

The McPherson Sentinel

- Duo revving toward engine design

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Imagine a 200 horsepower engine that could run on multiple fuels, possibly getting over 100 miles per gallon and 180 foot-pounds of torque, that doesn't involve batteries and exceeds federal auto emission standards.

Now imagine that engine using only two cylinders and three spark plugs per cylinder to achieve that level of efficiency. If you're Matthew Riley, you don't have to use your imagination. Like him, you'd be busy creating it.

Riley is the CEO and research scientist of Grail Engine Technologies, home of the "Grail Engine." Riley has already secured a provisional hopes to produce a working prototype soon.

"The technology has been around forever on all of this. It's all been there. Nobody's ever thought about how to put all of it together," said Riley, who has 20 years of experience in engine design, combustion analysis and flow technology. "All the technology in this is proven technology. Every piece of this is proven. It doesn't go against the laws of physics."

The "eureka" moment for Riley came in April 2008, in the kitchen of his friend Nicholas Bennington, who became the president and chief engineer of Grail.

"One of the things about Matthew is, as far as intellectual understanding of engines, is his capability to see things much quicker than me," Bennington said. "I'm the kind of person, I have to build something and look at all sides. He sees all this in his brain. It took me a while."

"I started drawing it out, doing cheap sketches, and Nick has a unique ability with Computer-Aided Design (CAD), as well as his business background and managing teams," Riley said.

Bennington has more than 20 years in the aerospace industry, including positions with General Dynamics, Douglas Aircraft and Bombardier/Learjet.

The Grail Engine works on what is known as the "Grail Cycle," which combines a process called Forced Semi-Homogeneous Charged Compression Ignition (FS-HCCI) and the Miller Cycle. FS-HCCI, in part, uses the compression of fuel and oxidizer to ignite the mixture while the Miller Cycle provides extra efficiency by changing the compression ratio of the engine. The result is more power in a much smaller package.

When completed, the engine should be able to use fuels ranging from traditional fossil fuels, to biodiesel, ethanol, propane, natural gas and, ultimately, Hydrogen when the technology and infrastructure for it becomes widely available. A computer can automatically calibrate the engine for each fuel, to achieve maximum engine efficiency.

The company also has a green focus, seeing beyond gas/electric hybrids.

"It should exceed 2016-17 federal emissions," Riley said. "What is the ultimate goal for us? To make our planet better, to stop the pollution, to stop the harm we're doing to our environment. This is fully recyclable."

Riley was born in Illinois, but has lived most of his life in Kansas. The engine itself is being developed in Chapman, and the company has partnered with Stewart's Sports and Awards, Salina Area Technical College, Kansas Racing Products, the Kansas Auto Racing Museum, Exline Inc., Pulse Star and Autodesk. On the advice of friends he moved to McPherson six months ago. He made it clear that the engine is being produced locally, and hopes, if successful, the benefits of it can extend to the entire community.

"I figured (McPherson) was the best place I could find. It has great parks and city personnel," said Riley, who added he thought McPherson was a great place to raise his kids. "I intend on staying here. I think I can do a lot for the community in the long haul."

For more information see www.grailengine.com.