**Motivation**

- Small-scale portable power within the 10-1000W range is currently supplied by primary cell – non-rechargeable – batteries. Batteries pose environmental threats and dependency on electrical infrastructures.

- A robust, fuel-flexible power system that ensures accurate delivery, monitoring, and control of generated power is the better & cleaner alternative.

**Background / Project Goals**

- Beginning August 2007, this project has been working towards the following goals:
  - Calculate engine efficiencies for each fuel
  - Collect data on torque and power generated from a variety of fuels:
    - Glow Fuel
    - Hydrogen
    - Gasoline
    - JP8
    - Diesel
    - Biofuels
    - Blends
  - Challenge: dealing with fuel immiscibility

**Results**

- The portable Graupner OS engine is Fuel Flexible:
  - Methanol: BMEP 240kPa @ 12000 RPMs (~50% WOT)
  - 87 Octane: BMEP 89kPa @ 8300 RPMs (~90% WOT)
  - JP8:BMEP 149kPa @12000 RPMs (~60% WOT)

**Discussion**

- Successful combustion of non-standard fuels were strongly dependent on:
  - engine temperature (cooling)
  - use of glow plug
  - fuel-to-air ratio
  - throttle position

**Future Work**

- Perform testing on more fuels: diesel, biobutanol, +more
- Electronically control / measure – fuel-to-air ratio, glow plug temperature, startup power
- Design a more robust, efficient & silent exhaust
- Create active control systems to optimize combustion
- Charge a battery