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FROM AUTO: FORMULA FOR SAFETY

Ford has drawn on the FIA Institute's technical and safety expertise for its latest single-seater race car design. The result is a chassis that matches the safety levels of an F1 racer — for a fraction of the cost.

This year has seen the relaunch of the Formula Ford Championship with a new car that isn't just the fastest junior single-seater in the UK but which also meets the highest levels of safety.

Much of this is down to the work that Ford has been doing with the FIA Institute over the past few years to ensure that its EcoBoost chassis sets the standard for safety in the junior formulae.

The project started in 2008, when Ford asked the FIA Institute to help it develop a spaceframe chassis that would be as safe as more expensive carbon-fibre tubs.

Michael Norton, Ford Motor Sport manager, says: "Safety is paramount for Ford and we wanted an official and regulatory way of ensuring all Formula Ford cars were built to a specific standard. We wanted to fully evaluate all aspects of the safety elements of Formula Ford and update the safety, where necessary, to ensure it complied with the latest standards we knew existed for this type of car."

Every area of the car was evaluated from chassis strength and side intrusion protection to crash structures and wheel-retention devices.

This is where the FIA Institute's expertise proved to be a major help, says Norton. "It was really down to the technical expertise and experience of the FIA Institute's Andy Mellor who was invaluable to the project", he says. "Andy's knowledge of all elements of FIA crash-testing for single-seat cars cannot be overestimated. His leadership with the technical aspects of the design, construction and implementation have ensured that all future Formula Fords have an incredible level of safety for a junior category series – equal to that of more expensive current carbon monocoque cars."

The car was subjected to a whole range of static and dynamic tests, many of which required unique solutions. For frontal protection, for example, a bespoke carbon crash structure was developed.

Mellor explains: "Although carbon crash boxes have been used for many years in leading championships such as F1 and F3, this car takes a slightly different approach whereby the energy absorbing carbon structure part is fitted inside the nosecone bodywork. Impact testing involved mounting a crash box to a rolling sled, then subjecting it to a controlled impact with both a rigid wall and side of the full chassis."

This worked so well that the resistance of the test structure was such that during the impact the trolley's average deceleration did not exceed 25g, and all structural damage was contained within the nosecone.

For side protection, as this is a tubular steel chassis, the development of the materials for the side intrusion panel itself and the way it was attached to the chassis were very important. To give additional protection to the driver in the event of a side impact, the car was fitted with FIA specification side (anti) intrusion panels. These panels extend fore-aft from the front roll structure up to the rearmost edge of the fuel cell. And vertically, from the floor chassis rail to the top of the cockpit opening.

Mellor says: "During the development phase of this project we tested many prototype panel configurations, especially to ensure compatibility with the nosecone during a T-bone impact. The panel strength is a crucial element of the car's ability to absorb a heavy side impact. It simulates the side of a carbon monocoque chassis and spreads the load throughout the steel frame ensuring the crash box does not penetrate."

The chassis also passed tests for rear protection and roll-over protection with flying colours. Mellor adds: "This Formula Ford shares many of the safety features and innovations found in the current Formula One car and provides a very high level of protection at a much more affordable cost."

The project has proved such a success that the FIA has adopted those safety regulations for use by National Sporting Associations running spaceframe chassis single-seaters around the world.

Norton says: "The knowledge we all gained from the project paved the way for the complete overhaul of the FIA Appendix J Article 277, which is now available to the entire motor sport world."

Safety elements engineered into the Formula Ford EcoBoost 200

- 1 - FIA approved frontal impact structure
- 2 - FIA approved rear impact structure
- 3 - FIA chassis and roll-bar quasi-static load tests
- 4 - FIA specification side intrusion impact panels
- 5 - FIA head surround support system (the part you see F1 drivers remove before they exit the car)
- 6 - FHR (HANS) system compatible
- 7 - FIA specification collapsible steering column
- 8 - FIA specification wheel retention tethers
- 9 - FIA specification cockpit opening size
- 10 - FIA approved removable seat

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