The **Small and Medium Manufacturers** *Series*

Forging New Partnerships:

How To Thrive in Today's Global Value Chain

RSM McGladrey

THE MANUFACTURING INSTITUTE
MANUFACTURING MAKES AMERICA STRONG

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Foreword

Every manufacturer is part of a supply chain and, indeed, no company ever goes it alone. Significant change is now underway and the parameters of traditional supply chains are morphing under the pressure of a globalizing economy. Manufacturers adhering to old supply-chain rules are putting their businesses in jeopardy by not adapting to new rules.

With the arrival of an interconnected global marketplace on Internet time, value chains are rapidly replacing supply chains. Value chains require business owners to think well beyond traditional supply-chain arrangements. They require greater levels of collaboration with external partners, including suppliers and customers. Value-chain manufacturing also requires employees who have skills far superior to their predecessors and world outlooks framed by these new realities.

Companies harnessing this new value chain are thriving and laying productive foundations for their futures. This report—*Forging New Partnerships: How To Thrive in Today's Global Value Chain*—seeks to raise the understanding of the threat to small and medium manufacturers (SMMs) who stick to the past while shedding light on how best to take advantage of the new reality of value chains.

Last year, working with the National Association of Manufacturers (NAM) and The Manufacturing Institute, we published *The Future Success of Small and Medium Manufacturers: Challenges and Policy Issues*.[i] This widely read report not only documented internal management, external policy and market challenges facing SMMs, it also outlined policy recommendations to spur manufacturing competitiveness.

Forging New Partnerships is a strategic look at the external market and internal management challenges facing SMMs as they position their businesses in larger, more expansive value chains and offers practical insights and best practices for SMMs to optimize their opportunities.

Owners and managers of small and medium companies are often so focused on day-to-day operations they forget to look up long enough to see how overall linkages in manufacturing are changing—and how their companies might profit from this shift. In fact, they may believe that their firm's growth potential is limited. My experience with SMMs indicates these limits are self-imposed and have little to do with the opportunities that abound for firms. SMMs—like all manufacturers—must look beyond the border of self-constrained boxes and beyond the borders of traditional U.S. markets. But to do that requires they build an organization with the capability to succeed *anywhere*. This is the value-chain success strategy.

Our research at RSM McGladrey, Inc., indicates only half of all manufacturers have these value-chain strategies. While larger companies are more likely to pursue global courses, the benefits also are available to SMMs—lower costs, more customers and, most importantly, a growing market presence around the world.

Our experience with SMM clients and NAM members has given us a unique understanding of how difficult it can be to operate in the new value chain, especially as these firms expand around the globe. Companies must navigate cultural barriers, language difficulties, financing challenges and unknown regulatory, tax and compliance issues. Savings from process improvements, such as lean, become more important than ever before. Large companies are handing off much of their innovation to SMMs who

in the past merely built to specifications. It might seem like a safe approach to focus solely on the sourcing side through strategies such as outsourcing or procuring imported components, but safe is not sound. It is imperative that SMMs also look at the sell side, and the tremendous opportunity for growth this might offer.

Going global is not without risk, but competing in the United States against increasingly global competition is no picnic either. Yet, there are countless resources to help SMMs. We hope through the stories, practices and examples in this report, SMMs will begin to see how the rewards of superior value-chain management can far outweigh the risks.

U.S. manufacturing will retain its global leadership only if its manufacturers of all sizes seize the opportunities the expanded value chain presents. We are proud to work with the NAM, The Manufacturing Institute and its members in putting forth best practices and strategies to make that happen.

RSM McGladrey

Thomas G. Murphy
Executive Vice President
Manufacturing & Wholesale Distribution
RSM McGladrey, Inc.

Acknowledgements

The Manufacturing Institute and the National Association of Manufacturers (NAM) want to thank and recognize the many individuals who helped develop and issue this report. We are grateful to Institute Chairman Joe Loughrey and NAM President and CEO John Engler for encouraging us to proceed with this publication and seeing the value in a new publication that will help small and medium manufacturers (SMMs) compete more effectively in the global marketplace.

We thank Tom Murphy, executive vice president at RSM McGladrey, a global accounting, tax and business consulting firm headquartered in Bloomington, Minn., for sponsoring and supporting this publication and for his active involvement in its writing. RSM McGladrey serves SMMs and the company brought its extensive knowledge to bear in shaping this report.

We were assisted in researching and drafting parts of this publication by the MPI Group Inc., a research firm in Shaker Heights, Ohio, and its CEO John Brandt and Vice President George Taninecz. Their knowledge of modern manufacturing, backgrounds as editors at *IndustryWeek,* publishing-management expertise, and knowledge gained through interviews of executives at leading SMMs were invaluable in making this report both current and practical.

At The Manufacturing Institute, Bill Canis, acting president, managed the writing and production of this report. We would like to thank Senior Vice President Phyllis Eisen and Managing Director of the Center for Workforce Success Stacey Wagner for their advice and counsel. Communications Vice President Laura Narvaiz contributed her good ideas and is helping publicize this report among SMMs, other business organizations and the media. At the NAM, many thanks to those who gave us their good ideas and suggestions from beginning to end, especially SMM Director Jeff Noah, who partnered with us on this from the outset; Senior Director of Member Communications and Marketing Services Irina Stepanova and Editor Julia Sydnor.

We thank the following 21 SMM leaders who provided their insights specifically for this report and whose experiences make this such a valuable look at how to succeed in today's manufacturing economy:

Erick Ajax, vice president, E.J. Ajax and Sons, Inc., Fridley, Minn.
Mary Andringa, president and CEO, Vermeer Manufacturing Co., Pella, Iowa
Ronald Boles, president, General & Automotive Machine Shop, Inc., Huntsville, Ala.
Ronald Bullock, chairman and CEO, Bison Gear & Engineering, St. Charles, Ill.
Jeffrey Evans, president, CEO and chairman, The Will-Burt Co., Orrville, Ohio
Drew Greenblatt, president and owner, Marlin Steel Wire Products, Baltimore, Md.
Stephanie Harkness, chairman and CEO, Pacific Plastics & Engineering, Soquel, Calif.
Hannes Hunschofsky, president, Hoerbiger Corporation of America, Pompano Beach, Fla.
Collie Hutter, COO and owner, Click Bond, Inc., Carson City, Nev.
Kellie Johnson, president, ACE Clearwater Enterprises, Torrance, Calif.
Kendig Kneen, CEO and owner, Al-jon, Inc., Ottumwa, Iowa
James Knott, president and founder, Riverdale Mills Corp., Northbridge, Mass.
Stewart McMillan, president, Task Force Tips, Valparaiso, Ind.
Dyke Messinger, president and CEO, Power Curbers, Inc., Salisbury, N.C.

Lowell Miles, CEO and chairman, Miles Fiberglass & Composites Inc., Portland, Ore.
Dave Morgan, president and COO, Allmand Bros. Inc., Holdrege, Neb.
Tony Raimondo, team leader, Behlen Mfg. Co., Columbus, Neb.
Kristy Schloss, president/CEO, Schloss Engineered Equipment, Inc., Aurora, Colo.
Chuck VerMerris, CEO and president, Radix Wire Co., Cleveland, Ohio
Paul Wagner, CEO and chairman, Minnesota Wire & Cable Co., St. Paul, Minn.
Richard Wilkey, president, Fisher Barton, Inc., Watertown, Wis.

