Here is presented a research activity to introduce new technologies in the component of a motorcycle prototype to participate to the International MotoStudent Competition.

**SCOPE OF THE WORK**
The aim of project is improving the mechanical stiffness of the steel motorcycle-swing-arm through an innovative composite structure. The optimal torsional, flexional and lateral stiffness of the chassis are obtained exploiting the mechanical properties of a carbon fiber layer added to the steel frame, with an inner honeycomb core as structural support. High static and dynamic performances of the vehicle are therefore guaranteed.

**PROCEDURE**
1) Design and FEM analysis of the chassis frame;
2) Study of the classical honeycomb configuration and iterative process to reach an innovative solution able to resist torsional and shear stresses in the diagonal direction;
3) Reorientation of the honeycomb structure and introduction in the cavity of the steel chassis frame, creating a light but resisting support;
4) Covering carbon fiber layer wrapping up the tubular and honeycomb structures.

The new honeycomb structure has better resistance to the torsional and shearing type of loading, typical of the motorcycle swing arm, allowing its usage in the direction orthogonal to cell’s axis. The special configuration optimizes the distribution of the mass in the volume and provides a light structural support to the carbon fiber layer. Additional carbon fiber sheets can be added and oriented according to the resisting necessities of frame.

**CONCLUSIONS**
The resulting sandwich structure is of reduced weight and performances improved. The original steel frame gains flexional, torsional and lateral stiffness guaranteeing high static and dynamic performances of the vehicle. Compared to a whole carbon frame, the composite structure reduces the overall costs and simplifies the production process. The simplicity of the procedure permits the applicability of the solution to a wide range of tubular structures. Further developments concerns the FEM modelling the composite material and the optimization of the thickness of the honeycomb structure.