

Comparative Analysis of High Lift Airfoils for Motorsports Applications

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Abstract : The purpose of this study is to analyze various high lift low Reynolds number airfoils using two-dimensional Computational Fluid Dynamics (CFD) code in the isolated flow field and select optimum airfoil to suit the motorsports application. The airfoil is selected after comparing the stall behavior, transition location, pressure recovery, pressure distribution and boundary layer characteristics of various airfoils. The prime consideration while selecting airfoil is highest C_l while achieving the sustainable performance over a range of Reynolds numbers encountered on the race track. The increase in C_l is always accompanied by the increase in C_d but this must be compromised since the main goal is to increase an aerodynamic grip. It is always desirable to increase the down-force in Formula One (F1)/Formula Student (FS) to gain reduction in lap time. This paper establishes the criteria for selection of high lift low Reynolds number airfoil while considering various parameters which affect the performance of airfoils.

Keywords : aerodynamics, airfoil, downforce, formula student, lap time

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