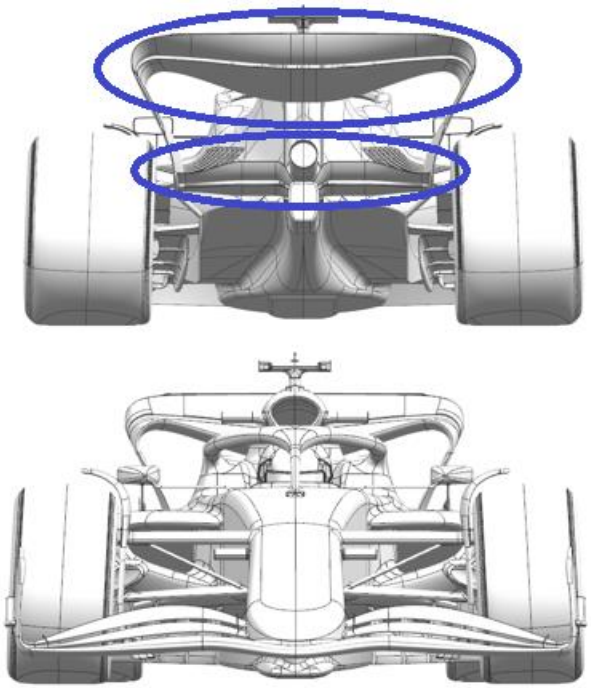
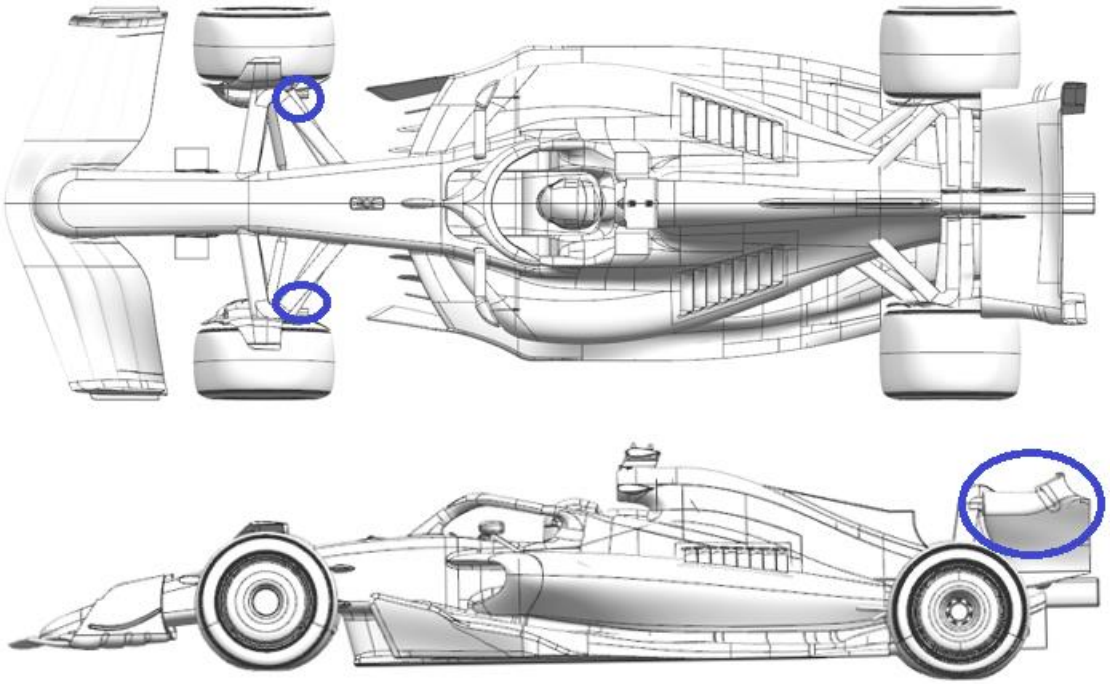
Pre-Event Automobile Display – Monaco Grand Prix

ORACLE RED BULL RACING

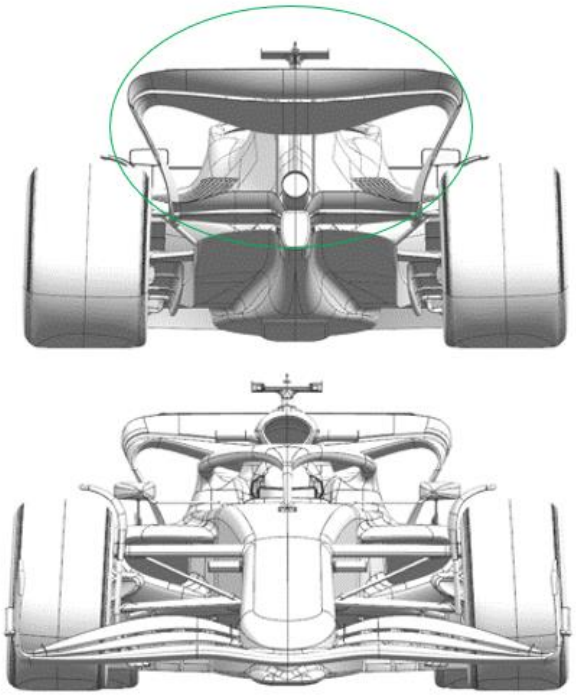
	Updated component	Primary reason for update	Geometric differences compared to previous version	Brief description on how the update works
1	Rear Wing	Circuit specific - Drag Range	Greater camber of the span of the rear wing bi-plane compared with other options.	Given the low average speed of Monaco a rear wing geometry to attain greater load at a given speed is valuable for performance, increasing the camber of the wing across the span and fulfilling the maximum Z depth have been pursued to attain the desired load. The Beam wing is an elevated load version which was already in the suite of options.
2	Front Suspension	Reliability	Wishbone shroud alteration to allow the steering lock required in Monaco.	The trailing edges of the wishbone shrouds have been altered to clear the wheel geometry at the lock angles required for Monaco.

