In 1960, the manufacturing sector employed about one of every four Americans. Today, it’s one of every 10. In terms of nominal GDP, manufacturing has gone from driving 25 percent of the economy to less than half that over the past 50 years.

These trends raise a natural question: Does manufacturing still matter in the U.S. economy? The answer, supplied at a recent conference held at the Federal Reserve Bank of Cleveland, is a solid “yes,” though it comes with some interesting wrinkles.

While it may never provide the employment base or comprise the share of GDP it once did, U.S. manufacturing seems positioned to remain a vital part of the economy for the foreseeable future. That forecast, however, depends on whether the country can implement policies to address potential problems and capitalize on current strengths.

The views expressed in this article were largely gleaned from presentations at the May 30-31, 2012, industry conference, Making It in America: Manufacturing Matters, co-sponsored by the National Association for Business Economics and the Cleveland Fed.* The conference focused on the changing dynamics and rebalancing of U.S. manufacturing industry in the global economy.

* Anything not directly discussed at the conference is attributed to other sources.
Here are four questions that permeated conference discussions:

1. **Why won’t manufacturing be the major employer it once was?**

   It’s no secret that the United States has lost manufacturing jobs to the offshoring of production processes to countries with low labor costs and a large population of low-skill workers. Low-skill, labor-intensive jobs are inherently mobile, and many of them will never return to the United States because it is simply unprofitable to locate those jobs here. We see this dynamic playing out across the globe as companies readily move production facilities from country to country in search of lower costs.

   Take China, for example: previously a reliable source of low-cost labor, the country has seen labor costs rise markedly over the past decade. According to the Bureau of Labor Statistics (BLS), Chinese wages increased 100 percent from 2002 to 2008. As recounted in a recent article in the *Economist*, rising wages in China have spurred the movement of some jobs to other lower-cost Asian countries.

   Global trade and competition have also affected U.S. manufacturing. Comparative advantages make certain manufacturing activities more productive in other countries. So when firms from different countries compete in the global market, the firms that can best take advantage of the strengths of a certain location will be successful, and the less strategic ones will close, with their resources reallocated to more productive uses.

   It is easy to conclude that when domestic companies move production facilities overseas, it is with intentions of importing back into the domestic market. However, it is more a reflection of the companies’ interest in participating in the global market than in exporting back to the United States. Total world sales by foreign manufacturing affiliates have increased by $1 trillion from 2000 to 2009, while sales to the United States have remained stagnant at roughly $200 billion, according to the Bureau of Economic Analysis (BEA).

   The real smoking gun for why manufacturing will not provide the employment base it once did is directly tied to the industry’s own success in improving productivity.

   It now takes only 170 workers to produce what it used to take 1,000 workers to produce in 1950, according to the BLS. Technological advancements to control costs as well as to improve product quality have increased productivity.

   This remarkable increase is analogous to the agricultural sector’s performance during the 20th century. Farm employment declined dramatically even as output shot up. While much of the advancements in farming happened earlier in the century, manufacturing saw its largest upticks in productivity beginning in the 1970s, as new technologies began to be incorporated into production processes.

   Within the manufacturing industry, productivity increases were especially pronounced in the production of durable goods over the last 30 years, thanks in part to the adoption of such process-improving technologies as Computer Numerical Control machining tools and AutoCAD. Moreover, as technological advances have continued to accrue, manufacturing productivity has continued to outpace productivity gains for the larger economy.

   ![Productivity, Thy Name is Manufacturing](chart.png)

   **Productivity, Thy Name is Manufacturing**
   
   **Average annual percent change**
   
<table>
<thead>
<tr>
<th>Year</th>
<th>Nonfarm Business</th>
<th>Manufacturing</th>
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<tbody>
<tr>
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<td>1.0</td>
</tr>
<tr>
<td>1960s</td>
<td>1.5</td>
<td>2.0</td>
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<td>1970s</td>
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<td>2010s</td>
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<td>2010–11</td>
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   Simply put, manufacturing companies today can do more with less. And they have. Manufacturing employment has fallen 1.5 percent per year since 1980, according to the BLS. At the same time, manufacturing output rose 3.1 percent per year, according to the Federal Reserve Board. In the end, increased productivity levels make it quite improbable for manufacturing to be the major employer it once was.

   “When you look at the labor side, it’s not a pretty story,” said Bill Strauss, senior economist and economic adviser at the Federal Reserve Bank of Chicago. “We still need millions of workers in manufacturing, but in terms of growing that workforce, most of the output has increased based on productivity.”
Why won’t manufacturing comprise as much of a share of GDP as it once did?

Manufacturing’s share of GDP has declined over the years partly by virtue of the industry’s own success. Increased productivity has allowed manufacturers to lower unit-labor costs, leading to lower relative prices for manufactured goods. Put another way, prices of manufactured goods have not increased as fast as other prices have. Holding the changing price level constant, manufacturing output has grown, on average, 1.7 percent per year since 1960 while total output has grown, on average, 3.1 percent per year. Thus, as a matter of accounting, manufacturing has made up a smaller share of GDP over time.

