Abstract

There is an increasing environmental concern over the use of traditional petroleum fuels such as gasoline, diesel, etc. in the automotive sector due to their large carbon footprints and harmful emissions. To address this, there is a need to explore novel and cleaner combustion techniques and alternative fuels for the automotive sector. In the Indian automotive scenario, in which the two–wheelers constitute a major share, it becomes immensely important to develop new technologies for the two–wheeler sector to cater to the mobility demands of the masses, as well as to pave the path towards renewable, cleaner and sustainable fuels. Methanol is a potential alternative fuel, which can be utilized in the modern IC engines with proper adjustment in the engine hardware, ultimately leading to higher engine efficiency, cleaner & efficient combustion and significantly lower emissions as compared to the conventional petroleum fuels. It can also be manufactured from municipal solid waste (MSW), and lower value biomass, making it essentially renewable, and promoting a circular economy. In this study, a single cylinder two–wheeler methanol (M85, which has 85% v/v methanol and 15% v/v baseline gasoline) fuelled engine prototype has been developed using suitable modifications in the engine hardware at the electronic control unit (ECU) level. The stock ECU unit was replaced with a programmable ECU unit, by necessary modifications in the wiring harness of the engine. All the parameters required for a proper engine operation were defined in the open ECU, and ultimately, fuel and ignition maps for M85 were developed. Other peripheral systems for the performance, combustion and emission analysis of the M85 prototype were also developed. This project report clearly explains the entire process for ECU calibration in a gasoline engine using speed density method.

Keywords: Methanol, Electronic Control Unit (ECU) calibration, Electronic Fuel Injection (EFI), Speed density tuning, Two–wheeler engines, Alternative fuels.