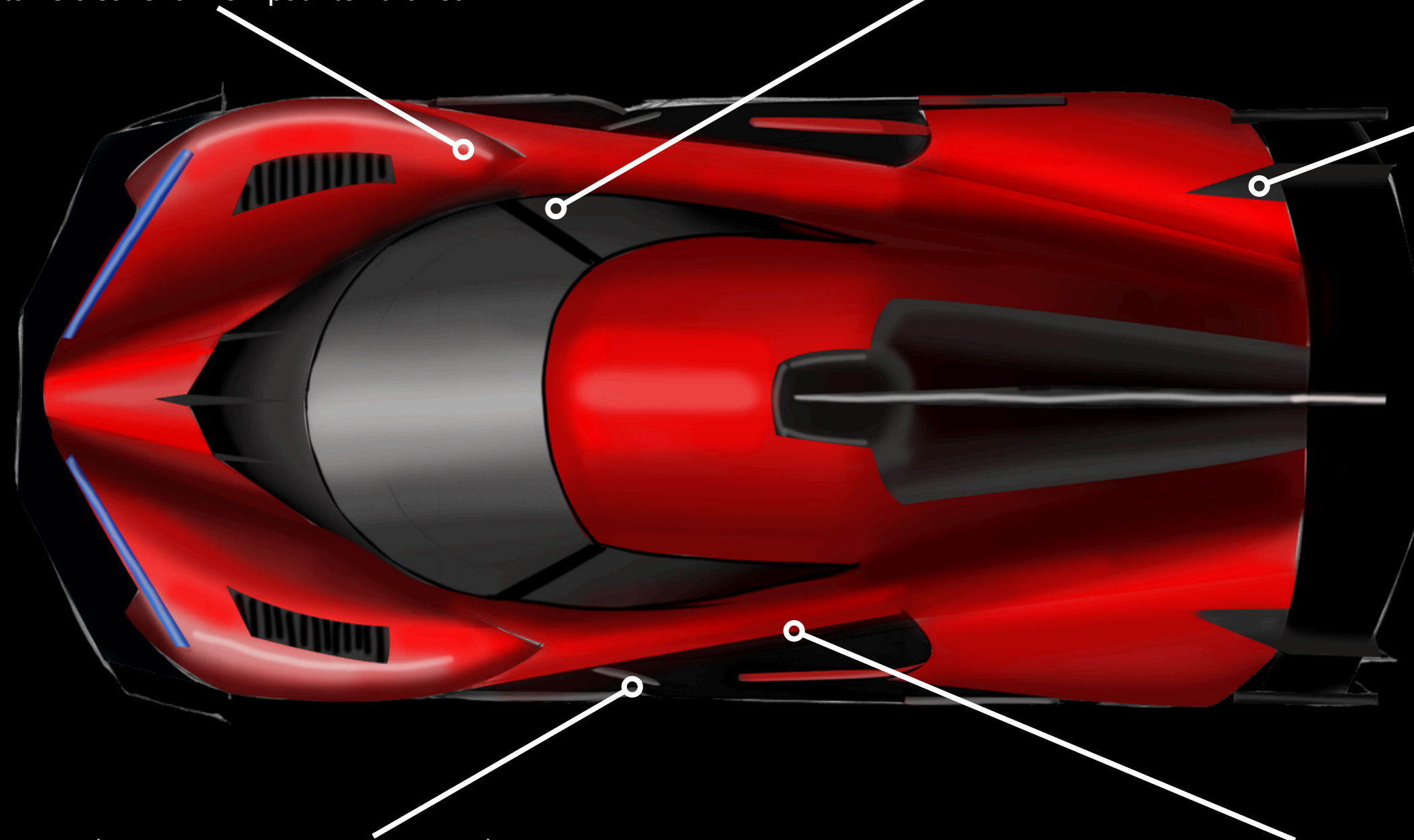
- Raised shoulder surface above wheels
- Allows airflow to pass over turbulent wheel wake
- Maintains cleaner airflow path toward rear

### TAPERED GREENHOUSE (COCKPIT COMPRESSION)

- Narrow central canopy reduces frontal disturbance
- Allows smoother laminar flow to pass along the sides
- Inspired by aircraft fuselage efficiency

### ANGLED REAR FINS (FLOW ALIGNMENT)

- Fins are angled outward instead of straight
- Helps guide airflow in the natural expansion direction
- Reduces separation and prepares flow for rear wing

