

2014 Manufacturing Insights Survey

Executive Summary



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Key Survey Findings

The *2014 Manufacturing Insights Survey*, conducted by Tooling U-SME, provides the information needed to help manufacturing executives and leaders make better strategic decisions and more efficiently manage operations. The survey evaluates practices and performances associated with three key manufacturing initiatives:

- **Continuous improvement** — improving quality, cost, speed, value, and safety
- **Workforce development** — building a workforce with the skills and motivation to improve
- **Production planning for new products** — moving new-product designs efficiently through production and into the market

The *Manufacturing Insights Survey* identified major threats to competitiveness among manufacturing firms:

- **Many are struggling with these three critical initiatives**, despite their importance to world-class manufacturing status and business success.
- **There are dramatic “execution gaps”** between *high executive awareness* of the importance of the three initiatives and *low support* (e.g., resources, investments) for their implementation.
- **Just 39 percent of manufacturers are anywhere close to world-class manufacturing status**,¹ underscoring the potential for most organizations to improve via the three strategies — all of which require improved training.
- **Productivity and profitability are directly improved by moving closer to world-class manufacturing status**: Manufacturers at or near world-class status outperform others, in large part because they manage and train differently.

The *2014 Manufacturing Insights Survey Executive Summary* provides crucial insights to help leaders get these three initiatives on track — and to capture new productivity and profits.

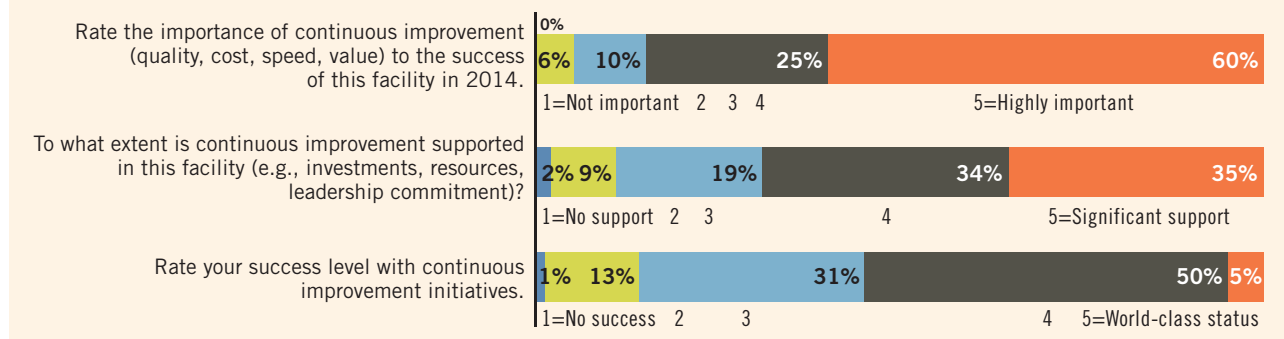
¹ Rated 4 (28 percent of respondents) or 5 (11 percent of respondents) on a scale of 1-5 where 5 equals “world-class status.”

Continuous Improvement (CI)

Importance, Support, and Success

Most manufacturers embrace continuous improvement. The opportunities — for improved productivity, higher profits, lower costs, and safer workplaces — are simply too great to ignore. None of the executives completing the *Manufacturing Insights Survey* report that continuous improvement was *not important* to the success of their facility in 2014. In fact, just the opposite — 85 percent rate continuous improvement as *important or highly important*.² Yet many of these executives are not supporting their continuous improvement initiatives with investments, resources, training, leadership commitment, etc. — or succeed with their efforts (*Figure 1*).³

Figure 1. Continuous improvement importance, support, and success (% of facilities)



Manufacturers have trouble moving from recognizing the importance of continuous improvement (CI) to success (e.g., world-class status) with CI initiatives.

Continuous Improvement Objectives and Metrics

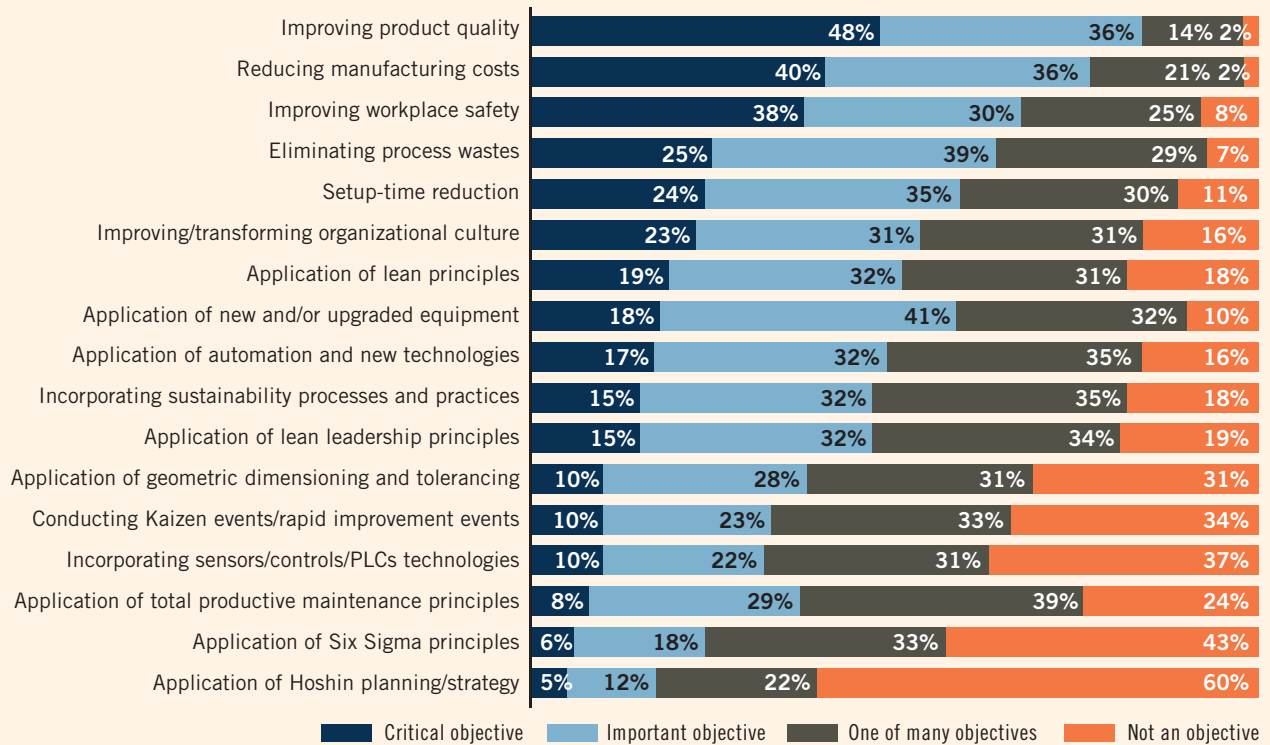
Manufacturers typically focus their continuous-improvement efforts on improving quality, reducing manufacturing costs, and improving workplace safety — the top three “critical” objectives. In addition, more than half of executives cite the following objectives as either critical or important (*Figure 2*):

