

UCI CI-SS Laboratory Exercise

Emissions: Turbine operation and data acquisition

Microturbine generators (MTG) offer a compact option for dispatchable power generation that is well suited for microgrids and integration into a diverse system involving renewable energy, storage, heating and power requirements, and economic dispatch. When used in a microgrid configuration, proximity to population will be more likely and thus a reduction of NO_x to minimize local ozone and particulate formation is important to protect health. Microturbine generators have demonstrated low single digit NO_x emissions and, in some cases, have attained certifications levels that indicate performance on par with the cleanest, highest efficiency central station power plants.



Capstone commercial 65 kW recuperated gas microturbine generator

When considering the use of hydrogen in a recuperated microturbine operating in a premixed combustion mode to attain low emissions, several factors must be considered regarding the characteristics of hydrogen: high flame speed and relatively low ignition energy required. Studies suggest that autoignition can be avoided with a reasonable aerodynamic design for the premixer, therefore, flashback is the principal area of concern. To this end, experimental efforts have been aimed at modifying injector design and combustor, as show below, to safely and efficiently operate on up to 100% hydrogen while maintaining relatively low NO_x emissions.