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UCT graduate builds world's fastest rapid-compression machine

The University of Cape Town's Gavin Evezard, of the Department of Mechanical Engineering, has singlehandedly built the world's fastest rapid-compression machine(RCM): a machine that could improve fuel combustion in automobile engines.

His doctoral thesis, *An Innovative Rapid Compression Machine in Theory and Practice*, describes the design of a novel RCM. Evezard, who graduates on 7 June, first explored the concept of a faster RCM in his final undergraduate year, built a prototype for his master's, and completed it for his PhD. The machine investigates what happens when an air/fuel mixture is squeezed very suddenly.

Evezard said: "The RCM is typically used in research facilities for fuel characterisation. Once fuel characteristics have been established and published, the data can be used for various new and existing combustion devices, normally with the intention of improving performance and efficiency."

The automated RCM Evezard built stops a piston that is moving at up to 40km/hr in less than one half of a millisecond (i.e. one half of a thousandth of a second). That's 20 times faster than a blink of an eye. The best rapid compression machines elsewhere in the world are slow by comparison, needing at best two milliseconds to stop a piston.

Adjunct Professor Andy Yates, who supervised Evezard's thesis, said: "It reveals a lot about the fuel. What happens is that it 'thinks' about burning for a moment, starts to burn, stops burning and then explodes. These timescales are crucial to extracting the optimal combustion performance from fuels."

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