We also thank the Manufacturing Extension Partnership (MEP) and partners for their insights throughout this report. Mark Troppe, Mark Schmit and Mike Stone provided valuable assistance and examples. The National Institute of Standards and Technology (NIST) MEP also collaborated with us on a roundtable with a cross-section of SMMs; thanks to MEP's director, Roger Kilmer, for his leadership and participation and to Mike Stone for his facilitation expertise. Thanks also to Jack Stewart, president of the California Manufacturers & Technology Association and Judith D'Amico, western regional director for Project Lead the Way, for their insights and suggestions at that forum. The roundtable served as a valuable focus group to confirm and enhance some of the concepts in this publication.

Introduction

With the rise of globalization, the world has witnessed a dramatic increase in the role that small and medium manufacturers (SMMs) play in traditional supply chains. In 2006, The Manufacturing Institute's first report in this series—*The Future Success of Small and Medium Manufacturers*—identified 15 best practices used by SMMs and recommended federal policies to strengthen the sector. This report, *Forging New Partnerships,* complements that earlier publication by examining internal management issues that SMMs are grappling with, as well as their abilities to take advantage of economic changes at home and abroad.

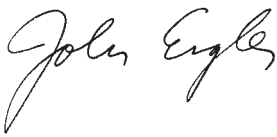
SMMs have always been critical players in supply chains, but their prominence has grown with manufacturing's new, global *value chains* that encompass products, processes and value-added services. SMMs are engaged at every stage—from research and development through manufacturing, packaging, shipment, service and support. These new value chains—networks of interdependent corporate relationships and the workforces that make them go—serve manufacturers' efforts by reducing costs, encouraging innovation and helping to drive company expansions.

The adage that no chain is stronger than its weakest link is especially true of value-chain relationships among manufacturers. Since SMMs account for 40 percent of U.S. production value, their failures and successes can have consequences far beyond individual manufacturing facilities. Consider how difficulties at a small vendor in the third tier of the automotive value chain might affect other manufacturers, disrupting production at parts or auto plants. Conversely, that same supplier might develop an innovative, new product or process that saves time and money for its customers and, consequently, those same large end-use customers.

SMMs encounter many obstacles and risks as they expand throughout global value chains. *Forging New Partnerships* reviews these challenges, but also illustrates how SMMs have turned these obstacles into opportunities by—

- taking on global competitors, at home and abroad;
- embracing continuous improvement, such as "lean manufacturing" and other methodologies;
- improving workforce skills;
- building an innovation culture inside their companies; and
- developing and funding next-generation processes, products and markets.

Many challenges face today's manufacturers, yet so do many opportunities. We hope that the insights in *Forging New Partnerships* will let manufacturers realize those opportunities and help build a stronger manufacturing economy for companies of all sizes.



John Engler
President and CEO
National Association of Manufacturers

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Executive Summary

Forging New Partnerships is a strategic look at the external market and internal management challenges facing small and medium manufacturers (SMMs)* as they position their businesses in larger, more expansive value chains. It is based on extensive interviews with a cross-section of SMM executives, survey data and a special roundtable discussion with SMM executives. The report—

- examines how the new value chains differ today from the supply chains of the past and the critical role of SMMs in it;
- shows how SMMs can leverage new opportunities to grow profits, expand into new markets and delight customers; and
- offers SMMs a valuable resource section that will help you network and find the strategic partnerships discussed in the report.

The many best practices cited in this report are drawn from interviews with NAM members, results of an annual survey by RSM McGladrey and insights from the NIST Manufacturing Extension Partnership (MEP). The NAM and the Institute also convened a roundtable discussion with a dozen SMM leaders where we discussed their business models and the major themes in this booklet. What we learned at that dialogue is reflected in these pages as well.

This report comes at an appropriate time: U.S. manufacturers today have ever-better opportunities for growth domestically and internationally. More is being produced in the United States now than at any time in the past, while exchange rates make U.S. products increasingly in demand abroad. U.S. goods exports were more than $1.023 trillion in 2006, nearly doubling over the last decade from $612.1 billion in 1996.[ii]

Working successfully within the supply chain is key to capitalizing on these new opportunities. Yet, the way manufacturers relate to each other in the supply chain has changed. The **old supply chain** connected mostly domestic suppliers to producers who assembled and/or transformed those components into a final product and sold it to the end consumer. It was a vertically organized structure with mainly components flowing through the supply chain while product design, pricing and service were dictated and managed by the final producer. Primary responsibility for innovation and value creation resided with the Original Equipment Manufacturer (OEMs).

Today, manufacturers are part of a **new value chain** that is a more complex matrix of interdependent corporate relationships and the workforce that makes them succeed. Innovation and value are created at all levels of the chain and in collaboration with external partners. In the new value chain, SMMs are more than just "build-to-print" suppliers. They are integral partners that help create the new technologies, products, services and business models that are vital for success, here and abroad.

Forging New Partnerships offers practical insights and strategies for SMMs to optimize their opportunities in today's value chain, including these:

- **Cultivate an innovation culture** at your company by offering unique incentives and rewards to employees who bring forth innovative ideas. As part of this

* *Small manufacturers (500 or fewer employees) and medium manufacturers (500 to 2,000 employees, unless otherwise noted in this report) make up the vast majority of all manufacturers (99 percent) and account for 40 percent of U.S. production value. There are about 295,000 SMMs in the United States.*

culture, implement lean manufacturing to help better compete while keeping employment flat and reducing costs.
- **Succeed with overseas sales** by supplying your customers when they set up overseas operations and winning new markets by offering a better product than local overseas businesses. To jumpstart exporting, use the resources of the Manufacturing Extension Partnership (MEP) and the U.S. Foreign & Commercial Service.
- **Tap your local community college** both for new talented workers and as a potential research partner for new products. One SMM calls her strategic partnership utilizing her local college's technology assets "compute to compete."
- **Use often overlooked financing options** to grow your business, such as government programs and tax benefits.

This report gives SMMs these tools and many more, showing the ways you can succeed and thrive if you take the right steps.

To make this report as relevant as possible for today's busy SMM executive, we have included several features that will help you focus on tangible results:

- **SMM interviews.** Our interviews with SMM executives are used throughout the report to show that the goals of greater innovation, new markets, a skilled workforce and new financing are very doable and within the reach of all SMMs. For example, too many SMMs have shied away from finding overseas markets for their products. The interview with Schloss Engineered Equipment demonstrates how one SMM harnessed the services of the federal government to find those overseas markets. And the sidebar interview with the CEO of Power Curbers gives a five-step process for identifying an overseas market niche and then finding the right partner there to help you succeed.
- **A matrix that matters.** In the report's conclusion, our authors have combined the best practices cited in the report into a matrix that shows where your company may fit in the new value chain, ranging from weak links to partner links. It assesses your effectiveness with both suppliers and customers and is good to look at not just today but six months or a year from now to gauge your success. Use it as your own internal report card.
- **Resources for SMMs.** In the final section of the report, we have pulled together suggestions for you to consider in partnering for success. Do you think you have something that the U.S. Department of Defense could use? We tell you how to find it through PRO-Net. Do you wonder who to first contact about getting started with sales abroad? Four export-specific Web sites are identified that will help you get going. There are similar resources for getting the new skilled workers you need and suggestions of where to turn if you want to hone your innovation edge but have some technology-related hurdles. While many of these are Web links, almost all of the sites have contact information so you can speak to a representative to answer your own specific questions.

