

# 5

# Styling

*The goal of styling was to design a vehicle family that would be suitable for the year 2004 and beyond without detracting from new technology and steel.*

## 5.1 BACKGROUND

The ULSAB-AVC Program was focused on total vehicle development. Styling, therefore, was an essential part of the development process. Styling is the basis and a major influencing factor in the development of any vehicle design and affects vehicle components and vehicle performance, such as body structure, closures, package, electrics, aerodynamic, and even the vehicle mass.

## 5.2. PES Styling Studio

The styling for the ULSAB-AVC Program was carried out at Porsche Engineering Services, Inc. (PES) Styling Studio in Huntington Beach, California. Here, the latest hardware and computer software was used to create the ULSAB-AVC Exterior and Interior styling.

## 5.3. Exterior Styling

### 5.3.1. Requirements for Styling

In ULSAB-AVC, the styling created surfaces (3D data) for a 2-door hatchback (C-Class) and a 4-door sedan (PNGV-Class) using common styling features. For the C-Class the possibility of other derivatives (sedan, estate (wagon), 5-door) should be presented as styling sketches (2D only).

The overall goal of styling was to design a family of vehicles that would be suitable for the year 2004 and beyond without detracting from the program focus of technology and steel. The styling should highlight the ability to develop a family appearance from one platform, consider material use, safety (Star-Rating) and enhanced aerodynamics. Consequently, the desired design statement should be contemporary without being a focal point in order to showcase the technology. The styling should also look lightweight but strong. It was planned

that the PNGV-Class vehicle should share the C-Class front end, but would feature a Sedan concept style that took account of the longer wheelbase.

### 5.3.2. Styling Direction

The ULSAB-AVC styling began with several stylists developing sketches (see Figure 5.3.2-1) for unique styling directions. These sketches were then used in an internal clinic to determine a main styling direction. In general, five separate approaches were explored with proposed differences in proportion and surfacing to achieve a variety of images.

#### Conservative approach (A)

The familiar proportions that range from style oriented fast-backs to utility oriented Kamm backs without overwhelming the technology being showcased.

#### Monospace approach (B)

This approach explores designs that reflect interior volume oriented trends, with forward cowl placement and vertical rear uppers.

#### Avant-garde approach (C)

Explores surface and graphic treatments that are advanced as the technology, with obvious aerodynamic elements to achieve low aerodynamic drag.

#### Formal approach (D)

Explores designs that have a modest three-box proportion and a heavier C-pillar to produce a more expensive image.

#### Trail active approach (E)

Fender-oriented surfacing and forms that reflects global trends toward light SUV elements and adds a stronger image to a conservative market segment.



**Figure 5.3.2-1 Styling sketches** (letter designates approach )

The final styling direction was cooperatively decided by stylists and engineers by reviewing the sketches and selecting the best elements from the various approach proposals.

### 5.3.3. Common Family Features

The ULSAB-AVC family is characterized by aerodynamic concerns, with low and softly contoured leading surfaces graduating to sharper trailing edges at the rear of the vehicles. This feature is further enhanced in top view by the rear header kick-up which promotes these aerodynamic considerations. The long wheelbase, with minimal overhangs and long cowl to axle proportion, creates a design that has both progressive proportions, as well as echoing trends to maximize the interior volume.

One major characteristic that is shared among the family is the roof rail separations at the A- and C- pillars. This feature provides a graphic distinction between the models. In addition, this feature could be used to finish the panels with individual effects to enhance model types.

### 5.3.4. C-Class Family Vehicle Sketches

The C-Class family as shown in Figure 5.3.4-1 includes styling for the following vehicle types:

- 3-door hatchback
- 5-door hatchback
- 4-door sedan
- 4-door estate (wagon)



C Class 3 Door



C Class 5 Door



C Class Sedan



ULSAB Advanced Vehicle Concept

Proposal: C Class Estate

**Figure 5.3.4-1 C-Class family sketches**

The 3-door, 5-door and estate (wagon) versions of the C-Class vehicles have tall, rear roof profiles, while the C-Class sedan has a tall deck to maximize the separation of airflow. This feature is also carried over to the PNGV-Class sedan. This feature enhances the functional European appearance of the family. The roofline and greenhouse graphics are gently arced, adding to the contemporary appearance. The design approach should allow refinement over time without losing the fundamental character of the vehicle.

