

**Boiling point?**  
**The skills gap in U.S. manufacturing**





# Does manufacturing have the talent it needs to perform in the global marketplace?

The past year has shown a renewed attention to the future of the manufacturing industry in the United States. In the media, in online conversations, and in person, people are wondering whether the U.S. has what it takes to compete, and whether we can and should rededicate ourselves to strengthening the manufacturing sector in the face of increased global competition and persistent economic challenges.

A strong manufacturing base has been fundamental to the economic success and effectiveness of the U.S., and we see little evidence of that changing. That's one reason why, year after year, studies continue to show that Americans remain stalwart in their support of a strong manufacturing industry. Our own recent joint study on U.S. public opinions of manufacturing<sup>1</sup> found that throughout one of the most turbulent periods in U.S. economic history, public views on the importance of manufacturing – both in terms of its role in the U.S. economy and its function as a job creation engine – have remained strong. Moreover, the manufacturing industry continues to be widely recognized as an indicator of the health of the U.S. economy.

As many U.S. manufacturers look to regain momentum, they will likely face some well-documented challenges. Not least among these is the issue of talent. This is not new – for years, manufacturers have reported a significant gap between the talent they need to keep growing their businesses and what they can actually find. Deloitte Consulting LLP and the Manufacturing Institute have renewed the Skills Gap study, conducted in July and August, 2011, seeking to answer several important questions about the nature of the skills and talent gaps in manufacturing today:

- What impact is the skills gap having on company performance?
- Although the skills gap issue isn't new, how is it evolving in the face of continued economic and competitive challenges? Which manufacturing jobs are being affected the most?
- What does the future of talent look like? What upcoming trends are companies preparing for today? How fast are these changes happening?

This Skills Gap report is the first of a series of studies that will examine these issues and more. This report seeks to address the questions posed above and provides an overview of the issues facing manufacturers today. Subsequent studies will focus on specific issues such as training and education, talent management, and community collaboration.

Overall, our survey findings are remarkably consistent with previous Skills Gap studies, with 67% of respondents reporting a moderate to severe shortage of available, qualified workers and 56% anticipating the shortage to grow worse in the next three to five years. In addition, our survey indicates that 5% of current jobs at respondent manufacturers are unfilled due to a lack of qualified candidates. These results underscore the tenacity of a worsening talent shortage that threatens the future effectiveness of the U.S. manufacturing industry. When asked to look ahead three to five years, respondents indicate that access to a highly skilled, flexible workforce is *the* most important factor in their effectiveness, ranked above factors such as new product innovation and increased market share by a margin of 20 percentage points. It's not just that manufacturers are concerned about talent today. This has been a serious issue for years, which begs the question of what must be done differently in order to achieve the right results.

It doesn't help that today the skills gap is hitting where it hurts the most. Manufacturers are having the hardest time filling skilled production jobs that fuel their ability to innovate and grow, even in the face of high unemployment. By that same token, their efforts to develop the skills of current employees are falling short. Meanwhile, the manufacturing industry itself is evolving at such a rapid clip that companies are putting themselves at risk of falling behind too far, too fast.

A closer look at the survey results turns up a few surprising insights into the talent gap and how manufacturers are responding. Here are several highlights.

## **The hardest jobs to fill are those that have the biggest impact on performance.**

Shortages in skilled production jobs – machinists, operators, craft workers, distributors, technicians, and more – are taking their toll on manufacturers' ability to expand operations, drive innovation, and improve productivity. Seventy-four percent of respondents indicated that workforce shortages or skills deficiencies in skilled production roles are having a significant impact on their ability to expand operations or improve productivity. Unfortunately, these jobs require the most training, and are traditionally among the hardest manufacturing jobs to find existing talent to fill.

<sup>1</sup> Deloitte and The Manufacturing Institute. Unwavering Commitment: The Public's View of the Manufacturing Industry Today. September 2011.

**While they recognize the importance of recruiting and developing talent, many manufacturers depend on outdated approaches for finding the right people, developing their employees' skills, and improving their performance.**

At a time when finding the right talent for the job has become so difficult, the spotlight shines even more brightly on recruitment and development efforts. After all, if manufacturers can't bring in talent with the skills they need, they can take steps to expand the skills base of their existing workforce. The bad news is that while most manufacturers have some tools in place to address these challenges, they are depending on outdated, informal methods such as word-of-mouth recruiting. When it comes to training, there is also considerable room for improvement.

**High unemployment is not making it easier to fill positions, particularly in the areas of skilled production and production support.**

There's no way around it: respondents report, on median, that 5% of their jobs remain unfilled simply because they can't find people with the right skills. Translated to raw numbers, this means that as many as 600,000 jobs are going unfilled, a remarkable fact when the country is facing an unemployment rate that hovers above 9%. Respondents separately report that the national education curriculum is not producing workers with the basic skills they need – a trend not likely to improve in the near term.

**The changing nature of manufacturing work is making it harder for talent to keep up.**

Over the past five years, most manufacturers have redesigned and streamlined their production lines while implementing more process automation. In short, as the industry has changed, the nature of work that it requires is changing as well. It's happening fast, and manufacturers will continue to expect more from their employees. Unfortunately, respondents report that the number one skills deficiency among their current employees is problem solving skills, making it difficult for current employees to adapt to changing needs.