Four Links in the New Value Chain

There is no magical potion that will transform your business into a value-chain success overnight. After all, manufacturing is not monolithic. What works for one SMM may not work for another.

But to succeed in today's value chain, one thing is clear: Managers need to line up new partners. Focusing only on how well the machines work inside the plant is not enough to compete successfully now and in the future. It requires difficult but rewarding work involving not just your firm, but countless others. By connecting with outside resources—partners within your industry and overseas, suppliers, customers, your customer's customers, government, academia—SMMs can swiftly expand their core competencies and gain economies of scale. Making the effort to collaborate will enable your small or mid-size company to meet today's challenges and leverage new opportunities associated with:

- **Global competition**—Foreign competition is everywhere, and the decision for SMMs is not, "*Will* you compete on a global basis?" but, "*How* will you compete?" SMMs must define and fortify their positions in a global supply chain by reviewing options (*e.g.,* buying foreign materials, selling overseas) and the rewards, challenges and risks associated with each. Growing overseas sales and even investing abroad are surefire ways to help compete effectively. The only wrong decision is to ignore globalization.
- **New strategies, new ideas**—Improvement and innovation go hand in hand. A commitment to innovation and new ways of doing business—in products, processes, technologies and strategies—frees assets and opens up selling opportunities for SMMs. A focus on innovation will keep your company from becoming a stagnant operator (incapable of improvement) or a commodity player (always under price pressures). This is especially true during a period when many markets (*e.g.,* the defense industry and "green" products) have insatiable appetites for something new. It's a fact of manufacturing life that businesses big and small have embraced new ways of operating—for example, lean manufacturing on the plant floor—and tools and cultures of innovation for products and services.
- **Workforce**—Amid a tight labor market, especially for manufacturers, SMMs must find ways to hire, develop, reward and retain the workforces necessary to compete in the new value-chain paradigm. SMMs can and do look for outside assistance and government support, but ultimately, it's up to each company to make sure they have the best workforce possible. SMMs who pay attention to recruiting, hiring and workforce development will have a deep talent pool, from entry level to executive, that brings them a competitive advantage, helps them fend off challenges and leverage new opportunities.
- **Financing**—Innovation, overseas sales and a stronger workforce all require new investment strategies. Wise investments made with rigorous analysis will help SMMs ensure that operations and financial strategies are synchronized for controlled growth and ready for the demands that today's value chains impose. A core best practice is taking advantage of tax laws that encourage these investments and government programs that can provide you with the cash and resources to expand, build a strong, skilled workforce or export. There are also a range of private funding opportunities that work for some SMMs.

Your Expanded Role in the Value Chain

Beyond understanding the four main links, SMMs must also take a broader look at how their overall functions in the value chain are evolving. In this new world, business-to-business customers want to see SMMs expanding their roles and adding more value as a supplier (product development, inventory management, product support, etc.). SMMs need to seize this opportunity and create partnering possibilities, structuring longer-term agreements that provide stability and rewards commensurate with the new roles and risks they are assuming.

In today's value chains, business operations and responsibilities are moving upstream, as SMMs are asked to participate in product functions from cradle to grave, *i.e.,* product design to warranty and recycling. Similarly, many SMMs in large equipment markets find themselves not only supplying production equipment to other manufacturers, but also designing entire production lines, including the development of specifications as well as integration and maintenance responsibilities.

It's now common for suppliers to assume complete design responsibility for their materials or components as incorporated into the end product (as opposed to simply manufacturing to customer specifications). Other SMMs are being asked to design a broader portion of the end product itself. Both scenarios present challenges that SMMs are often ill-equipped to handle. For example, more than 60 percent of small manufacturers and 40 percent of medium manufacturers lack a defined new product development and introduction (NPDI) process. In most companies, ownership of innovation is distributed throughout the organization, but in SMMs this function is typically managed by a single senior executive or business owner. SMMs also often fail to manage and distribute information about product design and development with team members both inside and outside the firm, preventing timely data from reaching key decision-makers.[iii]

"One of the things that small companies tend to do poorly that is really important is a concept called the 'fuzzy front end,'" says Dick Strojinc, director in the manufacturing and distribution consulting practice for RSM McGladrey, Inc., a leading national business, consulting and tax firm focused on SMMs "And that is the beginning stage of doing product development, getting a clear definition of what the end customer wants." Strojinc says getting that initial phase correct helps to ensure that product development has a high success rate. "Big corporations are very good at doing that. It is a process that medium and small companies could do just as easily."

Many SMMs are trying to get closer to customers for product development and other issues, with more than half of SMM plants (59 percent) reporting "some integration" with their customers and 11 percent reporting "extensive integration," compared to 61 percent and 10 percent of large-company plants. But SMMs also need to get their own suppliers involved: Just 56 percent report some integration with suppliers and 8 percent report extensive integration, compared to 72 percent and 9 percent of large-company plants.[iv]

Integration and closeness with suppliers and customers is more important now than ever because with expanded supply-chain roles come heightened risks, and customers

are pushing more of those risks on to SMMs. End-product quality and warranty issues are increasingly a *supplier's* responsibility, which means that SMMs need to ensure the materials, ingredients and components they deliver to customers, as well as what they receive from their own suppliers, meet specifications. Stories of flawed goods sourced from China—tainted wheat gluten, children's toys contaminated with lead-based paints and truck tires prone to disintegration—should put SMMs and all manufacturers on notice: How well do you know your supply base—and the quality of sourced goods?

SMMs have a unique opportunity to position themselves as an alternative to foreign producers by emphasizing product and service quality as well as the verified integrity of their supply base. As regulators take harder looks at imports, particularly from China, SMMs need to strike now—and offer competitively priced products with the service and support levels (value added) that customers can't get from manufacturers in low-cost regions.

However, becoming the value-added, innovative supplier that is so in demand in today's value chain forces SMMs to overcome several obstacles. The following sections take a look at these challenges and, more importantly, examine how to turn them into opportunities.

ACE Clearwater Enterprises: Getting the Front End Right

The roles of both SMMs and their larger company customers are changing as more responsibilities shift to SMMs. Just bringing lean operations to your plant floor is not enough in the new value chain. You also have to get the front end of manufacturing right: product design, engineering, quality review, entering orders and making sure the appropriate tools are in place before jobs are released to the shop floor.

Mastering this front end of manufacturing is a top priority for Kellie Johnson, president of ACE Clearwater Enterprises in Torrance, Calif. She says, "If you don't really focus on the front end and make that efficient, so it's error-proof, then the shop floor is not going to have a chance. Oftentimes, an engineer may miss something and if a tool needed for production is overlooked and this omission is not caught going through the process-check, then everything will come to a stop on the shop floor. One piece flow with lean won't work if you are not addressing these front-end processes."

Johnson says that in the aerospace industry, where she is a supplier, "customers are continuously flowing down quality requirements and order processing is changing constantly, so small and medium manufacturers have to be ready to respond. Our large customers may have this process standardized, but for us, we are touching the front-end process every time an order comes in."

