

Abstract Submitted
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Internal Combustion Engines as Fluidized Bed Reactors ZOE

LAVICH, ZACHARY TAIE, Oregon State University, SHYAM MENON, Louisiana State University, WALTER BECKWITH, SHANE DALY, Oregon State University, DEVIN HALLIDAY, Gas Technology Institute, CHRISTOPHER HAGEN¹, Oregon State University — Using an internal combustion engine as a chemical reactor could provide high throughput, high chemical conversion efficiency, and reactant/product handling benefits. For processes requiring a solid catalyst, the ability to develop a fluidized bed within the engine cylinder would allow efficient processing of large volumes of fluid. This work examines the fluidization behavior of particles in a cylinder of an internal combustion engine at various engine speeds. For 40 micron silica gel particles in a modified Megatech Mark III transparent combustion engine, calculations indicate that a maximum engine speed of about 60.8 RPM would result in fluidization. At higher speeds, the fluidization behavior is expected to deteriorate. Experiments gave qualitative confirmation of the analytical predictions, as a speed of 48 RPM resulted in fluidized behavior, while a speed of 171 RPM did not. The investigation shows that under certain conditions a fluidized bed can be obtained within an engine cylinder.

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