



**HARD MILLING**  
**HMS**  
**SOLUTIONS**



# HIGH-PERFORMANCE HARD MILLING

Succeeding By Doing It The Hard Way.  
Talk about doing things the hard way. Corey Greenwald is an engineer by training. In the past, he worked for a typical mold and die shop as a designer, a manufacturing engineer and in management.

It wasn't until six years ago, when his former company entered into hard milling, that he even ran a machine. He says it was one of the best things to happen to him in his career.

But, as time passed he was ready for a new challenge in his career. Greenwald saw a lot of potential in high-performance machining, and began to look for a new role that would allow him to pursue this. As fate would have it, Craig Sizemore, an experienced EDM operator and specialty shop owner for years, was also thinking about getting into hard milling.

So, the two partnered and in August of 2004, Hard Milling Solutions Inc. (HMS) was started in Shelby Township, Michigan. Today, this two-man shop has already grown from one to two Makino V56 machining centers, and has already realized that a third machine is probably in the company's near future.

"If people aren't looking to hard milling, they're missing out, because I guarantee it can save money," says Greenwald. "We can take an already hardened block and cut it to zero or negative stock with a finish that needs little to no benching. This is a huge time savings, and cost savings to customers. The Makino V56 makes that possible."

**MOVING FROM ONE TECHNOLOGY TO ANOTHER** Sizemore was originally approached by his local Makino distributor, Tony Pekalski of Single Source Technology (SST), who asked him if he saw any applications for hard milling in the EDM work he was doing. After some time passed, Sizemore did see a number of applications for hard milling and spoke in more depth with SST about the company's product offerings.

"Once I thought about it some more, I started to see where hard milling might be less expensive than wire EDM in some cases, which had always been the least expensive process for a lot of different applications," Sizemore continues.

"We did time studies back and forth between our wire machines and a Makino V56, and we found over and over that they could beat our times so we realized that this was a viable process. I began to look for someone who had hard milling experience and discussed it with Corey, and HMS was born as a completely separate company."

**THE DAWN OF A NEW AGE** Hard Milling Solutions specializes in only doing high-performance machining of hardened steel, as the name would imply. "A lot of people say they're hard milling, but we really are hard milling every single day," says Greenwald. "Most of the metal we cut starts in the high 50s Rockwell C-scale and goes well into the 60s. We're doing mostly D2 and

so of backlog. We don't like backlog. We get nervous if we have backlog and try to get every piece out of here every day whenever possible."

Both Greenwald and Sizemore say that Makino technology is key to their success. But they also agree that without the proper tooling, tool holders and software, they wouldn't be as successful as they are today. And they credit SST for helping them realize this well before they started the company.

"SST helped me learn how to hard mill properly," Greenwald says. "I had an idea of what I needed to do, and I'd been hard milling for a while. I took all of the Makino and SST Technology Transfer courses and learned a lot. I don't know of any other companies that you could both buy a machine

**"We can take an already hardened block and cut it to negative stock with a finish that doesn't need any benching."**

H13 and S7 that runs from 50-64 HRC.

"Makino machines are definitely built for this. When we get production mold work in for H13 and S7, that isn't even hard milling to us anymore. That's like butter! The other guys that aren't used to milling it are worried about it though, but that's our gravy work. Cutting harder steel requires planning for conditions like constant chip load and a very rigid environment, and the V-series machines are great with this."

Greenwald says that HMS is the "911 emergency shop" for other tool and mold shops. "We get a lot of calls for things like 'I forgot to put a pocket in,' to 'We need a clearance hole that we didn't allow for' where normally they would have to EDM it. We can help them.

"We try to get jobs out the door as quickly as we can. A lot of shops aren't comfortable unless they have a month or

and really learn the intricacies of high-speed machining."

Greenwald continues by saying they didn't cut corners when they opened the shop. "Some shop owners will go out and buy a machine and think they can skimp and save on tooling and software, so they go cheap. We talked to SST and got their recommendations on what would work best for what we wanted to do. We realized quickly that cutting just one corner could cause us to not be able to successfully do what we're doing.

"We went with Cam-Tool software and shrink-fit holders for our tooling and with the Makino V56s—what we think are the best machines on the market for hard milling—and that has made all the difference and permitted us to be profitable and successful in year one. And I'm sure there are many out there who think you can cut corners but you have to buy every piece of



This part for an automotive application is an extremely difficult part to cut because of an undercut section, which can't physically be cut from the top of the part, and the accuracy and blend lines required. It takes three setups on the V56 to achieve an undercut of 0.030 with a 0.040 radius at the bottom of the undercut (see highlighted area of photo).