To get the important front-end right, Johnson says, "ACE created a 'people cell'—that is it co-located contracts, manufacturing engineering, quality engineering, program management & MRP planning—to perform our contract review process. This ensures customer requirements are reviewed accurately and in a timely way."

Challenges and Opportunities in the Changing Supply Chain

Manufacturing supply chains have changed dramatically over the last decade, and even the smallest of manufacturers have components and materials whisking around the globe. As a result, manufacturers have radically restructured their organizations, outsourcing business functions in search of cost savings, value-added services and new ideas. This has led to an explosion in the number of participants in today's value chains—and in the complexity of managing value-chain relationships. The bottom line is that there simply are more business customers and suppliers around the globe, creating a thriving worldwide economy. World real GDP growth was more than 5 percent in 2006[v], nearly twice the pace of U.S. growth.

Transforming supply chains into value chains and nurturing the relationships they entail, especially on a global basis, present a multitude of new challenges to SMMs:

- The prospect of doing (or doing more) business overseas, both buying and selling abroad, *i.e.,* "globalization";
- Acceleration of continuous improvement and innovation activities as value chain partners look for increased productivity and the next great thing, whatever it may be;
- Changing workplace dynamics that demand a different kind of manufacturing workforce and high-skilled employees;
- Identification of new ways to finance your operations here and abroad; and
- A rapid transfer of responsibilities and risks back through the value chain, requiring new capabilities for many SMMs.

SMMs are working with others in their value chains to tap into opportunities that cannot be addressed alone. This is a change from the past when such external partnerships were less important. Today, they offer opportunities and keys to success.

The following pages identify the challenges and offer inquiring SMMs some pathways that have worked well for other manufacturers. The best practices cited here and the resources at the end of the report provide valuable insights for any manager who wants to take his or her company to a higher level of performance.

The Challenge: Global Competition

Few, if any, SMMs still compete solely in a regional or domestic market. Foreign competition is everywhere, and the decision for SMMs is not, "*Will* we compete on a global basis?" but, "*How* will we compete?" SMMs must define and fortify their positions in a global supply chain by reviewing options (buying foreign materials, selling overseas, etc.) and the rewards, challenges and risks associated with each. The only wrong decision is a failure to decide.

The most prominent change in manufacturing over the last decade is the increasingly global nature of business and supply-chain relationships. In the United States, exports and imports have risen 26.7 percent and 26 percent, respectively, since 2004.[vi] With unprecedented movement of goods around the world, even so-called "domestic" markets will not remain immune to foreign competition for long. This puts SMMs firmly in the middle of import-export traffic—and in the crosshairs of global competitors.

Most SMM leaders understand this: Forty-five percent of executives report that globalization is the driver most likely to influence their company's purchasing and supplier-management strategy over the next decade, followed by cost leadership (39 percent) and outsourcing (25 percent).[vii] Interestingly enough, both cost leadership and outsourcing are, in part, concerns resulting from globalization, as manufacturers ratchet down their cost structures to compete with low-cost regions of the world.

> "People are afraid of the shipping, the payment, the collection, all the issues that go with foreign sales. And once you master those, it gives you quite a competitive edge."
>
> Stewart McMillan, president, Task Force Tips

Yet there are still more than a few SMMs who don't sell or source overseas *at all:* Twenty-nine percent of plants owned by SMMs report no sales outside the United States, and, more surprisingly, 31 percent report that they purchase no materials or components from beyond the United States. Fully 64 percent of SMMs export less than 10 percent of their plant sales volume, and 61 percent import less than 10 percent of their materials and components by dollar volume. (Among large-company plants, 15 percent do not export and 14 percent do not import.)[viii]

Of course, there may be a few SMMs with valid reasons for not going global—perhaps because they operate within domestic supply chains. If this description doesn't fit your business, though, then you need to explore the prospects of globalization: Study your own global buy-and-sell options, assess risks and rewards associated with each and develop strategies to do business on the global stage as well as defend your U.S. turf from foreign imports.

It's easy for many SMMs to put off a decision to go global. There are so many questions SMMs ask:

- How do I get started?
- What are the best markets?
- Is getting paid by an overseas customer any different than getting paid by a U.S. customer?
- Where do I find a trusted representative to market my products for me?

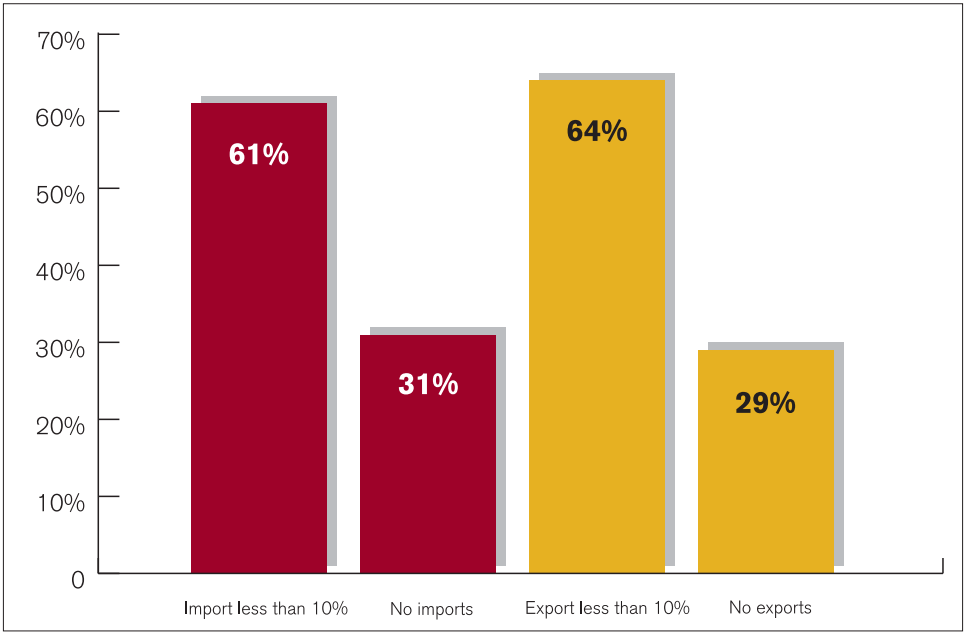
- Am I on my own or are there U.S. government programs to help?
- How will foreign currencies affect my business?

Stewart McMillan, president of **Task Force Tips**, an Indiana-based maker of firehose nozzles, had a decidedly negative view of globalization until he visited Taiwan a decade ago and found himself at a business crossroads. Immediately upon his arrival, McMillan took a taxi to a competitor's location, where he stood and pondered the strengths and weaknesses of his company versus the competition:

"And I thought, 'You know what? We can win this game.' And up until that point, I was a pretty dour son-of-a-gun around this place. I was telling people I was scared. They saw I was scared. It made people here scared. I came back from that trip with a whole new lease on life. And I can say we haven't looked back. I mean, are we going to lose orders now and then? Yeah, we are. But we are going to keep pedaling as fast as we can, and I think, in the end, we can win the game."

Task Force Tips jumped into the international market, forming an overseas distribution network, a key facet of which is serialization of product sales. (Serialization establishes selling markets aligned with resellers, thus ensuring that a reseller isn't undersold or out-positioned by another reseller in its own territory.) Through a program that McMillan calls "customerization," Task Force Tips is able to deliver—with the help of process and workforce improvements and investments in technology—nearly any custom feature for a customer within normal lead times (about 15 percent of the company's products are "customerized").

