

AN ALUMINUM MAKEOVER FOR THE GENESIS GV70 EV BODY

As the world transitions to electric vehicles, automobile manufacturers can benefit from the advantages of using aluminum for every body part. To demonstrate this fact, Almobility’s engineers worked with Hyundai Motor Europe’s Technical Center to conduct a theoretical conversion of the Genesis GV70 EV SUV steel intensive body to a full aluminum body.

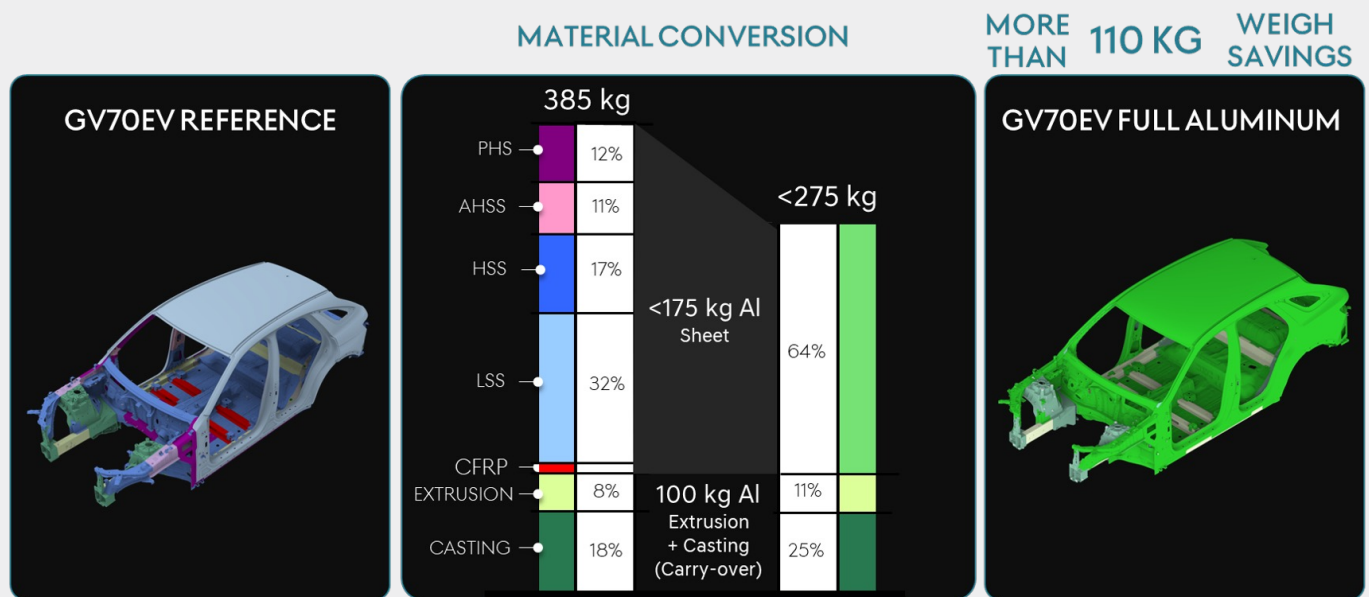
The result was a 40% weight saving against the steel reference parts, along with a significant reduction in the number of parts, joints, joint types, and gauge and grade complexity. At the same time, the full aluminum GV70 EV maintained or surpassed the reference body’s performance attributes for safety and stiffness.

Shedding Weight

The steel-intensive Genesis GV70 EV has a mixed-material body structure weighing 385 kg. By converting 285 kg of steel to 171 kg of aluminum, the team achieved a 40% weight reduction for these converted parts.

In the process, they applied standard gauge and grade conversion, to maintain stiffness (structure and exterior) and strength (buckling and crash/crush) to achieve the same or better BIW performance.

Convert 285 kg of steel to 171 kg of aluminum for **40% weight save & same performance**