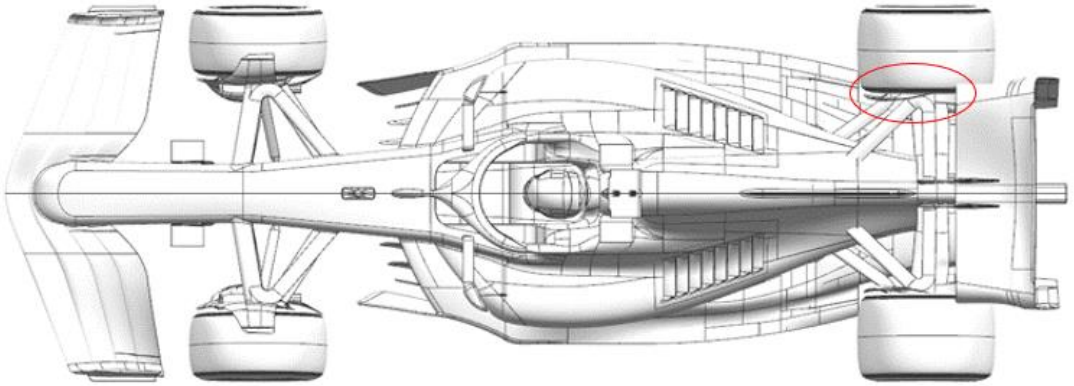


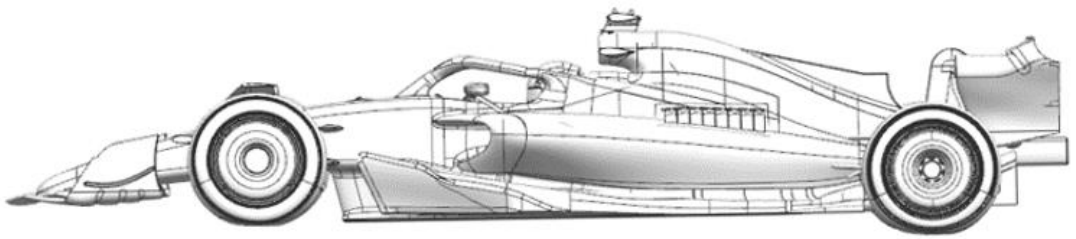


Scuderia Ferrari

	Updated component	Primary reason for update	Geometric differences compared to previous version	Brief description on how the update works
1	Rear Corner	Performance - Local Load	Updated RBD furniture, brake cooling inlet and suspension fairings	Meant to be introduced in Imola, these new Rear Corner components are part of the standard development cycle. They aim at improving local flow features and loading.
2	Rear Wing	Circuit specific - Drag Range	Higher Downforce Top Rear Wing and Lower Rear Wing designs	Introduction of more loaded Top and Lower Rear Wing main and flap profiles. This update is circuit specific, with the aim to cover the low efficiency requirements of Monaco.







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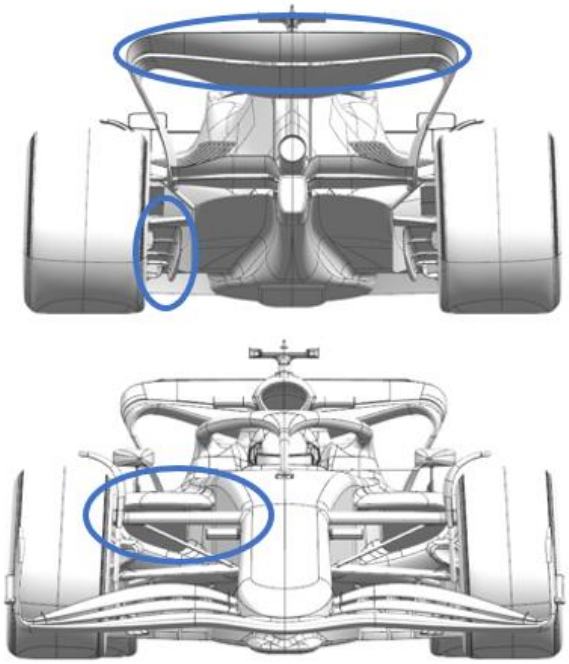
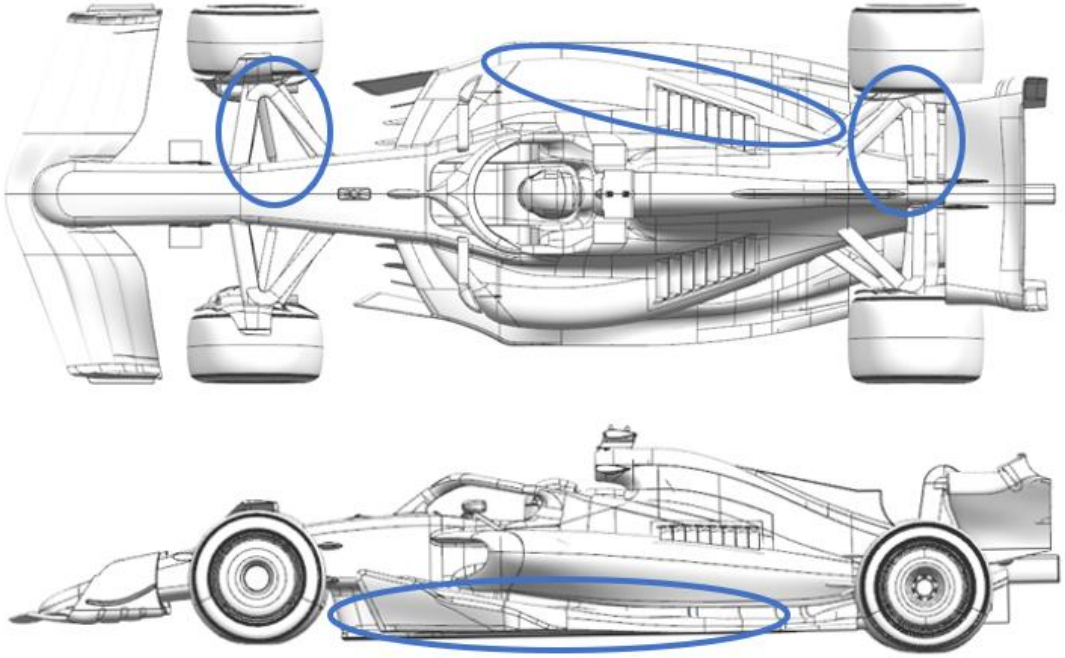
Mercedes-AMG Petronas F1 Team