Chart 1. SMM Global Activity



*Source: IndustryWeek/*Manufacturing Performance Institute 2006 Census of Manufacturers

Today, Task Force Tips does about $30 million in sales, of which a rapidly growing 35 percent share comes from overseas customers.

McMillan offers a few clues to tackle the challenge of going global:

"Well, guess what? It is difficult. But it's kind of like selling to the government. The people that sell successfully to the government are the people that have figured out the paperwork. And once they get the paperwork and the process figured out, the actual manufacturing of the products is not as difficult as the paperwork. I think, to a large degree, international business is very similar. People are afraid of the shipping, the payment, the collection, all the issues that go with foreign sales. And once you master those, it gives you quite a competitive edge over somebody else who's chosen to ignore it."

Like Task Force Tips, many SMMs with solid, well-thought-out overseas sales and/or sourcing strategies are able to grow their businesses. But this is only possible if you open your minds and doors to participation in the global trade revolution. The discussion on pages 19-24 will show you how.

The Opportunity: Grow Overseas Sales

Many SMMs are successfully competing globally. These successful firms have an outward-oriented mindset that sees the potential market as international in scope, not just domestic. They are proactive and have the confidence to commit resources to international growth. This worldview has helped their companies grow internationally and also become more competitive in the United States. Taking on foreign competitors head-to-head has forced these SMMs to be better.

Few, if any, SMMs are immune to the threat of foreign competition. As an SMM, you can ignore the threat as long as possible, perhaps squeezing a few more years of profit out of your markets before a global competitor makes a major move. Or, you can see opportunity for business growth by proactively planning your move into overseas sales. After all, 95 percent of the world's potential customers live outside U.S. borders, with middle classes growing rapidly in many of these big markets.

Developing an overall growth strategy to increase sales abroad is the critical first step. This involves determining which products have export potential, identifying target countries and markets, understanding your strategic advantages and how you will compete, and determining sales channels and partners. (See the following section, which includes a summary of a recent report on successful SMM export strategies.) Your plans will also need to include some thought about navigating in a growing market that may have different rules from domestic sales. There are issues including foreign currency transactions, customs paperwork, protecting your patents and trademarks and getting paid in a timely way from a foreign customer. You can find partners willing to help you get off the ground, including the Manufacturing Extension Partnership for overall growth strategy, and the U.S. Foreign and Commercial Service for foreign market intelligence, partner searches and detailed export mechanics (such as shipping documentation). Many stories in this booklet were selected because they give you an idea of how other SMMs got started.

These opportunities are certainly clearer when current customers establish operations overseas. If you want to retain their business, you may need to go where they go — and many SMMs are doing just that. Sometimes that means you can export directly from your U.S. plant, but it may mean that you'll need to open a small operation abroad to provide the same level of service your OEM expects here. Either way, your loyalty to that customer will likely make your business relationship even stronger than before.

Successful Export Strategies for SMMs

The Manufacturing Extension Partnership commissioned a study by Stone & Associates to identify successful export strategies for CEOs of small manufacturers. The findings (below), and specific examples that accompany them from NAM members, indicate that exporters who achieve successful international growth tend to have the following elements in their game plans:

- **They have strategic advantages and know how to exploit them.** It is hard enough to be successful competing on price with a me-too offering in domestic markets. It is even more difficult internationally, where you have the added cost of freight,

logistics and international sales, and are sometimes competing against low-cost local players in places such as China. Successful firms build their growth around some form of strategic advantage that differentiates them from low-cost competitors and allows them to avoid competing on price. These advantages might be a product or technology that performs better than competing solutions, specialized process or technical capability that few other firms have, a quality advantage that results in longer product life or lower costs for the customer, or a strategic focus on a niche market that, if served effectively, is too small to attract other competitors.

E.J. Ajax and Sons provides components to appliance manufacturers. When the production of a pressure cooker was moved to Asia, Ajax maintained the strategic partnership and continued to supply parts. Sales into the pressure cooker market of Asia have increased sevenfold, providing this Minnesota SMM with a big growth story.

- **They have a proactive commitment and mindset about pursuing international opportunities as a key source of growth.** At successful firms, the international market is not treated as a lower priority than domestic sales. These firms are committing resources to the international business, dedicating staff to it, establishing international revenue targets and plans and are being patient about profitability. The CEO is prepared to travel extensively to make it succeed. They also are proactive and aggressive about looking for new foreign target markets and partners to serve them.

  Tony Raimondo at Behlen Mfg. in Nebraska committed to his company's first international sales not only as a way to grow but also as a way to bring a system of continuous improvement to his workforce that previously lacked the kind of discipline brought out by international standards.

- **They invest in new products and capabilities—often specifically for the international market.** Successful firms go beyond just selling their U.S. products overseas. This can range from adapting the product for local regulations and cultures to developing whole new product lines aimed at international customers.
  Fisher Barton domestically supplies big equipment-makers such as John Deere. As his customers have grown their businesses abroad, he has sought their business, developing new parts for new equipment designs and new markets. Looking beyond his hometown in Wisconsin, president Richard Wilkey said the value added for a small exporter is to offer a product that is better than what the OEM is buying in the local European market.

- **They have learned that partnerships with overseas distributors, representatives, agents and joint venture partners are critical to success and should be selected systematically.** Companies cannot sign up "the first distributor that comes along." This means asking for references, conducting credit checks and financial due diligence and going to meet with potential partners in country. It also means strategically seeking out partners that are already connected to target markets that you want to penetrate. (In the U.S. Commercial Service Basic Guide to Exporting, you'll find a nice checklist that can help you evaluate a potential distributor or representative.)
  One size does not fit all. Industries and countries vary, so what works in Japan may not work in France. Some SMMs identify a representative who can engineer, estimate, sell and close because this one person will have to display all those aptitudes for you.

Working with Business Representatives Abroad

One part of an international business strategy is to identify partners in foreign countries who can help bring your product to market. The right representative for you may not be the same kind of person in every country, as markets differ. A common strategy for many SMMs is to develop an international presence by working with distributors, agents or other types of representatives. For example, Dyke Messinger, CEO of Power Curbers, Inc., says his company has been doing business overseas for more than 30 years. Power Curbers has worked hard to set up a distribution network overseas, completing the due diligence to identify potential markets and then assessing distribution partners within those regions. Messinger has identified a five-step process to get SMMs connected to international markets:

1. Identify the market—Messinger says his firm identifies potential markets by following the money. As a manufacturer of machinery for slipforming concrete curbs-and-gutters and highway safety barriers, Power Curbers follows government and private money flowing into infrastructure products. The company is currently gearing up for Eastern Europe, watching how and where road, rail and air infrastructure will locate, "and when that starts to happen, then machinery sales are going to follow," he says.

2. Gather market data—Once a market is spotted, the company gathers names of construction equipment distributors there. Messinger says they use the Internet, trade associations, suggestions from other manufacturers and occasionally the U.S. Department of Commerce (having done this before, he is now experienced enough to forego the services provided by the DOC and do the legwork internally).

3. Narrow and communicate—Once a list of distributors is established, Power Curbers does a rough cut of the names and Messinger says his company "starts some communication with them to find out if they've ever considered a product like ours. And sometimes I find that they represent our competition."

