

Project Title: [Prototype Billet Cylinder Head](#)

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Area: [Mechanical Engineering](#)

Sponsored by: [Velox Motorsports](#)

Velox Motorsports, with its headquarters located in Litchfield Park, Arizona, is an independent aftermarket automotive performance parts manufacturer. The projects taken on by Velox Motorsports include providing components for race vehicles. The customer needs require conceptual design and thorough analysis, to testing and validation on components and vehicles. Velox is requesting assistance in the design of a performance aftermarket cylinder head for a VR38DETT engine. The prototype cylinder head will be installed specifically on a race-trim Nissan GTR. The cylinder head controls the air-fuel mixture flow into each combustion chamber. The firing process then occurs in the combustion chamber and the burnt mixture exits through an exhaust port on the cylinder head.

In order to complete this project successfully, the cylinder head design must reduce deflection of the deck by at least 33% from its standard failure point to a value less than 0.0033". There must also be an additional injector port added to each intake airflow port. The addition of the second injector port should allow for a 100% increase in available fuel per cylinder. The final requirement is the increase of runner and port wall thicknesses by at least 25%.