- Eliminating process wastes
- Setup-time reduction
- Improving/transforming organizational culture
- Application of lean principles
- Application of new and/or upgraded equipment

² Rated 4 or 5 on a scale of 1-5 where 5 equals “highly important.”

³ Due to rounding of decimals, not all data will sum to 100%.

Figure 2. Objectives of continuous improvement (% of facilities)



It may seem surprising, given the extent of lean practices throughout manufacturing and their impact on the bottom line, that the “application of lean principles” was found to be critical or important for less than half of the facilities. But note that many lean techniques are getting substantial attention by manufacturers. A focus on *specific lean practices*, such as waste elimination, setup-time reduction, kaizen events, and total productive maintenance, is far more common: 86 percent of plants identified one or more of these as critical or important objectives.

Continuous-Improvement Challenges

Manufacturers also identified aspects of continuous improvement that pose challenges:

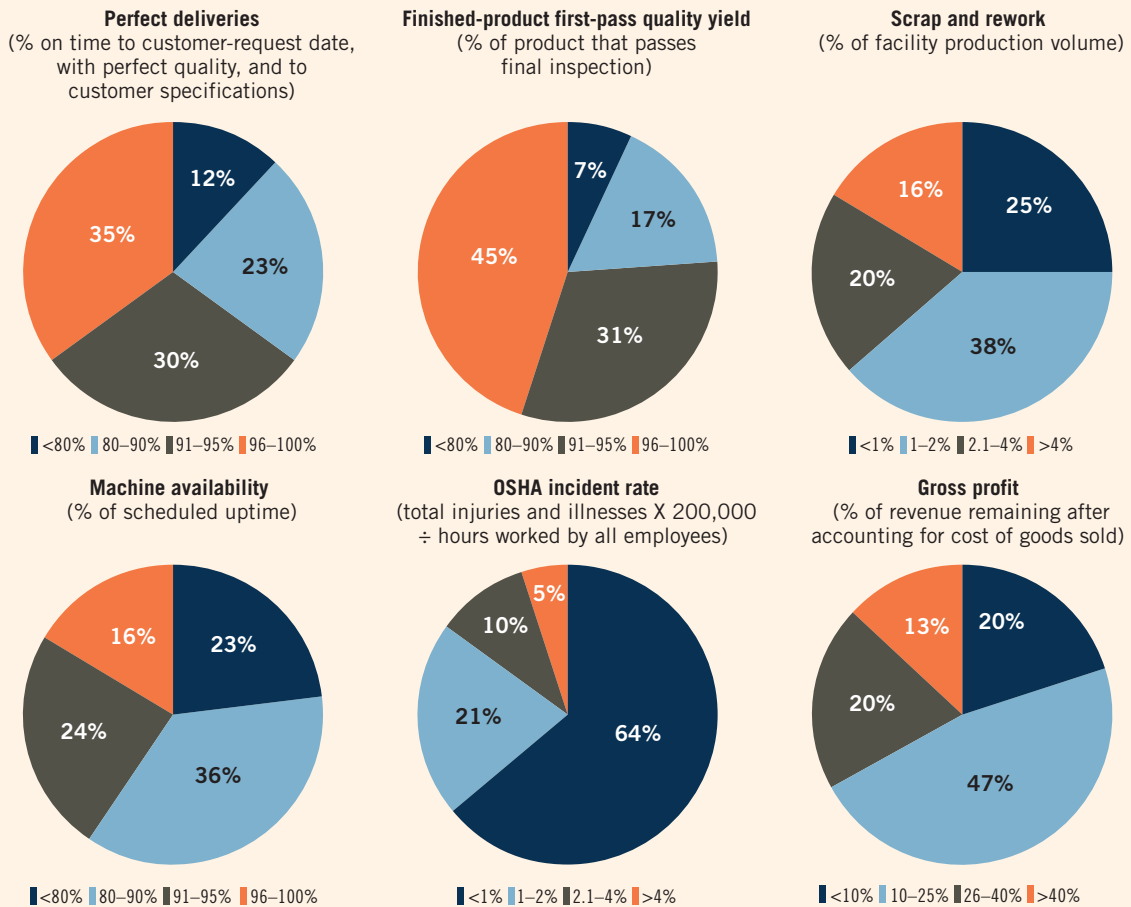
- Organization accepting the need for change
- Application of automation and technologies
- Changing the culture of the workforce
- Follow-through and sustaining improvements
- Skill gaps and training needs
- Time and resources to devote to improvement

Manufacturers focus their continuous improvement initiatives on — not surprisingly — quality, costs, and safety.

Many manufacturers struggle with basic operational performance metrics.

These challenges directly impact performance metrics, with many manufacturers struggling to achieve acceptable results (*Figure 3*). For example, 16 percent of manufacturers report scrap and rework rates of 4 percent of sales or higher: i.e., a \$50 million plant is effectively wasting \$2 million to revise or discard products. Poor delivery, machine downtime, and safety problems also dramatically impact the bottom line. For example, as safety rates deteriorate, insurance premiums and compensation payouts rise accordingly.

