DESIGN OF A LUXURY SEDAN

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PROJECT AIM :

Exterior Styling of a Luxury Sedan for the middle aged professionals from the upper class segment of the society.

TYPE OF USERS:

Persons who are exceptionally rich and who really believe in having a new driving experience every time they sit in the car. Their age would be in the group range of 32-45 years.

SCOPE OF THE PROJECT:

The project will be concentrated only on the exterior styling of the sedan and it will be a pure styling project. However data whenever , wherever will be clarified with the help of any ergonomics data if required.

WHY EXTERIOR STYLING ?

It is Love at first sight

For most consumers, choosing a car has as much to do with its design as with its performance and driving capacities.

INTRODUCTION:

Vehicles are classified into different types.The basic types are as shown below.

SPORTS CARS

CONVERTIBLES

SUV'S

VANS

INTRODUCTION:

Cars generally are categorized on the basis of their engine power and their overall dimensions.

A Segment Cars:

A **city car** (or **urban car**) is a small, moderately powered automobile intended for use in urban areas. Has four seats and their length is usually between 3.40 m and 3.60 m.(Wheelbase ~ 2.3m)

Examples of city cars:

- **Fiat Panda**
- **Peugeot 107**

B Segment Cars:

A **subcompact car** is an automobile in a vehicle size class smaller than a compact car but larger than a city car (and known as superminis in Europe). This is also known as the **B-segment** class. Subcompacts are usually considered to be those cars that have a length of 3.9 m to 4.2 m.

Examples of superminis / subcompact cars:

- **Hyundai Accent**
- **Suzuki Swift**

INTRODUCTION:

C Segment Cars:

Compact car is an automobile smaller than a mid-size car, but larger than a subcompact car, similarly recognized in much of the world as a "*C-segment*" (between B and D-segment) vehicles. Compact cars usually have lengths ranging from 4.25 m to 4.5 m

Examples of compact cars:

- **Honda Civic**
- **Mitsubishi Lancer**

D Segment Cars:

Mid-size cars have room for five adults and a large trunk. Engines are more powerful than compact cars and six-cylinder engines are more common than in smaller cars. Car sizes vary from region to region; in Europe, large family cars are rarely over 4700 mm long, while in North America and Australia they may be well over 4800 mm.

Examples of large family cars / mid-size cars:

- **Honda Accord**
- **Toyota Camry**

INTRODUCTION:

E Segment Cars:

An executive car or mid-luxury car is larger than a compact executive car/entry-level luxury car. They are usually very roomy, powerful and luxurious, making them more expensive than "standard" sedans.Their lengths usually range from 4.5 m to 5.0 m.

Examples of executive cars / mid-luxury cars:

- **Jaguar S-Type**
- **Chrysler 300**

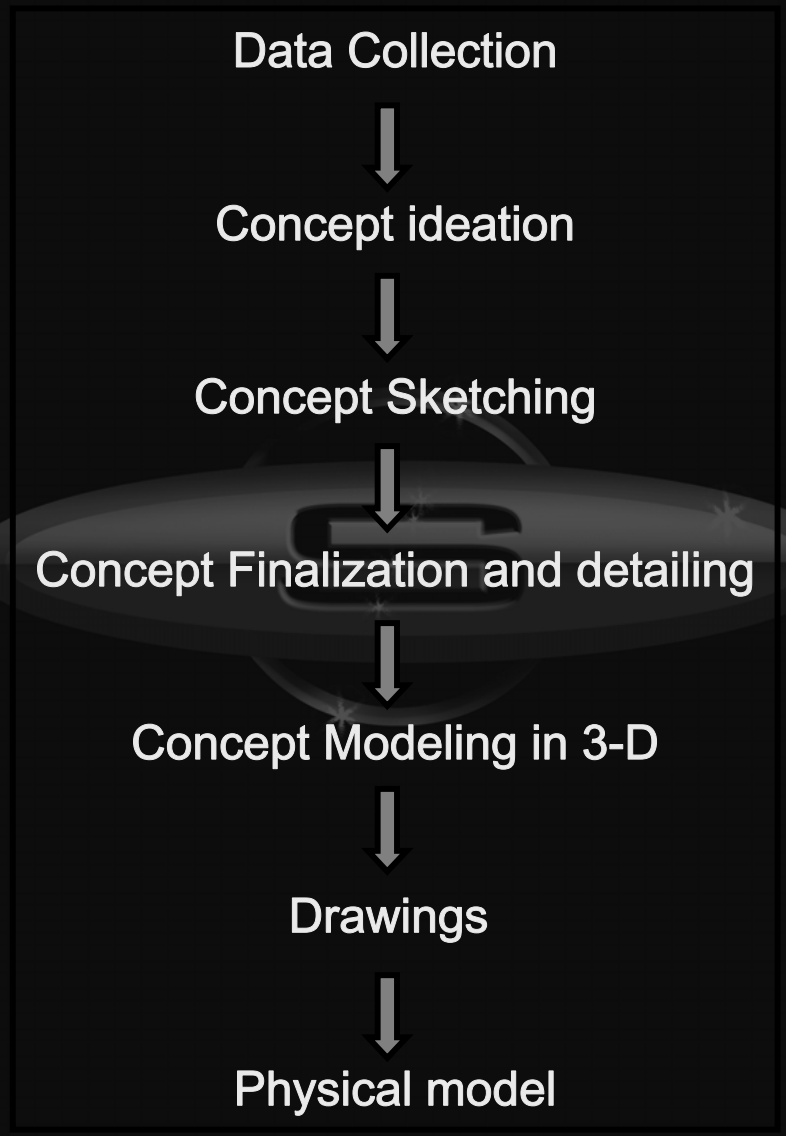
F Segment Cars:

A full-size luxury car is typically a four-door sedan. These are the most powerful sedans, with eight and twelve-cylinder engines and have more equipment than smaller models.Their length usually is above 5.0 m

Examples of full-size luxury cars:

- **Audi A8**
- **Mercedes-Benz S-Class**
- **Rolls Royce Phantom**

DESIGN PROCESS:



DESIGN PROCESS:

A glossary of terms as relating to automotive design.

Beltline
The longitudinal frontier between the car's main mass and the greenhouse.

Bone Line
Designers often use natural metaphors to describe body shapes, talking of hard muscle under soft flesh.
A bone line is a suggestion of solid structure beneath the body's surface.

DLO
Daylight opening, or window. Shape and position are influential on a car's character.

DRG
Down-the-road-graphics. The frontal appearance which defines the marque from a considerable distance.

Greenhouse
Glazed upper part of the passenger cabin comprising of the DLOs.

DESIGN PROCESS:

Hardpoints

Hardpoint has an actual and metaphorical meaning. It is the stage of design after Broadbrush, or conceptual phase. Hardpoints are also the fixed or frozen positions of, for example, the top of the radiator, top of the engine, top of the scuttle, suspension mounts and so on. Hardpoints might include greenhouse pillar sections, spare tyre location or side glass surface at a driver's eye level. Hardpoints are used in continuous comparative evaluation of competitors.

H-Point

A theoretical point (R-point in Europe) from which critical dimensions relating to legislation are measured. The h-point is approximately in line with the driver's hip joint. The position 'eye ellipse' is derived from the h-point. The eye ellipse is used to generate legally required vision lines.

Pillar/Post

Identified by the letters A,B,C,D (A pillar being the foremost or windscreen pillar), as they move rearwards through the greenhouse, the vertical (almost always angled) members of the bodywork support the roof, the equivalent of glazing bars in architecture. Montante in Italian.

DESIGN PROCESS:

Razor Edge

The origami school of car design, where sharp, geometrical forms of angles dominate the overall shape.

Rocker Panel

In US English, the body part between the bottom of the doors and the ground. Sill in British English.

Shut Line

The line between panels and doors. The precision and economy of these lines is a matter of intense competition between manufacturers and is a serious test of manufacturing finesse. The way the shut lines are articulated by designers is an unconciously powerful influence on the customer's perception of the car's character.

Swage Line

An emphatic crease in a metal panel.

Tumblehome

The angle between the vertical and the greenhouse when seen from the front.

Wheel arch

The aperture containing the wheels.

BENCHMARKING

Competitive benchmarking is used in competitor analysis wherein the companies best or well established in their processes are studied.

BENCHMARK STUDY OF DIFFERENT CARS:

FEATURES	BENTLEY CONTINENTAL FLYING SPUR	BMW 7-SERIES	MERCEDES BENZ S-CLASS
			
1. YEAR	2007	2007	2007
2. MAKE	BENTLEY	BMW	MERCEDES BENZ
3. MODEL	CONTINENTAL FLYING SPUR	7 - SERIES	S CLASS
4. ENGINE LOCATION	FRONT	FRONT	FRONT
5. DRIVE TYPE	AWD	REAR WHEEL	REAR WHEEL,4WD
6. PRICE	Rs 80,00,000/-	Rs 36,00,000/-	Rs 41,53,200/-
ENGINE			
1. DISPLACEMENT	5998.00 CC, 6 L	4800.6 CC, 4.80 L	5500.5 CC, 5.50 L
2. ENGINE TYPE	W 12	V 8	V 8
DIMENSIONS			
1. LENGTH	5307.1 MM	5039.4 MM	5207.0 MM
2. WIDTH	1915.9 MM	1902.5 MM	1872.0 MM
3. HEIGHT	1479.1 MM	1491.0 MM	1473.2 MM
4. WHEELBASE	3065 MM	2989.6 MM	3164.9 MM
5. TYRES	275/40 R 19	245/50 R 18	255/45 R 18

BENCHMARK STUDY OF DIFFERENT CARS:

Features	Honda Accord	Lexus LS	Jaguar S-Type
			
1. Year	2006-2007	2007	2007
2. Make	Honda	Lexus	Jaguar
3. Model	Accord	LS-460	S Type
4. Engine Location	Front	Front	Front
5. Drive type	Front wheel	Rear wheel	Rear wheel
6. Price	Rs 8,94,000/-	Rs 35,41,440/-	Rs 22,07,760/-
Engine			
1. Displacement	2354.00 cc, 2.4 L	4600 cc, 4.6 L	3001 cc, 3.0 L
2. Engine Type	I 4	V 8	V 6
Dimensions			
1. Length	4854.0 mm	5029.2 mm	4904.8 mm
2. Width	1818.7 mm	1874.5 mm	2060.0 mm
3. Height	1452.9 mm	1475.8 mm	1447.8 mm
4. Wheelbase	2740.7 mm	2969.3 mm	2908.3 mm
5. Tyres	195/65 R 15	235/50 R 18	235/50 R 17

DESIGN BRIEF:

General Specifications:

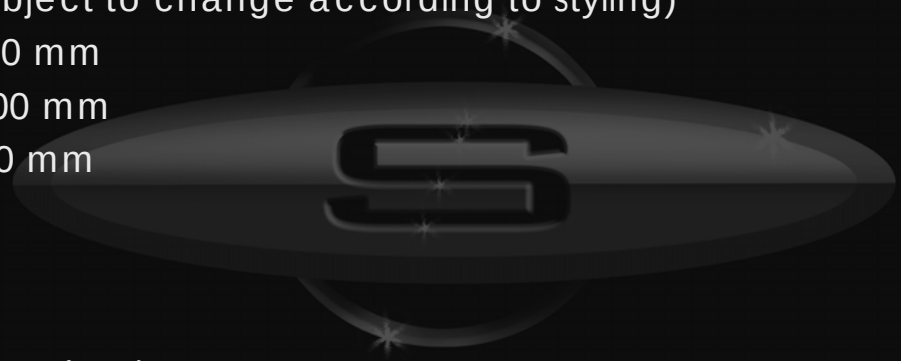
The car will have a Front Mounted Engine and will be have a Rear wheel drive.

Engine Specifications:

3800 cc, 4 Liter V8 Engine

Overall Dimensions: (Subject to change according to styling)

Length ~ 5100 mm
Breadth~ 2000 mm
Height ~ 1450 mm



Tire Dimensions:

255/45 R18
18” Light Alloy wheels

Theme of the Design:

The theme used throughout the styling process would be ‘Aggression’’, a killer instinct.

The theme ‘Aggression’ was selected because it is the current trend going on in the market.Sao a design will be made which will actually fit into this line of cars.

STYLING BENCHMARKS:

ALFA ROMEO

HONDA ACCORD

HONDA CIVIC

MERCEDES BENZ S- CLASS

CASE STUDIES OF DIFFERENT CARS:

MERCEDES S-CLASS (F-SEGMENT)

Front Features:

The edges of the classic grille with horizontal slats are demarcated by two deep creases along the surface of the bonnet to separate the area from the headlights.

The large headlights underscore the greater presence of the car,with a trenchant design and circular theme reminiscent of a camera lens.The profile of the headlights influences the flow of the sides.

Influence of Motion:

The direct transition from the line of the headlights to the bumper line creates a very distinctive motion that continues along and accentuates the solidity of the wheel arch.The rear arches are also accentuated and are echoed in the profile of the rear light clusters.

CASE STUDIES OF DIFFERENT CARS:

MERCEDES S-CLASS (F-SEGMENT)

Dynamism:

The curved flank midline pushes the volume of the car forward creating dynamism.there is a marked contrast between the arc of the roof and the waistline which continues in the taillight split by two bodycolour strips to increase the impression of width.The general effect is of great solidity which graphically expresses the effective stability of the car on the road.

Front and Rear wheelarches:

The front and the rear wheel arches are highly pronounced are on of the styling elements to strike a compromise between the stern and conservative nature and its potentially sporty and emotive spirit.

CASE STUDIES OF DIFFERENT CARS:

MERCEDES S-CLASS (F-SEGMENT)

Rear features:

The tail contour is inclined forward as is the profile of the rear lights stressing the almost coupe like rake angle of the rear screen in contrast with the large superimposed volume of the boot lid which splits the bodyline into two distinct designs: the descending curvature of the main bodywork and the more angular and the evident shape of the boot lid.

CASE STUDIES OF DIFFERENT CARS:

CITROEN C6: (F-SEGMENT)

Dynamism:

The dynamism of this car is derived from lines that drop down towards the tail.This confers an image of power, solidity and majesty to the car as a whole.The front is rather sleek and very aerodynamic in a perfect fusion of form and function,with perfectly integrated state of the art technology.