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the puzzle to really service the hard milling market. I'm also pretty sure that we could beat the guys who think that way based on the rigidity of the machines and the fact that they really are built to hard mill."

**TIME IS ON THEIR SIDE** HMS saves its customers lots of time. "We are a small operation, just myself and another operator, but we pride ourselves on our turn-around time. In the past, shops would typically take a block, rough it down to anywhere from 0.1000 to 0.0200 inches. Then they'd send it out to be heat-treated, bring it back, have to square up the block again and then finish the cuts.

"After that, they usually have to put some time in on the bench to get the finish they need. That's a lot of setups and a lot of time. We're able to eliminate most of these steps. Customers are blown away by the finish we get straight from the machine."

Greenwald says, for example, that one

customer called on a Wednesday and brought the job in that day. Partway through the job, there was a change to this eight-cavity mold in hard stainless steel. "We ended up cutting 44 inserts for the job. Now, these only measured four inches by four inches, but we cut 44 of them by the end of the day the following Wednesday—in one week—and got other work done also.

really believe that's what we're doing."

Another customer came to HMS with a perforation die with 506 holes in hardened D2 steel and they needed to hold a 0.0002-inch tolerance in a 0.080-inch hole. "I looked at Mike, my employee, and said 'I don't know how we're going to do this, but we are!' And we did, so now that's one more thing we can chalk up that we can do," Greenwald says with pride.

**"Off the V56 doing hard milling we're getting 10-12 RMS surface finish every single time. That's incredible."**

"We don't ever want a job to not get delivered and have to make that call to our customer that we can't keep our promised delivery date. We want our word to be good and to provide a service like no other shop they work with anywhere, and we

**A PENNY SAVED...**In addition to saving customers time, HMS is saving its customers money. "There's some wire EDM work that's getting replaced by hard milling and a lot of jig grinding that's getting replaced, but people don't know it

The machines on the shop floor at HMS consist of two Makino V56 machining centers—no grinders, HMCs, or other equipment at all.



yet," says Greenwald. "And by the time they figure it out we hope to get big enough to have a good head start on it."

"We focus, number one, on service and turning things around. I guarantee if your part can be hard milled, we can save you money on it. And that's a great feeling."

"How many businesses can you go out and find that are making money and still helping customers save money?" asks Sizemore. "That's what's so exciting about this business. We're doing something cutting edge that many people have not gotten into and our customers are saving money. I've been approaching some of my EDM customers with hard milling. I tell them that we're going to show them something they probably haven't seen before and save them money."

"For example, we delivered a job today that saved our customer nearly half of what we quoted them. They had a price in mind, and they were fine with it."

"But we were able to call them up and say, 'Your job is done, it's a better job than we could have done on the wire and oh, by the way, we were able to knock off about half of the price.' They were more than thrilled! And that is really a pleasure to be able to do!"

**FINISHES WITH A BANG** The finishes that HMS is getting off the V56 have proven to be better than they even expected. "The finishes are incredible," says Greenwald. "Coming from the powdered metal industry, I know how to bench a job for an incredible finish and even make a mirror finish."

"But we're getting a finish off these machines that requires no benching. I know people think it's smoke and mirrors, but it's a fact. Most EDM finishes can't even get close."

Customers are having a hard time accepting this, too. "Our customers are used to taking every mold they get and taking a 300- or 320-grit stone to them to get the right finish," Greenwald continues.



Shop owner, Corey Greenwald (right) sets up his part while engineer/CNC machinist Mike Gallagher finishes a program on his machine.

"But we have to teach them that they're wasting their money if they do that with parts we're giving them. I tell them that, if needed, start with a 500- or 600-grit stone, otherwise they are going backwards."

"We had some molds come back because of an engineering change and when they came back I called the customer to see what had happened to them. He said, 'Well, we had to stone them.' I had to tell them that the part we gave them was better than what he gave me back after stoning it, and urged him not to do it again with the new molds."

Greenwald says in his old position, even after jig grinding, he was typically only getting a 25-28 RMS finish. "Off the V56 doing hard milling we're getting 10-12 RMS surface finish every single time. That's incredible."

**WHAT THE FUTURE HOLDS** The partners agree that they see the company as staying competitive by always being in a state of flux as far as technology and product offerings. "Our philosophy is that we want to change and grow every day," says Greenwald.