4. Visit the market and potential partners—With initial contact made, a Power Curbers representative goes to the country, continuing to gather information through any means possible, such as the yellow pages, other manufacturers and distributors in the country, or even a good hotel business center. The representative then makes visits to potential distribution partners and potential customers. "People either respond with, 'I've never heard of that kind of machine before,' or, 'How does it work?' to, 'Oh, yeah, I think so-and-so owns a machine like this.'"

5. Formalize a deal—"Depending on what you do next, there's, of course, a variety of options available," says Messinger. "The distributor may want to come and see one of our machines operate. They might want to have another visit." Eventually, Power Curbers picks a distributor and inks an agreement. "And the key at that point is what is your contractual arrangement with them—the contractual arrangement can either make it easy for both of you to exit or it can make it very, very difficult. We think it's hard to get out of contractual arrangements in this country. But, sometimes, it can be even worse overseas." Because of Power Curbers' relatively small size and Messinger's reluctance to conclude long-term deals, he typically tries to structure something on a one- or two-year basis so both parties can see how it progresses and then move forward from there.

Although the process may seem extensive, Messinger insists that the total time (less travel) amounts to a days' worth of work at the office. For Power Curbers and anyone else completing due diligence for a distributor or for other international sales methods, it's a day well spent.

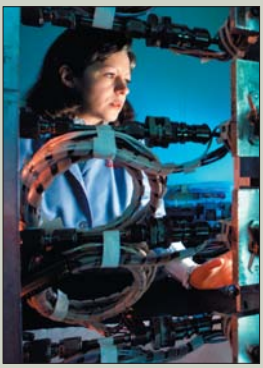
- **They have learned about the importance of investing in personal relationships, and understanding and adapting to the local culture and way of doing business.** In international business, you must take the time to invest in the development of personal relationships. Then business will follow.
  Finding someone who is already plugged into your industry and willing to work with you can put you many steps ahead. Building a relationship with a consultant is a strategy that has worked well over time for Nevada-based Click Bond, which successfully got its parts on the Euro Fighter, Euro Copter and with Airbus.
- **They leveraged relationships with existing multinational customers as initial sources of export business.** For many companies, these customers opened their eyes to the potential for international business.
  As mentioned above, both E.J. Ajax and Fisher Barton followed their major U.S. customers abroad, building their export business in the process.

SMMs have independently found that the pursuit of overseas opportunities was an impetus to rejuvenate their organizations. **Tony Raimondo** purchased **Behlen Mfg. Company** in Columbus, Neb., in 1984 as part of a management buyout. Raimondo, now chairman, realized he was buying into a struggling company. Behlen, which makes agricultural equipment, was a $32 million company losing several million a year. Raimondo set about overhauling weak processes and business strategies and soon set up a one-man international sales department.

The sales representative traveled the world pursuing opportunities for Behlen products, and Raimondo joined him as opportunities developed. "Global made us a stronger company as we had to address weaknesses," says Raimondo. "When our people asked [in 1984] why we were going international, my answer was, 'We need to be a stronger company.' Thank goodness we did."

That initial international effort has now pushed Behlen to $200 million in sales, of which up to 10 percent is exported to some 70 different countries. Behlen also now has a joint venture in China for manufacturing structural steel for the China market. *Inc.* magazine named the company "Turnaround

Schloss Engineered Equipment, Inc.



This Colorado-based manufacturer of environmental treatment equipment decided 15 years ago that it was time to diversify its international markets. Schloss previously had international sales, mainly through larger U.S. firms. President and CEO Kristy Schloss says, "We started on this new approach by capitalizing on the efforts of the U.S. Department of Commerce through the Export Assistance Centers (USEAC). Their efforts, including catalog shows, trade missions, matchmaking and Gold Key Service showed us the way to become independent exporters and helped us when we ran into obstacles." The biggest barrier she ran into in the initial years was getting paid. "Now we make sure that the financing is in place so that we have guarantees and letters of credit before we ship our product."

Team of the Year" in 1994, and Behlen won the state's quality award in 2000 and 2005.

Some SMMs have used many of the techniques cited in this discussion and, along the way, have become as adept at international business as bigger companies. **Vermeer Manufacturing Company,** a Pella, Iowa-manufacturer of agricultural, construction, environmental and industrial heavy equipment, has been exporting since the 1950s. **Mary Andringa,** CEO of Vermeer, says her father made the firm's first trips to Europe, demonstrating equipment and developing a network of international distributors.

"In the early 1970s, we set up an office; sales, service and language abilities; and product specialists closer to the customer in Europe. We also have other offices that are our wholly owned subsidiary offices in Australia and we are setting up one in Singapore. We are looking at South America to do a similar thing. We're very intentional about the fact that we would like to see our sales to customers outside North America continue to grow in the years ahead … And that global presence is part of our five-year plan."

Vermeer has leveraged the interest of international customers to grow domestically as well. Vermeer now captures about 20 percent of their sales outside of North America, with about 15 percent of its suppliers located beyond North America. The company recently began a joint venture assembly plant in China. The knee-jerk reaction to a story like this might be to assume that American jobs are heading overseas, but the reality for Vermeer is quite the opposite.

"We had over 50 percent of the market for one certain product in the 1990s in China," says Andringa, "and it was all exported. And we soon had mini-replicas of that product throughout China with many, multiple suppliers of that product. So in order to be able to keep our presence in Asia, we had to either start being there in Asia, or we had to really pull out all of our efforts in Asia."

Andringa says it has been a matter of survival in the region and, without the joint venture, Vermeer would lose a significant sales opportunity. "We're preserving jobs. If we didn't have this entity, we would lose a whole market presence, which now, at least, allows us to still export some products into that area because we're keeping the market presence. And if we had just decided not to do that at all, I think we'd have [fewer] jobs here."

Gaining international exposure for key executives is an important element in building businesses over the long haul. In the 1990s, **Will-Burt** worked with the Ohio Department of Development in seeking foreign partners and in 2004 was honored as "Exporter of the Year" for Ohio, making it the smallest company to receive the distinction. **Jeffrey Evans**, CEO and president, says a key to Will-Burt's success has been making sure that the management team has significant international exposure.

Knowledge of your foreign markets is invaluable when it comes to promoting or defending your product. Evans says he must fight to prevent knockoffs in China of Will-Burt products. Will-Burt makes precision-engineered solutions for commercial, mobile, industrial and military applications and now has two manufacturing and sales partners in China that produce and market products domestically and export internationally.

Until the past few years, Will-Burt maintained a worldwide strategy, deploying the same product everywhere in the world, notes Evans. "We are now attempting to create product and service solutions specific to our customers and markets, particularly in the differing geographies around the world," he says. Will-Burt hired its first full-time employee in the Far East, who will coordinate all functions throughout the region.

Succeeding with International Allies

Allmand Bros. Inc., a manufacturer of portable light towers, compact loader backhoes, light stands, trailer-mounted arrowboards and message boards, is based in Holdrege, Neb. Dave Morgan, president and COO, says the company has sales of approximately $50 million, of which about 15 percent come from overseas and could soon grow to 20 percent. His product is being sold in Europe, Asia and the Middle East, with Mexico, Latin America and South America also emerging as markets.

