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A Computational Study of the Effect of Intake Design on Volumetric Efficiency for Best Performance in Motorsport

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Abstract : This project was aimed at investigating the effect of velocity stacks on the intakes of internal combustion engines for motorsport applications. The intake systems in motorsport are predominantly fuel injection with a plate mounted for the stacks. Using Computational Fluid Dynamics software, the relationship between the stack length and power and torque delivery across the engine’s rev range was investigated and the results were used to choose the best option for its intended motorsport discipline. The test results are expected to vary with engine geometry and its natural manufacturer characteristics. The test was also relevant in bridging between computational data and real simulation as the results show flow, pressure and velocity readings but the behaviour of the engine is inferred from the nature of each test. The results of the data analysis were tested in a real-life simulation on a dynamometer to prove the theory of stack length on power and torque delivery, which helps determine the most suitable stack for the Vauxhall engine for rallying in the Caribbean.

Keywords : CFD simulation, Internal combustion engine, Intake system, Dynamometer test
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