Rear Features:

The treatment of the tail where the two contrasting lines meet is intentionally kept ambiguous and even puzzling making it a surprise element. Seen from the side,it looks like a two box shape,but from the rear three quarter view it looks like a three box saloon,this is because of the clever use of lines.Also space for the trunk is made by making the rear screen negatively curved.

CASE STUDIES OF DIFFERENT CARS:

SEAT LEON: (E-SEGMENT)

Aggression and Dynamism:

The front of the car has a decisive and rather aggressive dynamic impact conferred by the converging lines of the bonnet and lights towards the grille.The configuration also had a prominent swage line running across the flank.

Rear Features:

At the tail the designers managed to create light clusters neatly confined to two single elements.

Door opening details:

The handle of the rear door is completely invisible giving the car a more coupe like look.For the door to open a recess has been cut into the polycarbonate rear quarter DLO for the hand.

CASE STUDIES OF DIFFERENT CARS:

VOLKSWAGON Eos: (COUPE)

Elegance:

The roof forms a tight arch from windscreen to tail creating a sporty and an elegant effect.The roofline is streamlined, the rear of the car is muscular and the whole appearance is prestigious.

The proportions create a pure,fun shape with no frills, no make up, with positive, freehand forms, not dictated by mathematical surfaces.

Front Features:

The bonnet hangs slightly over the lights,like a sort of eyebrow and the position and shape of the headlights and grille inturn influence the design of the bonnet itself.

The V shape motif of the front grille continues along the bonnet with a long crease whereas the sides are slighly rounded.giving the car visually original wings and wheel arches.The rear is no less muscular and athletic.the wings extend upwards with a slight curvature over a continuous lateral swage.

CASE STUDIES OF DIFFERENT CARS:

VOLKSWAGON Eos: (COUPE)

Rear Features:

The muscular design of the tail is defined by three elements: the clear-cut vertical surface of the boot,the imposing bumper wrapping around into the arches and the bold light clusters.

CASE STUDIES OF DIFFERENT CARS:

LAMBORGHINI GALLARDO : (SPORTS COUPE

Proportions:

The design of the car makes one to immediately notice the athletic compactness and the dynamic appearance conferred by thelong wheelbase, the very short overhangs while still preserving thepurity and angularity.

The cab-forward cockpit integrated in the body by a strongly slanted front screen and tensed pillars, the complex surfacing intersected by crisp graphics and its cooling flow oriented detailing evokes as in the Lamborghini tradition in its proportions and formal language a strong aeronautical influence. Starring blade like front light graphics, the front face is orchestrated around the dominant cooling inlets.

There is an interesting feature, as the roof deploys,two horns sprout out for a few seconds: “the horns of the Lamborghini bull”.

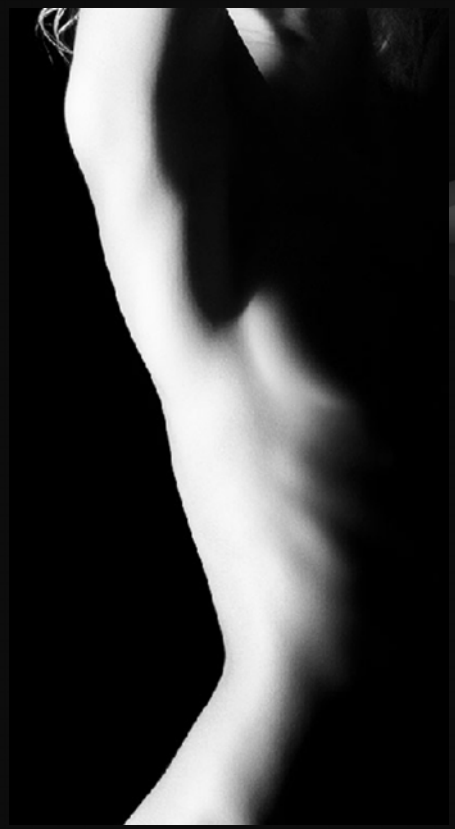
Door opening:

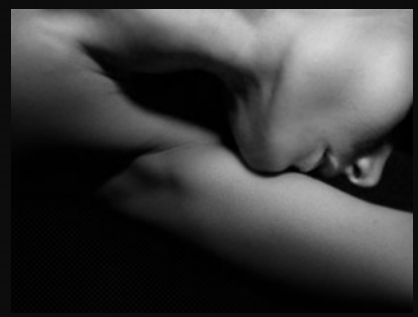
There is a step right in the flank at the end of the door.It also works as a door handle,looking perfectly rational.

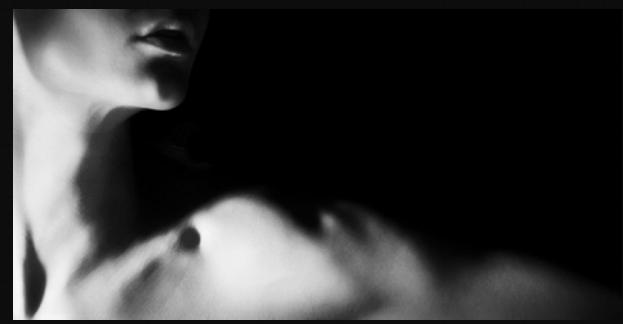
NATURAL INSPIRATIONS: Human Figures

Curves play an important role when it comes to the form definition.This basically reflects the identity of the car.Proportions also make a great difference in terms of the overall surface behavior in the car.

Human silhouettes are considered as the striking examples in terms of the proportions and the surface behavior. An image board representing these curves and proportions is shown below.

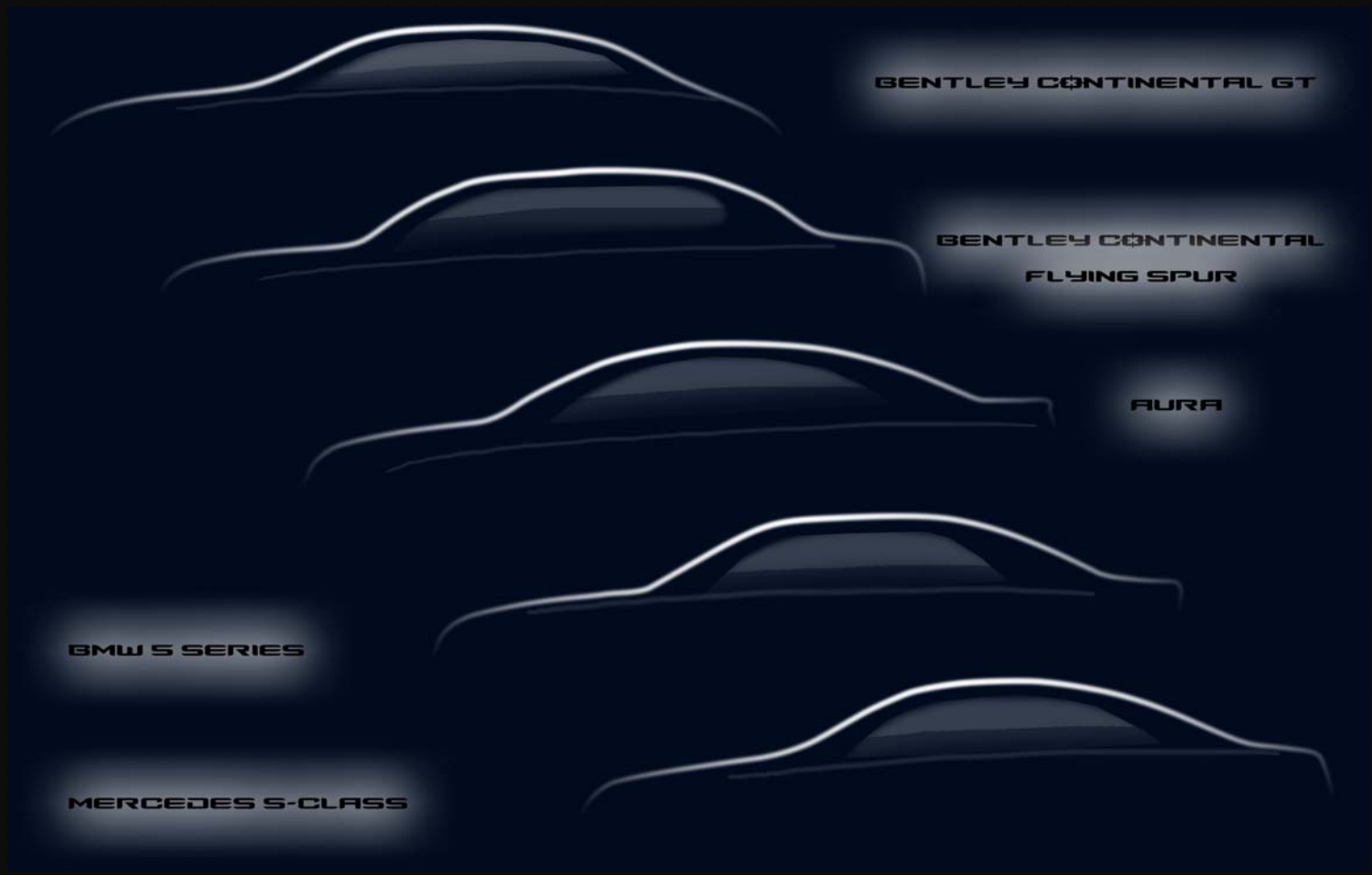






NATURAL INSPIRATIONS:

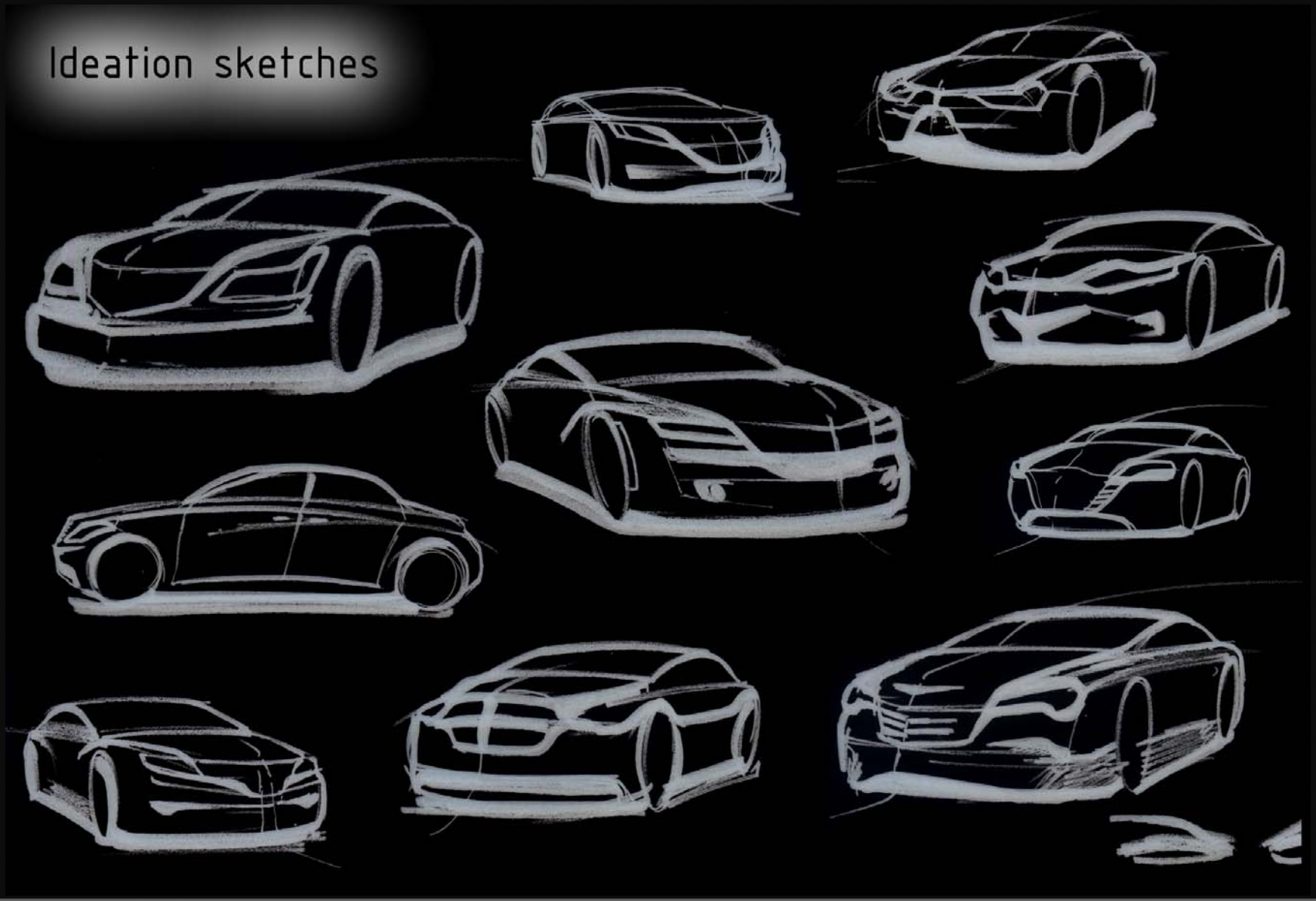
Fig below shows the silhouettes sketches of various cars as seen in dark. This basically gives the idea about the stance and the proportions of the vehicle.