	Updated component	Primary reason for update	Geometric differences compared to previous version	Brief description on how the update works
1	Front Suspension	Performance - Flow Conditioning	Top wishbone forward leg inboard pick-up lifted.	Change results in improved positioning of wishbone wake, which in turn improves onset flow into the sidepod improving cooling performance.
2	Floor Fences	Performance - Local Load	Change in fence camber	Change in fence camber results in increased local load and improved flow to the diffuser and hence more rear load.
3	Sidepod Inlet	Performance - Flow Conditioning	Wide and high sidepod inlet	Improve flow to the floor edge, which results in more floor load and also improved flow to the rear corner.
4	Coke/Engine Cover	Performance - Flow Conditioning	Wide bodywork	The increased bodywork width increases local downforce and also improves the flow to the rear wing assembly and rear corner.
5	Rear Wing	Performance - Local Load	Increased camber rear wing flap	Increased flap camber results in increased rear wing load, which in turn drops the pressure behind the car increasing rear floor load.
6	Rear Corner	Performance - Local Load	Second cascade of caketin winglets added	The additional winglet array adds local winglet load, and also drops the pressure behind the lower suspension legs increasing local load on these too.





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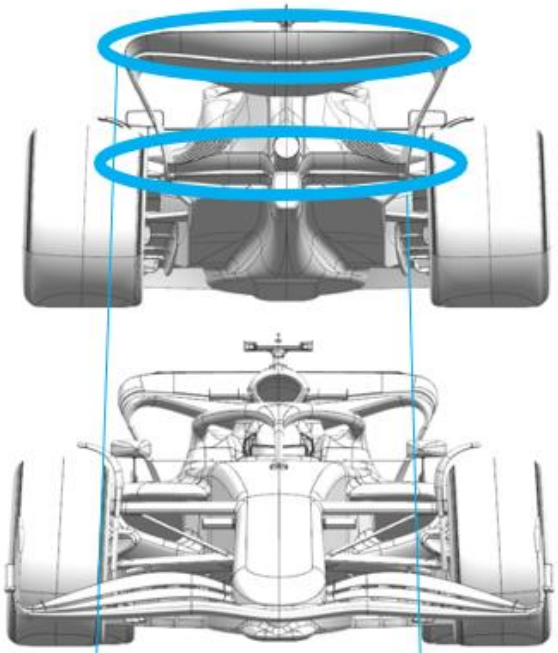
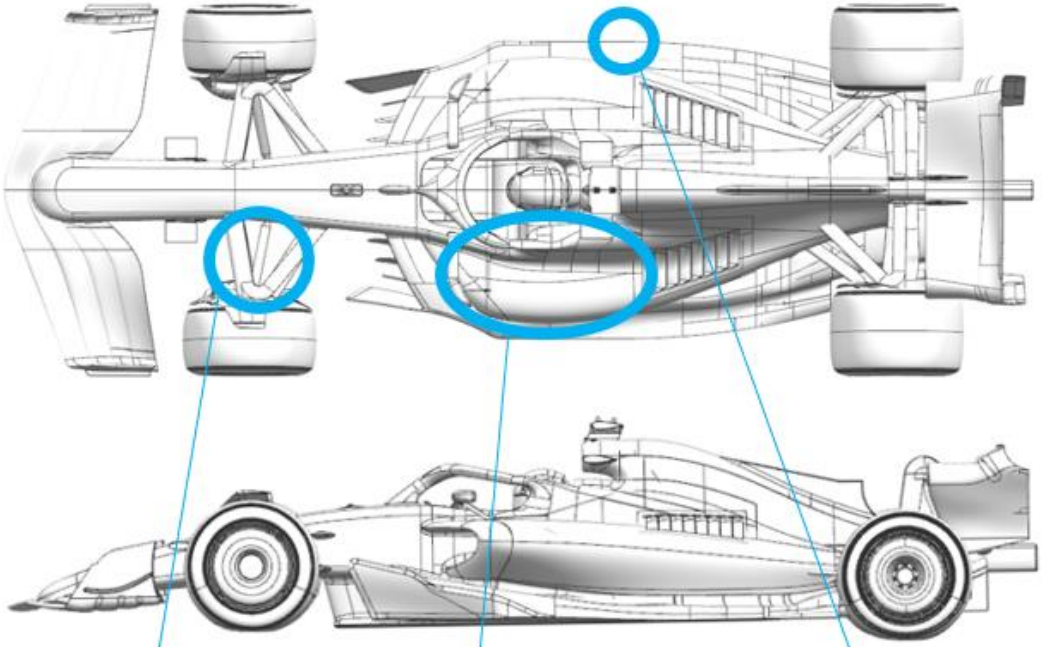
BWT Alpine F1 Team

	Updated component	Primary reason for update	Geometric differences compared to previous version	Brief description on how the update works
1	Front Suspension	Performance - Flow Conditioning	Realignment of wishbone, pushrod and trackrod fairings.	The realignment of the wishbone and pushrod fairings aims to improve flow conditioning by eliminating local separations. The trackrod fairing update is required for the increased steering angles required around the Circuit de Monaco.
2	Sidepod Inlet	Performance - Flow Conditioning	Wider sidepod with deeper gulley.	The deeper gulley of the sidepod improves airflow towards the top rear wing and beam wing. The wider nature of the sidepod targets an improvement to floor suction.
3	Floor Edge	Performance - Flow Conditioning	In conjunction with the aforementioned sidepod update, there is a small floor edge cut-out.	N/A - in conjunction with the above.
4	Rear Wing	Circuit specific - Drag Range	More loaded top rear wing main plane suited for track characteristics and high downforce nature.	The top rear wing features more load with the sole aim of tackling the high downforce nature of the Circuit de Monaco and offering optimal downforce level for best lap-time.
5	Beam Wing	Circuit specific - Drag Range	In conjunction with the aforementioned top rear wing update, the beam wing has more load with double element style.	The double element beam wing features more load with the sole aim of tackling the high downforce nature of the Circuit de Monaco and offering optimal downforce level for best lap-time.





Circuit specific top rear wing main plane with increased load.

In conjunction with top rear wing, more load with double element beam wing.

Realignment of wishbone and pushrod fairings. Trackrod fairing required for increased steering angles of the tight Monaco circuit.