At the heart of the company's international growth has been its strong partnerships with overseas companies. "The no. 1 thing is finding business partners in the part of the world that you want to get into that really, truly do act and think like partners. And then the second thing would be that when you have those partners, listen to them." He adds that assuming a U.S. product will work elsewhere is a mistake. You need to listen to partners and, based on their advice, be willing to modify product to meet local customs, regulations and approaches.

For example, Morgan says that in the European Union (E.U.), his representatives and dealers serve as much more than those titles imply. "Both of them have capabilities to probably manufacture a product if they wanted to. But they like our product and they've partnered with us. In that part of the world, that becomes particularly important because one of the struggles that we have selling into particularly the E.U. is the regulations that we face, the CE regulations." (The initials "CE" do not represent an acronym but are a declaration by a manufacturer that product meets the requirements of applicable European Directives.)

"We end up facing all kinds of technical specifications and engineering hurdles that we've found particularly difficult to stay up on and to meet," says Morgan of E.U. requirements. So the E.U. partners stay close to market requirements as they emerge and then manage final assembly of Allmand Bros. product to comply with any recent changes. Morgan admits that the process, instead of just shipping final product, can impede the flow of goods and add cost, but it enables the company to hit "moving targets" and compete in those markets.

For Will-Burt and other manufacturers, building a plant overseas is often the culmination of their global business strategy. Sometimes it is to avoid foreign tariffs or a value-added tax that make direct sales from the United States expensive. Kristy Schloss discovered this when selling to Europe, so her company opened a plant in Northern Ireland. Behlen Mfg. opened a facility in China to build for that booming construction market and Pacific Plastics has factories in India, Taiwan and Singapore, making medical devices for a rapidly growing global health industry. These are successful growth strategies with strong U.S. manufacturing operations, but a global outlook.

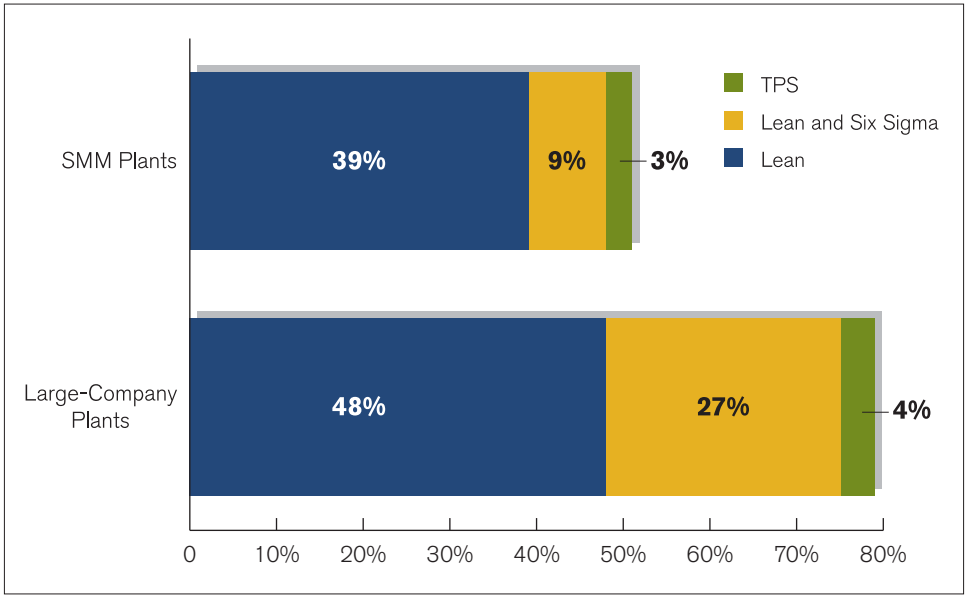
The Challenge: Pressures To Improve

Innovation has been described as the intersection of invention and commercialization. It is about finding new ways of doing business that, internally, drive operational improvements and, externally, drive revenue growth and profits. It includes new products and services, new processes and new business models and strategies. Lean manufacturing is a form of innovation that frees up resources, time and energy to devote to new ideas and products.

Many SMMs are not attuned to the need for continuous improvement. They continue to focus on "doing business," firefighting through their problems because they believe there's not enough time to work on continuous improvement. In fact, the business of improvement really is *the business*. For some, there may be a temporary luxury of captive markets and attractive margins, meaning they lack a "burning platform" to inspire improvement. Eventually this results in failure, with firms that don't develop a continuous-improvement mindset being left behind by competitors—both domestic and international.

Innovation is one of the things that American manufacturers have consistently done better than their peers in other industrial countries. Where an innovation culture thrives in a company, there is successful manufacturing—what was once called "Yankee ingenuity." There's no guarantee that U.S. manu-

Chart 2. Lean Disparity



*Source: IndustryWeek/*Manufacturing Performance Institute 2006 Census of Manufacturers

facturers will retain this hold on innovation, however. Rising education levels around the world and an emulation of the successes here will increasingly challenge manufacturers of all sizes. Internal challenges to fostering innovation include:

- A lack of senior management buy-in to the innovation process;
- Inaccurate metrics to measure it;
- Poor understanding by employees of the repercussions of poor quality;
- Absence of community college and other training partners who can help you build up employee skills and technology application; and
- Supply chain partners that don't help SMMs build a stronger innovation pipeline.

Little time remains for SMMs sitting on the improvement sidelines. Some may think that improvement approaches are overemphasized, but every industry has embraced some form of them and companies of all sizes are demanding that their supply bases respond—or those companies will find other suppliers. Lean manufacturing is one of the major improvement models that is generally considered the collective techniques and concepts that enable companies to efficiently and perfectly satisfy customer demand; key process principles of lean are eliminating waste in its many forms (*e.g.,* too much inventory, extra motion, excessive time) and increasing value added, *i.e.,* that which the customer really wants and values. In addition, in these times of tight labor markets, lean frequently frees up human capital and enables SMMs to redeploy employees into a more agile workforce, one capable of doing more with less. Nonetheless, the numbers show that not enough SMMs are lean—or even trying.

Bison Gear and Engineering: Lean for Suppliers Is Not an Option

Getting suppliers to see the value of lean is a high priority for manufacturers who want to see the full benefits throughout their value chain. At Bison Gear and Engineering in St. Charles, Ill., adhering to lean is not an option for suppliers—it's a mandate.

Bison, a manufacturer of a product line of fractional horsepower gear motors, began its own lean initiative in 2000 by reconfiguring its plant to accommodate flow processing cells and component replenishment areas. Chairman and CEO Ron Bullock says, "Moving to lean was a competitive imperative for us and was the pathway to improving customer service and quality in everything we do."

Revamping Bison's facility was just the beginning. Close on the heels of those internal changes, Ron Bullock announced the Supplier Partnership Improvement Plan (SPIP) because "suppliers must be comprehensively included as partners to ensure our own successful lean manufacturing." SPIP promotes, monitors and rewards suppliers who cooperate by reducing lead times and inventory levels, improving response time, reducing costs, improving product and information flow and implementing Kanban replenishment practices. Bison assists those suppliers who need help in mastering lean and quality practices.

