

Particulate Produced From Advanced Combustion Operation in a Compression Ignition Engine

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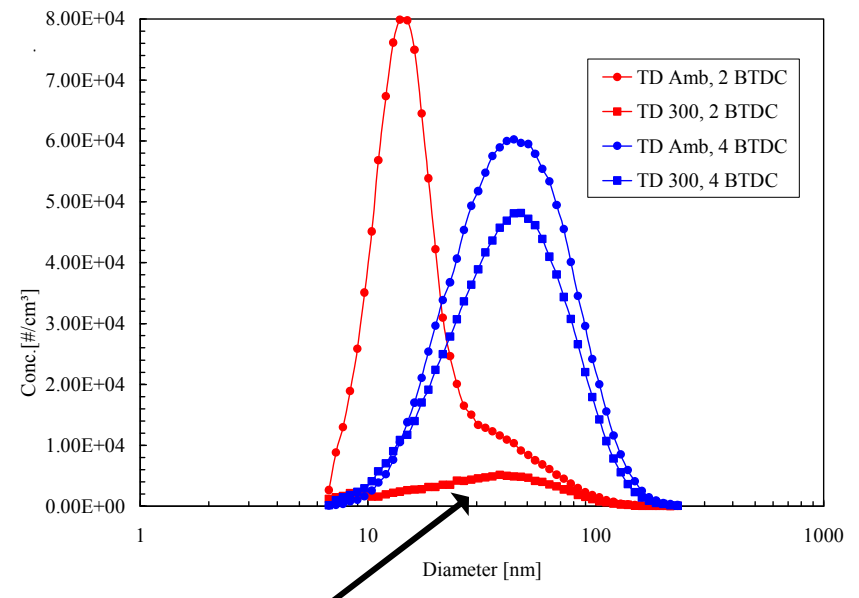
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OBJECTIVES

- Determine operating conditions to achieve high efficiency clean combustion (HECC) operation – focus on advanced fuel injection timing and high EGR operation
- Understand the limitations of HECC operation and determine the sensitivities to operating parameter variations
- Characterize the potential emissions reduction and the nature of the resulting emissions during advanced combustion
- Determine impact of H₂ addition – part of the larger DOE funded project on Hydrogen Assisted Combustion

Higher Efficiency with Low-NO_x and Low-PM (1800 rpm, 4.2 BMEP)

	Baseline	LTC	HECC
EGR Total (%)	11	48	50
Engine produce EGR (%)	11	16	16
Simulated EGR (%)	none	32	34
NO _x (g/kW.hr)	1.88	0.72	0.89
NO (g/kW.hr)	1.48	0.62	0.61
NO ₂ (g/kW.hr)	0.40	0.10	0.28
THC (g/kW.hr)	0.76	1.06	1.65
CO (g/kW.hr)	2.21	3.71	7.17
CO ₂ (g/kW.hr)	845	1511	1501
PM (g/kW.hr)	0.98	1.57	0.42
BSFC (g/kW.hr)	253	253	244
Intake Temp (C)	59	70	75
ExhTemp (C)	342	357	336
Main Timing (°ATDC)	2.88	2.88	-4.00
Pilot Timing (°ATDC)	-17.4	-17.4	none
Rail Pressure (bar)	450	450	490



Thermally denuded particles – dry soot fraction vanishes under well chosen injection conditions