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KRITSADA PUGASAB : GENERALISED ENGINE MODEL FOR FUEL
CONSUMPTION PREDICTION. THESIS ADVISOR : KANIT WATANAVICHEN, Ph.D.

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Data obtained during the engine dynamometer testing are used to produce engine performance maps. The engine maps employ normalised brake torque, normalised speed and brake thermal efficiency to allow comparison between dissimilar engines. A sufficient number of engine tests has been carried out and sufficient data have been collected to construct a generalised engine map by statistical method. With the application of suitable equations and a knowledge of which gear the vehicle is used, over a driving cycle, this map may be used to determine the fuel consumption for a variety of different engines. Furthermore, this could be extended to tuning centres and engine modified companies whom deal with many different makes. The existence of a generalised map would implied that carrying the data for each individual engine would be unnecessary.

Generalised Map in this thesis has been constructed from engine testing data of a Toyota Model 4A-FE (1587 cc.) , a Toyota Model 3E (1498 cc.) and a Mitsubishi Model G32B (1597 cc.) which all have the total market share of 60% compare with the same capacity of engine's population employed in Bangkok. this Generalised Map also compiles the statistical weights due to both amount of different engine's models and the use of different fuel grades in the market share. Therefore, this generalised map can represent SI engine capacity of 1300-1600 cc. in Bangkok.

The result was found that Generalised Map has the maximum brake thermal efficiency of 24.537% at normalised brake torque 0.8 and normalised speed 0.45. Fuel consumption that is estimated from Generalised Map by simulating a drive of a vehicle along the ECE15 driving pattern shows an approximate fuel consumption of 231.69 cc. per a test cycle. This figure contains 0.54% error compares with an estimated average value from the individual engine performance maps.

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