Figure 3. Operations metrics (% of facilities)



Other metrics cited as useful in monitoring continuous improvement initiatives include:

- Companywide cost of goods sold vs. previous year's performance
- Continuous check of action items and timelines

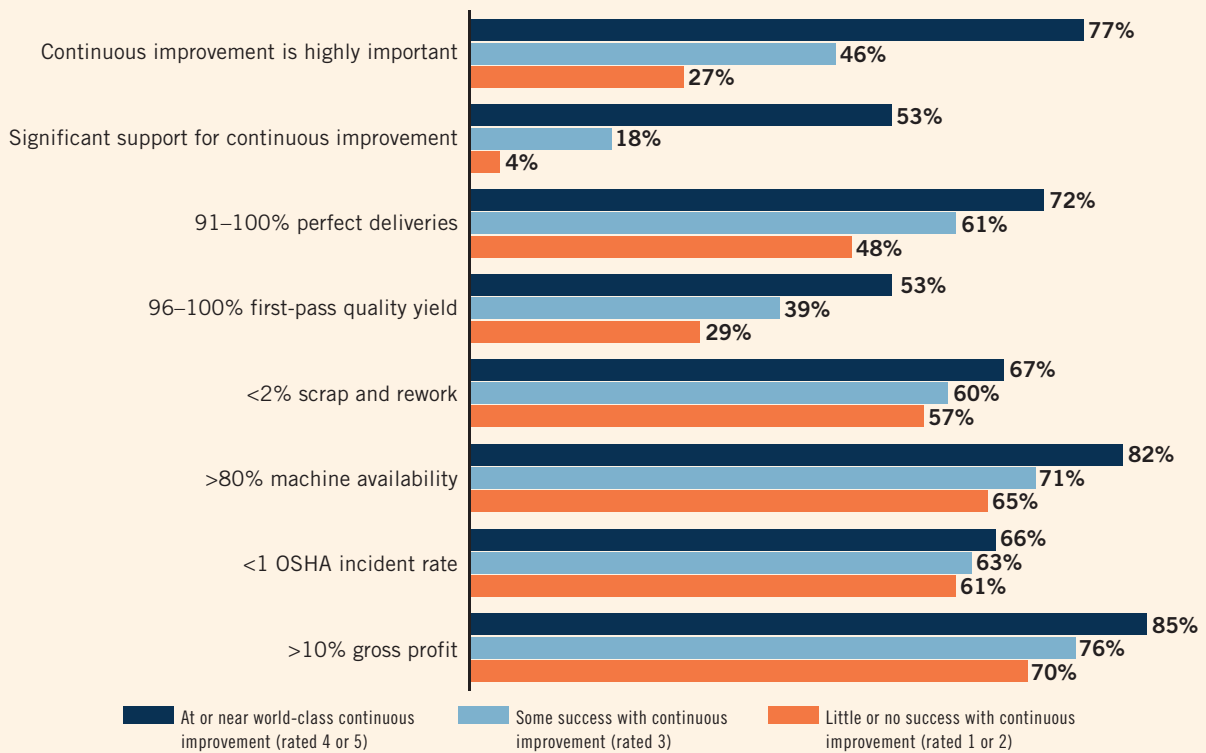
- Customer complaints
- Daily quality and on-time shipment information
- Efficiency (dollars per hour)
- Error costs
- Execution to schedule
- Failure rate/defect rate (parts per million)
- Gross sales
- Incident reports
- Mandatory monthly work-area improvement ideas
- Net profits
- Overall equipment effectiveness
- Productivity
- Safety activities
- Total production time (from the time material hits the floor until that specific material is shipped)
- Value-added per direct labor dollar

World-Class Continuous Improvement

Continuous improvement is a cornerstone of world-class manufacturing. Manufacturers that excel at continuous improvement are dramatically more likely to achieve *overall* world-class manufacturing status for their operation. And those manufacturers at or near world-class status *in continuous improvement* are far more likely to:

- Believe continuous improvement is highly important to the success of their facility
- Provide significant support for continuous improvement
- Report better operations metrics (*Figure 4*)
- Indicate that objectives are critical or important

Figure 4. World-class continuous improvement (% of facilities)



Workforce Training and Development

Importance, Support, and Success

It's increasingly clear that training and professional development are not only vital for manufacturing success, but essential tactics in meeting the growing talent challenge.

Economic recovery has manufacturers looking to increase hiring at last. Yet many have difficulties in finding talented employees or critical skillsets. In addition, as the economy improves and retirement accounts regain lost ground, baby boomers are beginning to leave the workforce — taking their skills and knowledge with them.

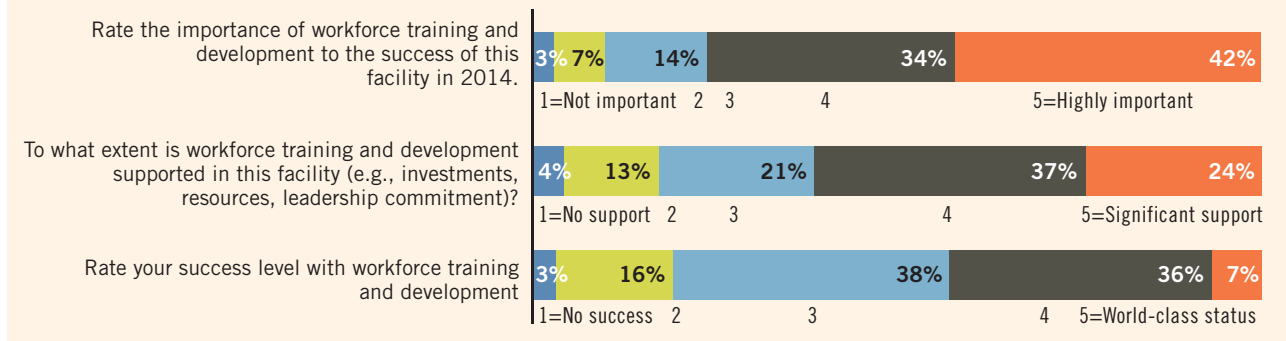
It's increasingly clear that training and professional development are not only vital for manufacturing success, but essential tactics in meeting the growing talent challenge. Skills that can't be found *externally* can often be grown *internally* as part of a strategic workforce plan. The *Manufacturing Insights Survey* finds a direct connection between a skilled, highly trained workforce and organizational improvements that boost the bottom line. That's because workforce training and development programs are an integral component for manufacturers in their quest for world-class manufacturing status and the benefits associated with that level of operational excellence.

Workforce Training and Development Importance, Support, and Success

The *Manufacturing Insights Survey* finds another serious execution gap regarding talent. Three-quarters of manufacturing executives rate workforce development as important to the success of their facilities in 2014;⁴ only 3 percent report that workforce training and development are *not important*. Yet far fewer offer support for workforce development initiatives — or achieve notable success with their employee efforts (*Figure 5*).

