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Heavy duty Spark Ignition (SI) Natural Gas (NG) engines have lower efficiency than the heavy duty Diesel engines due to partly the lower compression ratio used in NG engines and also the throttling losses especially at low/part loads. The maximum load is also limited in SI NG engines due to higher exhaust gas temperature and also lower compression ratio. The main objective of the NG engine project in Lund University is to approach Diesel engine *efficiency*; Diesel engine *maximum load* range and SI engine *emission* levels. High EGR rates combined with turbocharging has been identified as a promising way to increase the maximum load and efficiency of heavy duty SI NG engines. With stoichiometric conditions a three way catalyst can be used and thus regulated emissions can be kept at very low levels. High dilution requires closed loop combustion control. It is also desired to increase the reliability of the engine during transient operation. The project has focused on applying different controlling approaches to minimize the fuel consumption and increase the combustion stability. New methods to determine combustion stability during transients have been developed and used together with model based control methods.