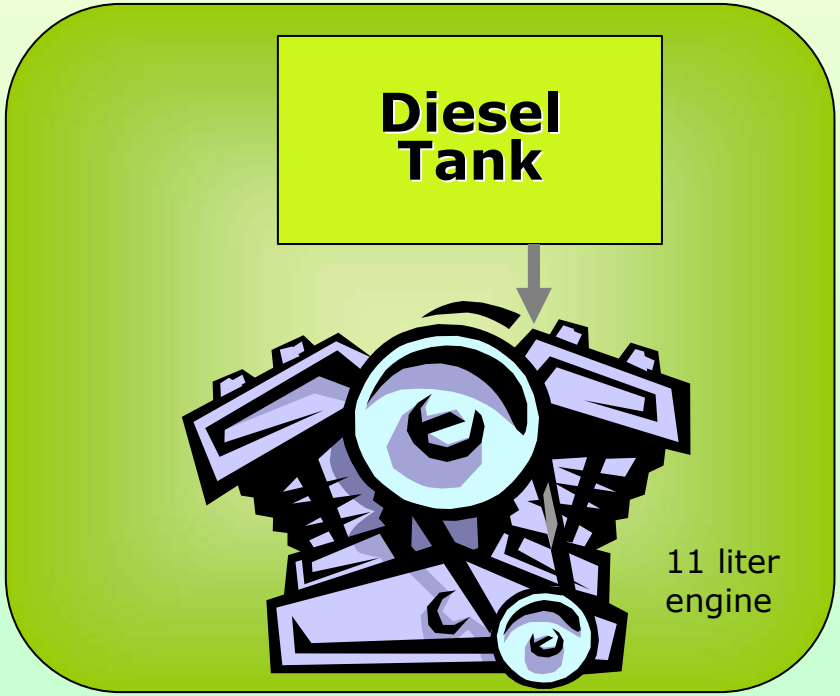
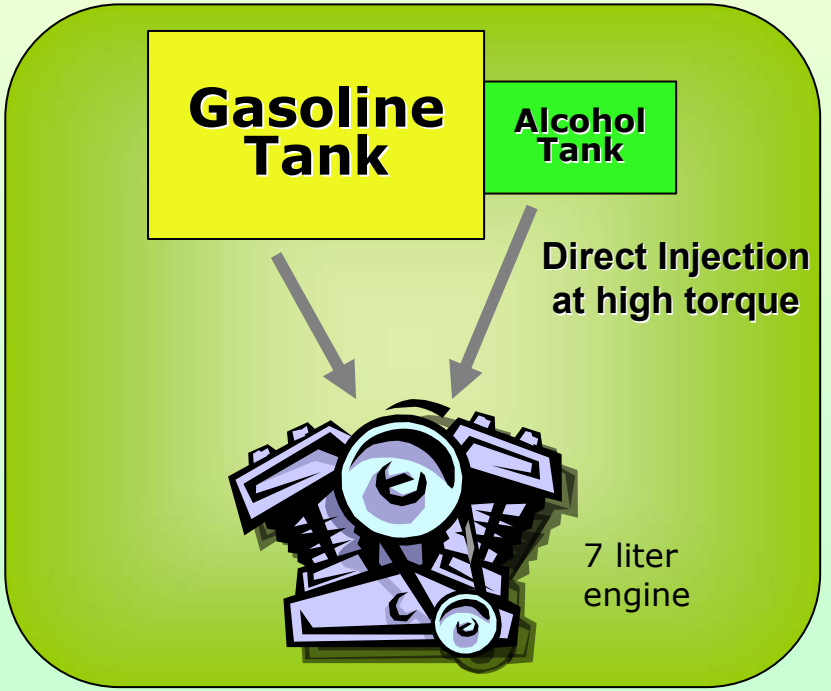
HD Applications of Significantly Downsized SI Engines Using Alcohol DI for Knock Avoidance

Enables replacement of a standard diesel engine...

... with a much smaller gasoline engine with same or greater power





turbocharged, high pressure, high compression ratio

Alcohol Boosting in Heavy Duty Truck SI Engines

- Knock eliminated by “on-demand” alcohol DI allowing aggressive downsizing of the MD11 (11 liter) to a 7 liter, stoichiometric SI engine
  - Same/greater torque/power, lower peak pressures and total engine mass flow than diesel with comparable brake thermal efficiency
  - Higher volumetric fuel flows due to the lower density of gasoline and alcohol; methanol use reduces alcohol fuel use by half compared to E85
- Emissions treatment (current and future) in EBS-conversion engines accomplished using the three-way catalyst at stoichiometric air-fuel ratios.
- Significant reduction in up-front cost of the engine should be possible by deletion of the high pressure fuel injection equipment, the use of a much simpler exhaust aftertreatment system and the reduction in the size of the engine, including turbomachinery and intercooler
- Attractive for vocational applications with central refueling
- In the absence of a knock-suppressing second fuel, premium gasoline can be used as the second fuel, allowing 50% of rated B-torque.