The recent recession and recovery have only accelerated this trend of doing more with less. The recession saw manufacturing employment and production fall roughly 17 and 20 percent, respectively. Production levels have regained nearly 15 percent of lost production, but employment levels have recovered only about 3.5 percent. This translates into stronger productivity gains, averaging 4.6 percent over the past two years, than posted during the 1990s or 2000s. Amazingly, manufacturing employment levels have now fallen to levels not seen since 1941, even as production levels have returned to 2005 levels.

Can we sustain these productivity increases?

Increasing productivity depends on new technology and a skilled workforce. Here lies one potential problem for the future of manufacturing in America: With almost 50 percent of production workers over the age of 45, according to the Census (Integrated Public Use Microdata Series, or IPUMS), the manufacturing workforce is quickly “graying.” Older workers will need to be replaced over the next decade, and there may not be enough younger workers with the necessary skills to do that.

Perhaps what manufacturing needs here is a marketing makeover. To ensure we have enough younger workers in the pipeline, we might need to change perceptions about careers in manufacturing. Today’s manufacturing environment is a far cry from the caricature industrial revolution-type factory job. It is a highly automated environment that requires specific technical skills above and beyond a strong back.

If anything can help change the perception about a career in manufacturing, it is the pay and benefits manufacturing workers receive. On average, compensation packages are 17 percent higher in the manufacturing industry compared with nonmanufacturing jobs. Manufacturing wages and salaries average $29.75 per hour compared with $27.47 for nonmanufacturing jobs, while benefits average $8.52 for a manufacturing job versus $5.37 for a nonmanufacturing job. And three out of four manufacturing workers have both retirement and medical care benefits, compared with only 55 percent of their private service-providing counterparts, according to the BLS. In total, the average compensation package for a manufacturing job is $38.27 per hour while a nonmanufacturing job averages $32.84 per hour.

The compensation premium partly reflects the skills and training of the underlying workforce. So if young people can be persuaded that manufacturing has a future, the next step is to adequately train future workforces. We have our work cut out for us on that front. The United States ranks 29th in math and 21st in science out of 65 countries, according to an Organization for Economic Co-operation and Development (OECD) survey.

Another way to address a possible worker shortage is to retrain the existing workforce. In 2010, 36 percent of unemployed production workers were between the ages of 16 and 34 (IPUMS). One policy approach to “upskill” this group would be to support the network of community colleges across the country, especially those that work with local employers to design curricula around the needs of the workplace. Collaborative efforts like these are a good way to ensure the skills of the workforce better align with the needs of the workplace.
Manufacturers are telling us that they’re having trouble finding the workers they need to be able to succeed,” said Chad Moutray, chief economist with the National Association of Manufacturers. “We need to continue to invest in education and change perceptions about the value of manufacturing to make sure that manufacturers have the workers who can work in those facilities.”

**What strengths should the U.S. build on?**

The United States still remains the world’s top manufacturer, reports the OECD, accounting for 19 percent of the globe’s manufacturing total value added. Moreover, real manufacturing exports increased 43 percent from 2002 to 2011 compared to a 15 percent increase for real GDP over the same time period, according to the Census Bureau and BEA. Most of this increase is accounted for by America’s comparative advantage in highly technical industries like aerospace, medical and pharmaceutical development, and computer and electronic components production.

To remain the leader, the United States must take advantage of its strengths. Patent laws make the United States a premier destination for research and development dollars and, in fact, the nation leads the world in patents per year (OECD). More important, an increasing proportion of R&D dollars are being spent by private companies, according to the National Science Foundation, which are more flexible and better able to respond to market needs than publicly funded research dollars. Policies designed to motivate research allow manufacturers to create innovative products as well as pursue technologies that will lower costs.

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“The one big advantage we have in the United States that other countries don’t have is a very innovative economy,” said Daniel Meckstroth, chief economist with the Manufacturers Alliance for Productivity and Innovation. “We have a very good infrastructure, we have the best universities in the world, and we are able to have high income because we are very productive and have high value-added per worker. You get that through becoming innovative, being technologically advanced, and applying capital to workers to increase productivity.”

Another strength is energy. The United States has a relatively dependable energy infrastructure network, subject to few service interruptions and thus providing for better management of production runs. The United States also has access to energy-related natural resources. Low natural gas prices allow not only for lower electricity costs, but also for cheaper feedstocks that go into industrial chemicals. Moreover, new innovations in exploration and production techniques associated with shale gas reserves are projected to provide a dramatic increase in both petroleum and gas reserves. Thus, energy costs should remain low for the next decade. Policies designed to promote a reliable energy infrastructure and the development of new energy sources will provide added incentive for manufacturers to locate in the United States.

**Down but not out**

Despite major changes, manufacturing does still matter in the United States, even if it no longer provides the employment base or comprises the share of GDP it once did. As long as policies can be implemented to address potential problems while capitalizing on our comparative advantages, the U.S. manufacturing industry can remain a global leader.

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**Employee Compensation per Hour by Major Industry, 2010**

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<tr>
<th></th>
<th>Manufacturing</th>
<th>Non-manufacturing</th>
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<tr>
<td>Dollars</td>
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<tr>
<td>Wages</td>
<td>Salaries*</td>
<td>30</td>
</tr>
</tbody>
</table>

*a. Wages | Salaries include paid leave and supplemental pay.
Source: Bureau of Economic Analysis.

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