**The skills gap is expected to take the biggest toll on skilled production jobs, and will likely widen as time passes.**

When asked where the skills gap is likely to hurt the most as respondents look to the future, they identify skilled production jobs by a wide margin. Fully 80% of respondents indicated that machinists, operators, craft workers, distributors, and technician positions will be hardest hit by retirements in the upcoming years. At the same time, companies expect the skilled production group to be the hardest to find in the job market.

#### **What now?**

The respondents indicate the skills gap is an issue that has reached the boiling point. The same old approaches aren't enough to close the gap. Manufacturers should pursue more creative approaches to recruitment and talent management to make sure they have the skilled personnel they need to win in the future. For example, workforce planning is important. But, on its own it's not enough to deliver what manufacturers need. Fresh approaches in areas such as employer branding can generate big results when pursued in tandem with more traditional approaches. Similarly, many manufacturers are using many of the same approaches to talent development that were being employed a decade ago. New performance tools and formal processes should be playing a larger role in any manufacturer's talent management plan.

The manufacturing industry can't solve all of its talent challenges on its own. Government agencies and educational institutions have roles to play as well, creating a clear path for students to receive the right skills and training to prepare them for a career in manufacturing. That's easier said than done in an industry environment that is evolving faster than at any point since its beginning. It will require new levels of collaboration between each of these players.

While the results of this survey may appear dire, in reality each of these challenges is surmountable. The U.S. has among the largest, strongest manufacturing industries in the world, and has demonstrated its ability to innovate and adapt time and time again. Now it's time to show the world once again why there is no better place for manufacturing than the United States.

# The performance imperative

For manufacturers, the skills gap issue isn't just influencing how they run their businesses today. Just as important, it's affecting their ability to grow and perform well into the future. While manufacturers may recognize this link, our survey results show that many don't have a detailed accounting for exactly where and how performance is affected on a day-to-day basis. This makes it that much harder for them to address such challenges in a meaningful way.

## Tools of the trade

Consider how surveyed manufacturers responded when asked which workforce factors they take into account when planning corporate strategy. Workforce planning and labor costs stand out as the dominant issues influencing strategic planning (see Figure 1). It's an encouraging sign that workforce planning tops the list, but it may also mask a wide range of capabilities that many companies include in the "workforce planning" category. For example, labor demand forecasts don't offer the ability to assess labor supply or perform scenario analyses that can help the company shift effectively to meet changing business conditions.

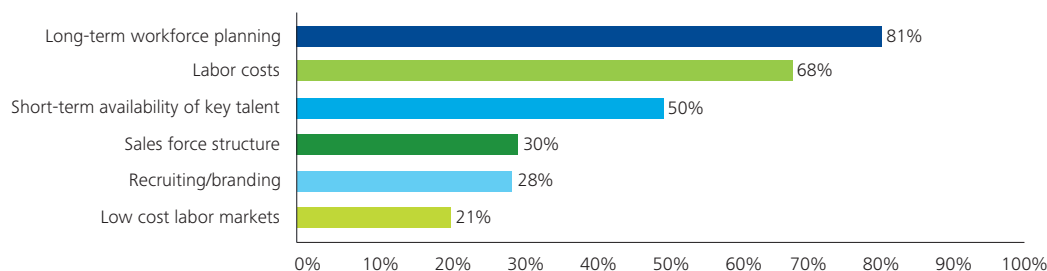
This finding also seems to belie other results in the survey indicating that informal methods of performance management and recruiting are among the most common approaches to how companies address their skills gaps. Meanwhile, potentially innovative approaches – employer brand development, for instance – lurk near the bottom of the list of factors being considered.

## Where it hurts the most

When it comes to how the skills gap affects the competitive ability of manufacturers, respondents indicated strong impacts across a variety of areas. When talent and skills gaps affect production and quality levels or development and innovation, it's a concern regardless of how you define it. Specifically, respondents don't have the skilled production personnel and supporting team members they need to maintain high production and quality levels, with 51% of respondents indicating this as the most challenging issue resulting from the skills gap (see Figure 2). Not surprisingly, it is most acute among small- to mid-sized manufacturers, with 60% of companies in the 500 to 1000 employee range singling it out as their most difficult issue. Digging deeper, respondents in certain industries highlighted slightly different issues. For example, in the life sciences and medical devices and technology, media, and telecommunications categories, effective sales and marketing had a much higher response rate as a top-three issue.

The workforce segments that are hardest to find are those that impact operations the most and require the most training. From machinists and craft workers to industrial engineers and planners, the talent crunch in these critical areas is taking its toll on manufacturers' ability to meet current operation objectives and achieve longer-term strategic goals (see Figure 3).

