The Formula SAE competition in Lincoln Nebraska offers 80 teams the challenge of designing, building and competing in a formula style race car. The teams must create a final product that is compliant with the rules governing the competition and are challenged to outperform competitors in various dynamic events, marketing, and design. The MSU 2012 FSAE engine team elected to further improve last year’s KTM 525. The engine in previous years has been modified to run on E85, has been converted to fuel injection had has been given a turbocharger. Changing airflow characteristics utilizing computational fluid dynamic software, the team hopes to raise volumetric efficiencies and lower intake temperatures. The team will also experiment with fuel injector placement seeking better fuel mixing and atomization. With the advantage of an extended design season, real world testing will assist the 2012 team in succeeding where previous years have fallen short.

Objectives:

- Engineer an intake system that flows 120 CFM through a 19mm restrictor and incorporates proper fuel injector placement for ideal atomization.
- Manufacture an exhaust system which will provide proper conditions for the turbocharger while allowing sufficient airflow and holding sound levels under 110 decibels.
- Modify the valve train system for a turbocharged engine by altering valve lift, overlap and event timing.
- Develop and implement an automatic shifting system to decrease acceleration time.
- Implement an effective data acquisition system to assist tuning the FSAE car for maximum performance.
- Utilize the MoTec engine management system to fine tune the engine and turbocharger operational characteristics.

Abstract:

The Formula SAE competition in Lincoln Nebraska offers 80 teams the challenge of designing, building and competing in a formula style race car. The teams must create a final product that is compliant with the rules governing the competition and are challenged to outperform competitors in various dynamic events, marketing, and design. The MSU 2012 FSAE engine team elected to further improve last year’s KTM 525. The engine in previous years has been modified to run on E85, has been converted to fuel injection had has been given a turbocharger. Changing airflow characteristics utilizing computational fluid dynamic software, the team hopes to raise volumetric efficiencies and lower intake temperatures. The team will also experiment with fuel injector placement seeking better fuel mixing and atomization. With the advantage of an extended design season, real world testing will assist the 2012 team in succeeding where previous years have fallen short.

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