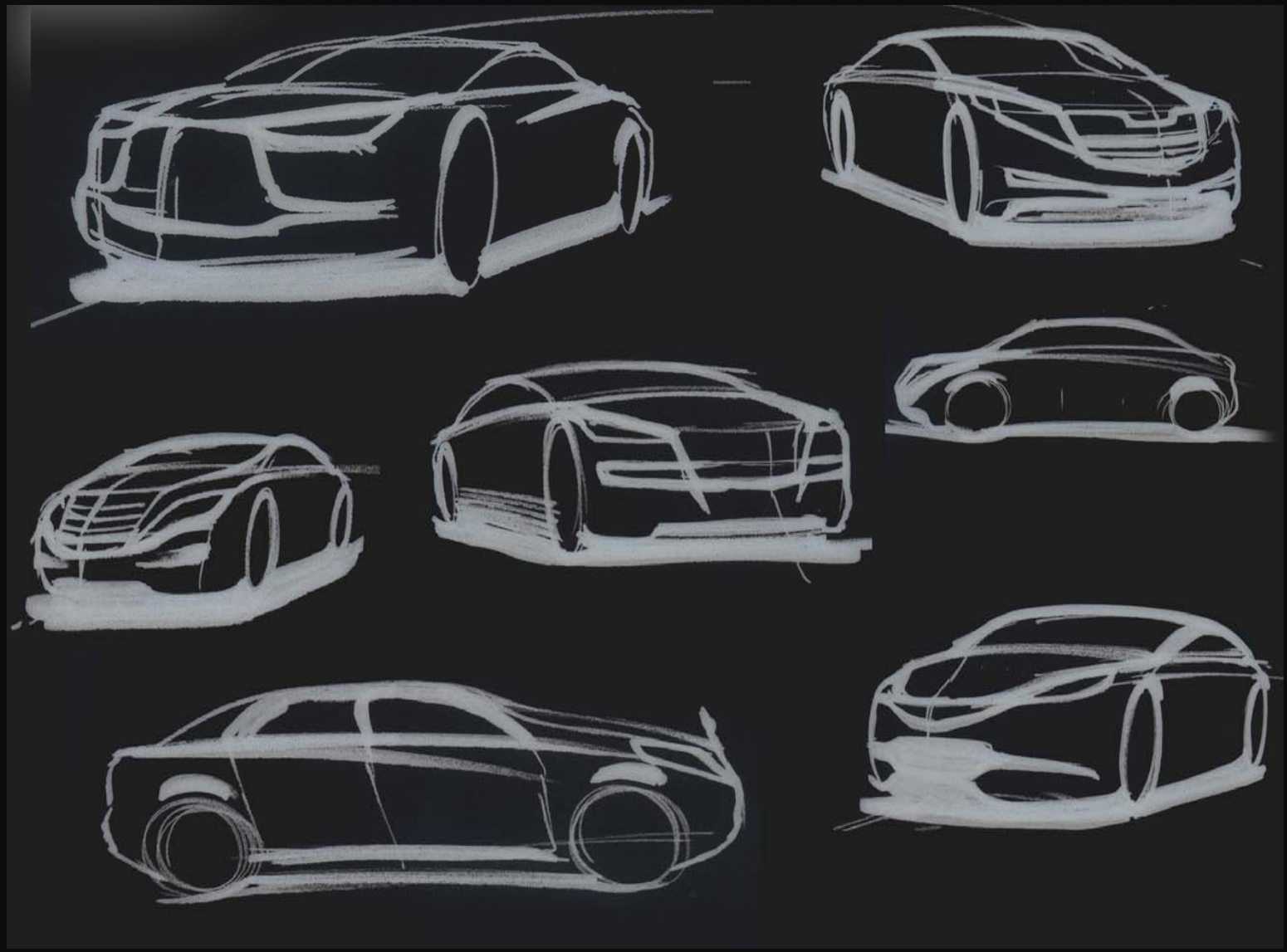
NATURAL INSPIRATIONS: Elements of Aggression

Since ‘Aggression’ was the theme chosen for the design an image board was made showing all the expressions which were then studied and reflected in terms of design cues in the car.

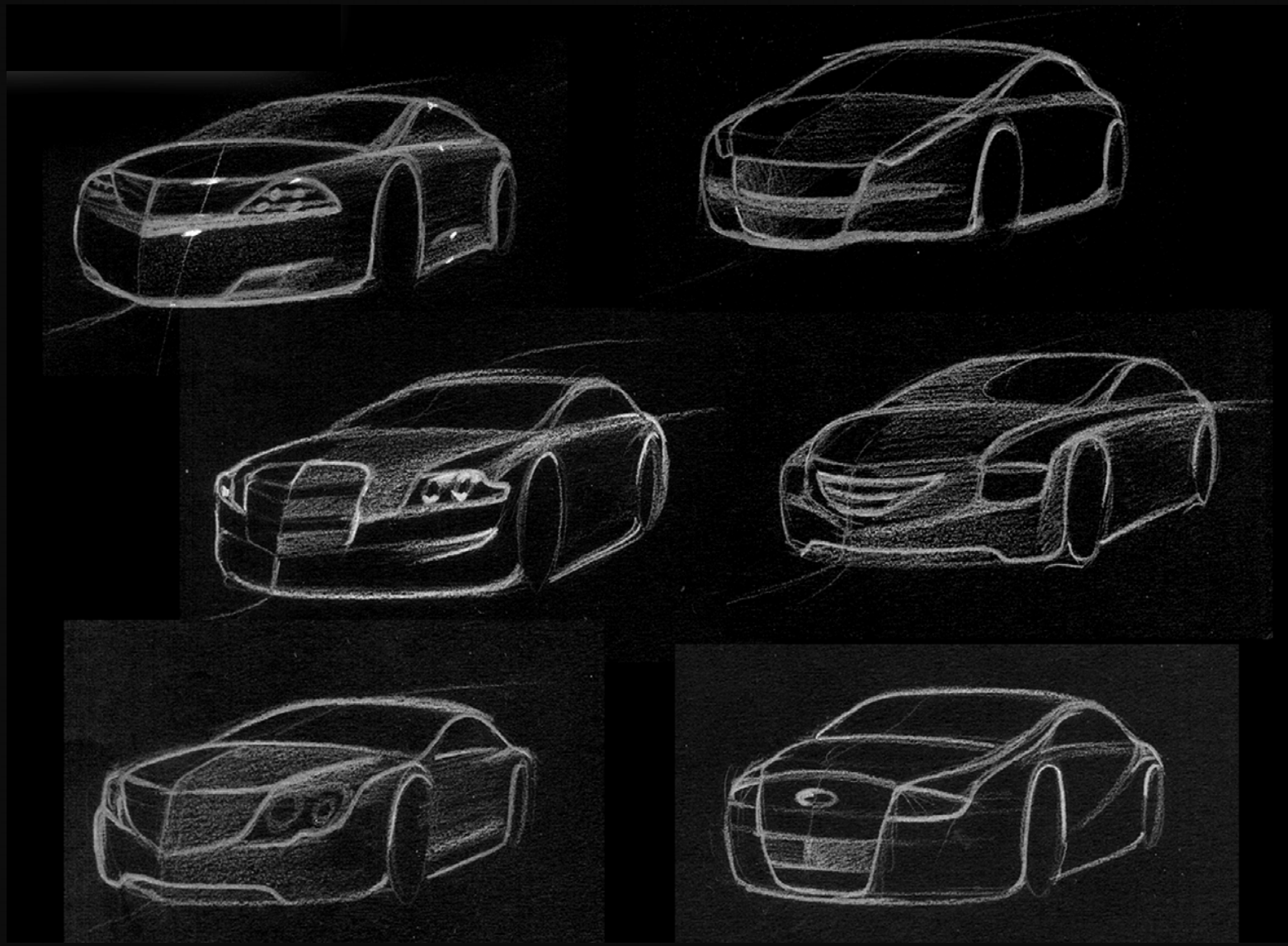
IDEATION SKETCHES:



IDEATION SKETCHES:

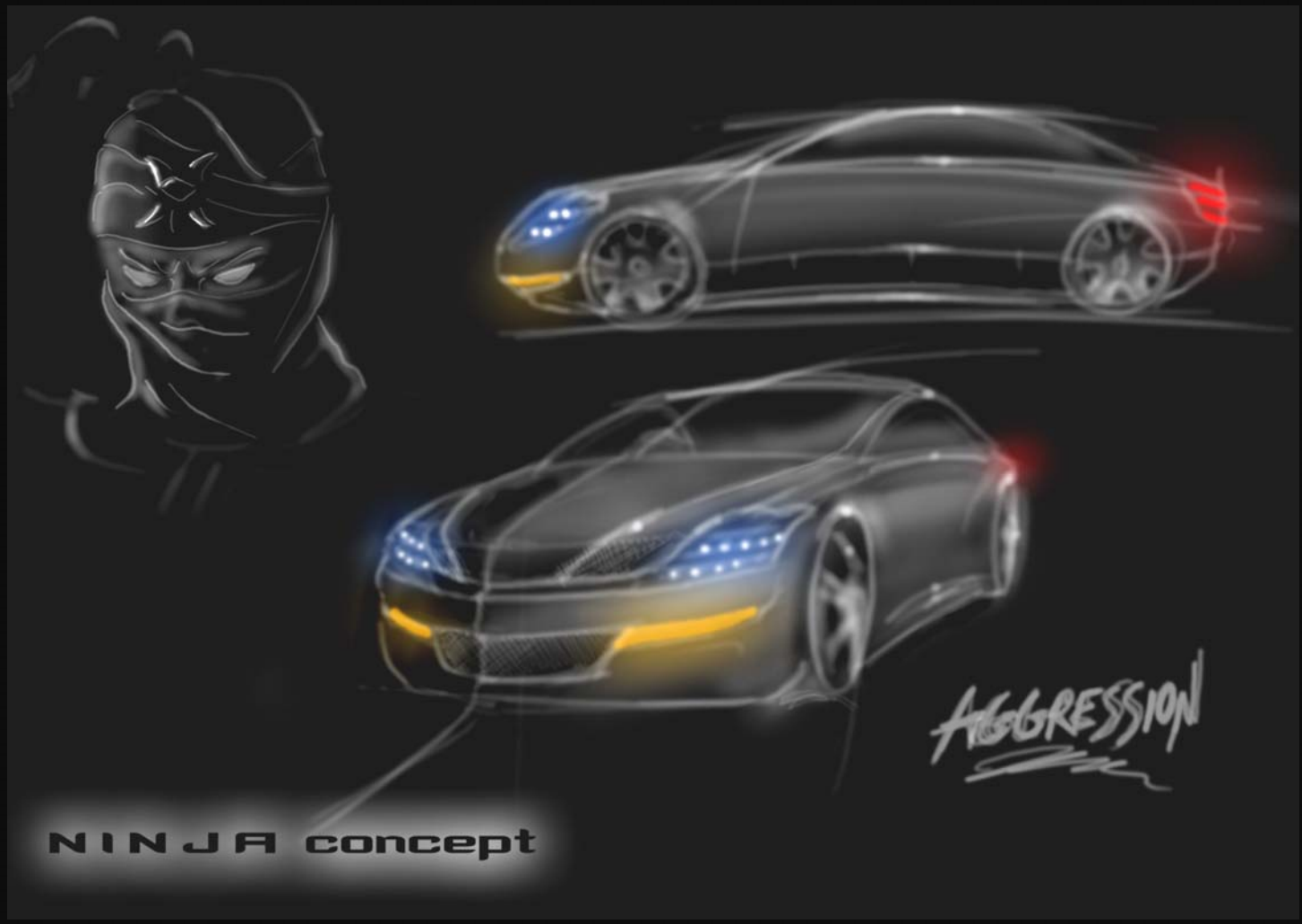


IDEATION SKETCHES:



IDEATION CONCEPTS:

The first ideation concept was inspired from the expressions of a ninja in a fight.This emotion was then reflected in the concept sketch shown.



IDEATION CONCEPTS:

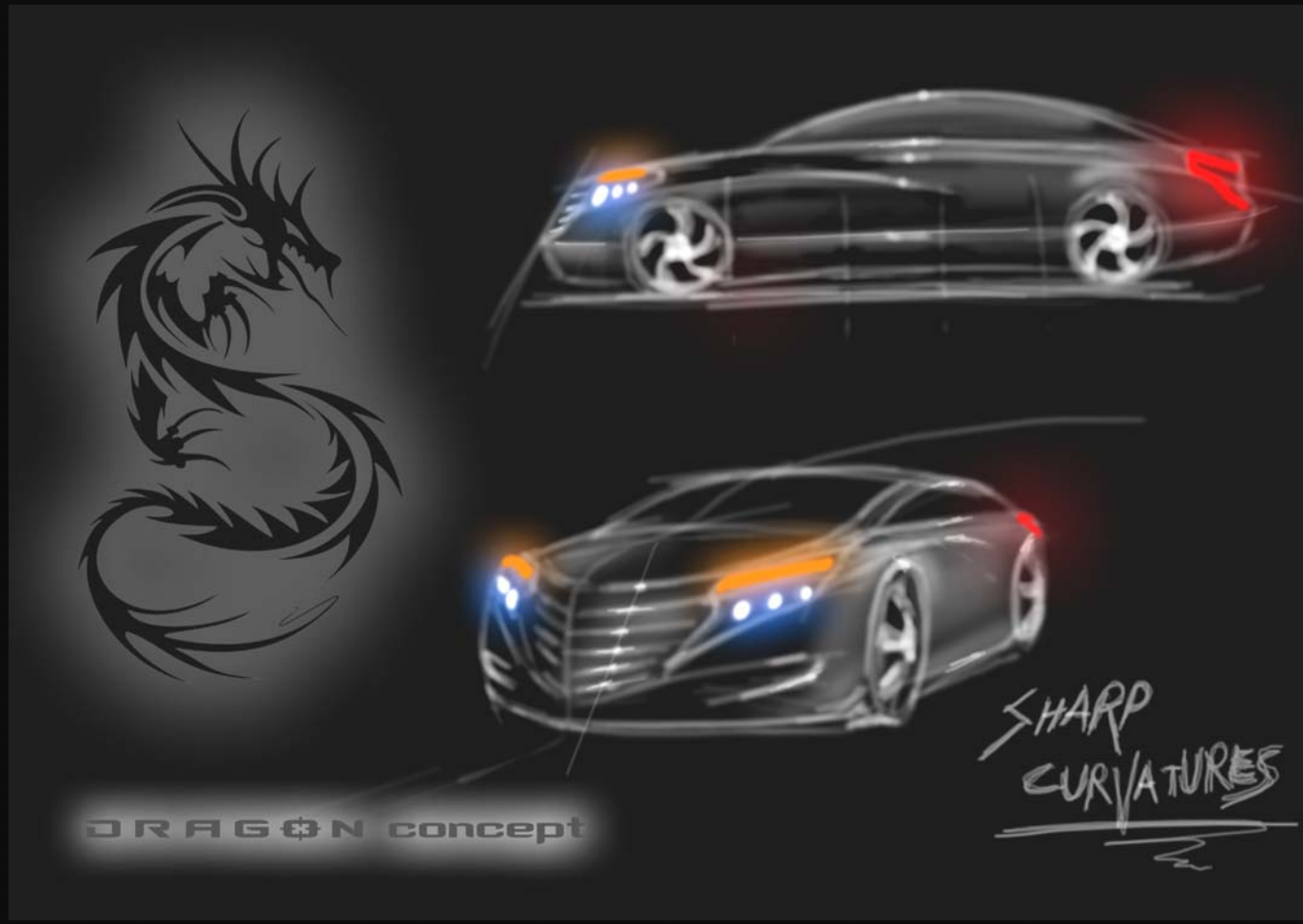
The second ideation concept was inspired from the type of clothes they wear. This attire was then reflected in terms of design cues in the vehicle.Basically in this the front grill which is the identity of the car is like the mask of the ninja which is a ninjas identity.