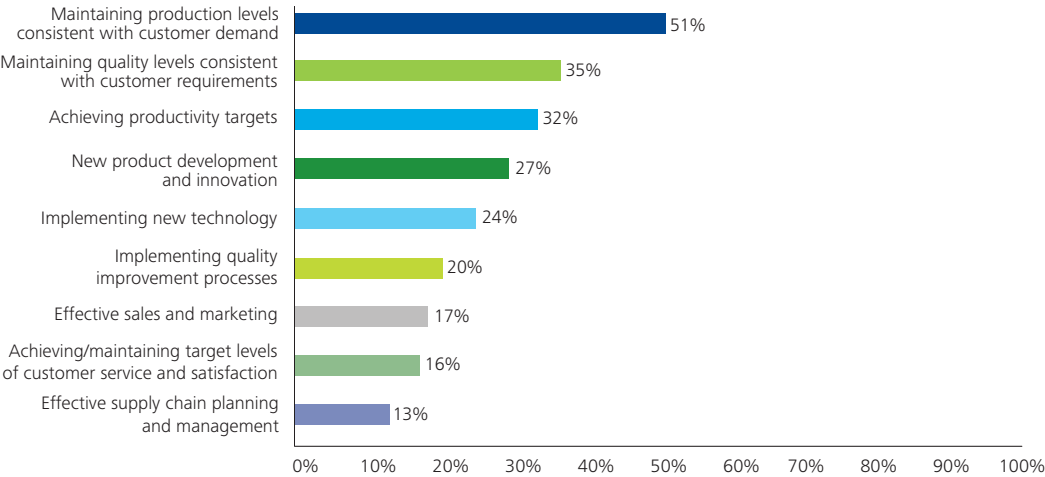
**Figure 1: What workforce-related factors do you consider when setting your corporate strategy?**



Note: This is a multiple selection question, percentages may not add to 100%. Base used is 1123.

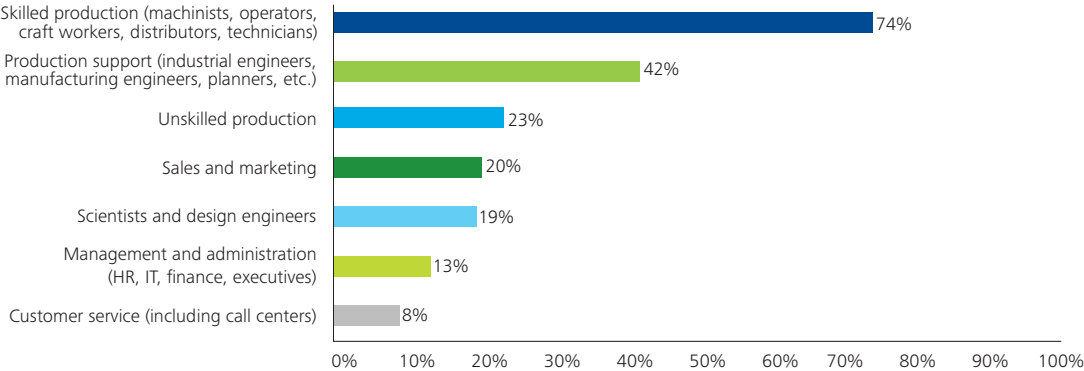
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**Figure 2: In which of the following operational areas has your company experienced the most difficulty due to workforce shortages or employee skill deficiencies?**



Note: This is a multiple selection question, percentages may not add to 100%. Base used is 1123.

**Figure 3: For which employee segments have workforce shortages or skill deficiencies had a significant negative impact on your company's ability to expand operations or improve productivity?**



Note: This is a multiple selection question, percentages may not add to 100%. Base used is 1123.

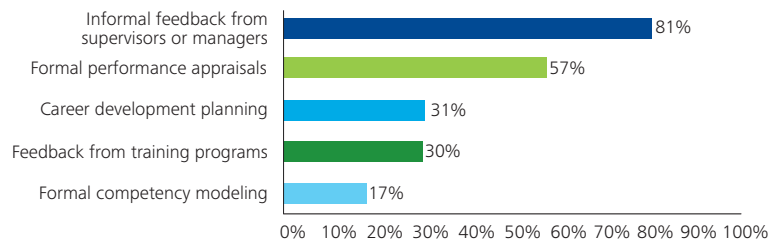
## Developing talent

Finding people with the required skills is only part of the equation. Respondents are also looking to develop their current talent in order to close the skills gap and outperform the competition. While most of the respondents we surveyed indicated that they have performance management tools in place, they are still relying heavily on informal methods. This isn't a new trend – our 2005 Skills Gap study reported virtually identical results. These results vary by company size and industry, of course. Respondents from life sciences and aerospace and defense companies report a higher reliance on formal performance appraisals, while respondent-companies with more than 5,000 employees from other industries depend more heavily on career development planning. Interestingly, the use of competency modeling, while higher among larger companies, is still relatively low when compared with other approaches (see Figure 4).

To make a significant impact, approaches such as competency modeling should be considered by manufacturers to gain momentum in their internal talent development efforts. Career development programs and competency models, for instance, can be an invaluable tool in aligning employees' expectations with those of their employers when it comes to the knowledge, skills, and abilities required. But today, only 31% of respondent-companies report having formal career development, and only 17% of the respondents report using competency model tools.

