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Supercomputing Comes to the Rust Belt

New initiatives are starting to bring the transformative benefits of supercomputer power to small and midsize businesses

by [Steve Hamm](#)

Three years ago, when Michael Garvey began looking for ways to revive his family's 85-year-old manufacturing business in down-on-its-luck Youngstown, Ohio, he settled on a surprising solution: supercomputing. For much of a century, the tiny company—originally Trumbull Bronze Co. but renamed M-Seven Technologies—specialized in casting bronze parts for steel mills. But now, it has started making money by collecting and analyzing vast storehouses of data to help larger manufacturers improve their operations.

A job that M-Seven did for BMW late last year shows how a company like Garvey's can be reborn thanks to the highest of high technology. BMW planned to retool its 900,000-square-foot paint shop in North Carolina, and it hired M-Seven to scan the entire space using sophisticated laser scanning equipment.

Once the scan was done, BMW used 600 gigabytes of data M-Seven gathered as the basis for supercomputer simulations that would help it come up with just the right process for switching over to the new equipment. So far, scanning represents less than 10% of M-Seven's revenues, but it's growing. "We're doing a phase change of our business," says Garvey, the company's president and a grandson of its founder.

INNOVATION DRIVER

M-Seven's transformation from metal melter to number cruncher is emblematic of a movement that's starting to gather steam all across the country's weary industrial zones. Old-line manufacturing companies are discovering that high-performance computing can give them a competitive edge or whole new sources of revenue.

Economic-development experts hail this trend as a key to reviving the Rust Belt and improving national competitiveness. "The potential here is absolutely outstanding," says Suzy Tichenor, vice-president of the Council on Competitiveness, an industry advocacy group. "The country that wants to outcompete has to outcompute. So high-performance computing is an important part of the country's innovation capacity."

Demand from large manufacturers has helped make supercomputers one of the most robust markets within the tech industry. Hardware sales worldwide grew by 9.4% last year, to \$10 billion, according to tech market researcher IDC. When you include software, storage, and other related pieces, the market could be as large as \$40 billion, according to another market researcher, Tabor Research.

HEAVY INVESTMENT

Because of the increased use in the past few years of off-the-shelf computers linked in clusters, there has been more than a tenfold improvement in the price-to-performance ratio for this type of computing. That makes it more affordable for

commercial uses, such as oil exploration, automobile crash-test simulations, and fluid dynamics testing.

But for supercomputing to penetrate to thousands of small manufacturing companies, the technology has to be even less expensive and more widely available. The Council on Competitiveness says most small companies that could use supercomputing capabilities now limp along by doing their number crunching on desktop workstations or small clusters of computers totaling 64 microprocessors or less. "Making the initial investment in hardware or software is the hardest part, and, until you do it, you don't know if you'll really see a major benefit from it," says analyst Addison Snell of Tabor Research.

That's why states, universities, and private companies are busy dreaming up new ways of making supercomputing available to smaller manufacturers. M-Seven Technologies is participating in a program started in 2006 called Blue Collar Computing, which is run by the Ohio Supercomputer Center. The OSC, made up of a handful of Ohio universities that own supercomputers, provides expertise and time on its computers for the states' manufacturers.

BEYOND THE MASK

"This is about the democratization of high-performance computing," says Stanley Ahalt, the OSC's executive director. "These companies should be armed with tools that allow them to work in a knowledge economy. They're doing something more valuable than just bending metal."

All sorts of industrial processes can benefit from supercomputing. Take welding, the specialty of Edison Welding Institute (EWI) in Columbus, Ohio, a Blue Collar Computing participant. Welding has become a high-tech activity. Because specialty metals are now so expensive, companies increasingly build machines and conduits out of multiple components.

That requires a lot of joining of different types of materials. And that, in turn, requires companies to optimize their welds. The traditional way to do this was by building prototypes and testing actual welds. But that's very expensive, so these days, companies prefer to use simulations to try out weld designs.

That's where supercomputers come in. By using them, companies can test a design in a couple of minutes, make changes, and then test it again. "We've gone way beyond a guy with a mask and a torch and sparks flying," says Henry Cialone, chief executive officer of EWI.

The nonprofit organization, with 250 members, is setting up a Web portal where EWI members will be able to place orders for computer time and set up their simulations. The portal is expected to be launched in May.

BIG BLUE POWERHOUSE

Private companies are reaching out to small manufacturers as well. Exa Corp., a Burlington (Mass.) company, has hooked up with IBM ([IBM](#)) to provide clients with supercomputing on demand. Exa supplies the software and expertise in running fluid dynamics simulations for the transportation industry, including for small truck and equipment makers. IBM provides the supercomputing power for less than \$1 per microprocessor per hour.

"This is a much better solution for small companies," says Steve Remondi, Exa's chief executive. "If these guys try to do this themselves, they have to buy the machine and the software, and they wouldn't use it every day."

Over the past decade, IBM has come to dominate the world of high-performance computing. It signaled its seriousness in 1996, when its Deep Blue machine beat Garry Kasparov, then the world's greatest chess player. Now, of the 100 top supercomputers operating in the world, Big Blue built more than half of them. It's counting on its on-demand supercomputing business to reach thousands of potential customers who wouldn't have been able to afford supercomputing before. Rust Belt, here they come.

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