IDEATION CONCEPTS:

The third ideation concept was based on an animal,a leopard displaying the anger when in a fight.Also the proportions of the car are designed in such a way that it gives the feeling of dynamism and subtle flow lines.

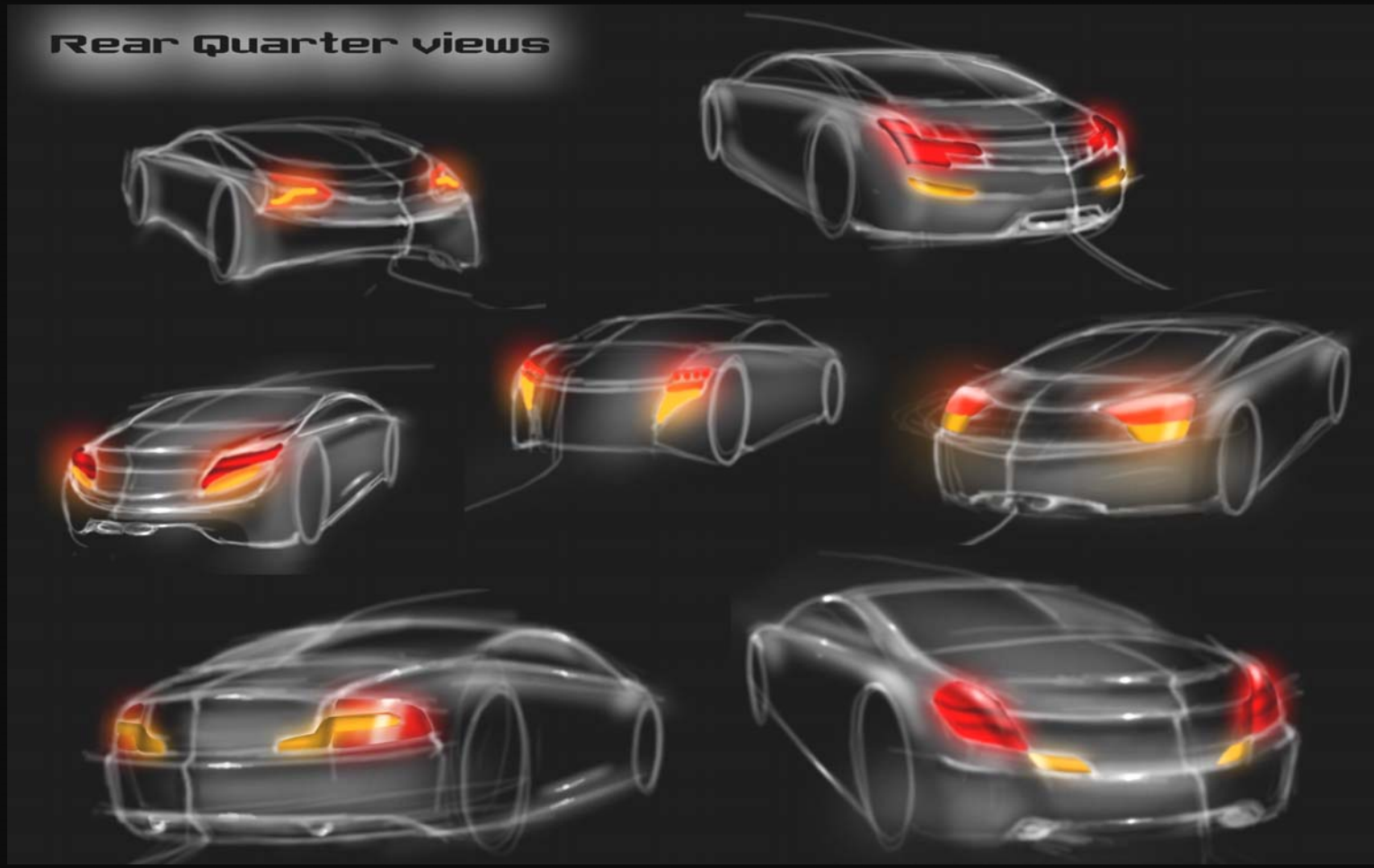
IDEATION CONCEPTS:

The fourth ideation concept was based on a dragon displayed by sharp elements.The sharp elements actually gives a feeling of aggression.These sharp curvatures were then carefully translated for deciding the feature lines of the car.



IDEATION CONCEPTS:

Options were also made for the rear of the vehicle because there has to be a continuous flow between the front and the rear of the car.Some of the concepts of the rear three quarter views are as shown below.



CONCEPT 1

CONCEPT 2

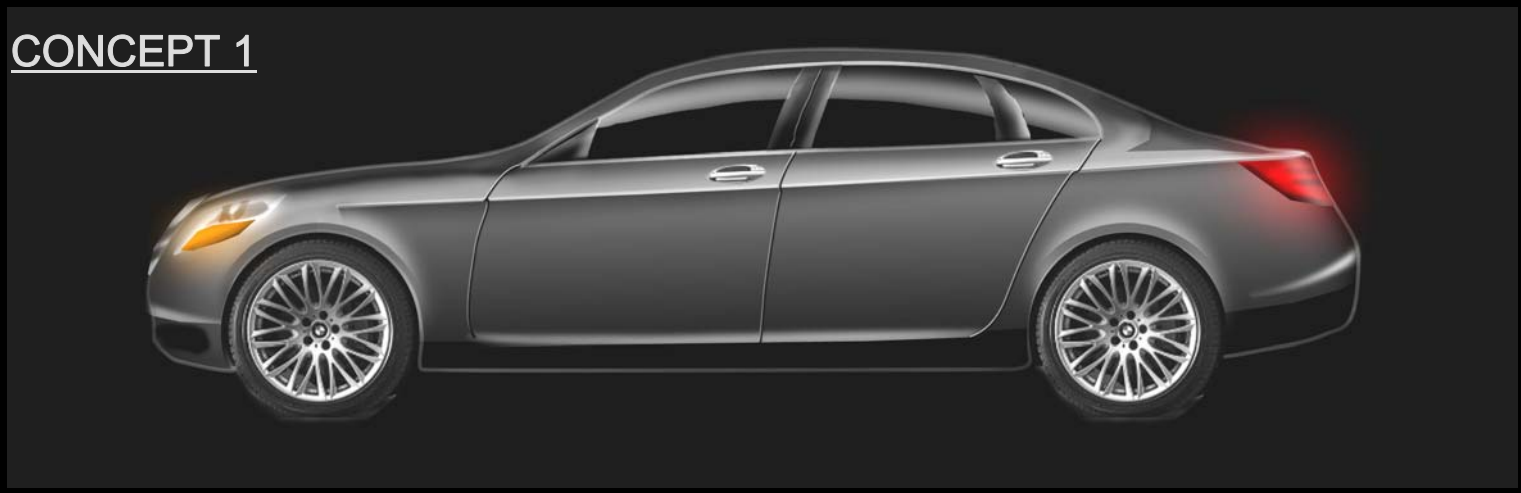
CONCEPT 3

CONCEPT 4

CONCEPT 5

CONCEPT RENDERINGS:

CONCEPT 1



CONCEPT RENDERINGS:

CONCEPT 2

CONCEPT RENDERINGS:

CONCEPT 3

CONCEPT RENDERINGS:

CONCEPT 4

CONCEPT RENDERINGS:

CONCEPT 5

DATA EVALUATION:

The renderings of these five concepts were taken to people to know their opinions about the design in terms of different features.

The people included designers from reputed industries.prospective buyers and colleagues.

This data was then evaluated on a scale of 1 to 9, 1 being the lowest and 9 being the highest in terms of ranking basis.The data was then tabulated and summed up. The concept getting the highest score was then taken as a final concept for further development.

The different heads under which the data was evaluated was

1. Exterior Styling.
2. Luxury in terms of visual appeal.
3. Dynamism.
4. Overall styling.

The other heads under which the data was analyzed was the different side views,the headlights, the taillights and the rear of the vehicle.

DATA TABULATION:

The feedback for **Styling (aggression)** from different users is tabulated as shown in the following tables.

USERS	CONCEPT 1	CONCEPT 2	CONCEPT 3	CONCEPT 4	CONCEPT 5
					
Mr. Dharmesh Mistry Head,Sheet Metal Aggr. Mahindra Tractors Age: 41 years	6	5	4	2	3
Mr. Subhash Mago Head,Sourcing Department Mahindra Tractors Age: 47 years	7	6	8	5	4
Mr. Sumit Malpani Deputy Manager,S M Aggr. Mahindra Tractors Age: 25 years	1	3	9	5	7
Mrs. Ramkrupa Senior Designer, Styling Mahindra Automotive Age: 40 years	6	5	6	4	5

DATA TABULATION:

USERS	CONCEPT 1	CONCEPT 2	CONCEPT 3	CONCEPT 4	CONCEPT 5
					
Mr. Jagdish Director, National Garage General Motors Age: 35 years	6	8	9	7.5	7.5
Mr. Anil Bhatt Sales Representative Force Motors Age: 30 years	5	9	5	1	3
Mr. Utkarsh Gautam Student IDC,IIT Bombay Age: 24 years	7	6	2	1	8
Ms. Shweta Suthar Student IDC,IIT Bombay Age: 25 years	7	5	1	3	9
TOTAL SCORE	45	**47**	44	28.5	46.5

DATA TABULATION:

The feedback for **Luxury (Visual appeal)** from different users is tabulated as shown in the following table.

USERS	CONCEPT 1	CONCEPT 2	CONCEPT 3	CONCEPT 4	CONCEPT 5
					
Mr. Dharmesh Mistry Head,Sheet Metal Aggr. Mahindra Tractors Age: 41 years	1	3	4	5	7
Mr. Subhash Mago Head,Sourcing Department Mahindra Tractors Age: 47 years	1	4	5	3	7
Mr. Sumit Malpani Deputy Manager,S M Aggr. Mahindra Tractors Age: 25 years	9	7	5	3	1
Mrs. Ramkrupa Senior Designer, Styling Mahindra Automotive Age: 40 years	3	4	4	7	6

DATA TABULATION:

USERS	CONCEPT 1	CONCEPT 2	CONCEPT 3	CONCEPT 4	CONCEPT 5
					
Mr. Jagdish Director, National Garage General Motors Age: 35 years	5	7	3	1	9
Mr. Anil Bhatt Sales Representative Force Motors Age: 30 years	9	7	5	1	3
Mr. Utkarsh Gautam Student IDC,IIT Bombay Age: 24 years	3	7	6	4	8
Ms. Shweta Suthar Student IDC,IIT Bombay Age: 25 years	3	5	7	9	1
TOTAL SCORE	34	**44**	39	33	42

DATA TABULATION:

The feedback for **Dynamism** from different users is tabulated as shown in the following tables.

USERS	CONCEPT 1	CONCEPT 2	CONCEPT 3	CONCEPT 4	CONCEPT 5
					
Mr. Dharmesh Mistry Head,Sheet Metal Aggr. Mahindra Tractors Age: 41 years	1	3	5	7	4
Mr. Subhash Mago Head,Sourcing Department Mahindra Tractors Age: 47 years	4	5	7	2	1
Mr. Sumit Malpani Deputy Manager,S M Aggr. Mahindra Tractors Age: 25 years	5	9	7	3	1
Mrs. Ramkrupa Senior Specialist, Styling Mahindra Automotive Age: 40 years	6	5	4	3	4

DATA TABULATION:

USERS	CONCEPT 1	CONCEPT 2	CONCEPT 3	CONCEPT 4	CONCEPT 5
					
Mr. Jagdish Director, National Garage General Motors Age: 35 years	1	9	7	3	5
Mr. Anil Bhatt Sales Representative Force Motors Age: 30 years	7	5	9	3	1
Mr. Utkarsh Gautam Student IDC,IIT Bombay Age: 24 years	4	3	6	2	2
Ms. Shweta Suthar Student IDC,IIT Bombay Age: 25 years	1	9	3	7	1
TOTAL SCORE	29	**48**	**48**	30	19

DATA TABULATION:

The feedback for **Overall Styling** from different users is tabulated as shown in the following tables.