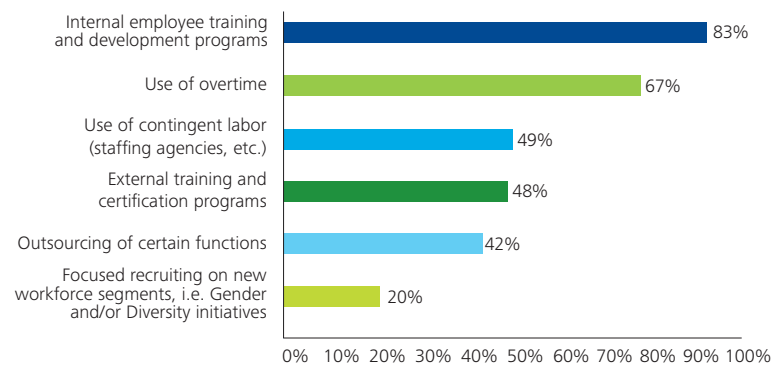
Clearly, many manufacturers are investing in training programs. But the evidence suggests that these programs are falling short of their goals. Two-thirds of the respondents said they're relying on overtime, while nearly half used third-party labor to close the skill gaps (see Figure 5). These methods are costly, inefficient, and can add up to a big drag on overall performance. The responses to this question are remarkably consistent across industry groups, indicating a need across the board to embrace more analytical and innovative means of dealing with skills gaps.

**Figure 4: From which of the following methods or techniques does your company identify and react to those skills gaps which most impact your company**



Note: This is a multiple selection question, percentages may not add to 100%. Base used is 1123.

**Figure 5: Which methods do you currently use to mitigate existing skill gaps?**



Note: This is a multiple selection question, percentages may not add to 100%. Base used is 1123.

## Readily available tools

Many manufacturers are skeptical about the ability of training to close the skills gap. It's true that training alone isn't enough, but it does have an important role to play. One problem is that without competency models or targets in place, it's hard for manufacturers to measure the impact of training efforts. Also, smaller manufacturers may not be able to support development of competency models. Fortunately, there are readily available tools created specifically for this purpose, such as the NAM-endorsed Manufacturing Skills Certification System, which can help manufacturers provide their workers with the required range of skills to compete. No matter which approach is used, the bottom line is that manufacturers need to more effectively understand what skills they really need, and then use targeted training approaches to make sure their workforce is prepared to deliver.

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# Skills gap: Current snapshot

After making difficult workforce-related decisions during the global recession, our results show that manufacturers are thinking about hiring again – even in a long, painfully slow recovery. That puts the skills gap in the spotlight once again. But what are manufacturers facing as they look to reinforce their labor pool? As noted previously and shown in Figure 6, 67% of respondents indicate a moderate to severe shortage in qualified workers overall. A deeper look at the data indicates that the issues are more severe for certain critical workforce segments.

## **Important roles are not getting any easier to fill**

Respondents have noted that their most significant needs today are in the skilled production sector, which will also face the largest skills shortages in the near future. Eighty-three percent of companies indicate a moderate to serious shortage of skilled production workers and 69% of companies expect this shortage to worsen over the next three to five years (see Figure 6).

Manufacturers face challenges in other technical job classifications such as engineering technologists and scientists, with moderate to severe shortages at 60% and 50% of surveyed companies, respectively. Again, the situation for these employment categories is expected to worsen in the near term. This will present a serious problem in a few years as more and more workers retire – and their employers know that. As shown in the next section, 75% of respondents indicated that pending retirements and an aging workforce will have the most significant impact among skilled production workers, with 40% saying it will be significant for production support.

Exacerbating the issue is the stubbornly poor perception of manufacturing jobs among younger workers. Our recent public opinion survey on manufacturing found that among 18-24 year-olds, manufacturing ranks dead last among industries in which they would choose to start their careers.<sup>2</sup> Combined with the results above, this leaves the manufacturing industry with some steep challenges related to business operations. Over 70% of respondents indicate an increase or no change over the past five years in how the current skills shortage negatively impacts critical functions like new product development, implementation of new technologies, or attaining productivity targets (see Figure 7).