Deeper gulley of sidepod for improved airflow to rear of the car and improvement of floor suction.

Minor floor edge cutout to complement sidepod update.

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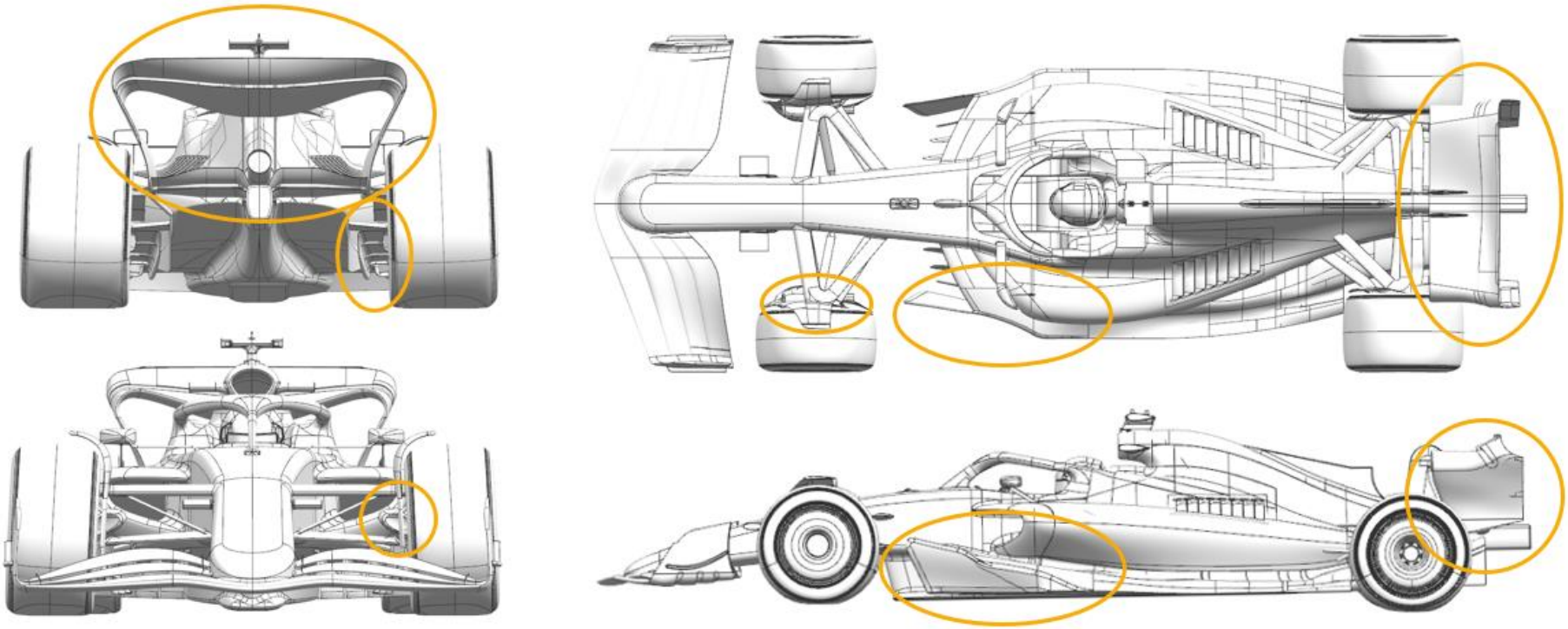
McLaren F1 Team

	Updated component	Primary reason for update	Geometric differences compared to previous version	Brief description on how the update works
1	Floor Fences	None	Modified OB Fence in line with TD-029	In line with TD-029, which was due to come into effect for Imola, the upper edge of the most OB Floor Fence has been modified.
2	Front Corner	Circuit specific - Cooling Range	Larger Front Brake Scoop	In order to manage high Brake Energy seen at this circuit, a larger Front Brake Scoop has been designed to increase Front Brake Cooling.
3	Rear Corner	Performance - Local Load	Rear Corner Lower Winglet Endplate	This new Lower Winglet Endplate features a cutout which alters local flow structures and load distribution on both the winglet itself as well as the rearward underfloor.
4	Rear Wing	Circuit specific - Drag Range	High Downforce Rear Wing assembly	This new Rear Wing assembly sits at the top end of the available downforce range, suitable to the circuit characteristic.
5	Beam Wing	Circuit specific - Drag Range	High Downforce Beamwing to suit Rear Wing assembly	This new Beamwing assembly sits on the upper end of the load range and works in conjunction with the more loaded upper Rear Wing assembly.



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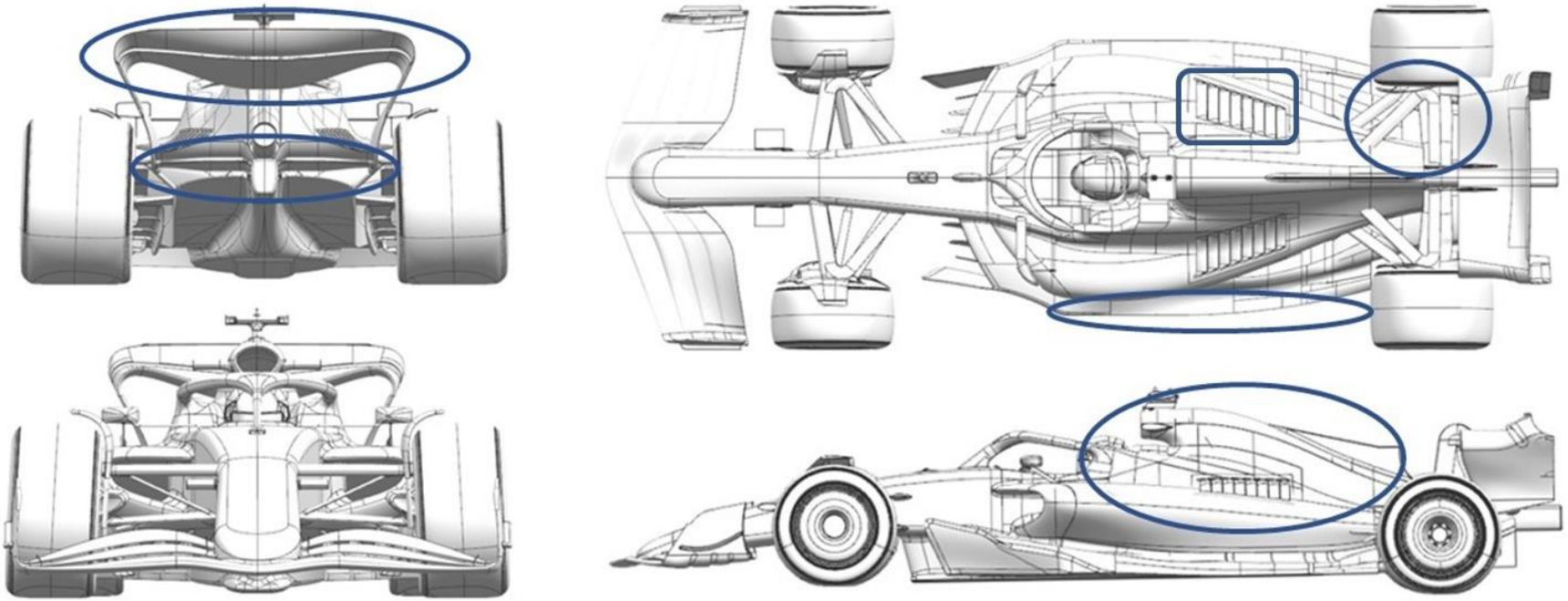
Alfa Romeo

