

# Advancing composite manufacturing in student motorsport

Enabling precision tooling for race car chassis development



Key products

**BE978**

## Challenge

Student engineering teams often face considerable engineering challenges when developing high-performance composite structures such as monocoque chassis, suspension components and aerodynamic surfaces.

For the Formula Student team at the University of Birmingham, previous manufacturing approaches had limited the accuracy, repeatability and structural consistency of key composite components. Earlier tooling methods had introduced variability in surface finish, dimensional stability and consolidation quality, ultimately affecting the ability to translate simulation performance into real-world results.

This challenge became particularly critical following a prior chassis failure within the team, which highlighted the need for improved tooling strategy, better material selection and more robust manufacturing control.

Delivering a lightweight, stiff and safe monocoque chassis required a step change in tooling capability, alongside access to engineering-grade materials and industry expertise.

IMechE Formula Student is Europe's most established educational engineering competition where teams are tasked to design, build and race a single-seater race car as part of a degree-level project providing transitional skills from university to the workplace. Teams are evaluated on engineering design, cost analysis and on-track performance as well as soft skills including project management and business planning.

**“Honestly, Base Materials supported us in every way, it was massively helpful. I didn't think we'd be able to do the project on even half this scale. The access to materials, technical expertise and hands-on support has allowed us to create something that will benefit the team for years to come.”**

**EMMANUEL ASARE**

Student Engineer, Formula Student team



## Solution

Base Materials supported the team and the project by supplying BE978, a market-leading, medium-temperature epoxy tooling board engineered for reliable and consistent performance. Known for its superior surface finish and excellent dimensional stability, BE978 provides a high-integrity tooling platform essential for accurate composite layup and repeatable manufacturing outcomes.

In addition to material supply, Base Materials provided technical expertise and full manufacturing support including tooling design input, blocking and bonding guidance, CNC machining support and finishing and surface preparation.

Three critical tooling systems were developed using BE978: a monocoque chassis mould, nose cone tooling and suspension wishbone tooling. These enabled the manufacture of high-precision composite components with significantly improved control over geometry, consolidation and surface quality.

The collaboration was initiated when Emmanuel Asare a student engineer working within the Formula Student team met with Base Materials during a work placement at a Formula One team. This led to a technical partnership that provided both material access and engineering support throughout the project lifecycle.

The introduction of BE978 tooling systems enabled a significant improvement in manufacturing consistency and part quality across the vehicle programme. Improved dimensional accuracy and surface finish quality allowed the team to better translate simulation models into physical performance, while enhanced tooling stability reduced variability in composite consolidation and increased build repeatability.



Most notably, the project delivered an estimated 15 kilogram weight reduction in the monocoque chassis compared to previous iterations, driven by improved tooling precision and more efficient material consolidation. This contributed directly to a lighter and more structurally efficient vehicle platform beyond the technical outcomes, the project strengthened collaboration between academia and industry, bridging the gap between theoretical design and real-world composite manufacturing. For Emmanuel, access to Base Materials' engineering expertise and materials enabled a transition from design-led development to production-validated engineering, reinforcing best practice in tooling design, composite processing and manufacturing control.



## Enabling the engineers of tomorrow

With tooling and manufacturing complete, the vehicle is now entering testing ahead of competition at Silverstone Circuit in June. The focus will be on validating performance improvements, refining vehicle setup and ensuring reliability under dynamic track conditions.

The programme will culminate in participation in the IMechE Formula Student live finals at Silverstone, where more than 100 university teams from over 30 countries compete, testing speed, precision and reliability.

James Kelly, Project Engineer at Base Materials, commented: "This project demonstrates our commitment to supporting STEM development and advancing composite manufacturing capability through real-world application.

"By providing BE978 tooling systems alongside technical expertise, we enabled emerging engineers to bridge the gap between design intent and manufacturing reality, supporting the development of future high-performance engineering talent."