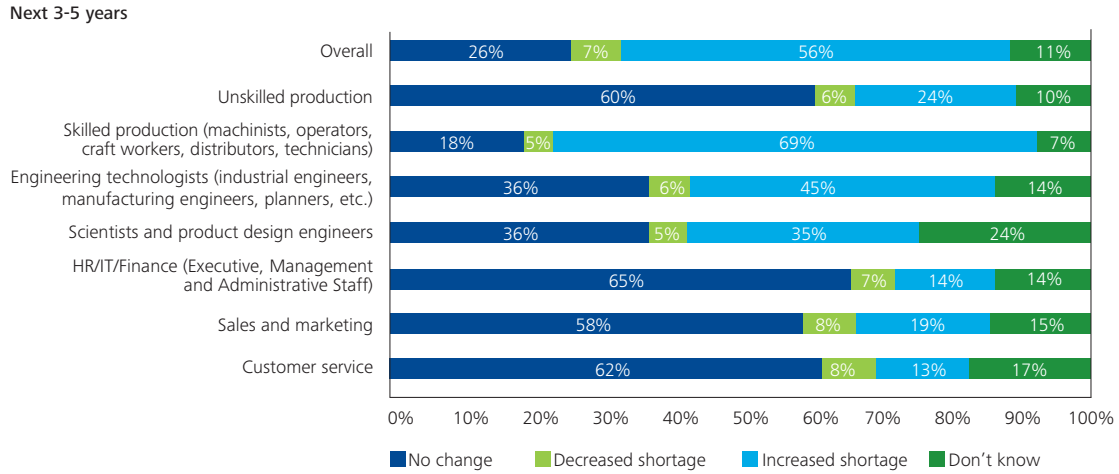
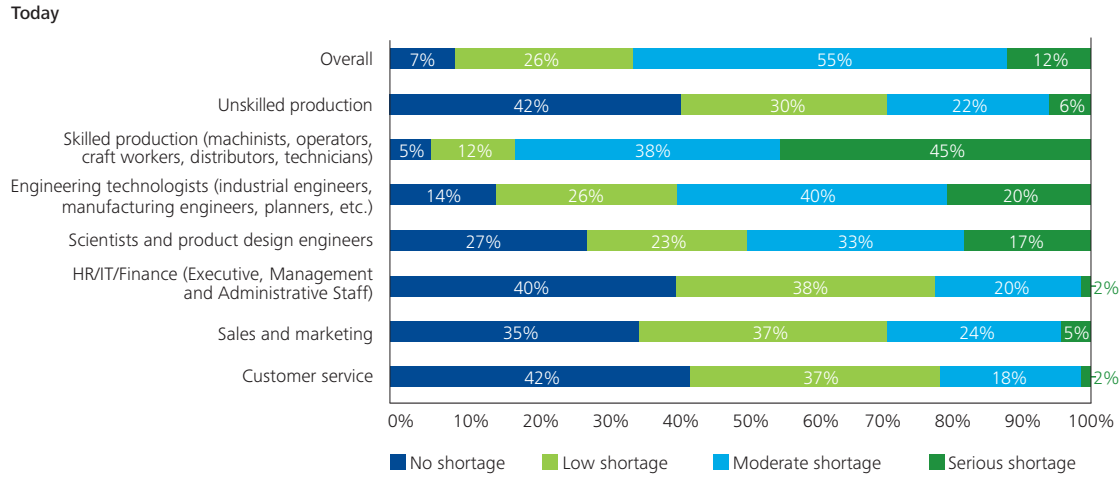
## **Focusing on the next generation**

San Antonio manufacturers recently partnered with the Alamo Community Colleges to introduce high-school juniors and seniors to manufacturing careers and higher education by completing an industry-driven curriculum to develop work ready skills in manufacturing. The dual-credit program incorporates classroom instruction with hands-on learning in a state-of-the-art facility and allows participating students to graduate high school with up to 35 credits, a National Career Readiness Certificate (NCRC), and the Production Technician Certification from the Manufacturing Skills Standards Council (MSSC). Local manufacturers provided significant input into program design and curriculum and local industry groups offer job internships valued as high as \$2,800. The San Antonio manufacturers also recruit Academy graduates for job opportunities in their facilities in manufacturing production operations and facilities maintenance.

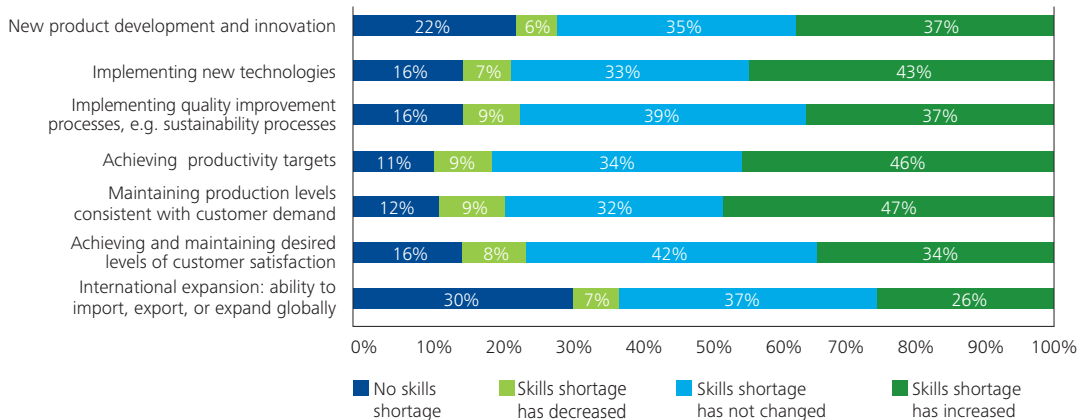
<sup>2</sup> Deloitte and The Manufacturing Institute. Unwavering Commitment: The Public's View of the Manufacturing Industry Today. September 2011.



**Figure 6: Please select the option that best describes the availability of qualified workers for the following workforce segments at your company today, and indicate if you anticipate the shortage to increase, decrease, or not change over the next 3-5 years:**



**Figure 7: If a skills shortage has been identified in your company, please indicate how this shortage trend has impacted each of the following areas during the past five years:**



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### Changing nature of work

The skills gap problem comes into sharper focus when considering the changing nature of manufacturing work during the past five years. Many manufacturers have redesigned and streamlined production lines while increasingly automating processes. While some remaining job roles will require less technically skilled workers, ironically, these trends and innovations actually demand more skilled workers, such as maintenance engineers. This changing nature of work is consistent across industries and companies of different size, and can make it difficult for workers to keep up with employment demands (see Figure 8).