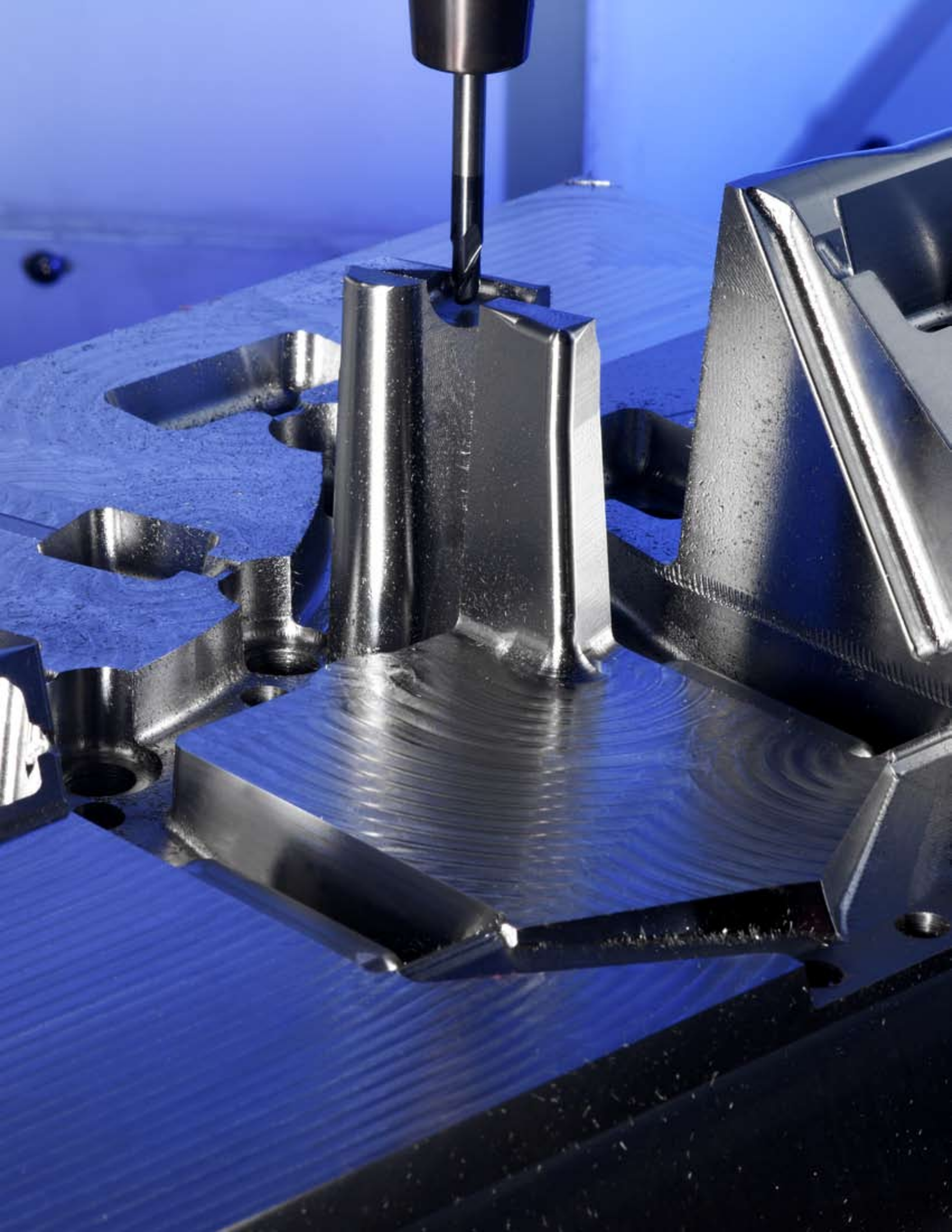
"We want to keep getting better and

not follow anyone else. We look at it as if our competition is always a leg up on us, and we strive to never be complacent and keep finding ways to get ahead and stay ahead, and the best way to do that is to stay at the front of the technology curve. If you call me in five years, there's a chance we'll be doing different things but we'll still be ahead of the curve."

Sizemore says that he is thrilled with the growth of the business and the future potential. "HMS is growing already at twice the rate my first company did, and with that company I had a lot of head-to-head competition. With HMS, there aren't that many people doing it yet so we're ahead of the curve."

"There's no one else out there teaching high-speed machining and hard milling the way SST and Makino teach it, and that has proven to be a huge advantage for us. This technology has made business a lot of fun again." **102**

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