⁴ Rated 4 or 5 on a scale of 1-5 where 5 equals "highly important."

Figure 5. Workforce training and development importance, support, and success (% of facilities)



Workforce Training and Development Objectives and Metrics

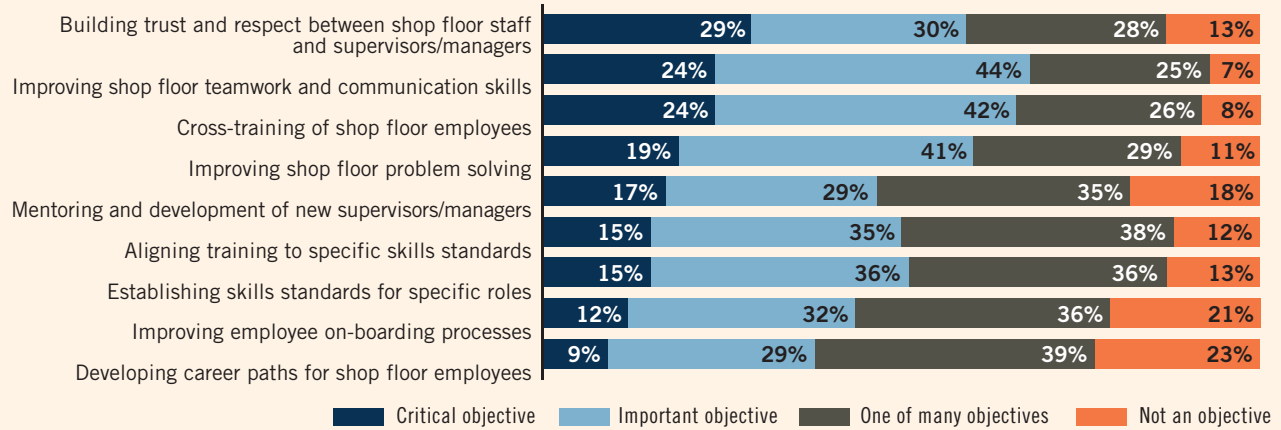
The top objectives of workforce training and development — rated critical or important by more than half of executives — are (Figure 6):

- Building trust and respect between shop floor staff and supervisors/managers
- Improving shop floor teamwork and communication skills
- Cross-training of shop floor employees
- Improving shop floor problem solving
- Aligning training to specific skills standards
- Establishing skills standards for specific roles

The survey findings highlight what many manufacturers increasingly encounter: Workforce development is not just providing employees with the right technical skills to perform “a job.” It also requires helping individuals acquire the soft skills — teamwork, problem-solving, coaching — and day-to-day business skills to succeed in more team-oriented, automated workplaces.

Manufacturers struggle to achieve success (e.g., world-class status) with workforce initiatives.

Figure 6. Objectives of workforce training and development (% of facilities)



Improving soft skills — **Workforce Development Challenges**

trust, respect, and communication — is critical to workforce training and development.

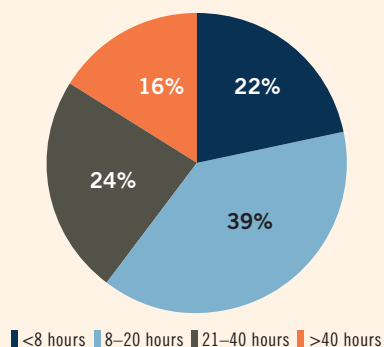
Manufacturers identify the following aspects of workforce training and development as challenges:

- Budget approvals for training, even when clear needs for training have been identified
- Developing managers, supervisors, and leaders in the organization
- Employee buy-in to new methods, techniques, and training
- Finding job candidates with required technical and soft skills
- Finding the people with the right attitude and work ethic
- Finding time to train employees
- Identifying training needs by area/department
- Pulling employees from the plant floor in order to train them

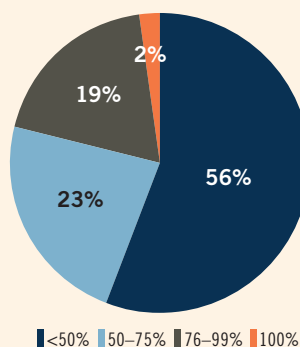
The *Manufacturing Insights Survey* asked manufacturers to identify their organization's performance across four metrics that gauge success of workforce training and development programs (*Figure 7*). Only 7 percent of all survey respondents report best performances (either of the top two answer categories) for all metrics.

Figure 7. Workforce training and development metrics (% of facilities)

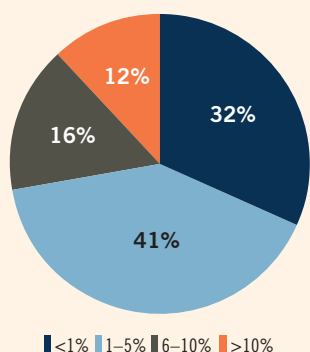
Training hours
(annual hours of training per employee)



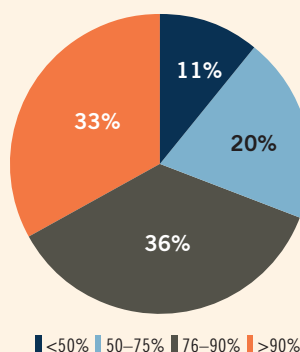
Self-directed employees
(% of employees with autonomous authority for their role/actions)



Annual labor turnover
(voluntary and involuntary separations as % of typical staffing level)



Employee retention
(% of workforce with more than five years with company)



Many executives also report that they lack measures to accurately track success in workforce development. Metrics cited by executives as effective in monitoring progress of workforce training and development initiatives include:

- ISO audits
- Labor times
- Labor turnover
- Production efficiency improvement
- Scores on annual employee surveys
- Self-assessment and scoring proficiency tests
- Skills matrix by job function
- Training hours
- Training modules (E-learning) completed