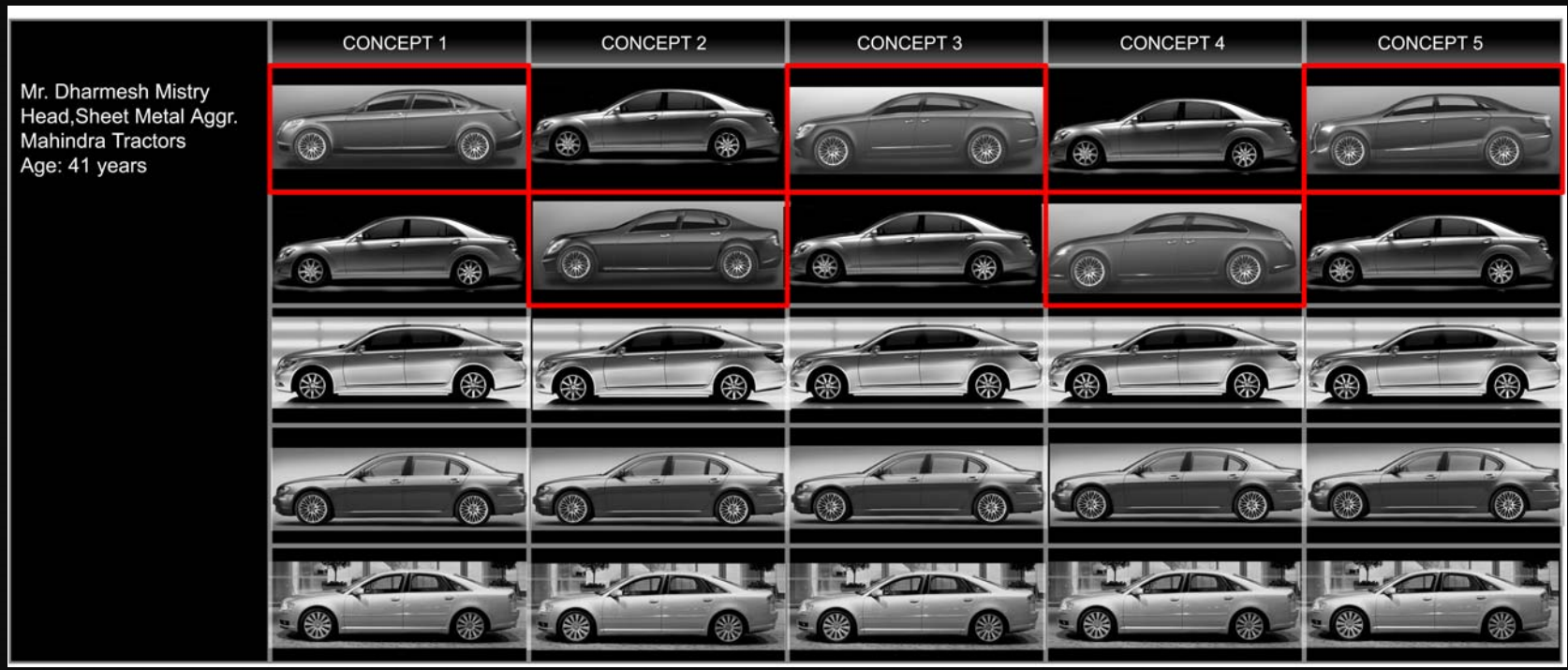
USERS	CONCEPT 1	CONCEPT 2	CONCEPT 3	CONCEPT 4	CONCEPT 5
					
Mr. Dharmesh Mistry Head,Sheet Metal Aggr. Mahindra Tractors Age: 41 years	1	3	5	7	4
Mr. Subhash Mago Head,Sourcing Department Mahindra Tractors Age: 47 years	7	6	8	5	4
Mr. Sumit Malpani Deputy Manager,S M Aggr. Mahindra Tractors Age: 25 years	7	9	5	1	3
Mrs. Ramkrupa Senior Designer, Styling Mahindra Automotive Age: 40 years	4	4	5	5	6

DATA TABULATION:

USERS	CONCEPT 1	CONCEPT 2	CONCEPT 3	CONCEPT 4	CONCEPT 5
					
Mr. Jagdish Director, National Garage General Motors Age: 35 years	1	3	9	7	5
Mr. Anil Bhatt Sales Representative Force Motors Age: 30 years	5	9	7	1	3
Mr. Utkarsh Gautam Student IDC,IIT Bombay Age: 24 years	2	5	4	4	7
Ms. Shweta Suthar Student IDC,IIT Bombay Age: 25 years	9	7	5	1	3
TOTAL SCORE	36	46	**48**	31	35

DATA TABULATION:

The feedback for **Side views** from different users is tabulated as shown in the following tables.



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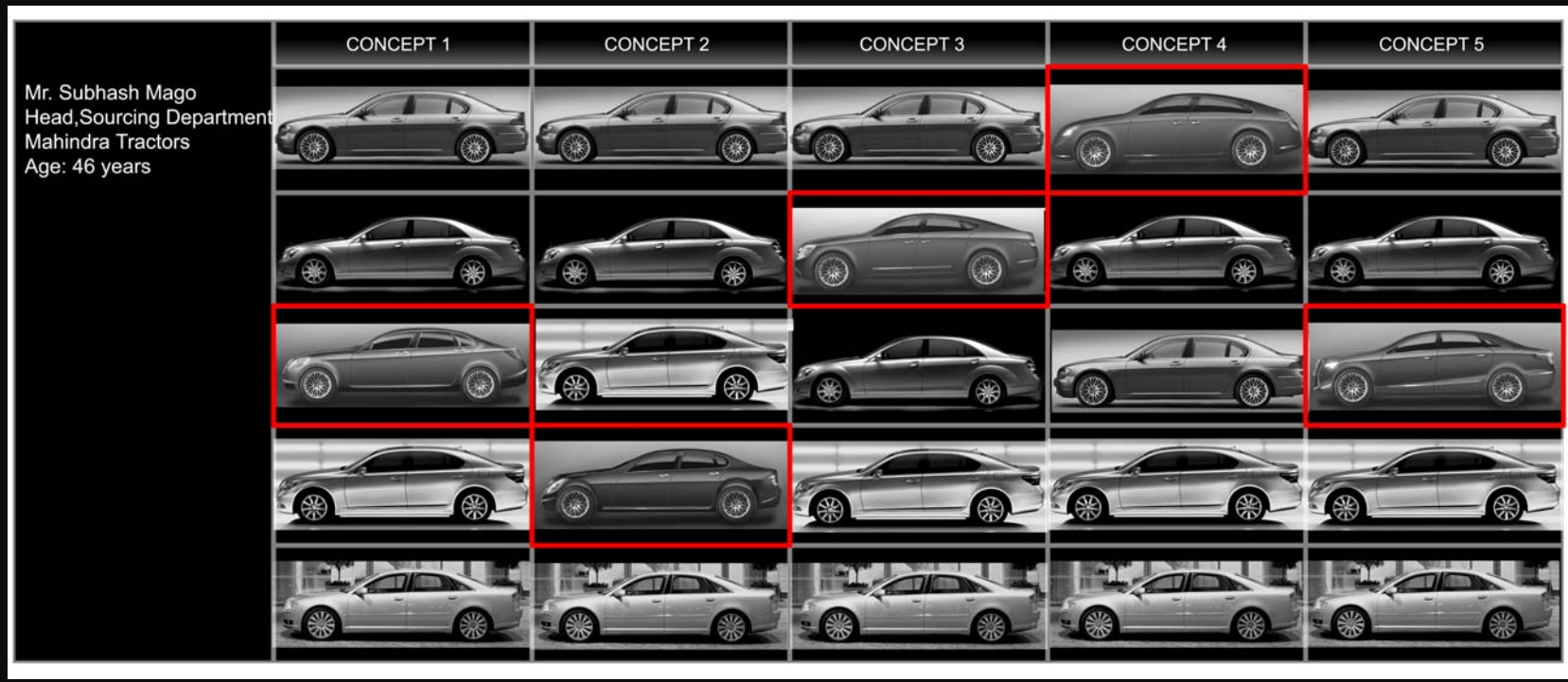

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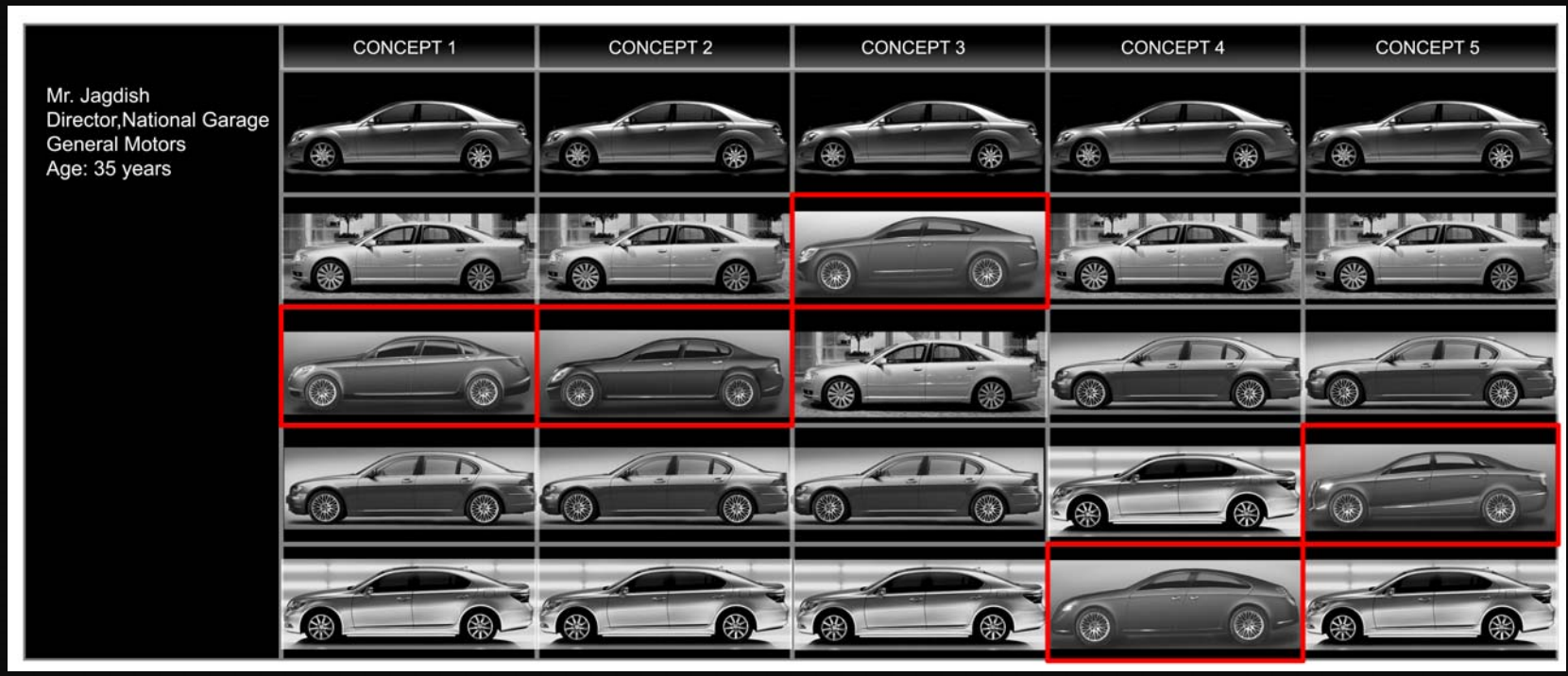
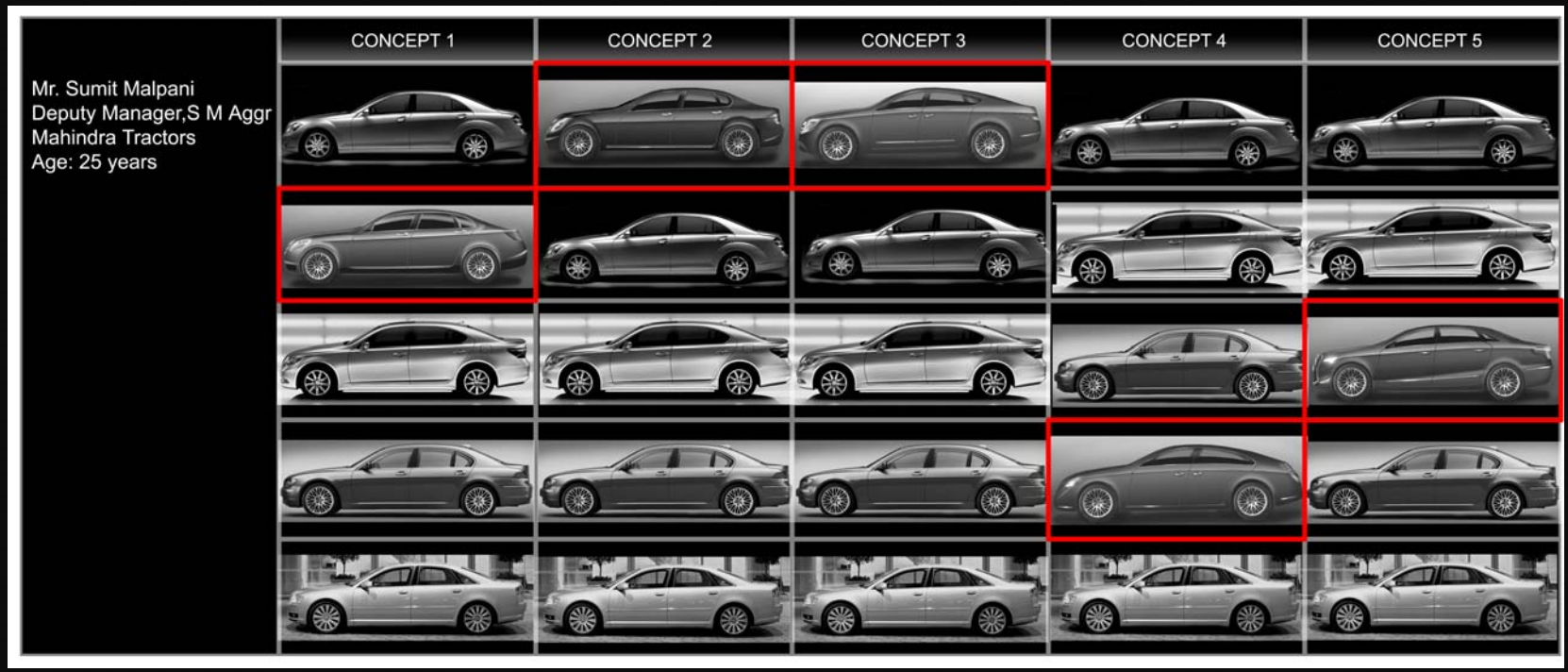
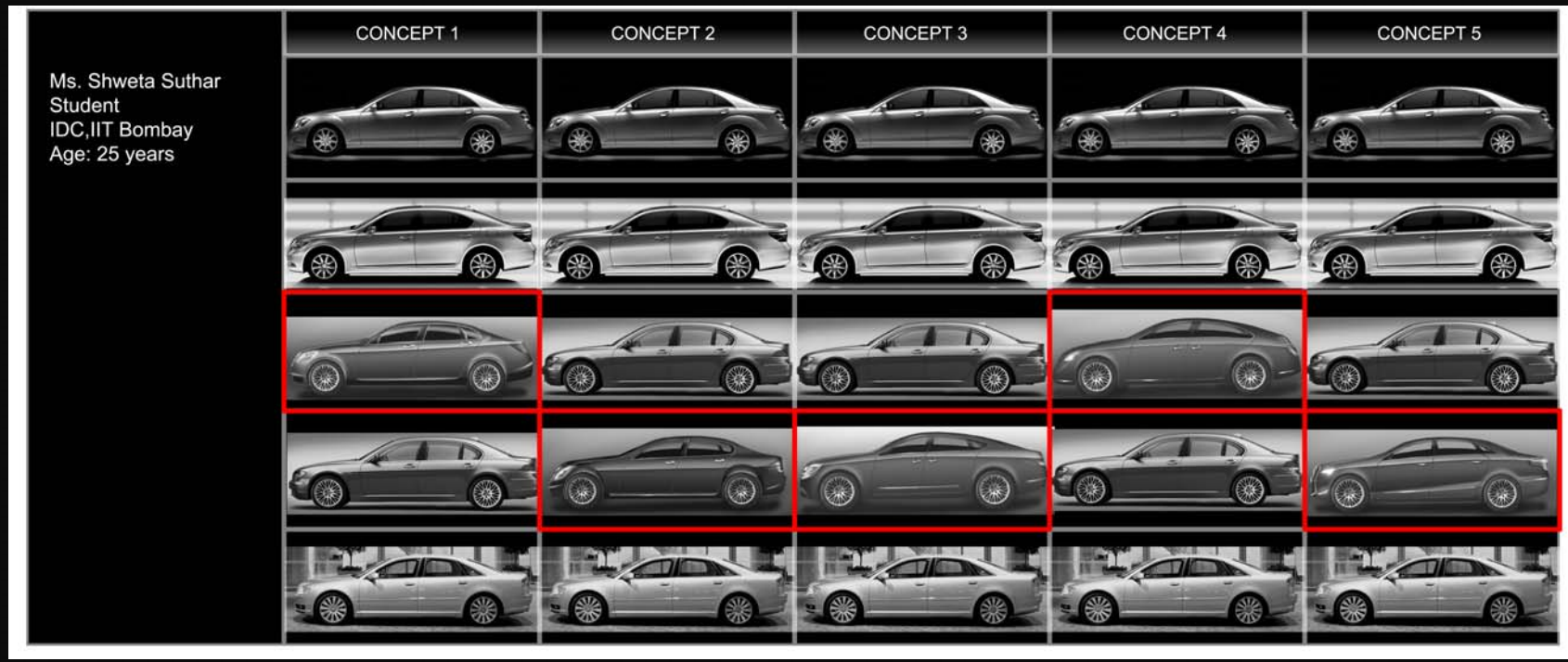