	Updated component	Primary reason for update	Geometric differences compared to previous version	Brief description on how the update works
1	Coke/Engine Cover	Performance - Flow Conditioning	A new engine cover with a different shape and different connection to the top of the floor	A redesigned engine cover will allow us to better direct the aero flow to augment downforce and improve the aerodynamic efficiency of the car.
2	Floor Edge	Performance - Flow Conditioning	A new design for the floor edge and fences	The improvement to the floor edge and fences, part of a wider package of improvements originally brought to Imola, will allow us to improve the aerodynamic performance of the car.
3	Floor Body	Performance - Flow Conditioning	A new design for the floor body	The improvement to the main part of the floor, part of a wider package of improvements originally brought to Imola, will allow us to improve the aerodynamic performance of the car.
4	Rear Suspension	Performance - Flow Conditioning	Redesigned rear suspension covers	Together with the redesigned floor, this upgrade improves the aerodynamic performance of the car and works as part of a package to maximise the downforce generated by the car.
5	Rear Corner	Performance - Flow Conditioning	Redesigned rear brake ducts	Together with the redesigned floor, this upgrade improves the aerodynamic performance of the car and works as part of a package to maximise the downforce generated by the car.
6	Rear Wing	Circuit specific - Drag Range	New profile of the main planes of the rear wing	The new rear wing, in conjunction with the beam wing, will allow the team to maximise the aerodynamic performance of its package for the unique configuration of the Monaco circuit.
7	Beam Wing	Circuit specific - Balance Range	New profile of the beam wing (bi-plane instead of stacked)	The new beam wing, in conjunction with the rear wing, will allow the team to maximise the aerodynamic performance of its package for the unique configuration of the Monaco circuit.
8	Cooling Louvres	Circuit specific - Cooling Range	New max cooling config - Increased louver porosity	The newly introduced louver geometry will help in high cooling/low mass flow rate tracks to maximize the cooling performance of the car staying inside the dedicated spec limits.



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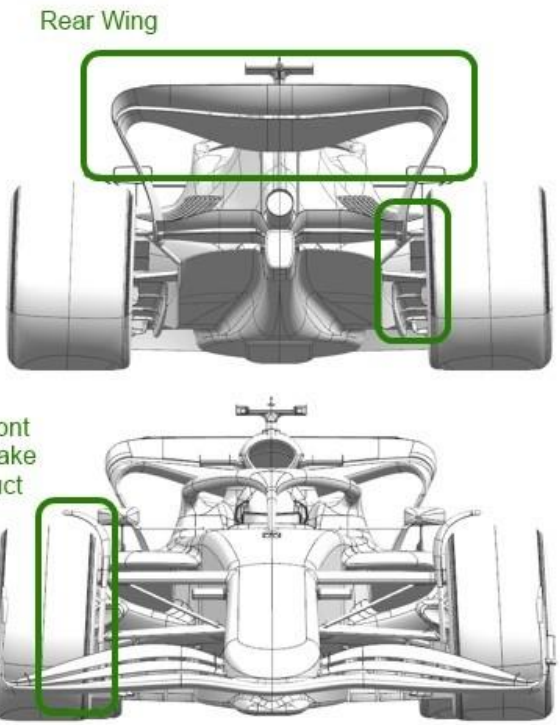
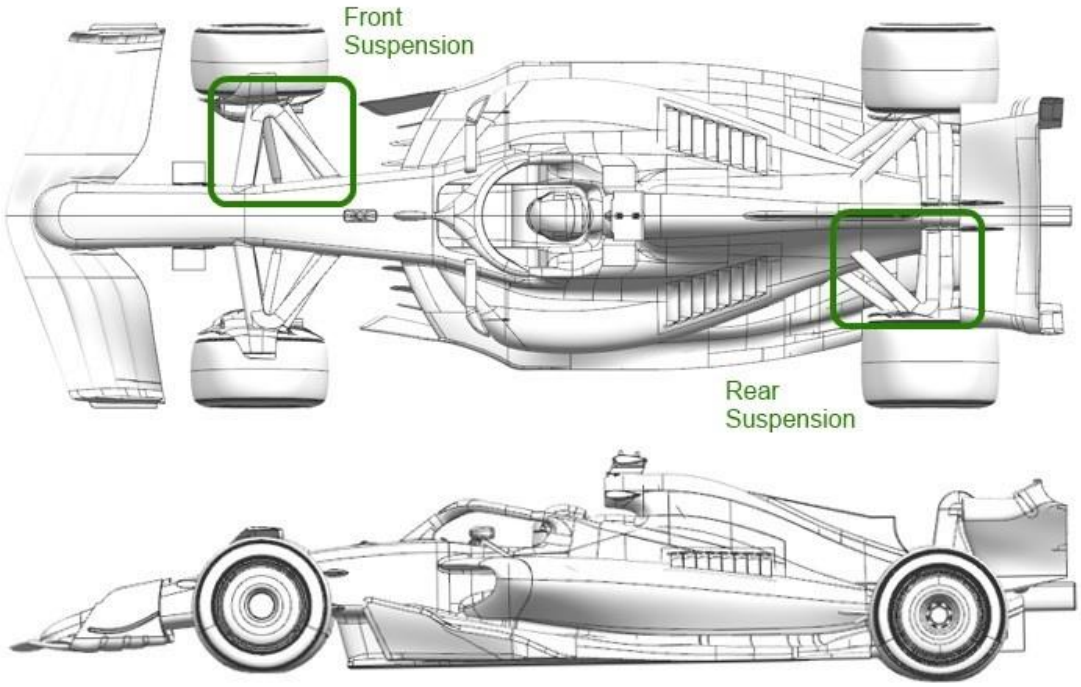
Aston Martin Aramco Cognizant Formula One Team