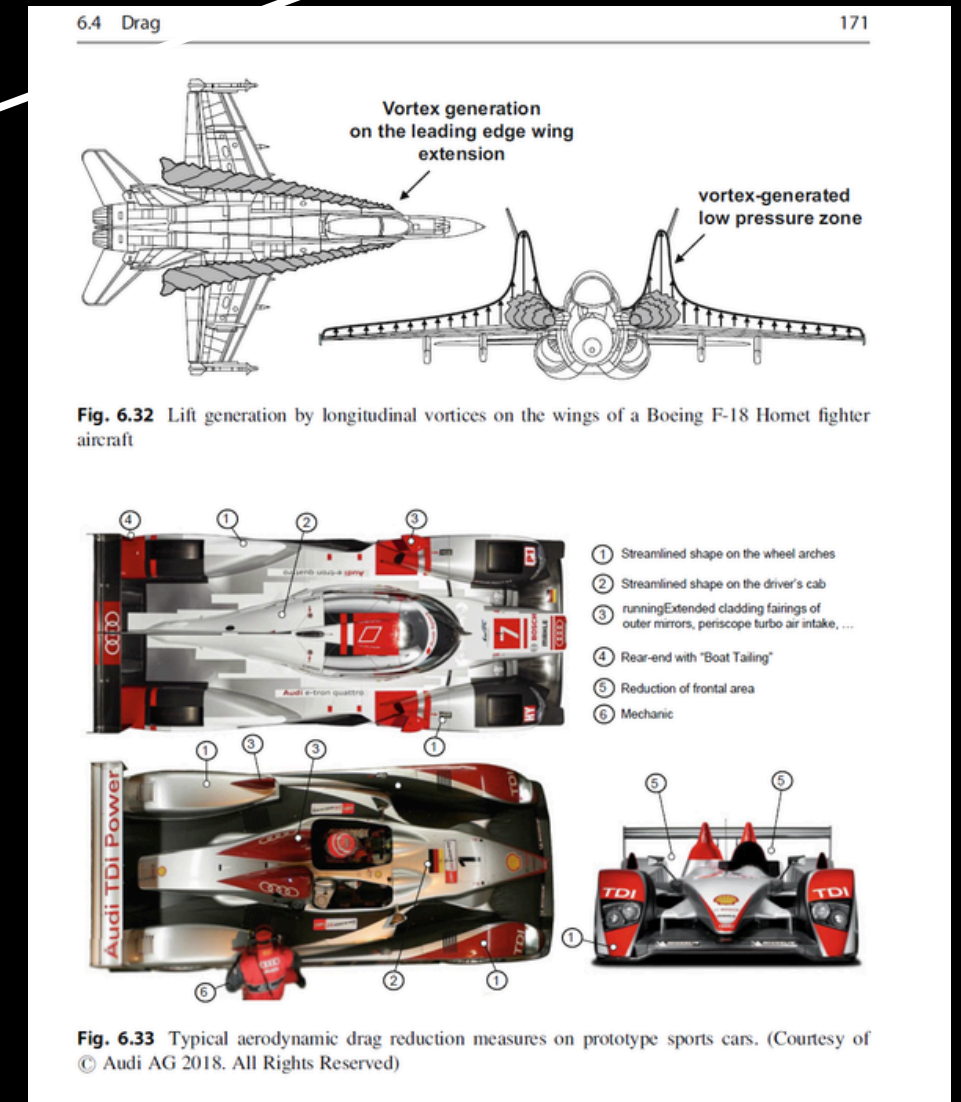


### BARGE BOARD (WHEEL WAKE MANAGEMENT)

- Positioned behind front wheels
- Deflects dirty air (turbulent wake) outward
- Protects central and side airflow ,keeps flow more laminar downstream

### SIDE CHANNEL COMPRESSION (COKE BOTTLE EFFECT)

- Body narrows toward the rear
- Accelerates airflow (Venturi-like effect from top view)
- Increases airflow energy before diffuser + rear wing