DATA TABULATION:



DATA TABULATION:



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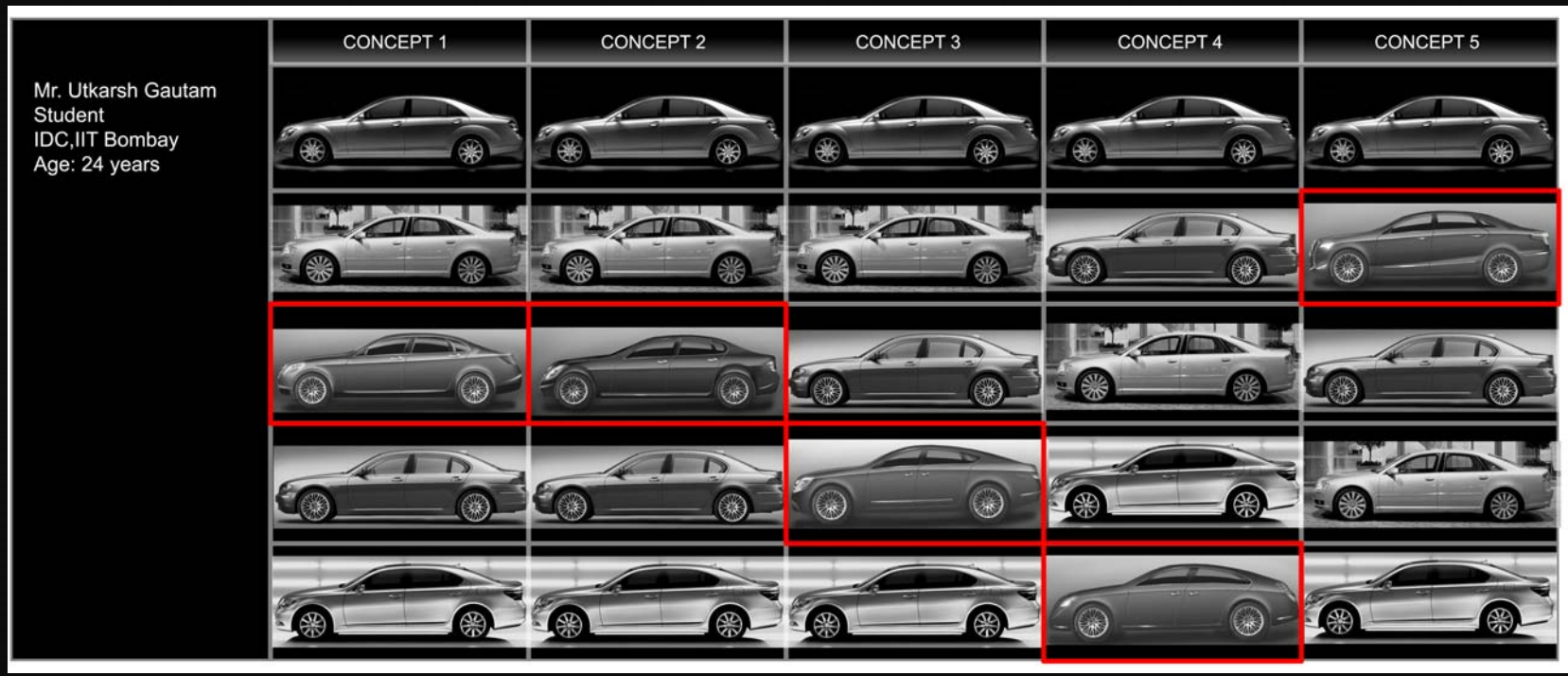
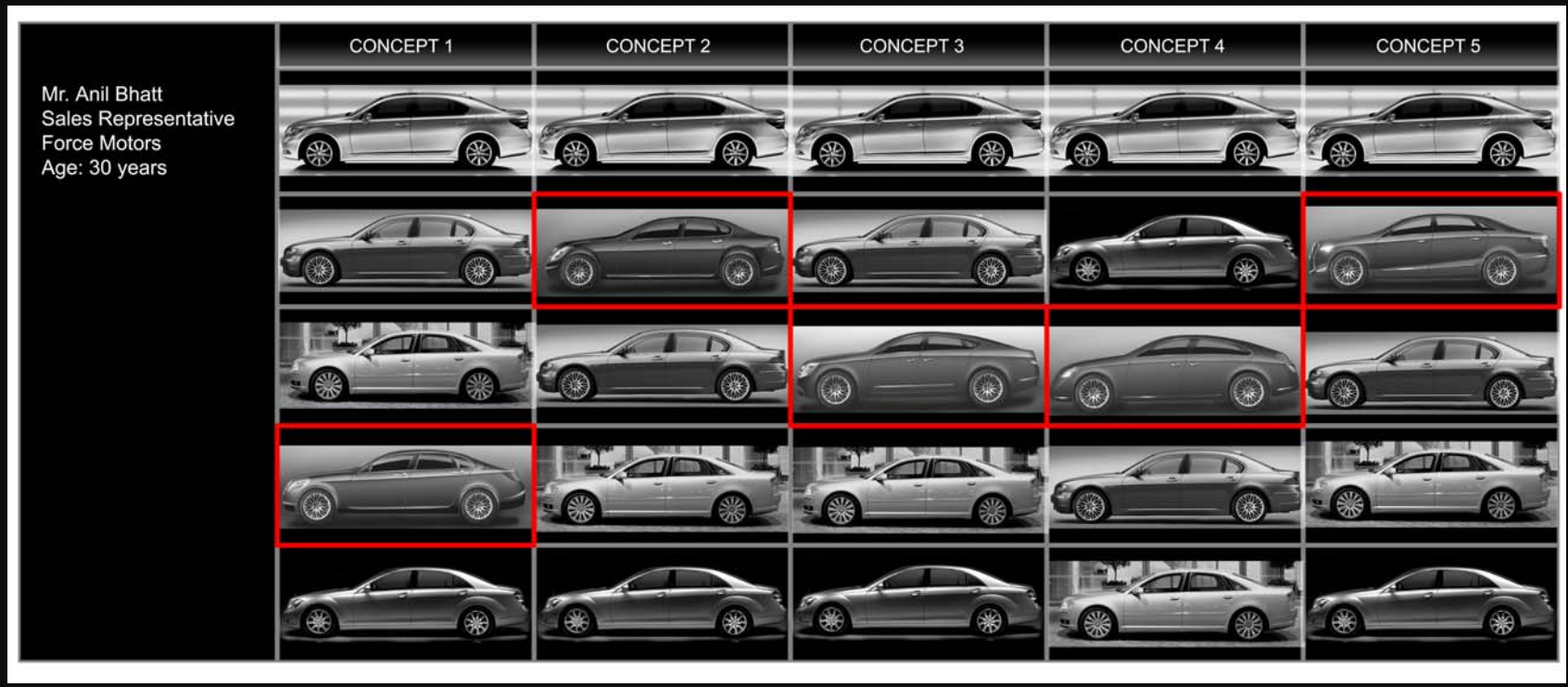


DATA TABULATION:



DATA TABULATION:

General Comments:

MR.DHARMESH MISTRY:

1. Concept 5 feature line is disturbing.
2. Concept 5 rear is bulky.
3. Front grill angle makes it more aggressive.
4. Sharp edges makes it look aggressive.

MRS.RAMKRUPA:

1. Can be aggressive but at the same time should be pleasing or the customer will not buy.
2. The front and the rear should actually make a continuous flow in all the concepts.

MR.ANAND GAWDE:

1. Styling is more aggressive in Concept 4
2. Rear of Concept 3 is good.
3. Side of Concept 2 is good.
4. Would buy a car having the rear of Concept 3 and front of Concept 2.

MR.SUBHASH MAGO:

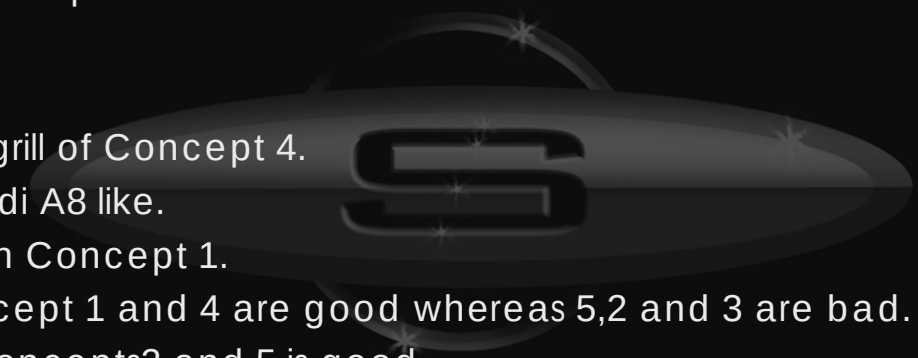
1. Should be unique, a class apart.
2. Full of power, luxurious with shining looks and curvatures.
3. Did not like any of the grills .Change the grills.
4. Should be more royal,majestic.

DATA TABULATION:

General Comments:

MR.ADVANI:

1. Concept 3 has a bad roof, it is very low.
2. Would like the front grill to be rectangular and have straight slits like Mercedes.
3. B-pillar can be shifted to the front so that the rear interior space can be increased.
4. Likes a car which has a decent looks rather than smiling face like looks.
5. Rear view of Concept 1 is better.



MR. JAGDISH:

1. Did not like the grill of Concept 4.
2. Concept 5 is Audi A8 like.
3. Not pleased with Concept 1.
4. Taillights of Concept 1 and 4 are good whereas 5,2 and 3 are bad.
5. Side profile of Concepts2 and 5 is good.
6. Front Grill of Concepts 2 and 3 is good.
7. Avoid suicide doors.
8. Chrome strips are good but don't overdo it.

MR.ANIL BHATT:

1. Front grill of Concepts 4 and 5 is not there in Indian cars so should be avoided.
2. Concepts 3,2 and 1 looks are nice.