### Critical thinking: Beyond technical training

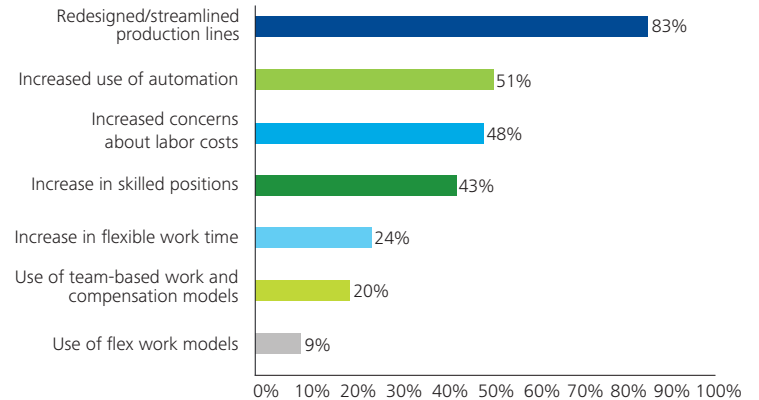
Many industries, not just manufacturing, are feeling the talent crunch. It's been widely reported that high school students have demonstrated a lack of proficiency in math and science. But when we asked respondents what they considered to be the most serious skill deficiencies in their current employees, inadequate problem-solving skills topped the list. It was followed by a lack of basic technical training and inadequate basic employability skills (see Figure 9). Notably, inadequate math, reading, and writing skills weren't seen as being as serious as other concerns.

While the national curriculum may be discretely addressing certain skills, there continues to be a lack of broader problem solving abilities. Many manufacturers and other employers are learning that skills such as critical thinking not only allow an individual to digest, analyze, and communicate information, but are needed across a broad range of disciplines.

### The unemployment paradox

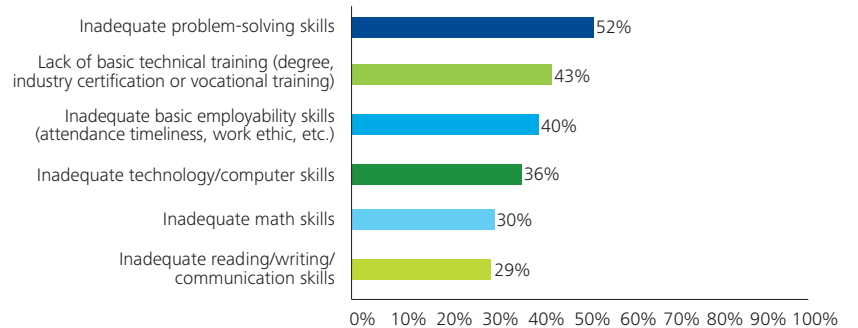
In an attempt to translate the factors described previously into real numbers, we asked respondents how many actual jobs went unfilled due to a lack of qualified applicants. We found the median value of unfilled jobs is 5% among the survey's nearly 1,100 respondents. Think of it this way: as many as 600,000 well-paying jobs are going unfilled while the national unemployment rate hovers around 9%. As discussed above, these results will likely get worse. But like in our 2005 and 2009 surveys, we continue to see that many manufacturing companies are still using the same tactics to address the same problem. Manufacturers can help by improving training and recruiting, but they can't do it on their own. To some degree, it may require a national movement, which could include public policy changes, to help address the skills gap concerns.

Figure 8: To what extent has the nature of work changed during the past five years?



Note: This is a multiple selection question, percentages may not add to 100%. Base used is 1123.

Figure 9: What are the most serious skill deficiencies in your current employees?



Note: This is a multiple selection question, percentages may not add to 100%. Base used is 1123.

# Future forward

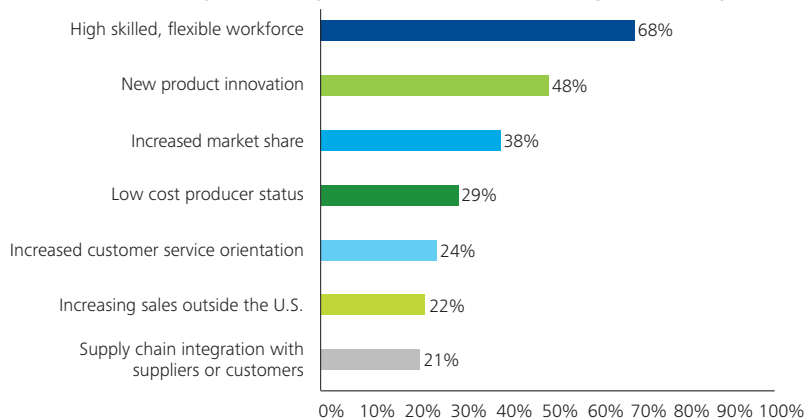
The manufacturing industry is undergoing a rapid evolution, spurred on by technology advances, globalization, and shifting demographics. What do manufacturers expect to happen when it comes to talent in the future, and how are they preparing to come out on top? Are manufacturers taking the right steps to prepare for even greater skills gaps in the future?

## The changing workforce

The changing nature of work, and the ensuing need for improved workforce skills, has become a focal point for companies as they plan for their future results. When asked which factors would help improve their businesses the most over the next five years, a highly skilled and flexible workforce topped the list for manufacturers, ranking ahead of product innovation, increasing market share, low-cost producer status, and even supply chain integration with suppliers, among other factors (see Figure 10). In an era when many companies have spent significant time and resources to streamline operations and improve innovation and customer service, this result highlights the effort that should be considered by most manufacturers to combat the expected severity and impact of future skills gaps.