The C-Class estate (wagon), 3-door and 5-door all adopts the same hatch. However, the sportier line of the estate's (wagon) C-pillar balances the vertical utilitarian proportion inherent in current wagon designs. The estate's (wagon) roof rail and wheels could be finished in a clear-coat natural steel to enhance the functional image.

### 5.3.5. PNGV-Class Vehicle Sketch



**Figure 5.3.5-1 PNGV-Class vehicle sketch**

The PNGV-Class vehicle shares the C-Class vehicles' front-end components, but the PNGV-Class's upper bodyside crease starts to rise from the midsection of the car to differentiate it from the C-Class sedan. Instead, the C-Class sedan bodyside begins to rise just forward of the tail. In addition to the differing architecture and roofs of each model, the surface treatments also provide additional character differentiation between the two sedans.

### 5.3.6. ULSAB-AVC Styling (Photorealistic images)

Surfaces are moderately curved, yet accented with a crisp line along the bodyside, balancing organic and cubic design statements while avoiding trendy design cues. The bodysides are simple in surfacing to avoid becoming dated and to reduce excessive material. This simplicity lends itself to the modification

and changes of part-lines without substantially affecting the design appearance. Simple recesses along the lower portion can be used to accept light impact strips.

A major factor in brand identity for each OEM comes from the significant impact created by the grille and front-end design. For the ULSAB-AVC study, the grille and ‘front face’ have purposely been left very simple. In this way OEMs could envision a vehicle’s unique front-end brand identity. However, the C-pillar does add a strong element of character, allowing the vehicle to be easily identified but without necessarily declaring a manufacturer.

Forward and rear lighting was designed to be modern and technical. Lamp surfaces are optimized to reduce overall mass. Panel lines have been cut to reflect the advantages of the structural features underlying the surface.

Common wheels are visually advanced and produced from steel. The rear bumper incorporates an aerodynamic outlet confirming that airflow is a priority in the design of the ULSAB-AVC vehicle family.

The photo-realistic images of the C-Class and PNGV-Class vehicle concepts are shown in Figures 5.3.6-1 through 5.3.6-5.