DATA TABULATION:

General Comments:

MR. SUMIT:

1. Change the indicators of Concepts 1 and 2.Make it like Concept 5.
2. Concept 5 headlights are good.

MR.UTKARSH:

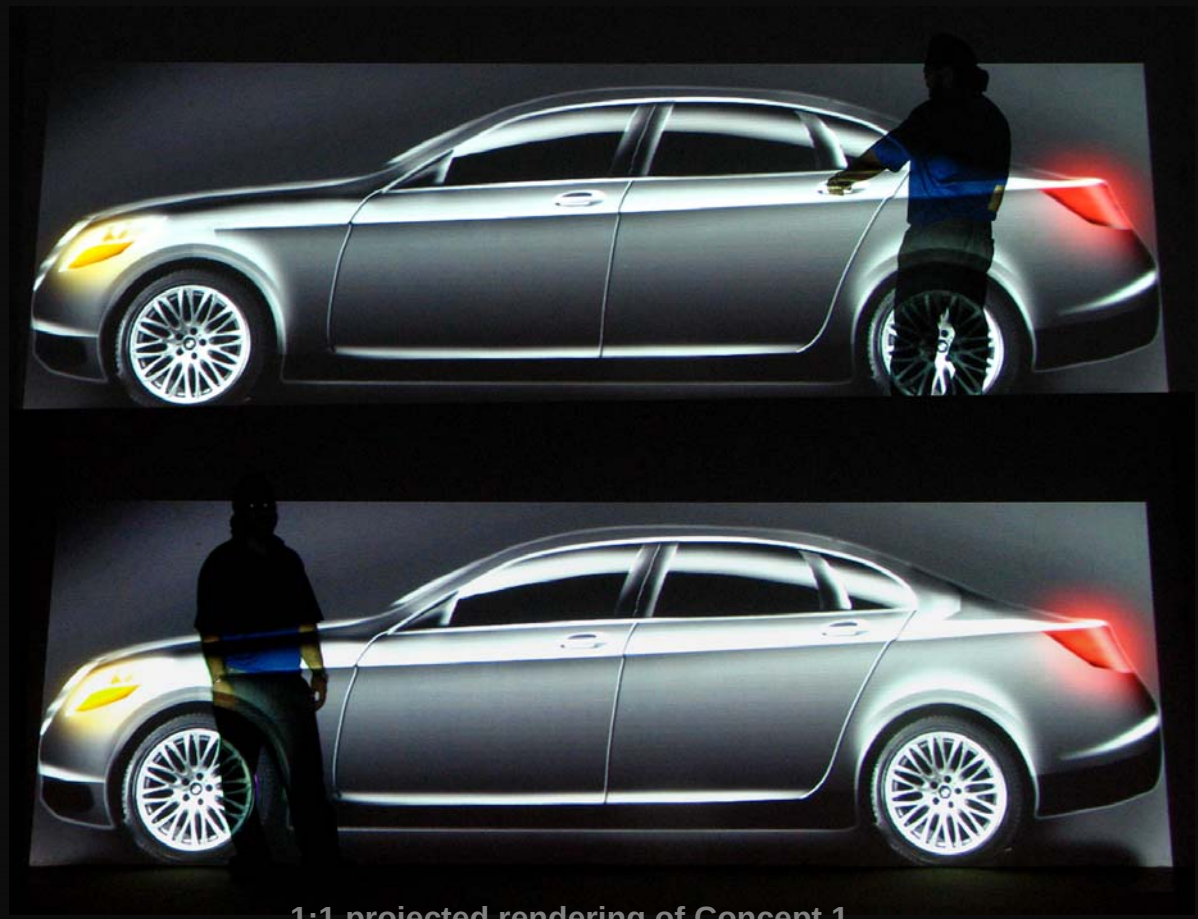
1. Proportions of the vehicle are not clear.
2. Concept 4 is like a man whose nose is cut.
3. Concept 3 rear is static, no energy, soap box.
4. Rear of Concept 4 is better due to better flow of surfaces.
5. Rear of Concept 1 is also good.

MS.SHWETA SUTHAR:

1. Concept 5 waist line is good.muscular,tight,feature line is good, grill not good.
2. Concept 2 headlights can be put in Concept 5.
3. Taillights more aggressive in Concept4.
4. Taillights of Concept 1 extend to the waist line,continuous line.
5. Rear quarter windows of Concept 5 is nice.
6. There could be a center kink in Concept 2.
7. Concept 2 headlights can be put in Concept 1.

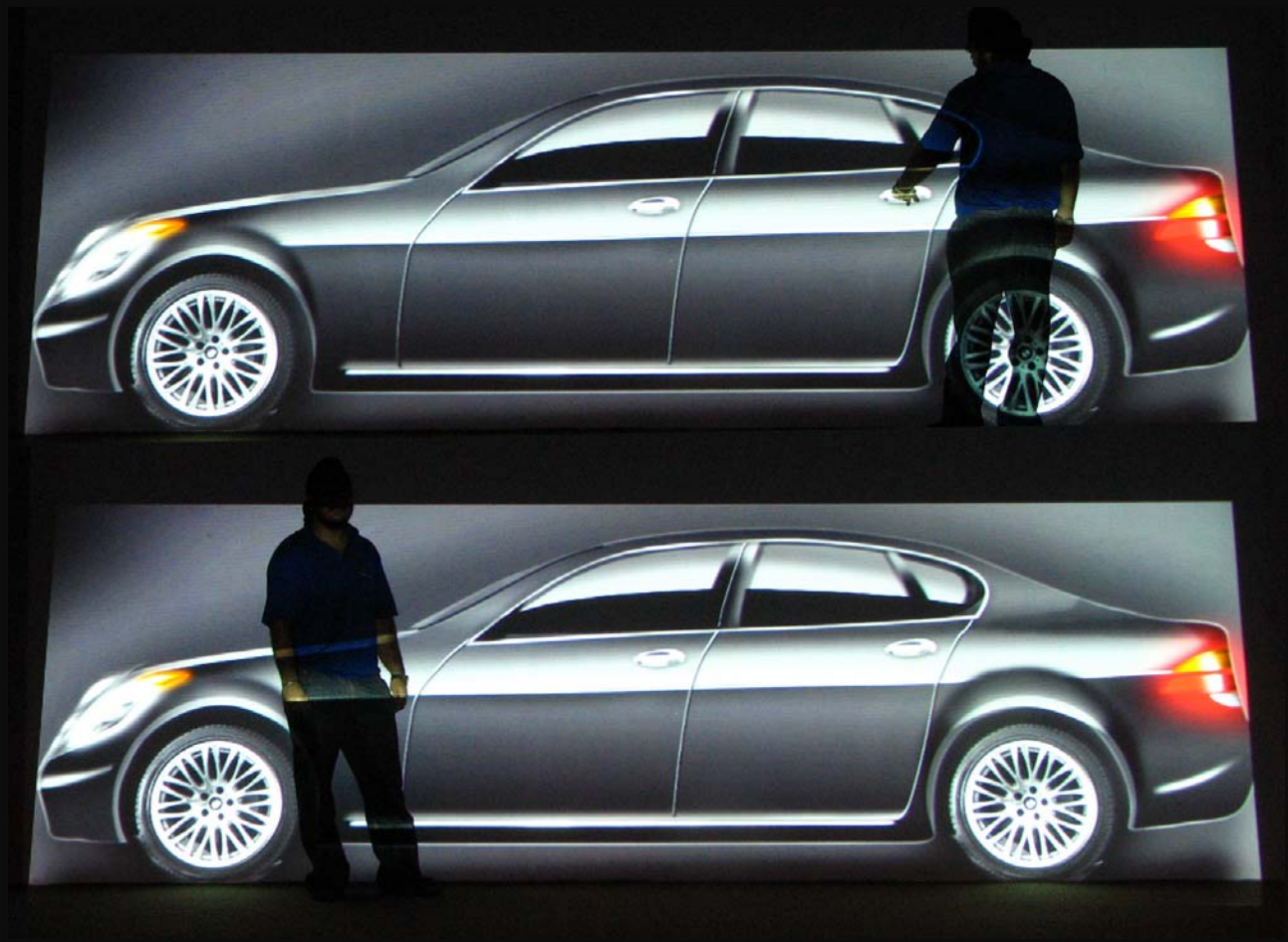
CONCEPT DETAILING:

A true scale projection of all the renderings of the concepts was done to get a true feeling of the design.This is done also to exaggerate any smallest detail into its actual size and also to find out any discrepancies in the proportions of the design as such.



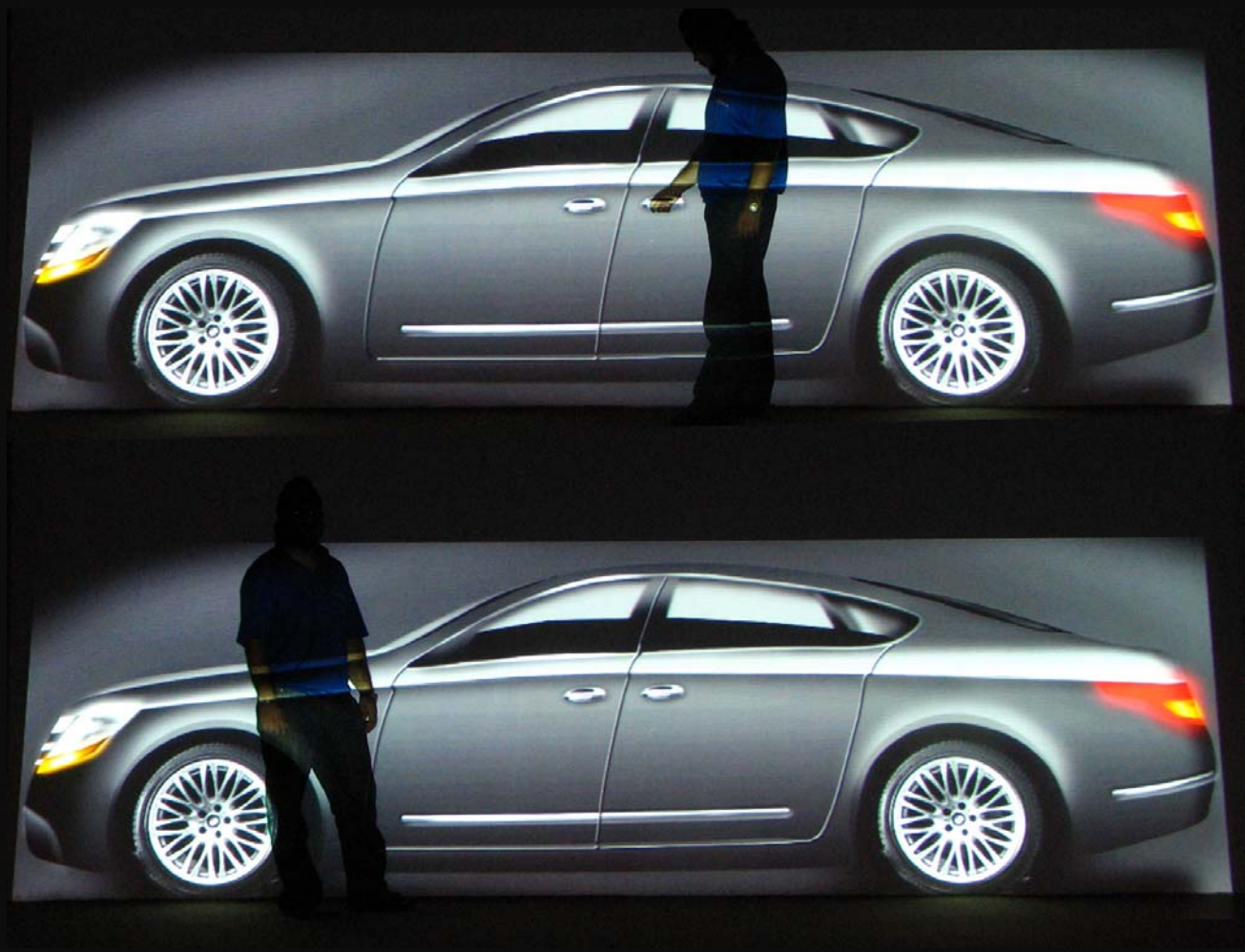
1:1 projected rendering of Concept 1

CONCEPT DETAILING:



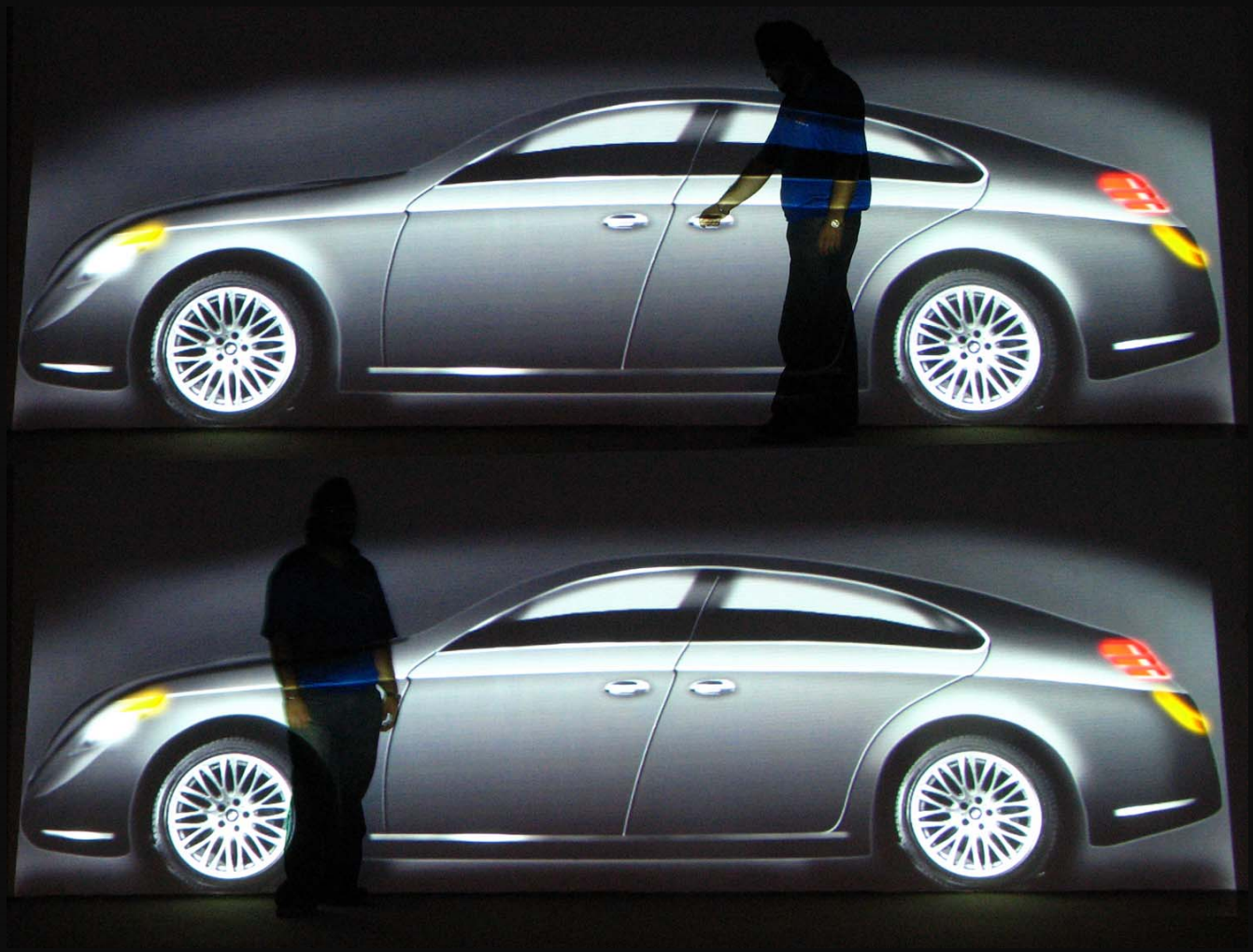
1:1 projected rendering of Concept 2

CONCEPT DETAILING:



1:1 projected rendering of Concept 3

CONCEPT DETAILING:



1:1 projected rendering of Concept 4

CONCEPT DETAILING:

1:1 projected rendering of Concept 5

CONCEPT DEVELOPMENT:

After the concepts were analyzed based on the ratings given by the users and their comments on the designs and also on the basis of the true scale renderings, Concept 2 was selected as the design for further development.