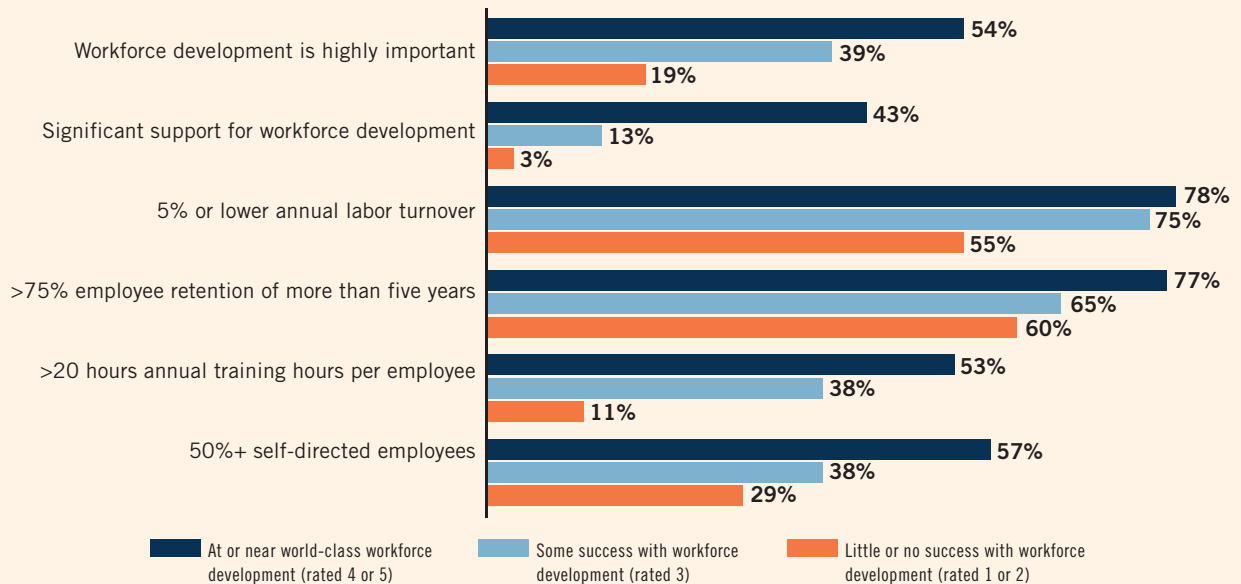
World-Class Workforce Training and Development

Manufacturers at or near world-class workforce training and development recognize its importance, support it with investments and training, and enjoy improved performances.

Workforce training and development is a must for any organization hoping to be a world-class manufacturer. So it's not surprising that manufacturers that excel at workforce training and development are dramatically more likely to achieve *overall* world-class manufacturing status for their operations. And those manufacturers at or near world-class status *in workforce development and training* are far more likely to:

- Believe workforce development and training is highly important to the success of their facility
- Provide significant support for workforce development
- Report better workforce development metrics (*Figure 8*)
- Indicate that workforce development and training objectives are critical or important. (For example, 79 percent of manufacturers at or near world-class workforce development rate cross-training of shop floor employees as critical or important vs. just 48 percent of those with little or no success.)

Figure 8. World-class workforce development (% of facilities)



Production Planning for New Products

Great ideas coming out of R&D and new-product development don't necessarily translate into successful products. These "virtual goods" need to be efficiently incorporated into manufacturing processes that accommodate new product dimensions, materials, equipment, workflows, and standards. *Profitable* innovation is increasingly driven by the speed — and seamlessness — of the handoff from design to manufacturing.

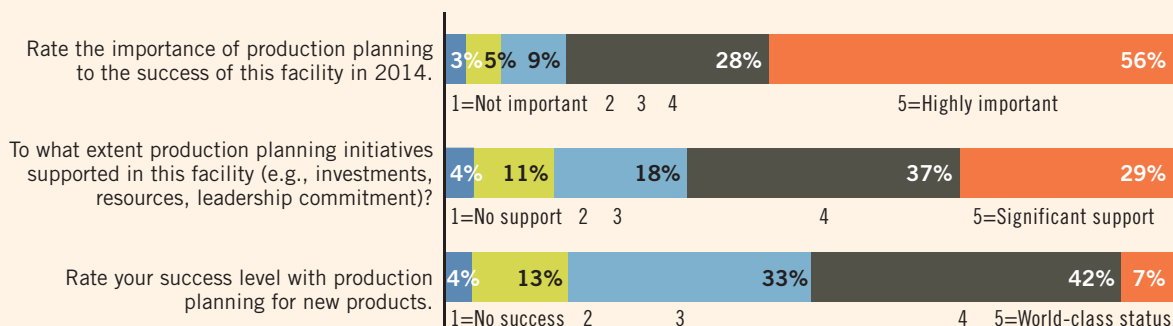
Innovation success today requires the coordination and collaboration of design with manufacturing and an ability to plan for the production of new products. This process involves decision-making and allocation of physical assets (machinery and inventory) as well as soft assets (skills necessary to make or assemble new products, management talent to establish new processes and standards to control production). Without production planning, a great design can turn into a product that misses its window of opportunity and the revenues and profit that go with timely market entry.

Production Planning Importance, Support, and Success

Four out of five executives report that production planning for new products is important to their facility's success in 2014. But another execution gap looms: far fewer manufacturers invest in supporting this initiative, or achieve success with it (*Figure 9*).⁵

Manufacturers have trouble achieving success with production planning.

Figure 9. Production planning importance, support, and success (% of facilities)



⁵ Rated 4 or 5 on a scale of 1-5 where 5 equals "highly important."

Eliminating waste in the production planning process — scrap, rework, and time (setup and flow) — are critical objectives of production-planning initiatives.