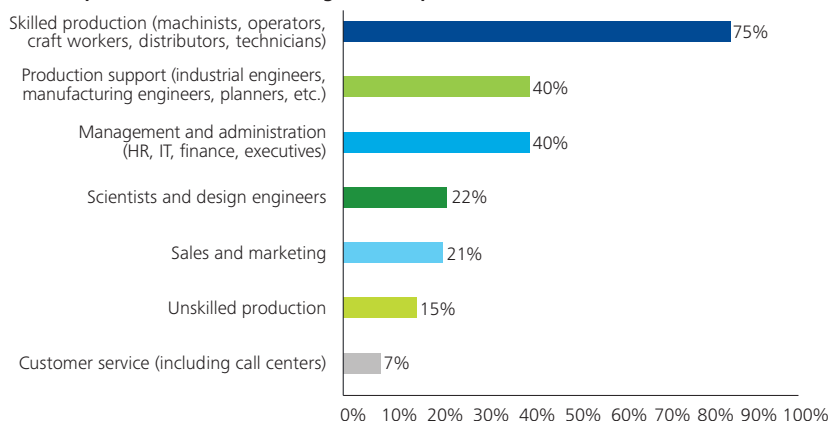
This may be an area of concern to manufacturers since retaining, hiring, and developing that skilled workforce will likely be difficult in the face of aging demographics. As more and more older and experienced employees retire, finding younger talent to replace them has become increasingly difficult, exacerbating the talent crunch. The anticipated retirement exodus could seriously hurt manufacturers in specific workforce segments over the next five years. The areas of skilled production (machinists, operators, and technicians) and production support (industrial and manufacturing engineers, and planners) would be hardest hit according to survey respondents (see Figure 11). Manufacturers are also feeling the pinch when it comes to highly specialized and innovative employees, such as scientists and design engineers. Their shortage could affect new manufacturing processes and production development (see Figure 12 on the page 10).

**Figure 10: Given the change in the economy and business environment, which of the following will be most important to your company's future business success during the next 3-5 years?**



Note: This is a multiple selection question, percentages may not add to 100%. Base used is 1123.

**Figure 11: Retirement challenges: In which workforce segments will the aging workforce and anticipated retirements have the greatest impact?**



Note: This is a multiple selection question, percentages may not add to 100%. Base used is 1123.

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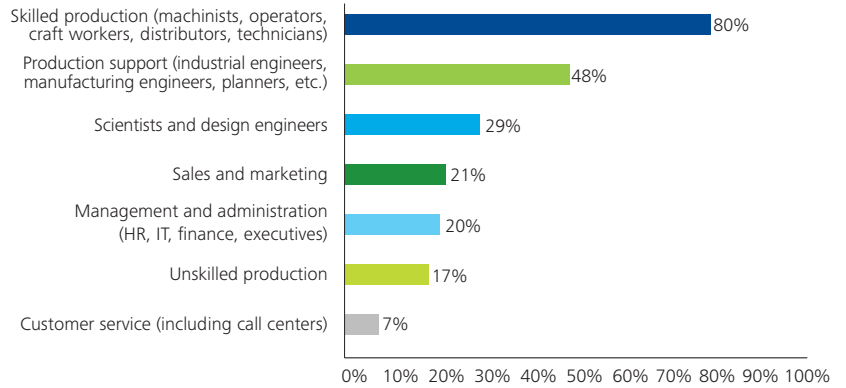
### Innovate to get innovative workers

Finding a skilled workforce at the desired cost is critical to continued viability, growth, and innovation. And as shown by responses, many companies expect innovation to have a heavy impact on employees, particularly as it relates to new process and products (see Figure 13). However, many are still applying the same old methods to address this rapidly changing workforce and talent gap. For example, only 20% of respondents to a recent talent management survey said they're focusing on recruiting for their particular needs.<sup>4</sup> It's going to take much more than that.

Many leading companies say it's crucial to develop an innovative workforce plan, create a talent pipeline, and engage employees – both current and future – to remain competitive. Most top talent leaders say an effective plan should connect business and talent goals, provide ways to measure progress and performance, and leverage technology to help recruit and retain talent.<sup>5</sup>

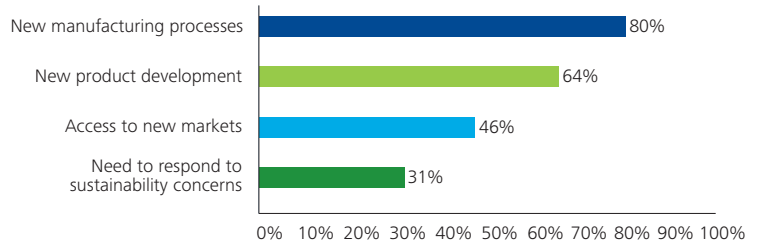
<sup>4</sup> <sup>5</sup> Deloitte. Talent Edge 2020: Blueprints for the New Normal. December 2010.

**Figure 12: Hiring Challenges: In which workforce segments do you anticipate the greatest hiring challenges during the next 3-5 years?**



Note: This is a multiple selection question, percentages may not add to 100%. Base used is 1123.