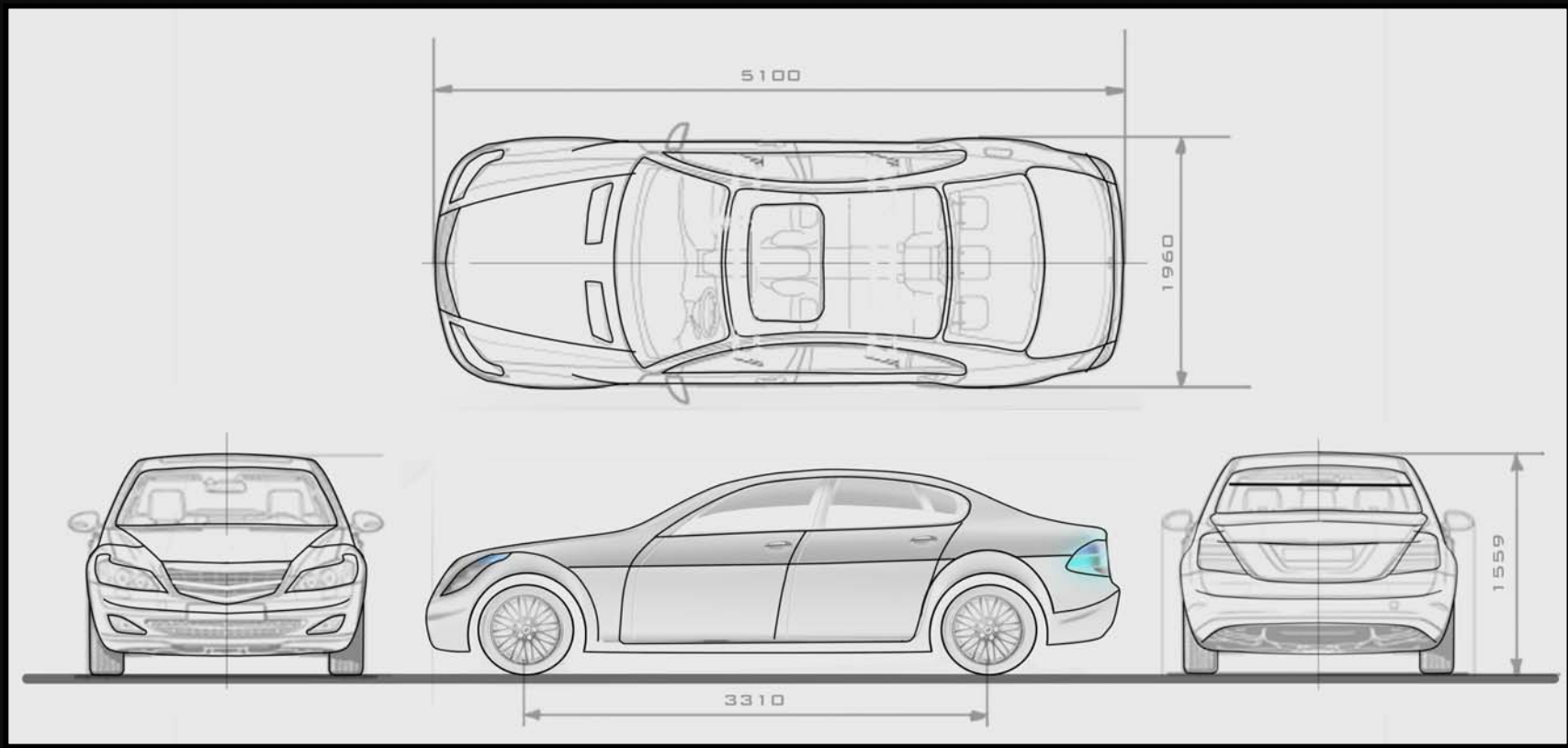
Concept 2 exploratory model was made so as to understand the surfaces better.This was done by making cross sections on the exploratory model itself. This gives a better understanding as far as flow of the surfaces is considered.

Also a better understanding of the proportions and the stance of the vehicle is determined before starting with the actual drafting and 3D Modeling.

CONCEPT DEVELOPMENT:

Concept Drawings:

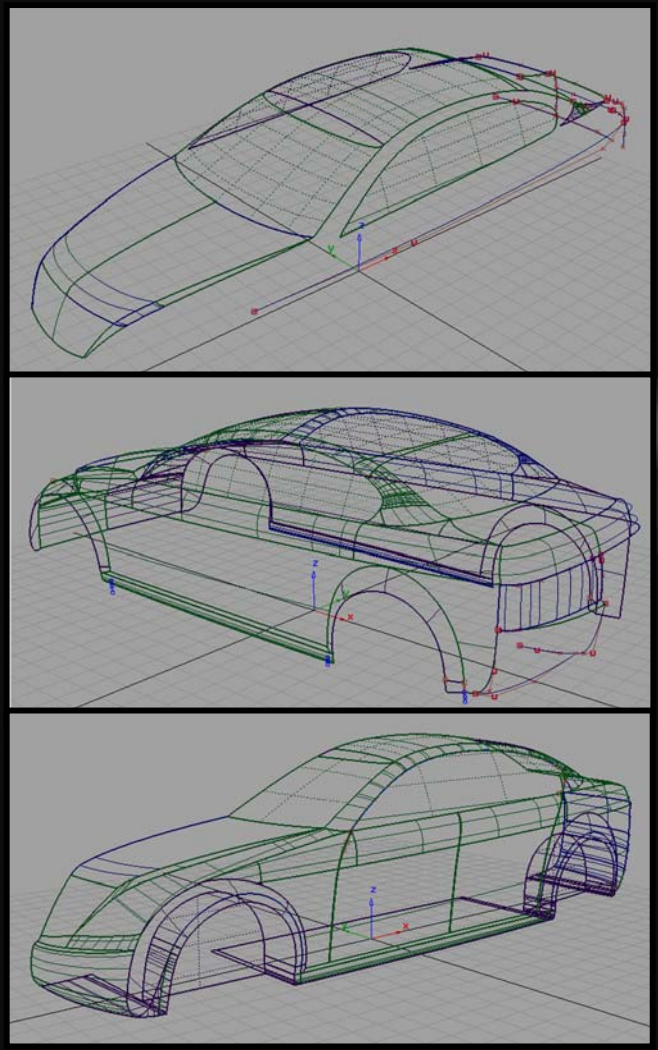
Concept 2 orthographic data was drafted so as to start with the 3D CAD Modeling. The four orthographic views generated are as shown in figure.



Orthographic views of Concept 2

CONCEPT DEVELOPMENT:

CAD Surface Development Stages:



The orthographic views were used as a base for this and surfaces were made on a 3Dd software.

At first a basic surface is made which actually helps in defining the overall proportions of the vehicle.Any changes to the surfaces can be made at this moment itself.

Changes made to the concept model should be only in the initial state when the number of surfaces is less.The more the surfaces get associated or attached to different surfaces,the more cumbersome it becomes to tweak the surfaces.

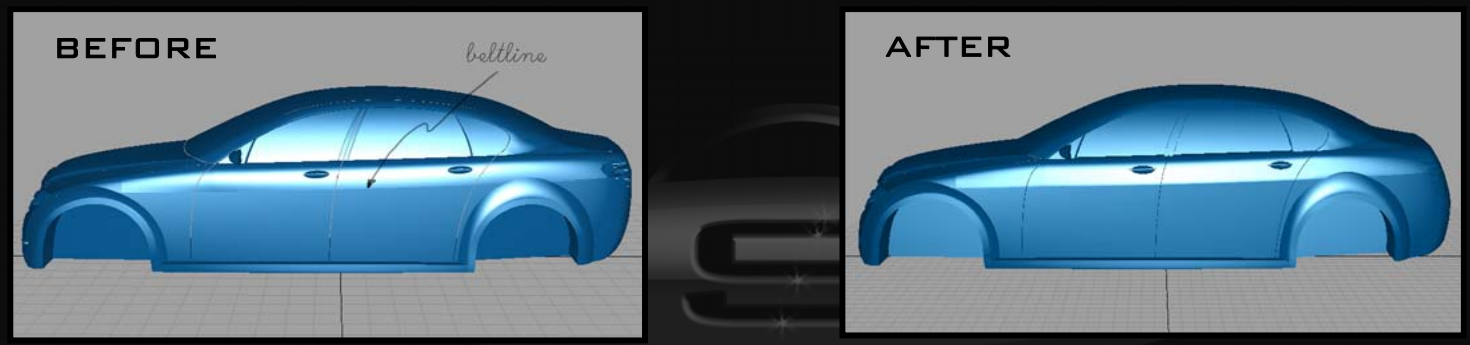
The software used for the above design was **Alias Studiotools.**

Fig 18.3.1 besides shows the surface development stages in surface modeling.

CONCEPT DEVELOPMENT:

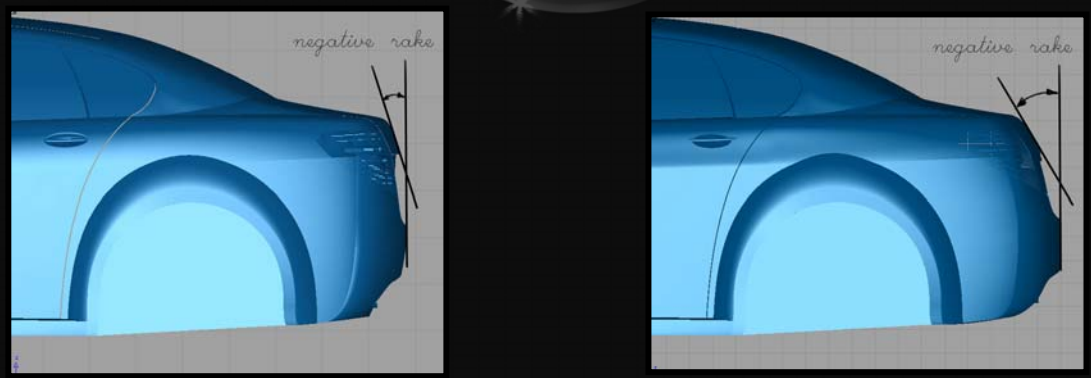
CAD Surface Development Stages:

Changes made to the different surfaces from the exploratory model made is shown here.The following figure shows the beltline of the vehicle before and after being changed from a soft curvature to a distinct change of surface. Also figure shows the negative rake of the vehicle before and after it was increased.



Beltline

BEFORE



AFTER

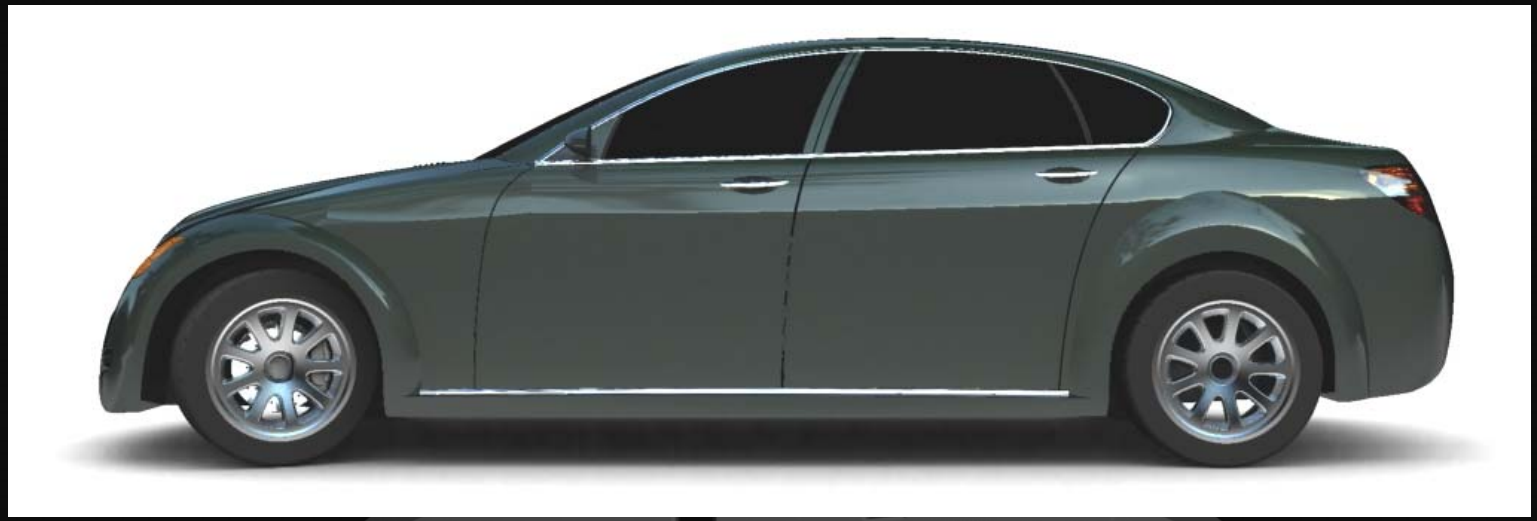
Rear Negative Rake angle

FINAL RENDERINGS:

The final renderings were rendered in 3D Max.

FINAL RENDERINGS:

FINAL RENDERINGS:



FINAL RENDERINGS:

FINAL MODEL:

Thank you