	Updated component	Primary reason for update	Geometric differences compared to previous version	Brief description on how the update works
1	Front Suspension	Performance - Local Load	The upper wishbone has a slightly modified twist distribution.	Due to different onset conditions the section of the wishbone fairings we re-aligned to improve the interaction and local load generated.
2	Front Corner	Performance - Local Load	The lower deflector planview incidence has been adjusted within the legal limits.	The new position is a more optimum alignment with the changes in flowfield upstream from the new front wing tip area.
3	Rear Suspension	Performance - Local Load	Small detail changes to the rear suspension fairings to alter section incidence.	The changes are predominantly to suit the modified rear brake duct and the different flowfield this creates in this area.
4	Rear Corner	Circuit specific - Cooling Range	Modifications to the inlet and exit ducts of the rear brake duct, and associated changes to the elements mounted to the IB face.	The internal flow paths are improved leading to an increase in cooling. The elements have been reworked to improve performance in this new flow regime.
5	Rear Wing	Circuit specific - Drag Range	There is a new rear wing with more aggressive geometry.	The more aggressive wing increases local suction for increased loads, and is acceptable due to the lower efficiency of this circuit geometry.


Rear Wing
Front Brake Duct


Front Suspension
Rear Suspension

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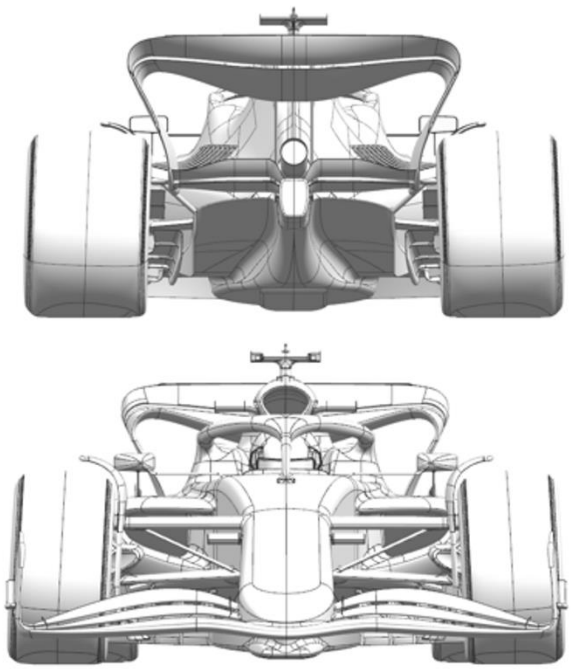
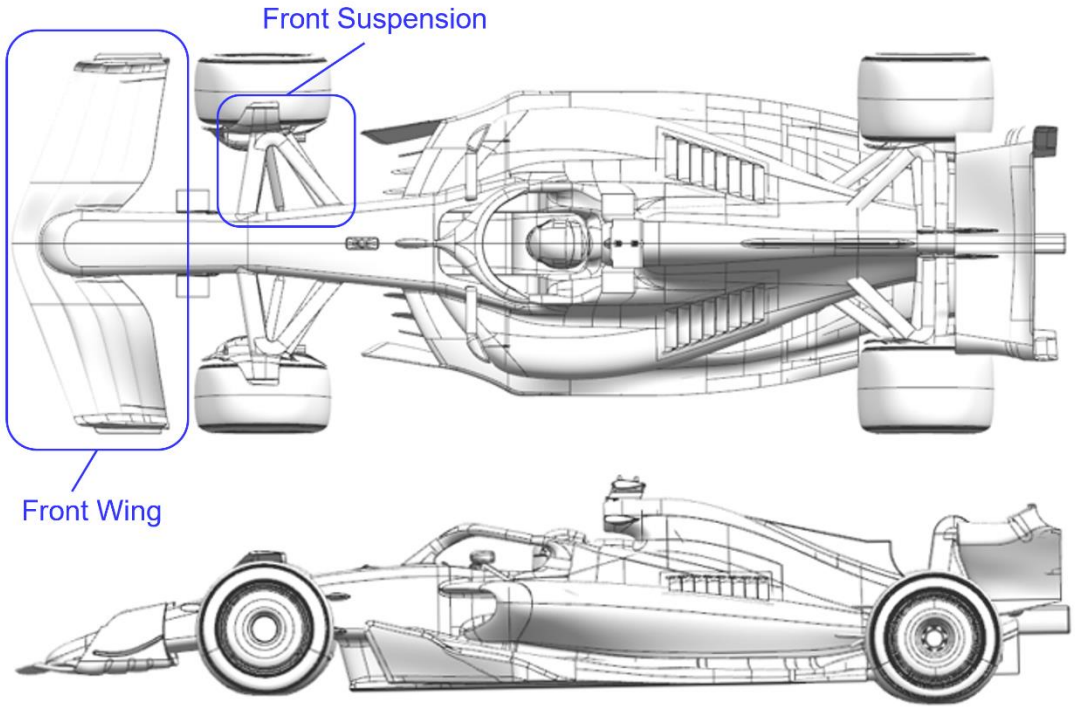
MoneyGram Haas F1 Team

	Updated component	Primary reason for update	Geometric differences compared to previous version	Brief description on how the update works
1	Front Wing	Performance - Flow Conditioning	Evolution of the four profile geometries along the Front Wing Span has been modified.	The front wing affects the aerodynamic field of the car bodies behind it. With this new shape a particular care has been taken to the wake interference with the lower front suspension leg and the front tire.
2	Front Suspension	Performance - Mechanical Setup	Few modifications at the front suspension geometry will be introduced for next Monaco race.	The particular conformation of the Monaco circuit requires some modifications to the geometry of the front suspension which will allow the driver to be able to correctly control the car in all the corners of the circuit. Some small aerodynamic surfaces will be updated to satisfy these modifications.