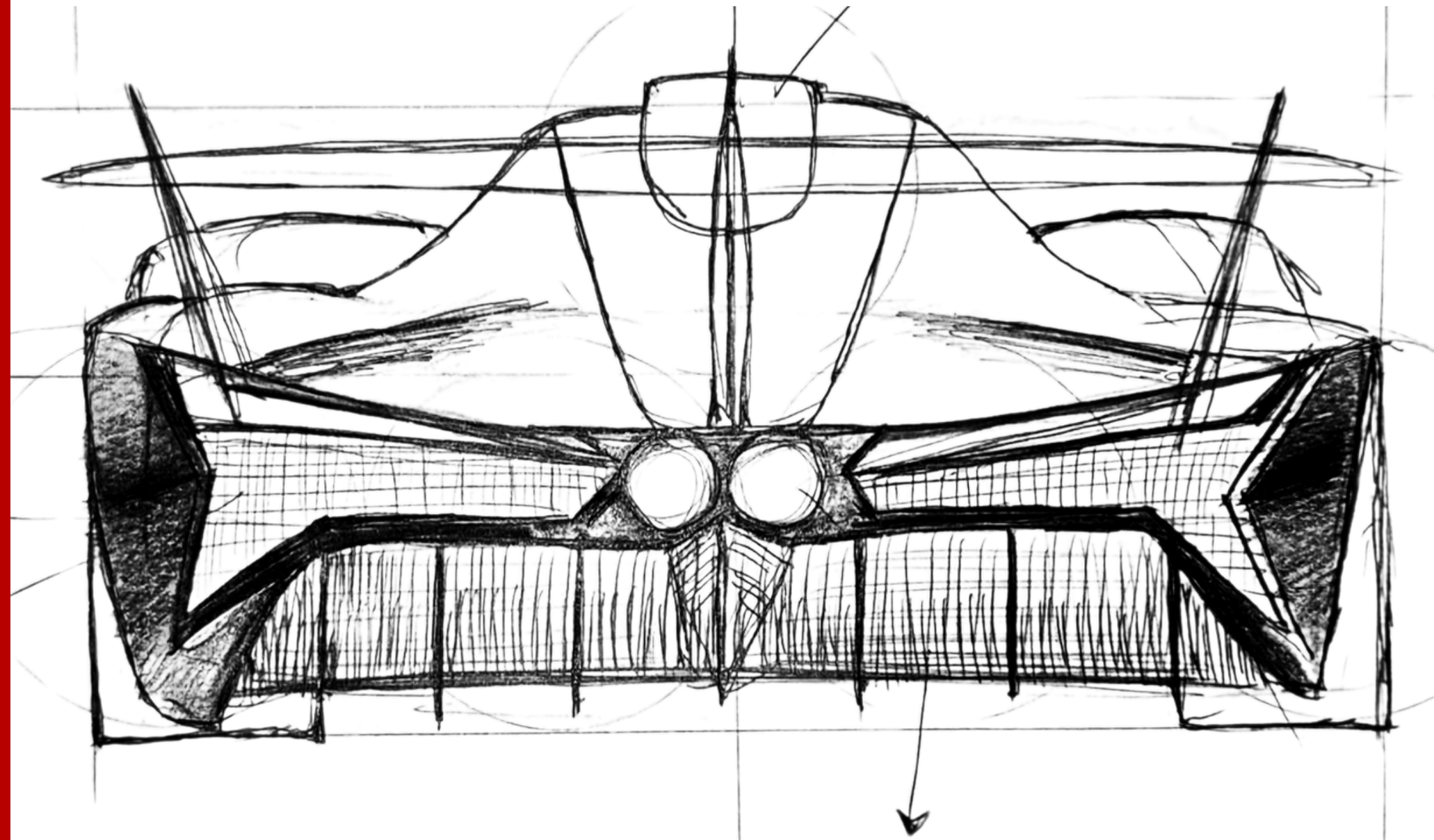


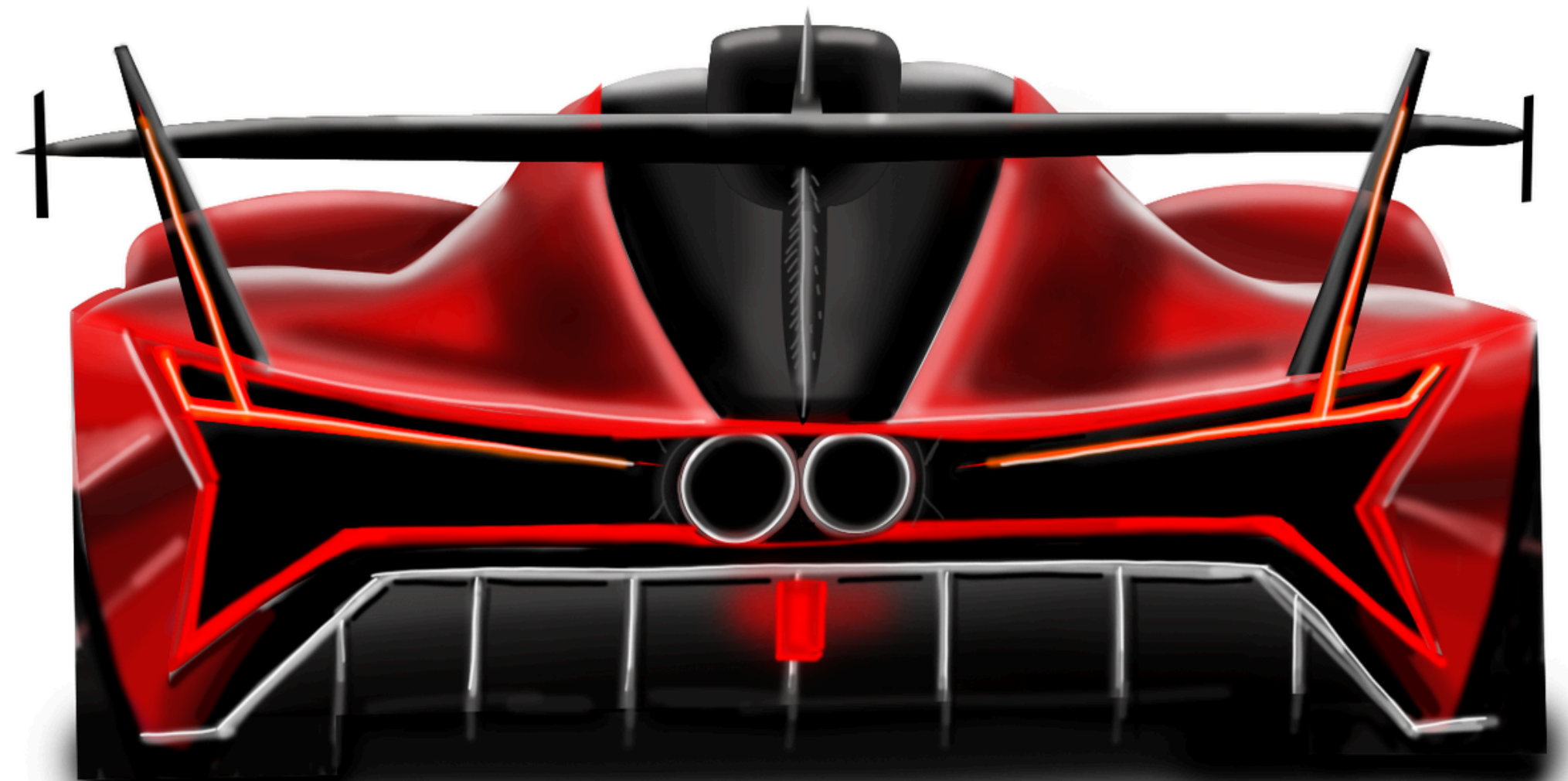
# REAR VIEW

## AERODYNAMIC & DESIGN OBJECTIVES

The rear view is the final stage of the vehicle's aerodynamic system, where airflow is stabilized, expanded, and released in a controlled way. This area became important not only for visual aggression and brand identity, but also for managing rear downforce, wake behavior, thermal extraction, and high-speed stability. As the design evolved, the rear began to function less as a stylistic ending and more as an aerodynamic completion point, where active and passive aero elements work together to finish the airflow journey from front to back.