**Figure 13: How does innovation impact your workforce?**

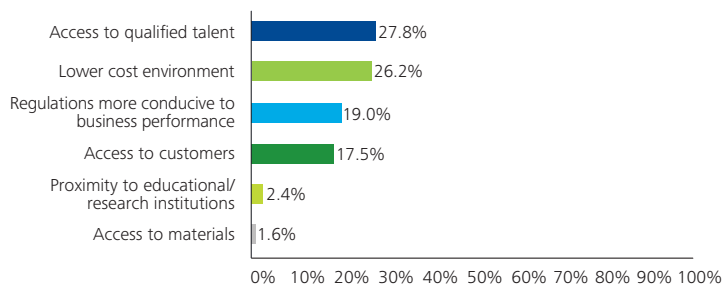


Note: This is a multiple selection question, percentages may not add to 100%. Base used is 1123.

### Geographic strategies

Manufacturers have undertaken a range of strategies to address their skills and cost needs, including geographic shifts of workforce and operations. When asked whether they are currently considering a substantive shift in workforce location, 11% of respondents said they were. Their reasons vary widely. As shown in Figure 14, responses were split evenly between access to qualified talent and a lower cost environment. While this may not be surprising, it is interesting that more innovative approaches such as proximity to educational and research facilities are given much less attention.

Figure 14: What is the most important consideration when selecting a geography?



Note: This is only applicable to respondents that stated they were considering moving which was 11% of total.

### Paths to closing the gap

There's no one magic solution that can address growing skills gap concerns among manufacturers. Larger forces, such as globalization and technology, will continually change the landscape, and employers should consider shifting accordingly. Some issues may need to be addressed through public policy involving many more stakeholders. However, there are some demonstrated methods manufacturers can take to mitigate the gap.

Knowledge management plans and solutions can address the brain drain as older workers retire, taking with them valuable knowledge and experience. Capturing critical information through technology and passing it on to newer and younger workers can help reduce training time, can improve collaboration and communication, and even help companies get to market faster by leveraging previous programs.

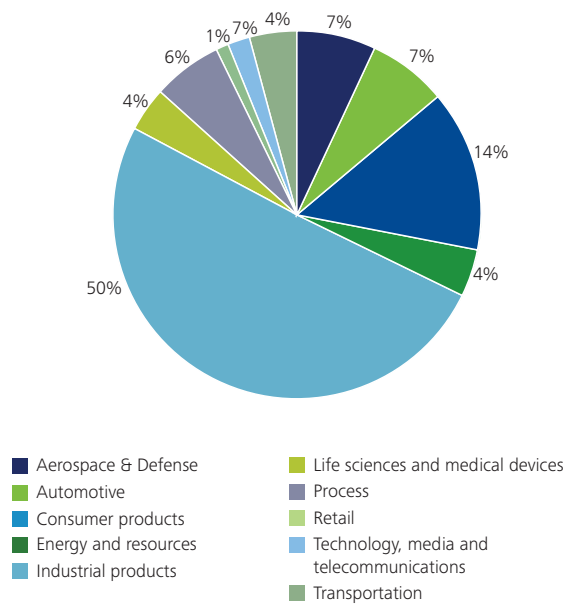
Older workers can also gradually scale back their hours as they phase into retirement or even work as a part-time pensioner while helping younger colleagues gain the right knowledge and skills. Manufacturers and skilled trades have historically used apprenticeship programs to pass on specialized skills from an experienced craftsman to a new worker. And through mentoring programs, whether informal or established by a company, experienced workers can provide coaching and advice to less experienced colleagues. Employers have also leveraged their local community colleges or trade schools to supplement employee skills.

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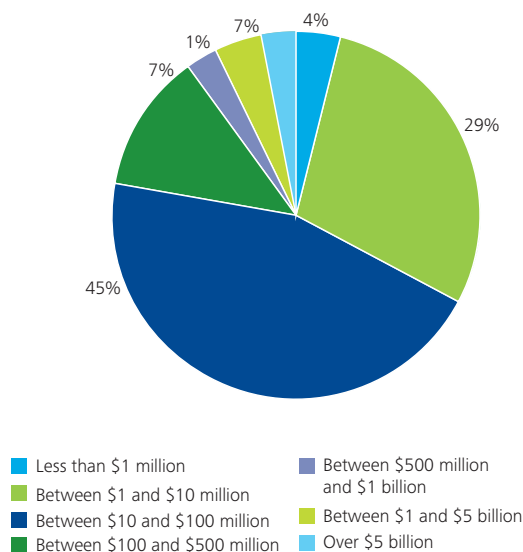
# Methodology

This survey was commissioned by Deloitte and The Manufacturing Institute, and was conducted online by Deloitte during July and August of 2011. The survey polled a nationally representative sample of 1,123 executives across fifty states and has a margin of error for the entire sample of +/- three percentage points.

**Figure 15: Participating company primary industry classification**



**Figure 16: Participating company size, based on annual revenue**



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The Manufacturing Institute is a non-partisan 501(c) (3) affiliate of the National Association of Manufacturers focused on delivering leading-edge information and services to the nation's manufacturers through its Center for the American Workforce and its National Center for Manufacturing Research. Visit [www.themanufacturinginstitute.org](http://www.themanufacturinginstitute.org).

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