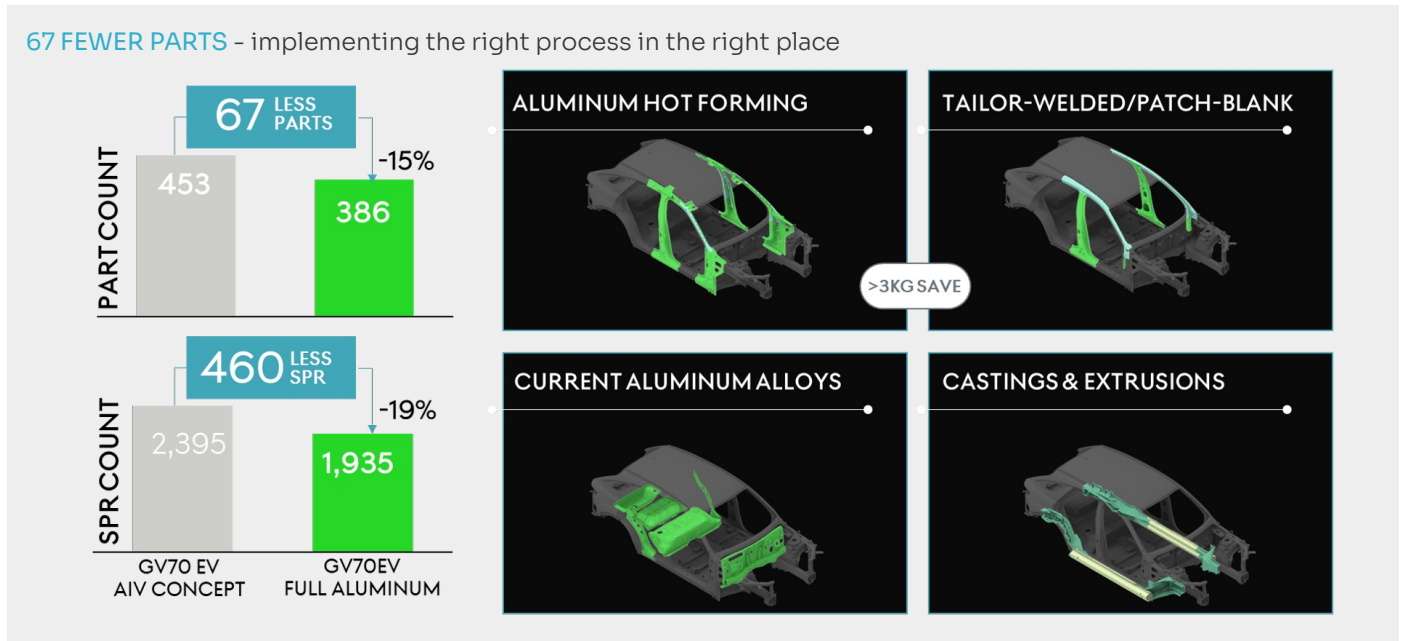


Significant Reduction in the Numbers of Parts and Joints

Weight was not the only focus. By applying systematic joint reduction methods, the team reduced the spot joint count from 6,381 in the reference vehicle to 5,267 in the initial concept phase for the same part count, while limiting the number of SPR joints to only 2,395.

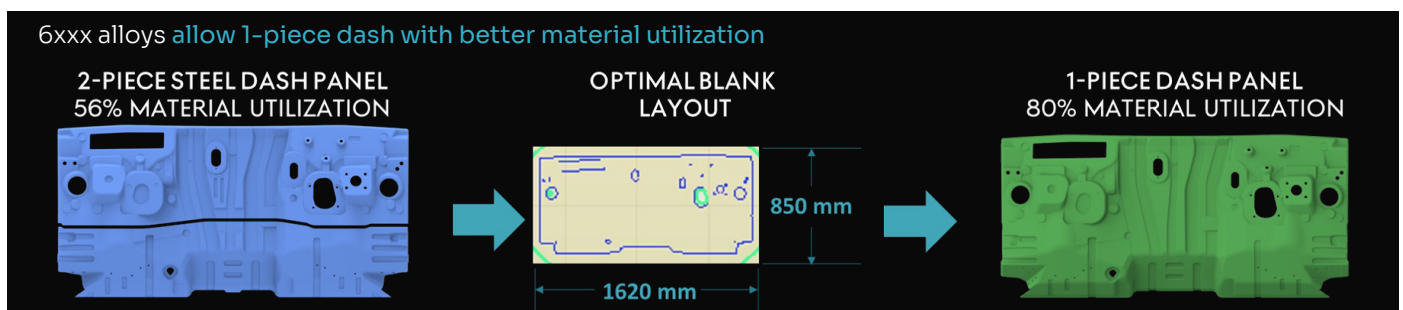
Additionally, by employing the right process in the right place, the team attained a 15% reduction in part count, from 453 parts in the steel-intensive GV70 EV to only 386 in the aluminum version, decreasing body weight by an additional 3kg and reducing the related joint count.

As a result of this part and joint optimization phase, the team reduced the total number of joints in the full aluminum body and minimized the quantity of unique SPR joint stacks from the steel-intensive reference to the full aluminum GV70 EV, the total spot joint count dropped to only 4,575 (a 25% reduction versus the steel reference), with a further reduction of SPR joints to only 1,935.



Optimizing the Design and Consolidating Parts

The study included part integration opportunities in the body, for example in the A Pillar and B Pillar assemblies in the upper structure and the dash panel & rear floor assemblies in the underbody - demonstrating part consolidation, using the latest aluminum processes, as well as part manufacturing feasibility, these integration opportunities often resulted in better material utilisation than the steel reference parts.



The Result: Full Aluminum Performs

The aluminum GV70 EV body achieved a 40% weight reduction relative to the steel reference parts and provided equal or better performance in all crash load cases, since aluminum, adjusted to the correct gauge & grade can absorb more energy per kg than steel. The weight save and increased gauge delivered superior NVH (noise, vibration, and harshness) performance & through optimized design for aluminum, there was an overall reduction in manufacturing complexity, with less parts and joints. Automakers, take note: aluminum is the fast lane to a better body.