- Generate rear aerodynamic load
- Release airflow cleanly
- Reduce turbulent rear wake
- Support thermal extraction
- Stabilize airflow at speed
- Integrate active aerodynamic control





The rear was designed as a compressed aerodynamic and propulsion zone, where the body tightens inward to emphasize speed, stability, and controlled airflow release. This narrower rear allows the angled fins, central spine, dual-dash exhausts, and diffuser opening to feel integrated into one focused technical composition rather than isolated features. Visually, it gives the rear a stronger aerospace character, while aerodynamically it supports cleaner airflow release and a more disciplined rear identity.

## ACTIVE DUAL ELEMENT AERO CONTROL

- Tilts for braking, maximum drag, air brake
- Increases angle for cornering, grip
- Flattens for straight, drag reduction

The wing adapts depending on driving conditions, allowing the car to balance grip and efficiency dynamically.

- Creates pressure difference (high vs low pressure)
- Second element delays stalling
- Generates stronger downforce

The dual-element wing increases downforce while maintaining airflow attachment, making it more efficient than a single element.

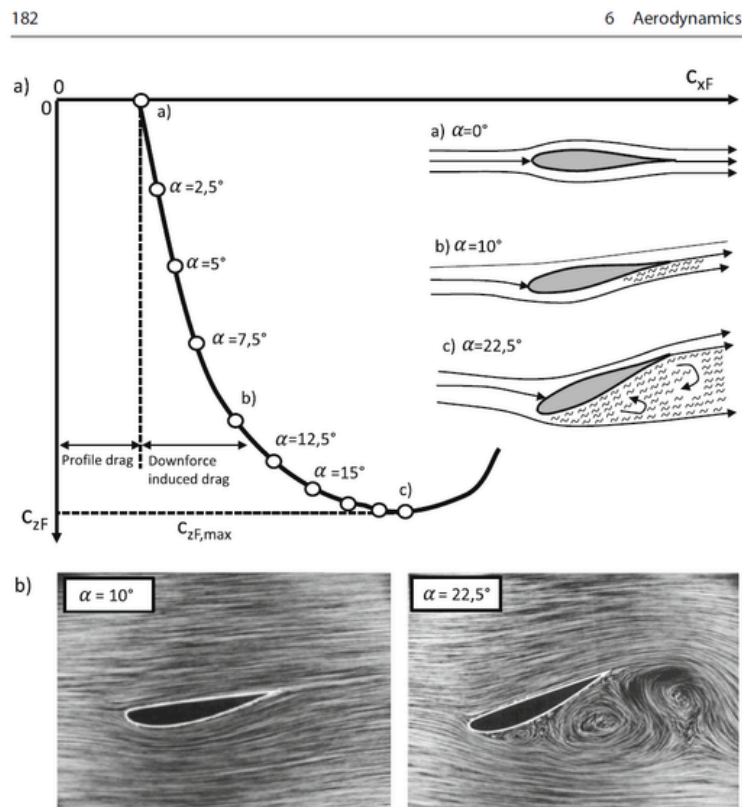


Fig. 6.44 Influence of the angle of attack (a) in the wing polar diagram and (b) as streamlines in the water channel. (Courtesy of © Deutsches Zentrum für Luft- und Raumfahrt e. V., Central Archive 2018. All Rights Reserved)