Front Suspension
Front Wing

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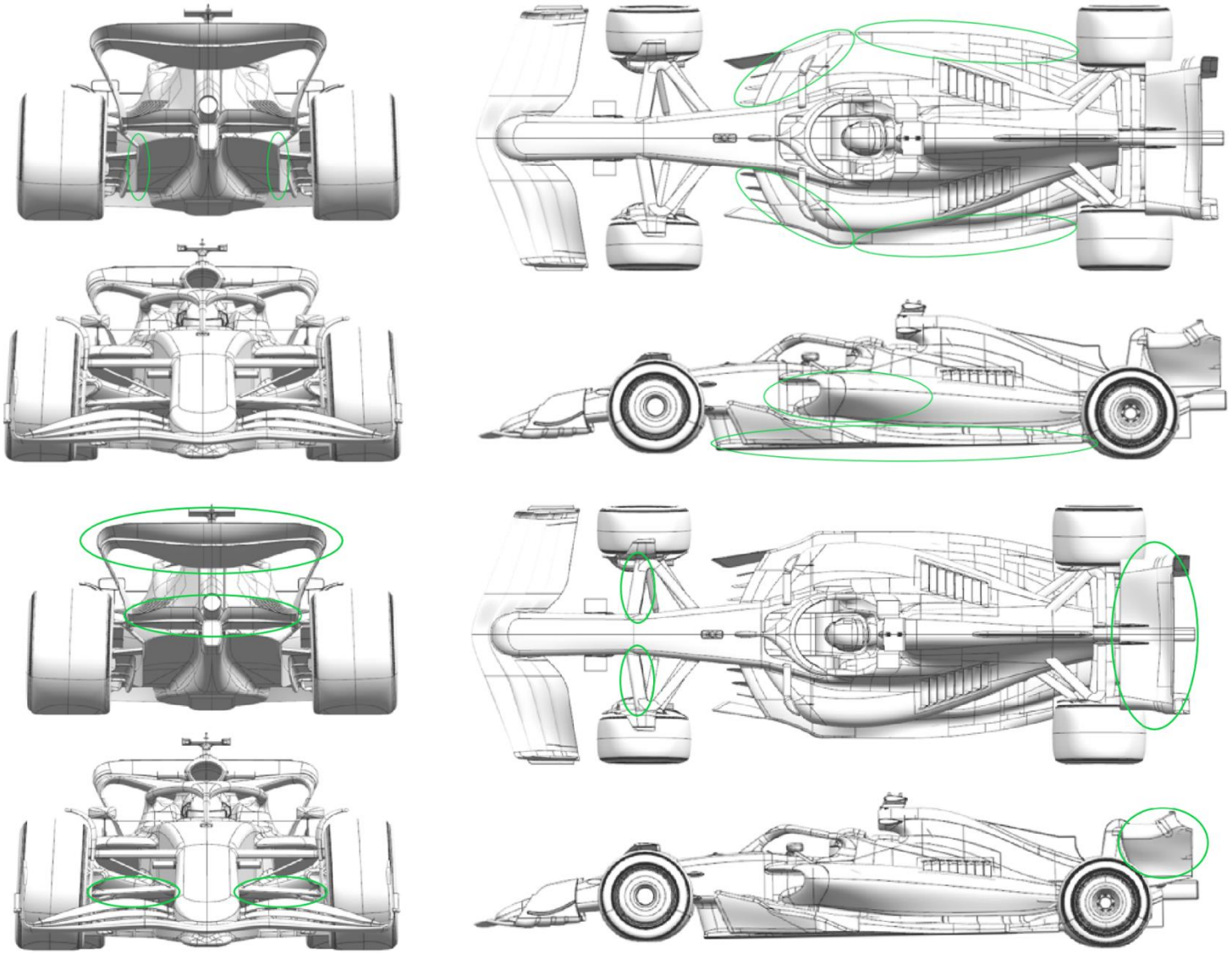
SCUDERIA ALPHATAURI

	Updated component	Primary reason for update	Geometric differences compared to previous version	Brief description on how the update works
1	Floor Body	Performance - Local Load	Compared to the previous floor body, underfloor surfaces local to the fences have changed. Upper surfaces behind the outermost floor fence have been lowered. The floor 'curl' detail ahead of the rear tyre has been modified.	Floor body roof changes local to the floor fences combine with fence geometry changes to generate stronger vorticity from fence shedding edges, which gives increased local load. Lowered upper surfaces behind the outermost fences send increased massflow to floor edges for increased local load. The tyre curl change reduces losses coming inboard of the rear tyre, which improves diffuser tail performance.
2	Floor Fences	Performance - Local Load	Compared to previous floor fences, their camber distributions have changed in sympathy with changes to floor body roof surfaces.	Floor fence changes and floor roof changes combine to give increased overall load as described above.
3	Floor Edge	Performance - Local Load	Compared to previous floor edges, the new geometry has been narrowed to make room for a wing element that forms an extension of the previous floor edge wing.	The extended floor edge wing acts as a trailing edge device to the main floor edge, lowering local pressure and giving better sealing of the floor for increased local load.
4	Diffuser	Performance - Local Load	Compared to the previous diffuser, vertical sidewalls have been modified.	The diffuser tail change increases outwash to keep rear tyre wakes further outboard, thereby reducing blockage at the diffuser exit for increased local load.
5	Sidepod Inlet	Performance - Local Load	Compared to previous sidepod inlets, radiator duct inlet areas have been reduced by raising the lower lip.	Reducing the size of the sidepod inlet allows increased massflow to pass under the inlet, which feeds floor edges and allows the latter to generate increased local load.
6	Coke/Engine Cover	Performance - Local Load	Compared to the previous engine cover, the 'undercut' has been modified to suit the smaller sidepod inlet.	The engine cover update matches the sidepod inlet area reduction, allowing greater mass flow to floor edges for increased local load.