**Figure 5.3.6-1 C-Class 3/4 front view**



Figure 5.3.6-2 C-Class side view



Figure 5.3.6-3 C-Class 3/4 rear view



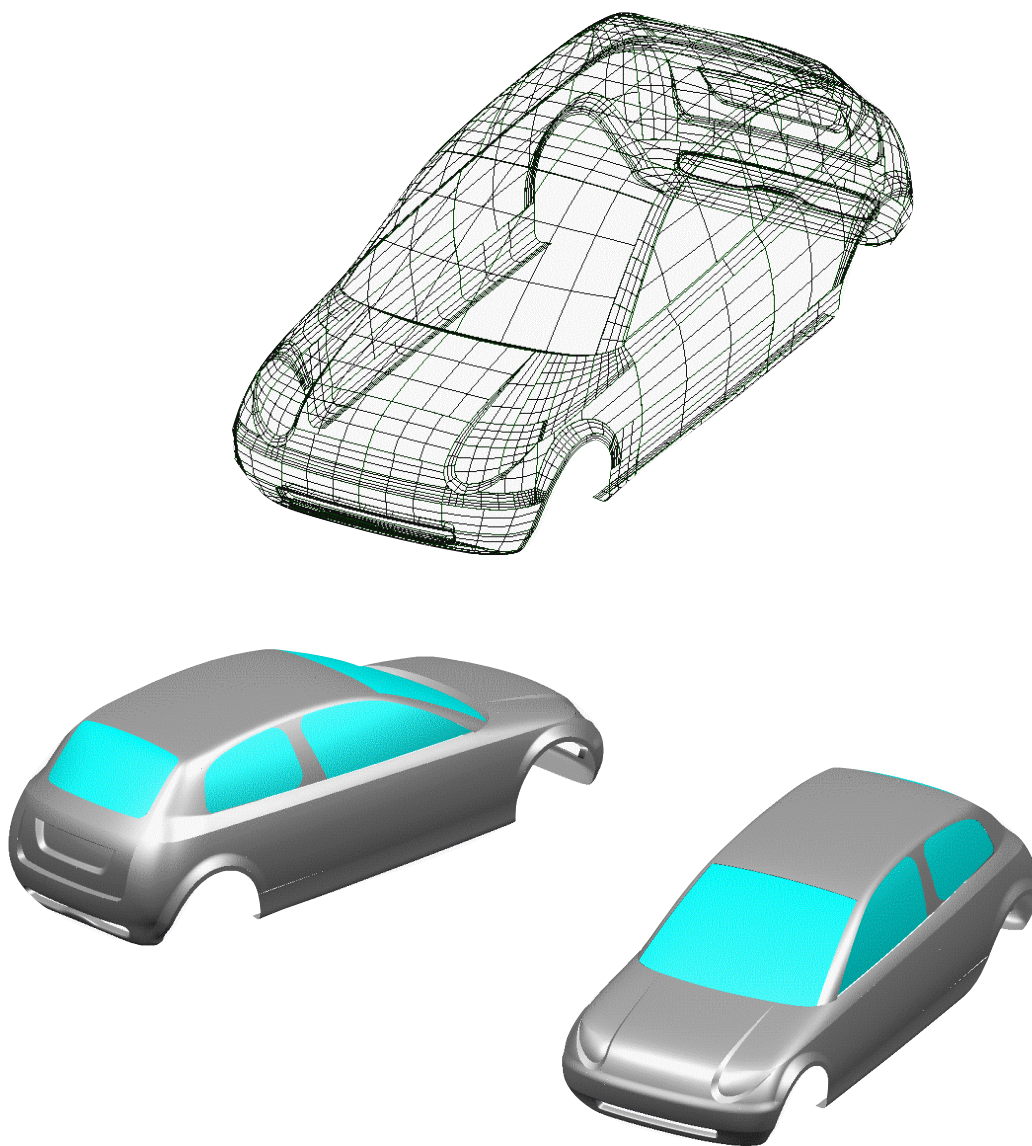
Figure 5.3.6-4 PNV-Class 3/4 front view



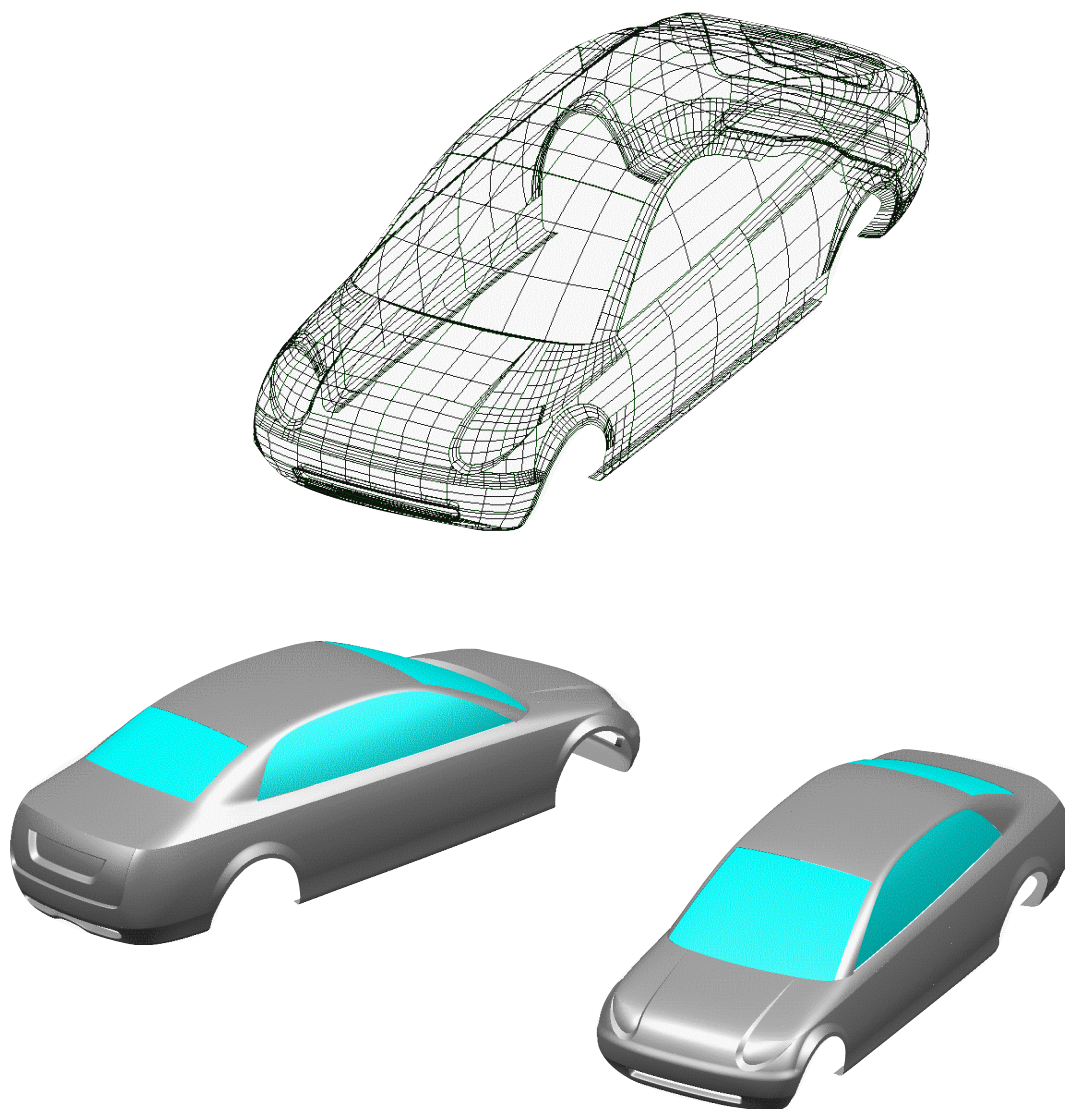
Figure 5.3.6-5 PNV-Class side view

#### 5.4. Exterior Styling Surface Models

For the body structure, closure and upper surface related parts, surface models of the two vehicle concepts were developed based on the styling sketches. The representations of the surface models are shown in Figure 5.4-1 and 5.4-2.



**Figure 5.4-1 C-Class exterior styling surface**



**Figure 5.4-2 PNGV-Class exterior styling surface**

## 5.5. Interior Styling

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The ULSAB-AVC interior design is based on combining interior components in an advanced way that supports modular assembly.

### 5.5.1 Interior Styling Direction

The ULSAB-AVC interior styling began, as the exterior styling, with the development of styling sketches (see Figure 5.5.1-1) to determine the main styling direction.

The interior design themes are driven by the desire to expose steel and then integrate the steel features into modular components that are lightweight in appearance.

