

## Nano expectations

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Pennsylvania officials, organizations and companies are looking toward a day when they can say high-tech manufacturing is the largest contributor to the state's economy.

But that day is far off, especially considering that the political will to find jobs in future industries is just coming to a head. And many such industries, such as nanotechnology and biomedical research, are populated with small firms fighting for survival in a harsh economic climate.

"As we find applications for things like nanotech, the manufacturing of it will become more important, but it's not going to replace the manufacturing sector we lost," said Michael Smeltzer, executive director of the York-based [Manufacturers' Association Of South Central Pennsylvania](#).

The state lost an estimated 580,000 manufacturing jobs from 1977 to 2007, based on statistics supplied by the state [Department Of Labor And Industry](#). The number is an estimate due to a 2001 change in how states and the federal government tabulate industry jobs.

Manufacturing is still king in Pennsylvania, though, making up 15 percent of gross state product, or about \$72.6 billion in 2006, according to a 2008 [Department Of Community And Economic Development](#) (DCED) state-of-the-industry report.

Many jobs over the years have been eliminated for efficiency reasons, Smeltzer said. However, manufacturing has come as far as it can in automation, for now. You still need specialists to run, repair and maintain the machines, as well as supervise the quality of products made. The new focus in manufacturing is on materials.

[Ross Technology Corp.](#) in Upper Leacock Township, Lancaster County, is on track.

Ross is a steel fabricator with more than 50 years of experience in making parts and items for other industries, such as steel shelving and racks. But some of its newest items are nothing more than sophisticated powder.

Ross' powder is a nano-engineered hydrophobic coating. Basically, it's super waterproofing for solid surfaces such as steel. The coating creates an air force-field protecting the surface from water damage. The coating is created by manipulating chemical atoms to maximize the substance's repellent properties. Water bounces off the surfaces like mosquitoes off a hat with bug repellent.

"You see these power lines coming down everywhere," Andy Jones said, referencing severe winter weather that regularly hits the Northeast. "If you coat those type things with this coating, the freezing rain will roll right off.

Jones is vice president of research and development for Ross Technology. With the expansion of its nanotech division, Ross is aiming to complement traditional manufacturing with high-tech, Jones said.

Ross, along with [Oak Ridge National Laboratory](#) in Tennessee, was given an [Award By R&D Magazine](#) in 2008 for accomplishments in research on NanoSH Superhydrophobic Technology. The magazine based in Rockaway, N.J., is a trade publication for research and development firms and other organizations.

Ross expects to be producing mass amounts of hydrophobic coating for infrastructure and other industries by the middle of this summer. It's also researching new body armor for soldiers, as well as water-filtration methods that could be useful in developing nations.

Behind it all is work with nanotechnology.

Few people expect all the lost jobs to be recovered in the next several years through high-tech sectors alone, but others say it's a snowball effect that could be big if high-tech industries get a slight push.

Youssef "Joe" M. Habib is the chief executive officer of [Illuminex Corp.](#), a nanotech firm also of Lancaster County. The company has been around for six years but is still pushing to release its first commercial products.

Like nanotech products, a shift in economy-driving industries can take a lot of time to develop, Habib said.

"High-tech fields are not going to add a million jobs tomorrow, but they certainly could add a thousand, then 10,000 the next year," he said.

Illuminex knows about adding jobs slowly. The company started with Habib and another partner doing experiments out of a college closet. Today, the company has nine people working on nano-engineered products, such as heat pipes that could remove heat from computers and solar-panel technology in fabric form.

Ross Technologies also grew its research department. In two years, the firm added two materials scientists, four interns and built a network of outside consultants. That's pretty good for two years, Jones said. The company plans to add more jobs in the near future, although Jones said he couldn't specify how many or when.

"There's stuff coming out in the pipeline, and it looks very promising," he said. "There are these niche products, and they need to grow in those niche industries first."

Slow and steady is the key, said Alan Brown, executive director of the Pittsburgh-based [Pennsylvania NanoMaterials Commercialization Center](#). The center is funded through state and private money to help companies research and develop nanomaterials into market-ready products.

Observers shouldn't confuse high-tech optimism for foolish expectations about near-term potential, he said.

"Are we going to replace tens of thousands of jobs in the steel industry? It's not going to happen overnight," he said.

Still, there are prospects that high-tech fields could be reasonable replacements for lost jobs, factories and companies some day.

"The general consensus is that it's going to be a slow-moving and monumental tidal wave that will wash across in terms of future economic development," Brown said.

Nanotech is slower than industries with more established roots, such as pharmaceutical manufacturing. At least one big addition to Central Pennsylvania's high-tech manufacturing segment is just around the river bend.

Great Britain-based drug-maker [GlaxoSmithKline](#) (GSK) is nearly ready to launch its vaccine factory in Marietta, Lancaster County. Packaging operations could begin as early as April. GSK is testing its assembly line now and needs regulatory approval from the [U.S. Food And Drug Administration](#). Actual production of various vaccines could begin at the facility in 2010. By 2013, GSK expects the plant to be at full capacity, with at least 270 employees. The plant will be GSK's production and distribution hub for the U.S. vaccine market.

Pharmaceutical manufacturing is a top industry in Pennsylvania, according to DCED. Pharmaceuticals, with 13 percent of total manufacturing output in 2006, is second only to primary and fabricated metals. That, along with alternative energy production, are high-tech sectors that the Rendell administration has been actively boosting.

"Pennsylvania is poising itself, and we're training workers to go into these high-tech manufacturing fields," said Jamie Fulginiti, a DCED spokeswoman.

There are no magic bullets, but the U.S. and Pennsylvania are competing on a global stage to attract investment in high-tech fields, Brown said.

If a concerted effort isn't put forth today to give these emerging industries a push, then it'll be difficult later to compete with Germany, Japan and Korea. Those nations are courting the same high-tech sectors as Pennsylvania and the U.S., Brown said.

In terms of support, the federal government has been throwing a lot of money behind tech firms researching applications for nanomaterials, Habib said.

Research grants have abounded, but they've been scattered around like so much confetti. Undisciplined support is not enough anymore, he said.

"Now we're at a point where they have to be more focused on what they commit to," Habib said.

Everyone seems to agree that manufacturing can continue to be Pennsylvania's largest economic driver. However, change is slow and painful at times. Manufacturing's future requires more skill from its workers and a new direction.

"Today, if you don't innovate, it's not a case of if you die," Ross Technology's Jones said. "It's when you die."

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### **Keystone among top 10 nano-states**

Pennsylvania returned to the top 10 in a ranking of the strongest states for nanotechnology in 2007, according to [Small Times](#), an Oklahoma-based Web magazine documenting all things micro- and nanotech.

Pennsylvania placed **Ninth Overall** in 2007, the most recent ranking year. The Keystone State placed 13th in 2006 and previously had broken the top 10, according to Small Times.

The rankings measure each state through multiple criteria, including workforce, research dollars, industry density, venture capital and innovation.

The state was bolstered by tech and bioscience industry density (ninth) around Pittsburgh and Philadelphia, as well as the ability of companies to bring in large amounts of research grant money (fifth). Pennsylvania did not rank in the top 10 for other categories.

Here are the top states overall:

1. California
2. Massachusetts
3. New Mexico
4. New York
5. Michigan
6. Texas
7. Maryland
8. Illinois
9. **Pennsylvania**
10. Ohio

-Jim T. Ryan

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