

## Attachment 5

### Aston Martin DBX: Body Structure & Safety

#### Engineering Highlights:

- **Bespoke bonded aluminium body structure harnessing technology from Aston Martin sports cars evolved to suit the needs of an SUV**
- **Lightweight, rigid body structure provides strong and stable platform**
- **Quiet & refined cabin using lightweight NVH materials**
- **Carbon fibre one-piece prop-shaft technology derived from sports cars**
- **Wide range of active safety features fitted as standard**

For years Aston Martin has been at the forefront of bonded aluminium construction, using the technology with great success in its sports cars. As such, harnessing that knowledge when creating the bespoke body structure for DBX means the same advantageous properties of light weight and stiffness apply just as much to a luxury SUV as they do to a sports car.

By creating an all-new, all-aluminium body structure specifically for DBX, Aston Martin's design and engineering teams were able to work together to achieve their respective targets. It meant that on the one hand measurements such as wheelbase, overhangs, door length and canopy relationships could all be tailored from the outset to create the proportions and packaging desired by the designers. However, the development of a new structure also allowed the engineers to maximise stiffness in crucial areas to ensure the best dynamics, while reaping the natural agility benefits of such a lightweight construction method.

An example of how all facets of the car were considered and included in the design from an early stage is the brake cooling. A section of the ducts that channel cold air to the discs form a structural part of the car. A specifically integrated portion of the chassis was designed to link with the rest of the duct thereby saving material and improving the routing of the air.

The end result of such harmonious collaboration between different parts of the company is the best body that Aston Martin has ever produced. Its headline torsional rigidity is incredibly impressive, but perhaps more importantly it also has much greater stiffness at key hardpoints than its rivals. These are the mounting points for crucial elements like the engine and suspension and by better controlling the loads at these locations it not only means the car has intrinsically better dynamic qualities, but

also means the associated bushings can be softer. The knock-on effect of softer bushings is that refinement is improved, in every condition that the car is being driven.

Refinement, from an engineering perspective, is most commonly considered in the form of NVH, which stands for noise, vibration and harshness. NVH and the material used to combat it was a key consideration from the inception of the DBX project. For example, there is a double skin bulkhead for the first time in an Aston Martin, acting like a noise isolating structure between the cabin and the engine. Furthermore, new Pirelli P-Zero tyres have been developed specifically for DBX, featuring noise reducing technology.

The body structure is made from large castings joined together by some extremely stiff extrusions. This stiffer, more solid method of construction requires fewer sealing paths and consequently reduces the amount of NVH material that must go into the car. Similarly, there are fewer panels throughout DBX thanks to a more harmonious overall design concept. This in turn has resulted in less adhesive and a more naturally refined car, providing another reduction in NVH material.

Intelligent material selection for the wheel arch liners and the new underfloor protection means tyre noise is also minimised without the need for additional parts. Furthermore, the transmission tunnel was designed from the outset to work in harmony with the trim surrounding it as opposed to refinement coming solely from the trim. This meant a simpler and lighter tunnel with less trim. Transmission refinement has also been improved by the use of a single carbon prop shaft. This is in place of the two-piece item often found in rivals that necessitates a centre bearing which can transmit undesirable energy into the floor pan.

DBX's overarching NVH concept is very similar to the *Superleggera* concept applied most recently to DBS Superleggera. The result of all the savings and efficiencies is that the NVH pack weighs just 30kg, to achieve the required levels of refinement. This reduction in weight has significant benefits on everything from dynamics to fuel economy with the overall kerbweight of DBX placed at 2,245kg (4,940lbs) placing it amongst the lightest in the segment despite a very high standard specification.

Safety is inherent in the design of Aston Martin's new SUV and the feeling of being cossetted by the car's protective structure has been driven throughout the car's development. However, in addition to DBX's passive safety elements there is also a raft of additional active safety features, all of which come as standard. Many things will of course be taken for granted, such as the multiple front, side and curtain airbags. Equally there will be no surprise in finding ISOFIX attachment points for child seats. However, adaptive cruise control and lane keep assist both make their Aston Martin debut in DBX. There is also automatic emergency braking with a pedestrian detection system.

Even with the driver in full control of the steering and speed of the vehicle, technology such as traffic sign recognition, lane departure warning, rear cross traffic warning and blind spot warning will be working away to help achieve the safest possible journey.

Andy Haslam, Vehicle Line Director, DBX said, “The fresh approach that the engineering team has brought to creating an SUV has not only produced a body structure that is benchmark for the class, but also brings new advancements for Aston Martin. By working harmoniously across the company to develop solutions that satisfy design, dynamics and NVH, we have ended up with the best body structure Aston Martin has ever produced.

This model is truly a product of great British innovation delivering class leading interior space and storage and a unique luxurious design proportion, despite maintaining a shorter overall length than its competitors. That, combined with the innovative mechanical integration between Design and R&D has created a car with class leading weight distribution and a natural agility surpassing its natural rivals. It’s a car that perfectly balances everyday practicality with true Aston Martin sports car character”