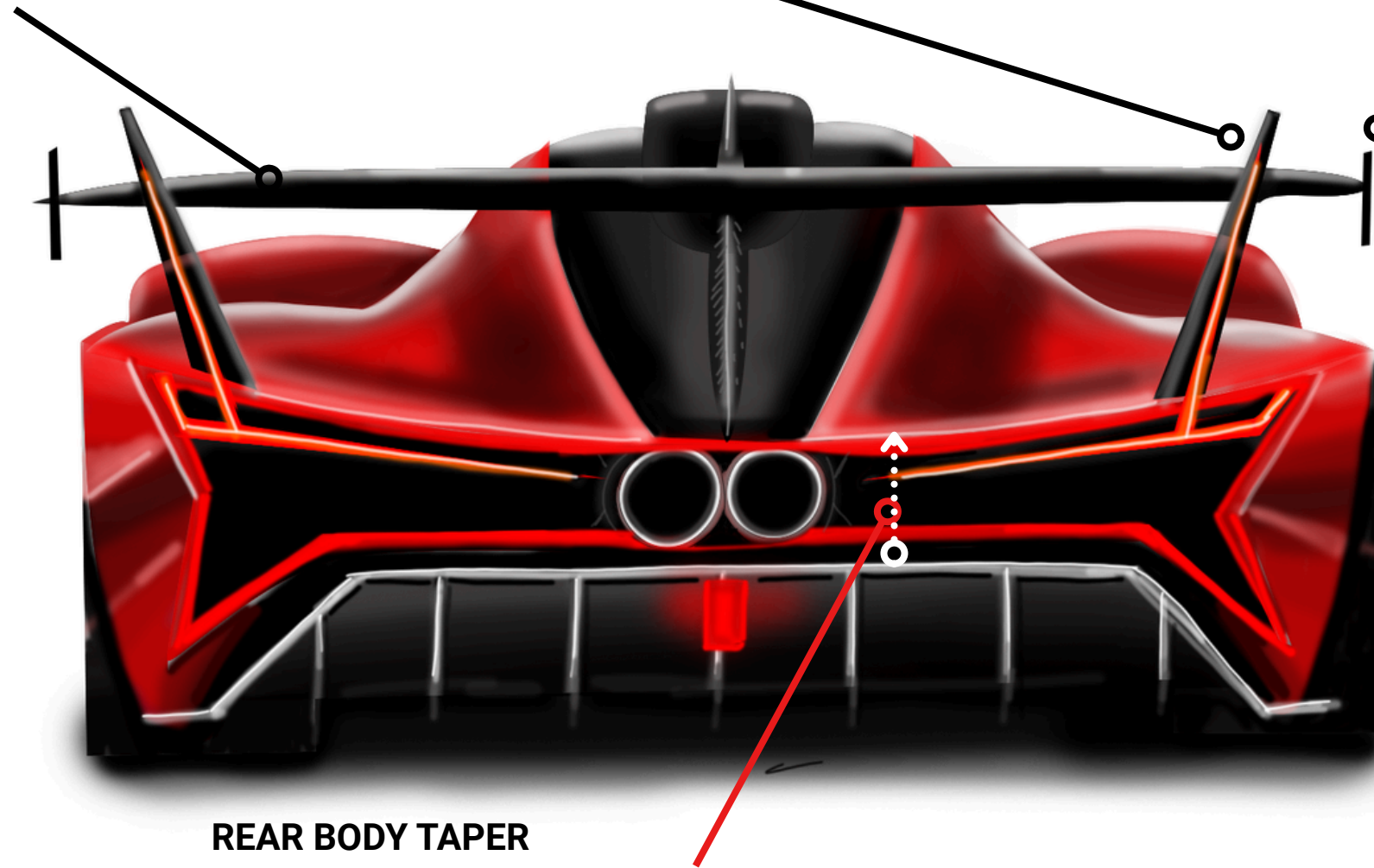
## SHARK FINS

Translated by Avro

Flow Stabilization Fins

- Control airflow at yaw (cornering)
- Reduce lateral instability
- Guide air toward wing

The fins help stabilize airflow when the car is not perfectly straight, improving high-speed control.



## REAR BODY TAPER

- The rear body was intentionally narrowed to reduce aerodynamic drag and improve airflow release. A tighter rear profile helps reduce the size of the turbulent wake behind the vehicle, while also allowing airflow to remain more controlled as it approaches the diffuser and rear wing.

## Vortex Control Plates

- Reduce tip vortices
- Contain pressure difference across wing
- Improve aerodynamic efficiency

End plates reduce energy loss at the wing tips, improving overall downforce efficiency.

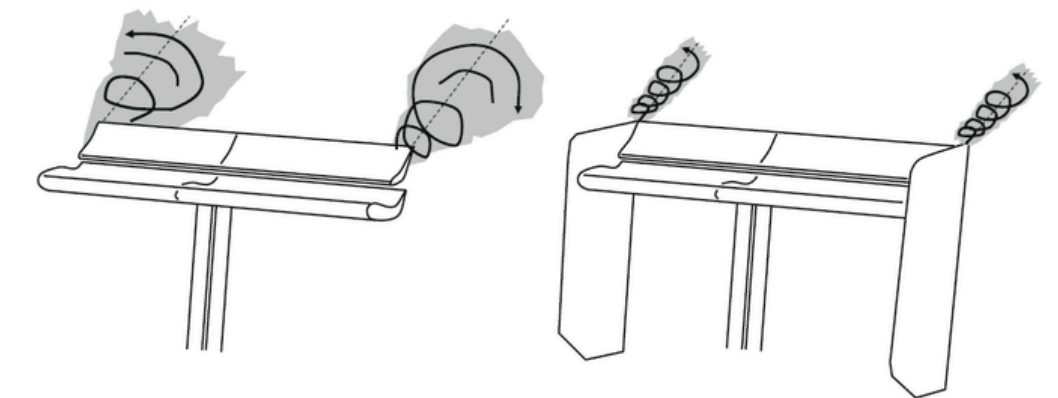


Fig. 6.63 Reduction of wake vortex size by end plates

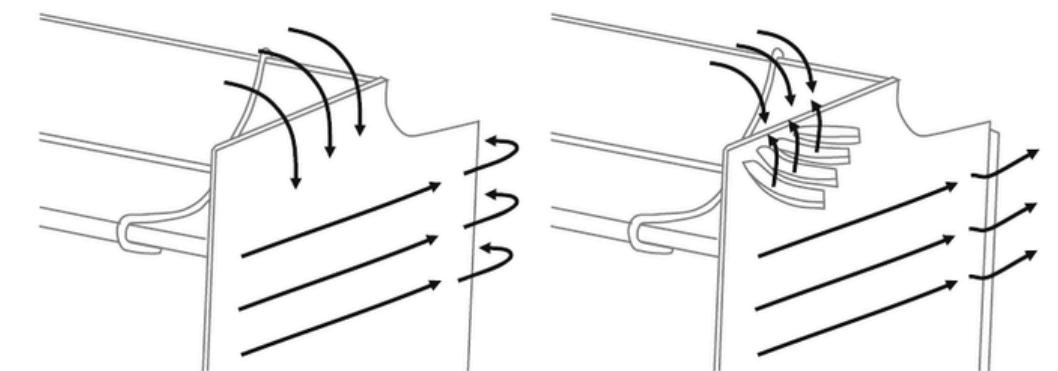


Fig. 6.64 Effect of a slotted end plate  
solutions are no longer possible today due to the ban on moveable aerodynamic devices.