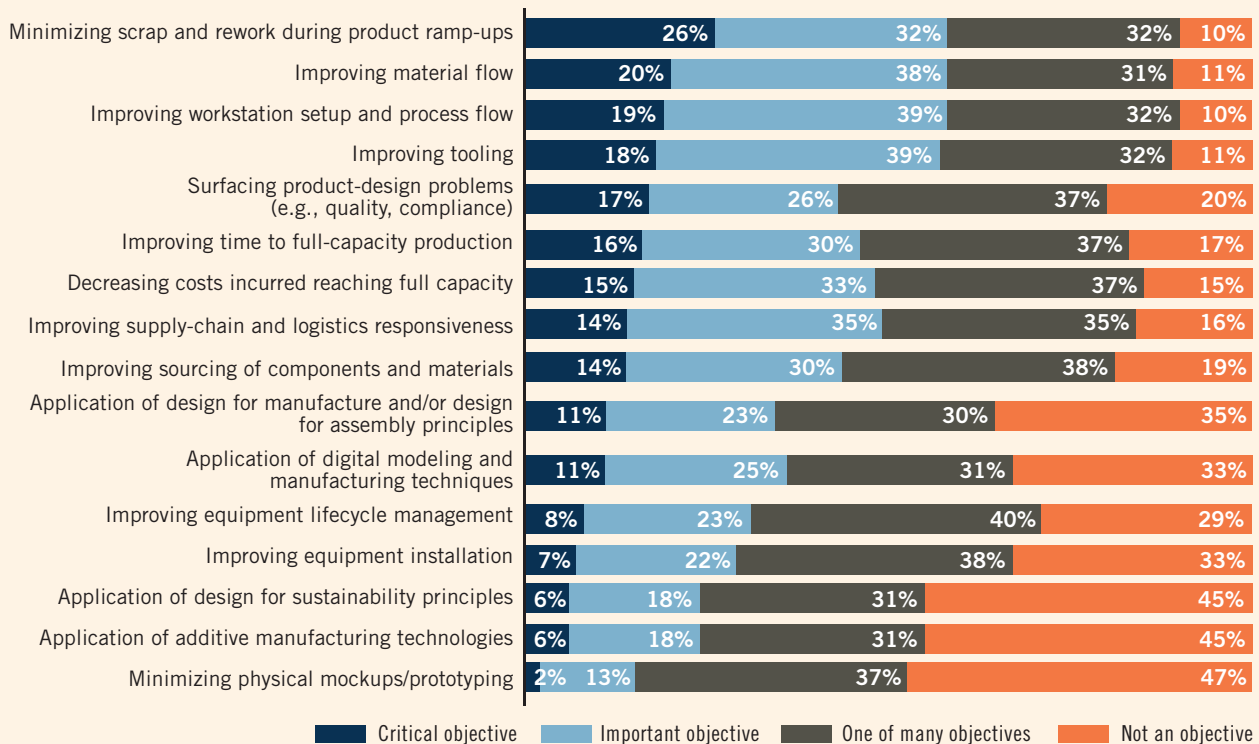
Production Planning Objectives and Metrics

The top objectives of production planning — rated critical or important by more than half of executives — are (Figure 10):

- Minimizing scrap and rework during product ramp-ups
- Improving material flow
- Improving workstation setup and process flow
- Improving tooling

A wide range of production-planning objectives are rated highly by manufacturers, illustrating both opportunities for improvement as well as the influences of product or industry on production planning. For example, facilities with assembly operations are more likely to rate improving workstation setup and process flow as a critical or important objective. Conversely, facilities with plastics and composite processing are more focused on improving material flow.

Figure 10. Objectives of production planning (% of facilities)



Production Planning Challenges

Manufacturers identify the following aspects of production planning for new products as challenges:

- Accuracy of planning or lack of planning
- Organizational silos
- Capacity constraints
- Changing customer needs
- Customer communication of demand changes
- Demand fluctuations
- Greater awareness of impact of changes on processes (e.g., manufacturing)
- Need to improve flow/level loading
- Poor scheduling
- Supply-chain and logistics responsiveness

Executives were asked to identify their organization's performance across five metrics that gauge success of production planning for new products (*Figure 11*). Many manufacturers struggle: One-quarter report that fewer than half of their products launch on budget, and 29 percent report that fewer than half of launches are on time. And one in five manufacturers fail to hit *both* the budget and time specifications for half or more of their product launches. While many manufacturers clearly rely on new products to sustain their organizations, they may not be considering the need to train management and employees on how to improve the production-planning process — and, thus, leak away both revenues and profits with late, overbudget launches.

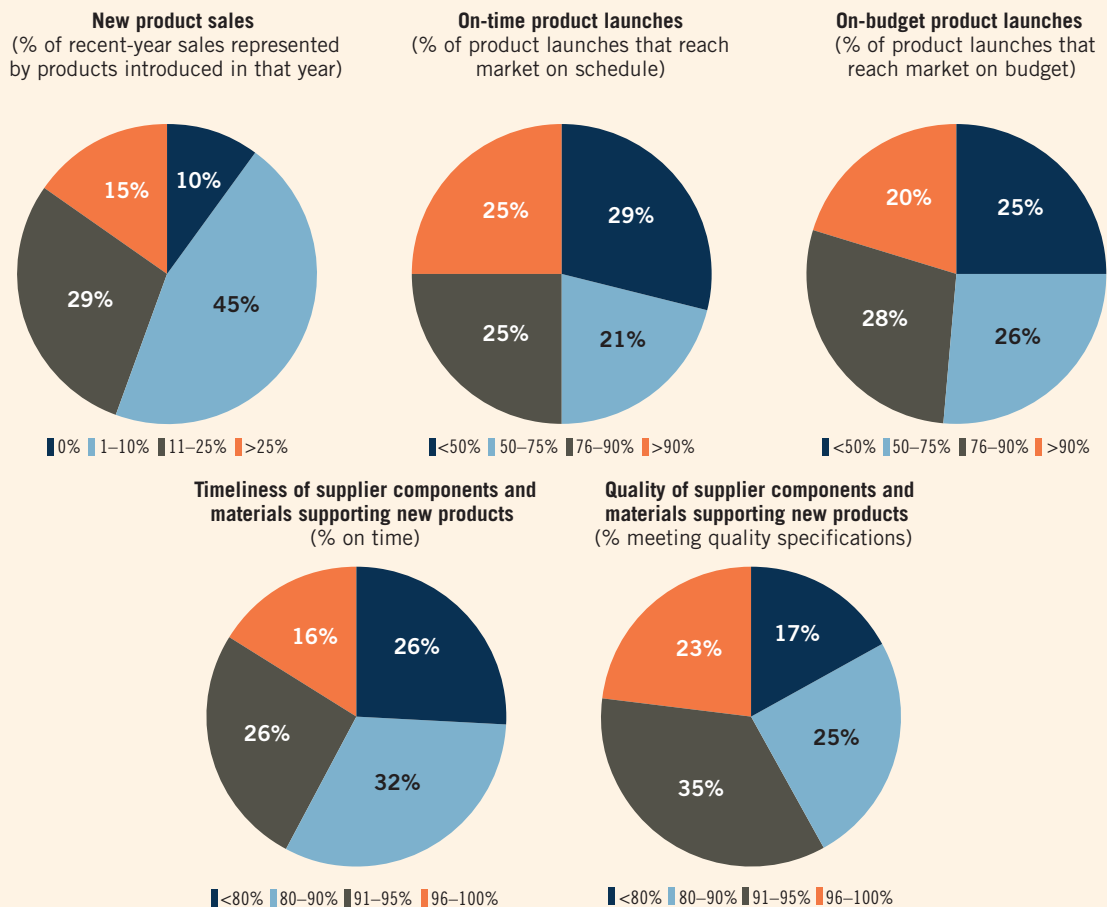
Other metrics cited by executives as effective in monitoring progress of production planning include:

- Actual vs. scheduled delivery dates
- Bill of material manufacturing-release percentage relative to temporal targets
- Customer acceptance rate of first-off samples
- Delivery to the schedule

Manufacturers struggle with late and over-budget product launches.

- First-in, first-out
- Internal and supplier on-time delivery
- New sales revenue
- Revenue generated by products in last three years
- Setup time efficiency
- Work-in-process and raw-material inventory levels

Figure 11. New-product metrics (% of facilities)



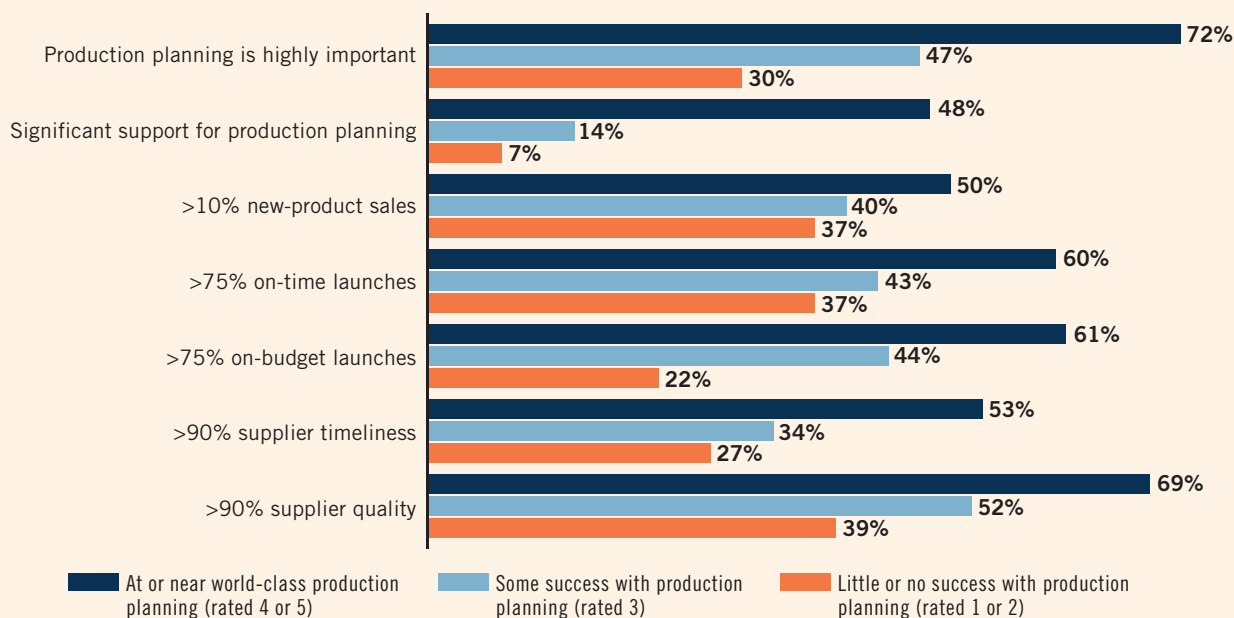
Production Planning Objectives and Metrics

Production planning is necessary to achieve world-class manufacturing, and for organizations focused on innovation and new products, it is critical. Manufacturers that excel at production planning are dramatically more likely to achieve *overall* world-class manufacturing status for their operation. And those manufacturers at or near world-class status *in production planning* are far more likely to:

- Believe production planning for new products is highly important to the success of their facility
- Provide significant support for production planning
- Report better new-product metrics (*Figure 12*)
- Indicate that production-planning objectives are critical or important

Manufacturers at or near world-class production planning recognize its importance, support it with investments and training, and enjoy improved product-launch performances.

Figure 12. World-class production planning (% of facilities)



Manufacturing Support

Where do manufacturers go when they need help? Few world-class manufacturers handle upgrading their continuous improvement, workforce development, and production planning initiatives without external help. A majority of executives report that their facilities seek external support for these efforts at least occasionally (*Figure 13*). Manufacturers are most likely to seek assistance from the following types of organizations (*Figure 14*):

Continuous improvement:

- Professional associations (e.g., SME, ASQ, APICS, AME)
- Service and goods vendors/suppliers
- Consulting and business advisory firms

Workforce training and development:

- Universities/colleges
- Professional associations (e.g., SME, ASQ, APICS, AME)
- Service and goods vendors/suppliers

Production planning for new products:

- Service and goods vendors/suppliers
- Peer networks
- Consulting and business advisory firms

Most manufacturers routinely seek outside help.

Figure 13. Frequency of external support (% of facilities)

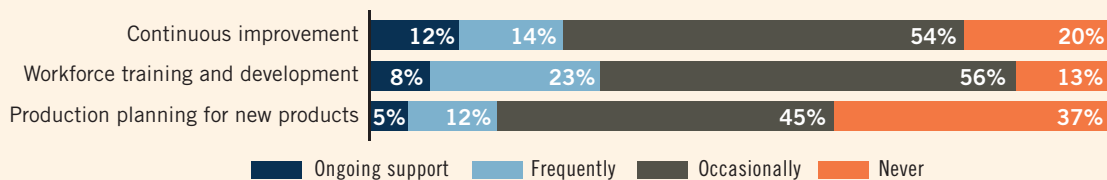


Figure 14. Where facilities seek assistance (% of facilities)