7	Front Suspension	Performance - Mechanical Setup	The position of the outboard trackrod has moved rearward relative to the brake drum face.	This modification gives greater road wheel angle for the same steering wheel angle compared to the standard outboard trackrod position. The higher maximum road wheel angle is required to negotiate the turn six hairpin specific to this circuit.
8	Rear Wing	Performance - Local Load	The upper wing elements have increased camber and incidence, particularly in the outboard part of the wing assembly compared to previously raced wing designs this season. The lower 'beam' wing assembly is a biplane arrangement, which also features increased camber and incidence wing elements compared to previously raced assemblies.	While the efficiency (lift to drag ratio) of these wings is too low to be optimum for most circuits this season, the absence of long straights or high speed corners at this event puts a premium on downforce generation over the associated drag rise. These wings generate the maximum amount of downforce of all available rear wing assemblies.
9	Rear Wing Endplate	Performance - Local Load	The outside face of the lower endplate has been modified to include a cambered vane.	The cambered lower surface of the vane generates suction, giving increased local load from the endplate.



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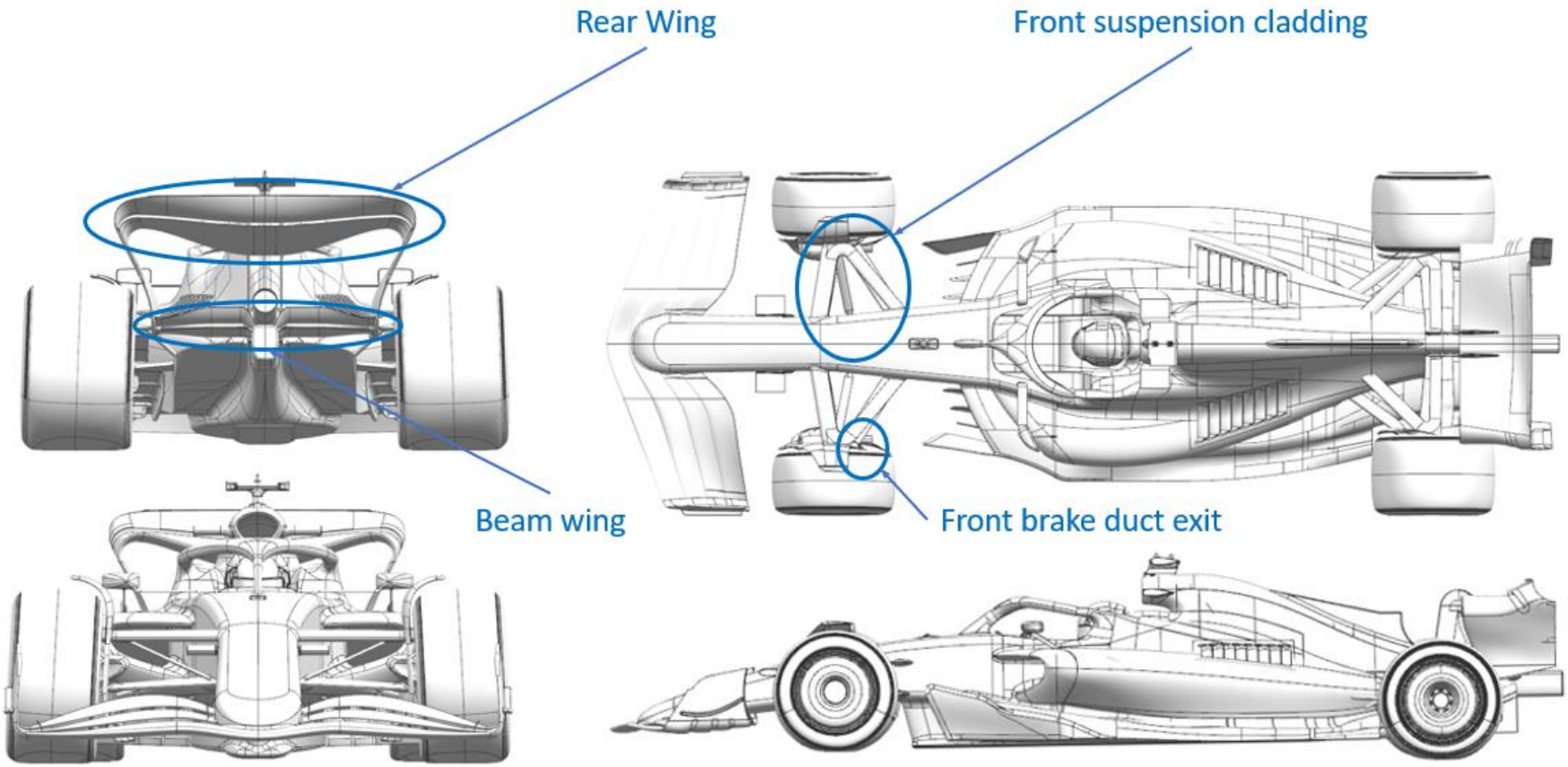
Williams

	Updated component	Primary reason for update	Geometric differences compared to previous version	Brief description on how the update works
1	Rear Wing	Circuit specific - Drag Range	The new rear wing is a larger, more inclined profile. The upper outboard junctions to the end plates are higher and squarer than on the previous medium downforce rear wing. The leading edge of the mainplane sits lower on the new wing to present a larger area.	The larger and more aggressive wing elements deliver increased load and drag, which are efficient for circuits such as Monaco.
2	Beam Wing	Circuit specific - Drag Range	The new beam wing is larger and more inclined than beam wings we have run previously this year.	The larger and more aggressive wing element delivers increased load and drag, which are efficient for circuits like Monaco.
3	Front Suspension	Performance - Mechanical Setup	Change in steering arm length.	Increases the gain between steering wheel rotation and front road wheel angle. Helps achieve the steering required to negotiate the tight corners in Monaco.
4	Front Suspension	Performance - Local Load	Revised cladding on front suspension elements: trackrod, upper and lower wishbones.	Primarily these changes are to accommodate the higher front wheel angles required for this circuit. The cladding is then optimised to maximise the local load and consequent flow structures.
5	Front Corner	Circuit specific - Cooling Range	The exit of the front brake duct is increased in size.	There is a higher air flow through the front brake cooling system to cope with the unique demands of Monaco.


Rear Wing
Front suspension cladding
Beam wing
Front brake duct exit