## CENTRAL SPINE

- Organizes airflow along centerline
- Prevents chaotic flow over rear body
- Feeds cleaner air to rear wing

The central spine helps maintain a consistent airflow path toward the rear aero system, especially at high speeds.

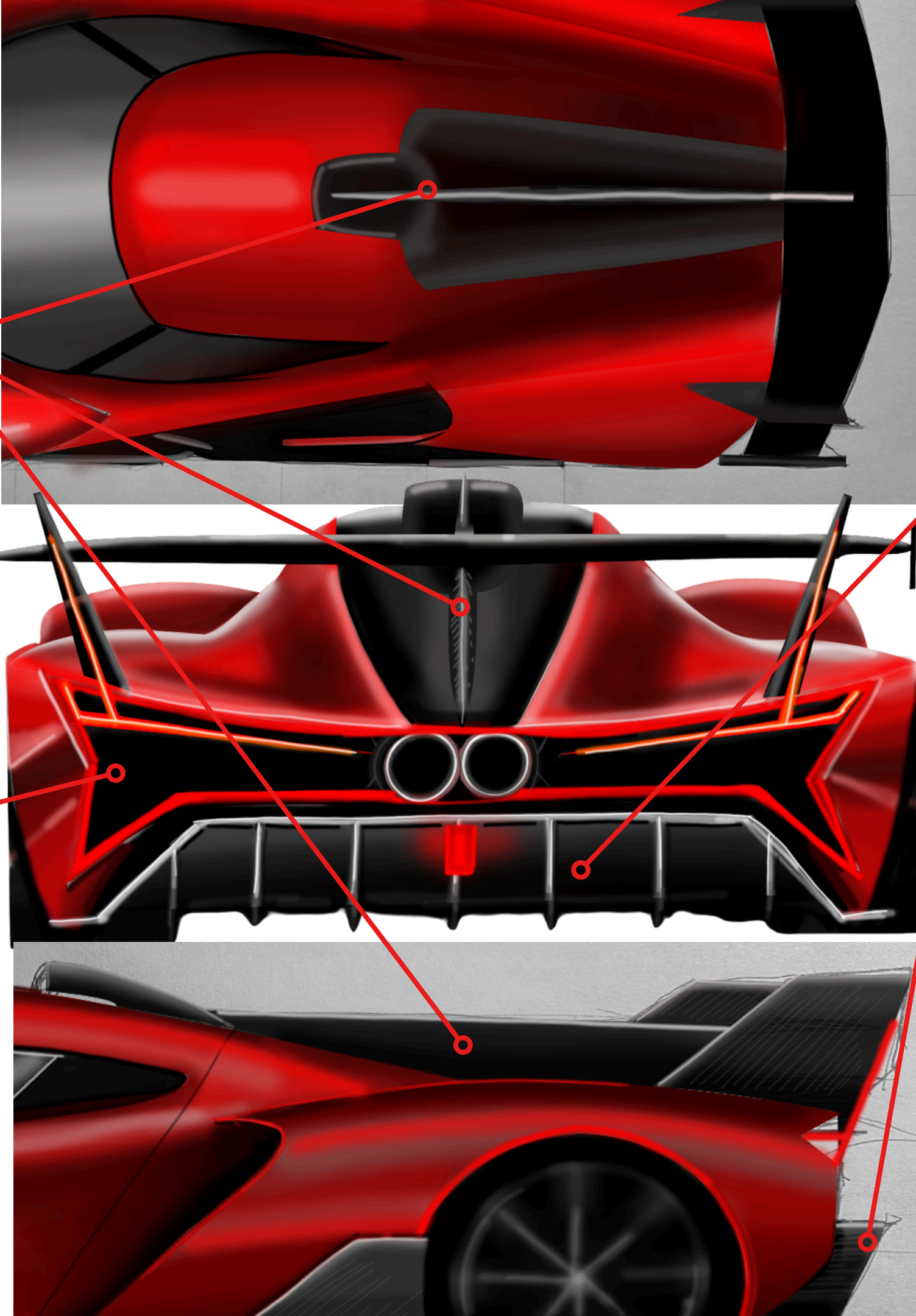
## VENTS

### Thermal & Pressure Extraction

- Releases hot air from engine bay
- Reduces rear pressure build-up
- Improves aerodynamic cleanliness

Rear extraction zones help manage heat and prevent pressure buildup that would disrupt airflow.

The maple leaf was not used literally, but translated into the geometry of key vent and intake surfaces. Its pointed, directional structure provided a useful formal language for shaping openings that feel both aerodynamically purposeful and distinctly Canadian.



## REAR DIFFUSER

### Ground Effect Diffuser

- Accelerates airflow under the car
- Creates low pressure zone (Bernoulli effect)
- Expands air at rear → generates downforce

The diffuser is the main source of downforce, using accelerated underbody airflow and controlled expansion to stabilize the car.

## DIFFUSER EXPANSION ANGLE

### Flow Expansion Control

- Gradual expansion prevents flow separation
- Maintains attached airflow
- Improves diffuser efficiency

The expansion angle is controlled to prevent flow separation and maintain consistent aerodynamic load.