	Continuous improvement	Workforce development	Production planning
Professional associations (e.g., SME, ASQ, APICS)	41%	34%	12%
Service and goods vendors/suppliers	38%	27%	19%
Consulting and business advisory firms	38%	26%	14%
Peer networks	37%	25%	19%
Industry associations (e.g., National Association of Manufacturers)	36%	25%	13%
Universities/colleges	31%	45%	9%
Trade/sector associations (e.g., Association for Manufacturing Technology)	28%	24%	11%
Business and industry groups (including NIST's Manufacturing Extension Partnerships)	24%	18%	9%
State associations	19%	23%	8%
Local associations (including Workforce Investment Boards)	19%	19%	5%
Traditional advisers (e.g., accountant, legal counsel)	19%	11%	6%
Other	9%	8%	7%
No assistance	11%	12%	45%

The best manufacturers are more willing to retain external experts to assist with their three key initiatives. For example, annual spending on external services to support continuous improvement is \$10,000 (median) among all facilities (*Figure 15*). Manufacturers at or near world-class manufacturing status spend \$12,500 annually, compared to \$10,000 by those facilities that have made *some progress* toward world-class status and just \$5,000 by facilities that have made *little or no progress* toward world-class status.

Professional associations are vital allies in helping manufacturers improve.

Figure 15. Annual spending on external services by initiative (medians)

	All manufacturers	At or near world-class manufacturing status	Some progress toward world-class manufacturing status	Little or no progress toward world-class manufacturing status
Continuous improvement	\$10,000	\$12,500	\$10,000	\$5,000
Workforce training and development	\$10,000	\$20,000	\$15,000	\$5,000
Production planning for new products	\$1,000	\$5,000	\$1,500	\$0

Many facilities invest relatively little for outside help or, surprisingly, nothing at all. For example, one-quarter or more of facilities spend *nothing* on external support for the three initiatives, and more than 10 percent seek *no assistance* for any of the three initiatives. But the *average* annual spend for external support reveals the extent to which some facilities are willing to invest in outside assistance and support the three key initiatives:

- Continuous improvement: \$99,517 (average)
- Workforce training and development: \$248,568 (average)
- Production planning for new products: \$336,352 (average)

Conclusion

Manufacturers that survived the recession are finally in position to profit from improved economic conditions, provided they are establishing programs that allow them to continuously improve their operations, develop and leverage their workforces, and efficiently make new products in their facilities.

As the *2014 Manufacturing Insights Survey* reveals, an ability to succeed at each facet will help a facility to capitalize during the current upturn and achieve success. That's because pursuit and improvement of the three initiatives puts manufacturers at a competitive advantage:

- ***Continuous improvement:*** Raising the bar and repeatedly improving manufacturing performance keeps customers satisfied (customer expectations are always rising) and doing so without exhausting excessive labor, resources, time, etc. keeps margins high while keeping ahead of the competition.
- ***Workforce training and development:*** Being able to develop workforces and management talent helps to minimize the need to continually find the skills that many deem unfindable, and, what's more, it leads to a culture that attracts the best talent and skills.
- ***Production planning for new products:*** The optimum profit-earning window for new products gets smaller and smaller. Streamlining the handoff from design to manufacturing improves manufacturers' likelihood of hitting the window at the appropriate time and keeping products in the market longer.

The steps to push all three initiatives toward a world-class capability are simple: Recognize the initiative is important, and then support it — leadership commitment, training, resources, assets, etc. What are you waiting for?

Profile of Respondents

Company, division, or facility (% of facilities)

Company	66%
Division	14%
Facility	20%

Executives who answered for a company or division were instructed to base their answers on one specific facility that is most representative of the overall organization.

Locations within organization (% of facilities)

Single location	54%
Multiple locations, national	19%
Multiple locations, global	27%

Half of manufacturers operate a single facility.

Industry (% of facilities)

Job shop	21%
Machining, tooling & equipment	19%
Aerospace & defense	12%
Automotive	7%
Heavy equipment (e.g., construction, agriculture)	6%
Electronics & high-tech	5%
Life sciences (e.g., medical devices, pharmaceuticals)	5%
Oil, gas & energy	5%
Industrial distributor	2%
Government	1%
Weapons & ammunition (not defense-related)	0%
Other	18%

The wide range of industries represented in the survey indicates that challenges with the three initiatives are common to all manufacturers.

Processes (% of facilities)

Machining	77%
Assembly	72%
Fabricating	55%
Design and new-product ramp-up	53%
Welding	49%
Molding	18%
Plastics and composite processing	16%
Other	29%

Manufacturers focus on machining, assembling, fabricating, and designing products.

Note: More than one answer allowed.

A diverse mix of manufacturing executives took part in the survey.

Primary role of respondent (% of facilities)

Corporate leadership	34%
Production	19%
Engineering	16%
Continuous improvement	7%
Sales and marketing	6%
Human resources	5%
Training	4%
Maintenance	2%
Design/research	1%
Supply chain	1%
Logistics	0%
Other	6%

The vast majority of manufacturers have a U.S.-based parent company.

Parent company location (% of facilities)

United States	83%
Canada	6%
Mexico	0%
Other	11%

The wide differences between median and average sales and employee figures highlight the broad range of manufacturers participating in the survey.

Approximate annual revenues

Parent company

Median	\$18,000,000
Average	\$2,758,900,215

This facility

Median	\$12,000,000
Average	\$210,515,636

Full-time employees and equivalents

Parent company

Median	130
Average	11,957

This facility

Median	80
Average	358

Methodology

The 2014 Manufacturing Insights Survey was conducted using an online questionnaire promoted by Tooling U-SME. There were 337 total valid respondents to the 2014 survey, with completed questionnaires received in February and March 2014. Responses were received by The MPI Group, an independent research firm, and then entered into a database, edited, and cleansed where necessary to ensure answers were plausible. All respondent answers to the *2014 Manufacturing Insights Survey* were either anonymous or confidential. Confidential respondents received a customized benchmark report as an incentive; anonymous respondents received this Executive Summary as an incentive.

About Tooling U-SME

Tooling U-SME delivers versatile learning and development solutions to the manufacturing community. Thousands of companies and educational institutions use our on-line learning services, instructor-led training and assessment programs to address workforce needs. Tooling U-SME is a division of SME, a 501(c)3 organization that has been gathering, validating and sharing manufacturing knowledge for more than 80 years.

Contact: For more information on the *2014 Manufacturing Insights Survey*, please call Tooling U-SME at 866.706.8665 or email swerley@sme.org