# 5 Styling

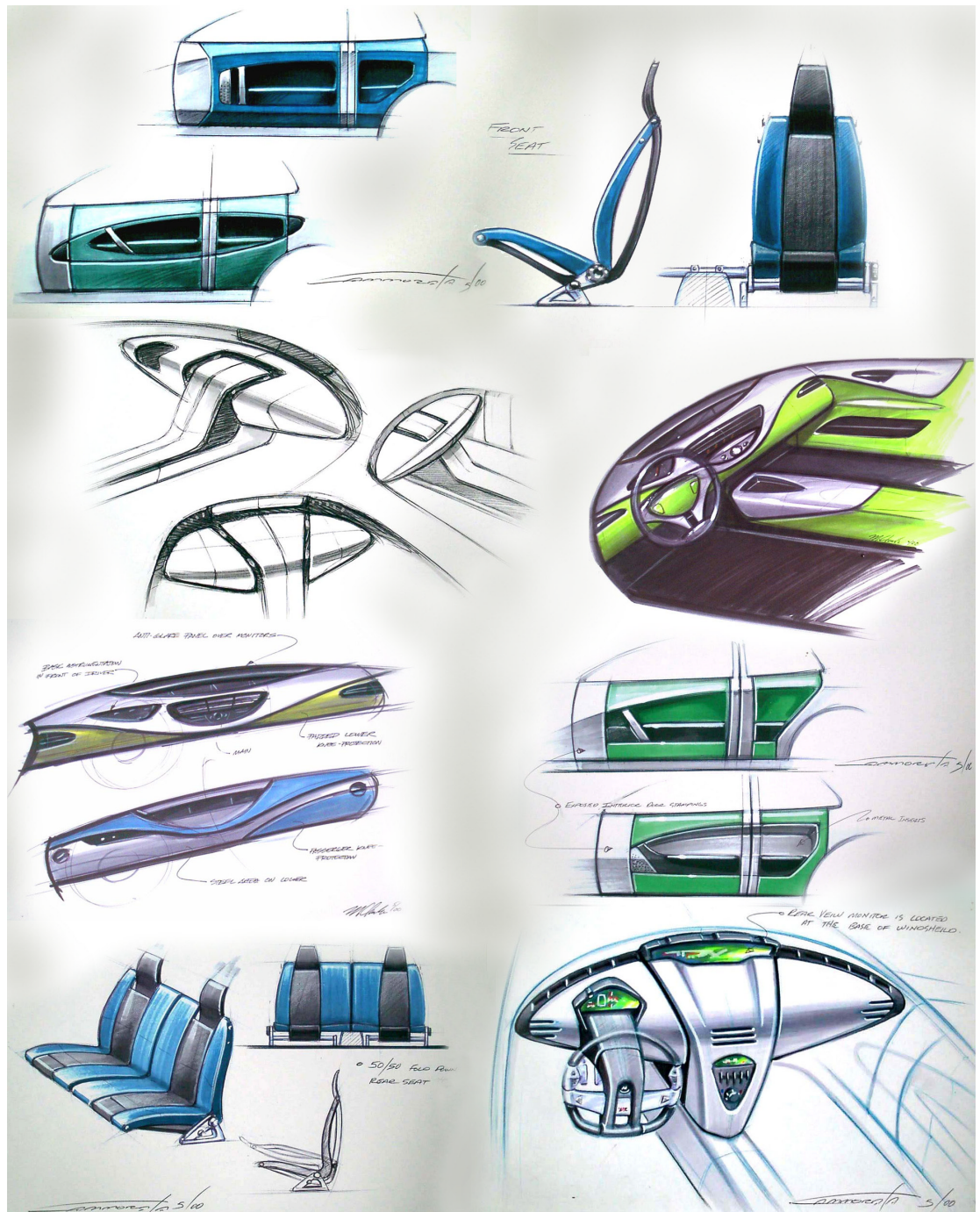


Figure 5.5.1-1 Interior sketches

### 5.5.2 Interior Styling Concept

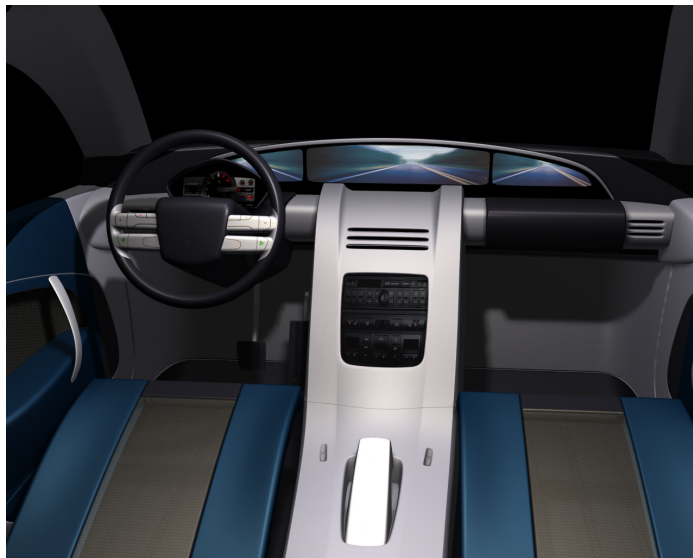
The four main areas of styling are:

