

Creating a Half-Pint Heavyweight

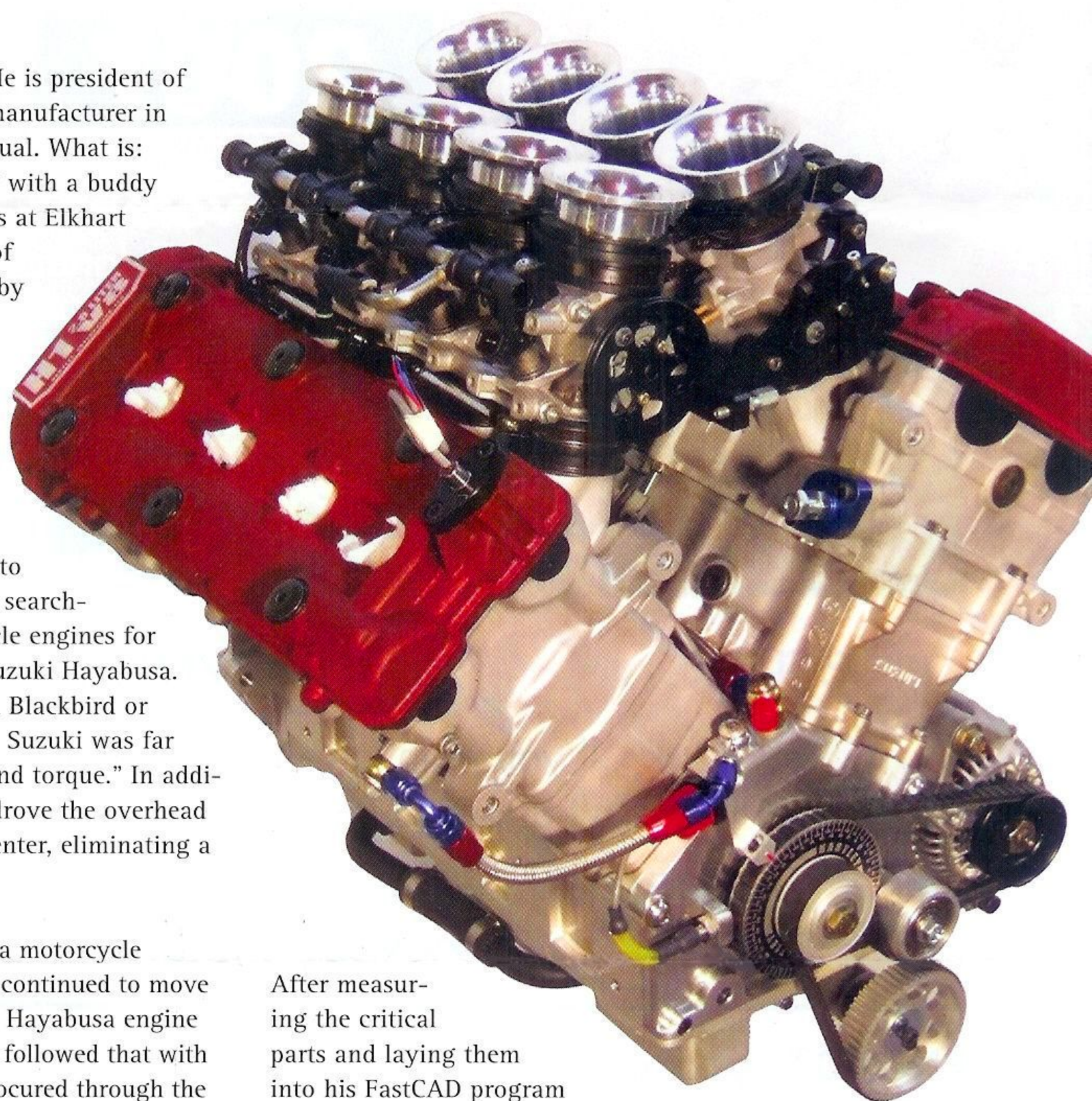
John Hartley built a V8 with a shop manual, CAD programs, a donor Suzuki Hayabusa motorcycle engine, and perseverance. Automakers can learn from his experience.

Christopher A. Sawyer, Executive Editor

John Hartley isn't your typical engineer. He is president of Faustel, Inc., a custom printing machine manufacturer in Germantown, Wisconsin, which isn't unusual. What is: he built his own V8 engine. "I was talking with a buddy of mine while we were at the vintage races at Elkhart Lake about the idea of building a V8 out of two motorcycle engines," he recalls, "and by the time we hit the Pizza Hut on the way home I'd decided to do it." Although the performance of his Ford Zetec-powered Caterham 7 sports car was thrilling, its four-cylinder engine sounded flat and unimpressive, a problem Hartley was certain a V8 would not have. Setting a price of \$6,000 for his project—"you have to start somewhere," he says—Hartley started searching the universe of water-cooled motorcycle engines for "the ultimate motor." He found it in the Suzuki Hayabusa. "It had more displacement than the Honda Blackbird or Kawasaki Ninja motors," he says, "and the Suzuki was far and away the leader in both horsepower and torque." In addition, the bore centers were greater and it drove the overhead cams from the crank end rather than its center, eliminating a potential weak point.

Despite admitting that the idea of building a motorcycle engine-based V8 was "a bit crazy," Hartley continued to move forward. He bought a Hayabusa engine manual on eBay, and followed that with a complete engine procured through the online auction house. He read the manual cover-to-cover, then disassembled and measured the engine. The heads, cams, cam covers, cylinder liners, throttle bodies, and pistons basically would carry over, but the rest of the engine would be new. Hartley needed the engine to be

sufficiently compact so it could fit in the same space as the four-cylinder Zetec, which meant abandoning an even-fire 90° design. "I wanted the bank angle to be as tight as possible for packaging, and 75° was as tight as I could go and still have room for the oil galley and enough structure to keep the block reasonably stiff," he says.



After measuring the critical parts and laying them into his FastCAD program (Evolution Computing, www.fastcad.com), Hartley started with the design of the crank and built the rest of the engine up from this starting point. "I went with a flat-plane crank for horsepower, breathing, size, and scavenging," he says. The block and heads, he figured, could be cast from 356/LM25 aluminum alloy, and he found a low-cost foundry that would make the patterns and cast the pieces for a reasonable price. Because he wanted to duplicate the size of the motorcycle engine as much as possible, he designed walls that would be much thinner than they would be in a car engine. "What I lost sight of," he says, "is that—when you go to a V8—you are cutting double the number of holes in the case, which reduces its rigidity, while you are doubling

@ To see the Hartley H1 V8 in detail, see:

<http://www.h1v8.com/page/page/1562068.htm>