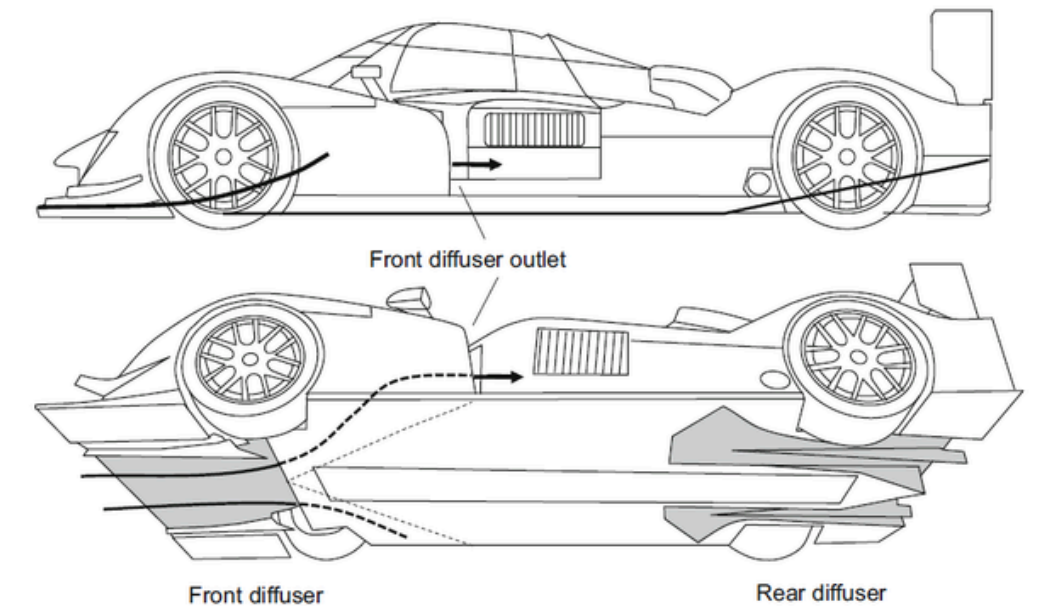


Fig. 6.84 Front and rear diffuser on the underbody of an LMP1

# RENDERS

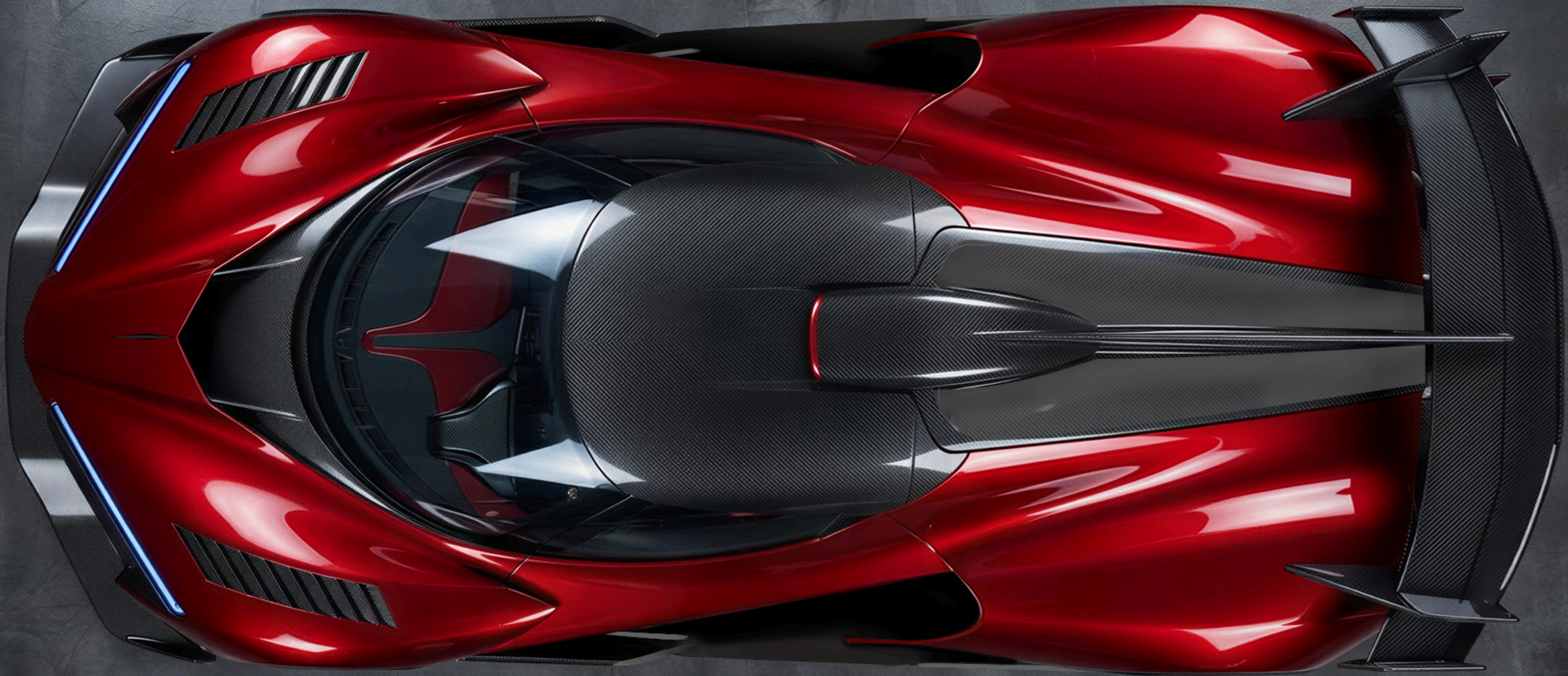
## FURTHER REALISM

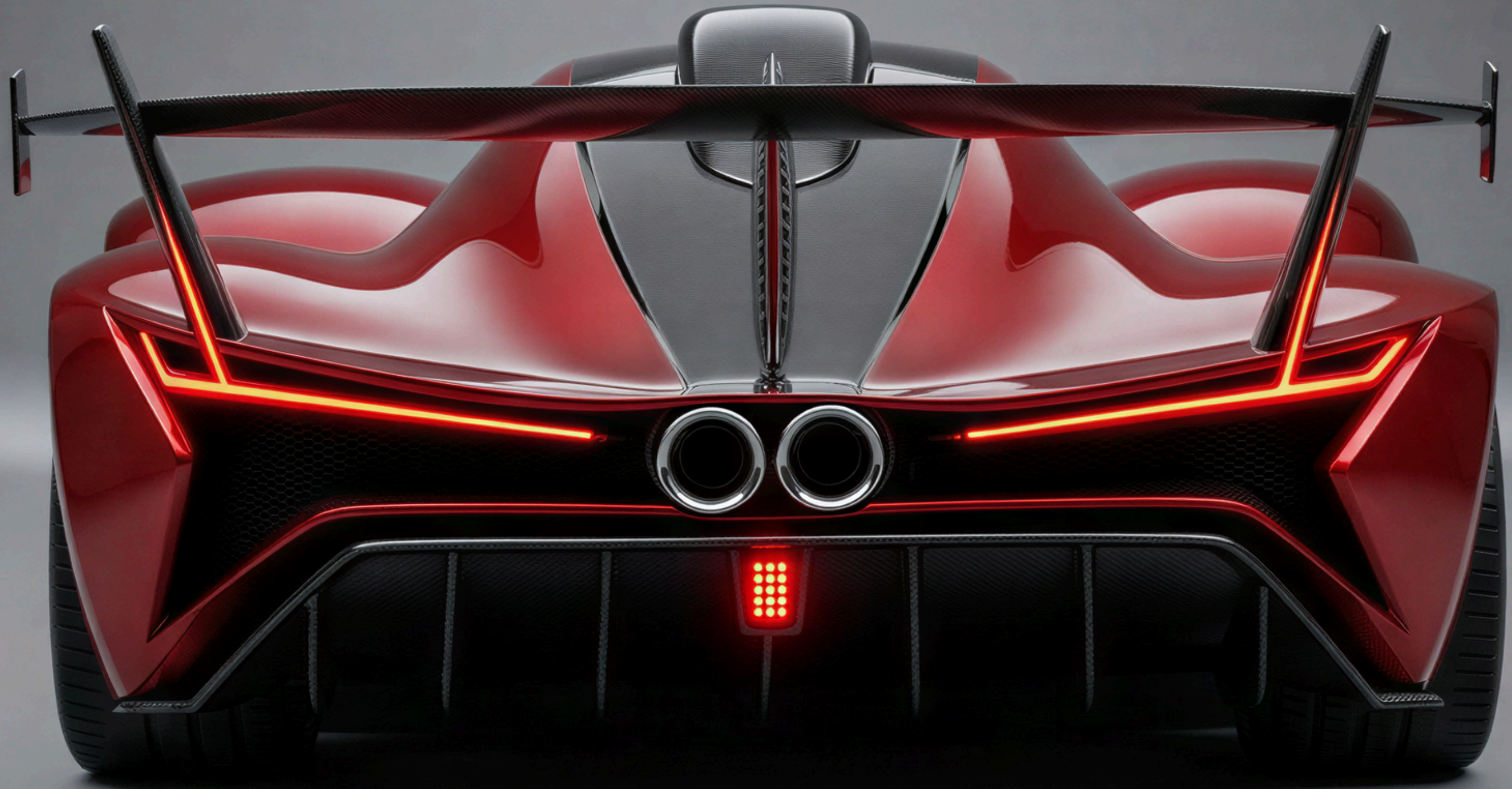
The design process began with hand sketches, which were then digitally painted and refined in Photoshop to develop form, surface quality, and visual depth. Once the drawings became more resolved, I used Vizcom as a tool for extra realism and form visualization, rather than as a final design generator. Its purpose was to help me better understand how the vehicle might read in three dimensions, particularly in terms of surfacing, proportion, and overall visual presence. This stage also became useful in preparing the design for later poly modeling in Blender, as it helped clarify how the body volumes and aerodynamic features could translate into a more resolved 3D form. The Vizcom outputs were then brought back into Photoshop for further refinement, ensuring that the final visuals remained aligned with my original design intent.

I also tested a more additive workflow inside Vizcom, where I kept editing and evolving the outputs to see how far I could push the design. But I realized that after a certain point, it started drifting away from the aerodynamic logic and consistency I had established in the original drawings. So I treated it more as a realism and exploration tool, and brought everything back into Photoshop to regain control.”









This stage represents the final phase of my design process, where the project moves from 2D development into a physical outcome. After refining the form, proportions, and aerodynamic intent, the next step is to translate the design into accurate blueprints, develop a 3D model in Blender, and produce a scaled prototype through 3D printing and surface finishing

FINAL DESIGN REFINEMENT ONGOING.  
TECHNICAL DRAWINGS AND PERSPECTIVE DRAWINGS  
WILL BE ADDED.