- Cockpit module
- Center console
- Door panel module
- Steering wheel module

The cockpit module's main theme revolves around a steel cross member feature that is intersected by a large flowing center console tunnel as shown in Figure 5.5.2-1.

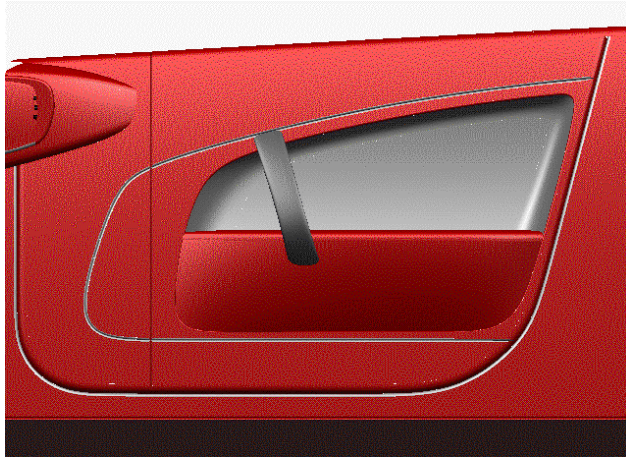
It is designed to look lightweight and integrates HVAC ducting, air bag and steering wheel module. In front of this module is a large ergonomically located rear view camera display panel.

As an important structural element the center console formed one of the most challenging tasks for design. To overcome the visual mass of packaging the drivetrain elements (tunnel), the design shows sectional surface breakups on the top of the console.



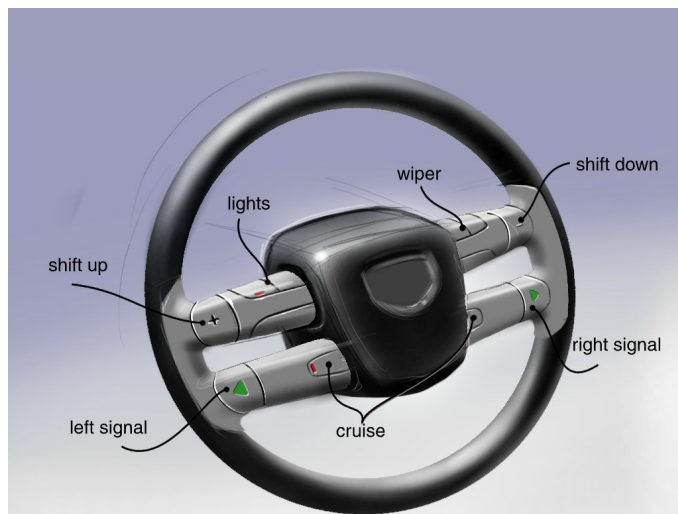
**Figure 5.5.2-1 Interior styling cockpit concept**

The door panel module as shown in Figure 5.5.2-2 integrates both soft touch and exposed steel material. These materials are broken up into vertical bands that are then bisected by flowing horizontal lines. These lines contain within them the functional elements of the door panel (armrest, speakers, door pull etc.)



**Figure 5.5.2-2 Door panel styling concept**

The steering wheel module integrates the steering wheel and a flat panel display which is then attached to the cockpit module cross bar. This module is designed to look like a separate component that contains vehicle information and vehicle control functions. This module is balanced on the right side of the center console tunnel by a passenger air bag with a similar design language and attachment. The steering wheel styling as shown in Figure 5.5.2-3 incorporates a similar steel cross bar language and includes within it all the controls for vehicle operations.



**Figure 5.5.2-3 Steering wheel styling concept**