



DELIVERING THE FUTURE OF COMPOSITE SOLUTIONS

AUTOMOTIVE

Gurit's Automotive composite part production facility has been supplying leading OEM's with carbon fibre based Class A composite panels since 2007. The development of innovative technology is the defining strength of Gurit and is enabled by the unique understanding of composite materials, structural design and materials processing. This knowledge base provides the capability to formulate, design, prototype and manufacture fully assembled, primed and coloured exterior body panels.

The Gurit approach to providing solutions requires an integrated relationship with the customer, giving access to Gurit's technical strengths and capabilities, and ensuring the delivery of specific requirements and expectations.

CARBON COMPOSITE BODY PANELS

The elusive objective of all composite panel manufacturers has been the attainment of an A-Class surface. Gurit's award winning SPRINT® CBS materials technology has provided the breakthrough, enabling the production of A-Class carbon body panels directly from the tool, whilst utilising out of auto-clave moulding process. The materials and process

have been developed to ensure retention of this exceptional surface quality throughout the lifecycle of the vehicle.

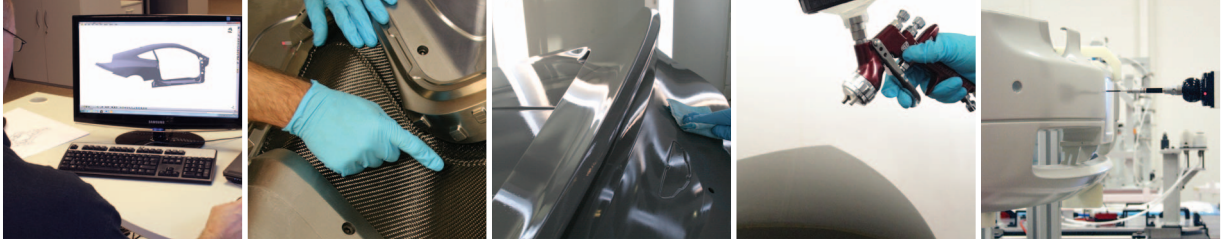
Behind the surface, composite processing techniques and material optimisation allows design flexibility that cannot be attained with incumbent metal panel technology. The combination of the functionality of the materials and the robust and efficient processing techniques, provide some outstanding benefits for the customer.

- A-Class Carbon Composite Technology
- Customisation of strength, stiffness and weight
- Ultimate Freedom for Designers

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PART PRODUCTION PROCESS Gurit has built a world class parts manufacturing facility to support the production of composite parts for OEM's. The facility utilises a wide range of innovative technologies that are essential to maximise the potential of the carbon body panel solution and to provide a clear competitive advantage to Gurit's customers.



1. DESIGN Advising customers on composite-specific design matters for their components is a key part of Gurit's offering as a tier 1 automotive supplier. Gurit also has an experienced design team who can adapt basic surface data, supplied by the customer, and produce a complete 3D CAD part, with specified thicknesses, B surface data, fixing points and other critical design parameters. Once the component geometry is finalised, CAD work on the tooling concept can begin. This is largely an interactive process with inputs from the customer; from Gurit engineers and the tool makers own design team.

2. MATERIAL KITTING 3D part geometry is processed through CAD tools to create a 2D kit of plies. These plies are cut from the materials that make up SPRINT® CBS using a CNC ultrasonic cutting machine. The plies are nested to maximise material utilisation and cut to a high level of accuracy ($\pm 0.6\text{mm}$) and repeatability. Once cut, the plies are assembled in optimum conditions and then placed in Kanban racks ready for use.

3. TOOLS AND MOULDING The 2D kits are then applied to preform tools to further reduce cycle time and optimise output before being transferred to the mould tool. These tools can be Nickel Shell, Steel or Carbon and incorporate a specially developed vacuum system. The three main functions of the vacuum system are: to provide rapid closure of the tool; to remove air from the materials during processing, consequently consolidating the material; and to provide a high quality B side surface. The tools are specifically developed to provide the required surface finish, durability, and rapid cycle times whilst remaining

in situ. Rapid heating cycles are obtained using PLC electronics and key in-process data is captured and recorded for each part.

4. CNC MACHINING Cured panels are subsequently machined to remove flash, add holes and prepare for bonding of child parts. This operation is undertaken on a high precision 5 axis CNC machining center that is fully ATEX compliant for carbon fibre applications. With a multi position tool carousel and a machining bed that can hold up to 6 fixtures, changeovers are kept to an absolute minimum.

5. BONDING AND PRIMING Precision Bonding jigs are used to produce the final assemblies with all the necessary child parts being bonded in position using Dow & 3M adhesives. Body panels are then transferred to one of Gurit's temperature and humidity controlled painting booths, for the application of a highly advanced DuPont primer system. Once the primer has been applied the parts are prepared for the final colour paint application. This final colour paint application can be done by the customer or at the Gurit automotive paint facility.

6. CMM and Final Inspection The parts undergo a rigorous quality inspection before release for shipping. Part geometrical accuracy is a fundamental requirement and therefore this is quantified using a Coordinate Measurement Machine (CMM) with its integrated statistical analysis tools. As well as the standard CMM probe Gurit have capability to laser scan parts to enable 3D part Interrogation. The A-class surface is less numerically quantifiable and therefore highly trained inspectors use a 1000 lux lighting station for part release, benchmarking quality against physical OEM boundary samples.

CBS 200 PRESS TECHNOLOGY

As the result of extensive in-house research, Gurit has now developed a press process to reduce the labour and time needed to make high-performance composite panels. With a curing time of just 10 minutes, the refined process allows for the manufacture up to 40,000 parts per year from a single tool set. CBS 200 takes automotive parts production to the next level.