Almost 80 percent of U.S. manufacturing plants with large corporate parents ($1 billion or more in annual revenue) are pursuing some form of lean manufacturing, whether lean itself, lean and Six Sigma, or the Toyota Production System. Only 51 percent of SMM plants are using one of the lean approaches, however, and a startling 22 percent of SMM plants follow *no improvement* methodology whatsoever (see *Lean Disparity*).[ix]

The efficient movement of right-sized inventories through the value chain is critical to profitability—and a key tenet of lean manufacturing. To achieve this, U.S. plants use just-in-time supplier deliveries (in place at 43 percent of U.S. plants), pull systems with kanban signals (40 percent) and vendor-managed or -owned inventories whereby suppliers are responsible for in-plant material and components until a product is produced (34 percent). Here, too, SMMs are falling behind in adoption rates for these practices, with a full 21 percent using *no* inventory-management techniques (see *Inventory Management*).[x]

The reluctance of SMMs to adopt lean principles undermines their bottom lines: U.S. plants that have implemented at least one of the lean approaches report a median 35 percent gross profit margin and $197,000 sales per employee, versus just 31 percent gross profit and $150,000 for those not implementing lean.[xi] The "lean gap" faced by SMMs is especially surprising because lean is an approach that small companies can afford, requiring them only to understand the processes, identify wastes, address the root causes of problems, and then improve the process with available resources (as opposed to approaches that immediately throw equipment or technology at the problem). Often, the early steps of lean will rearrange processes and make use of *simpler* means for operations, occasionally removing equipment and technology "monuments." Only after processes have been improved are investments in automation or equipment considered.

Lowell Miles, CEO and chairman of **Miles Fiberglass & Composites Inc.,** in Portland, Ore., has seen his company through many transitions. After the company's largest customer cancelled orders in 2001, Miles was forced to diversify its customer

Table 1. Forms of Inventory Management
Large Companies Lead Smaller Companies

	U.S. plants	Parent company less than $1 billion	Parent company $1 billion or more
Just-in-time supplier deliveries	42.9%	42.2%	48.6%
Pull systems with kanban signal	40.1%	38.1%	51.4%
Vendor-managed or -owned inventories	33.6%	30.4%	50.0%
Quick equipment changeovers	29.0%	26.6%	46.4%
One-piece flow technique	26.2%	25.2%	25.2%
Parts/goods supermarkets	18.3%	14.4%	30.7%
Production leveling/heijunka	16.6%	14.1%	33.6%
RFID/computerized inventory tracking	12.5%	9.3%	20.0%
None of these	19.3%	21.4%	7.9%

*Source: IndustryWeek/*Manufacturing Performance Institute 2006 Census of Manufacturers, more than one response possible.

Lean production is "lean" because it uses less of everything when compared to mass production: half the manufacturing space, half the investment in tools, half the engineering hours to develop a new product in half the time. Also, it requires keeping far less than half the needed inventory on-site, results in many fewer defects and produces a greater and ever-growing variety of productions.

Source: MIT International Motor Vehicles Program

base, and sales are now above 2001 levels, employment levels have been restored[xii] and the company was one of seven finalists for the U.S. Chamber of Commerce "Small Business of the Year" award. Even with this recognition, CEO Miles realizes that there are still opportunities for improvement, and that his firm's next challenge is to get lean.

"We're doing it because we know it works," says Miles. "I've visited a number of friends of mine that have plants similar to us that have been [applying lean for] a year or two, and they're seeing great benefits from that. And we just think that to stay competitive and build our business, that's something we have to do."

Miles notes that lean not only offers a low-cost approach to improvement, but one that is supported by numerous academic, governmental and consulting resources. Miles Fiberglass & Composites has been able to get grants from Oregon State University and the local Economic Development Commission, "so that our investment is mostly in-kind instead of out-of-pocket, and that's helped tremendously."

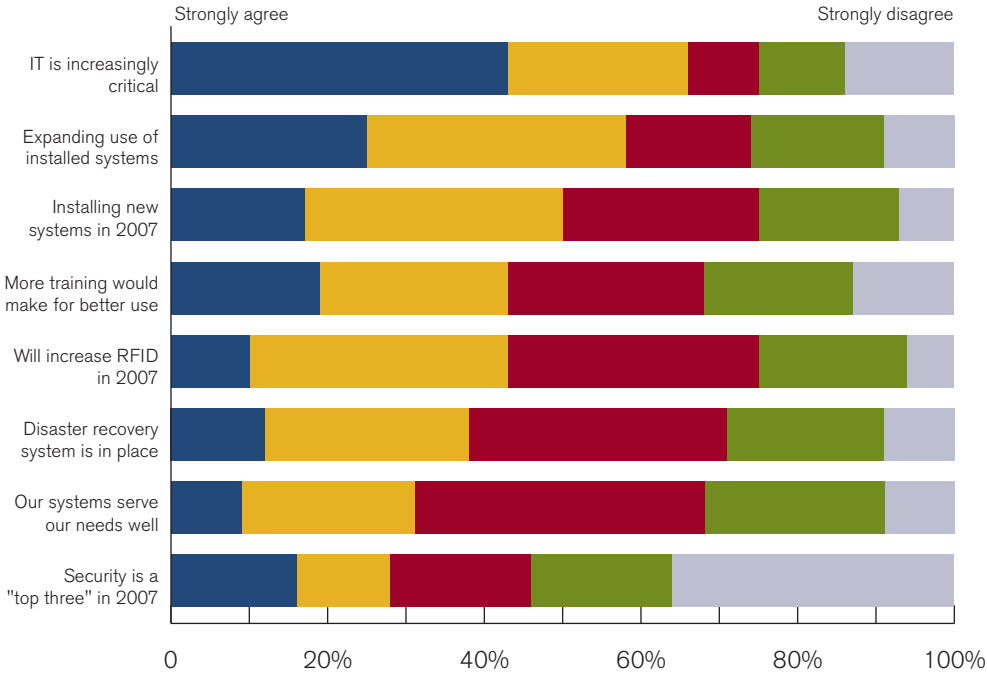
Many of the nation's Manufacturing Extension Partnership (MEP) centers have education and consulting programs focused on lean and are ready to help SMMs tackle the challenge. In 2006 alone, nearly 25,000 manufacturers were served by MEP centers around the country (with nearly half of that effort focused on improving manufacturing systems). A conservative assessment of MEP effectiveness based on feedback from 5,261 clients for 2005 indicates that MEPs helped—

- generate new sales of $2.842 billion;
- retain sales of $3.408 billion;
- deliver cost savings of $1.304 billion;
- create 17,453 jobs; and
- retain 35,766 jobs.[xiii]

In a connected supply-chain environment, SMMs must also invest in enabling information technologies that can improve productivity. Too often overlooked in these strategies are the pipelines through which information flows. For example, broadband speeds in the United States are substantially slower than what's found overseas—1.9 megabits per second in the United States versus 61 megabits per second in Japan and 45 megabits per second in South Korea—putting U.S. manufacturers and all of U.S. business at a connectivity disadvantage. The kicker is that Americans often *pay more* for slower service. In addition, broadband speeds can vary significantly by state. For example, Rhode Island is touted as having the speediest networks (5011 kilobits) versus the slowest in Alaska (545 kilobits).

SMMs can help improve a state or national technology disparity by making their voices heard to their elected officials. More immediately, SMMs can improve the infrastructure and the capabilities of systems that do exist by selecting systems, vendors and applications that best support their needs. Those needs are even more demanding as SMMs expand their reach globally. Being able to have systems communicate across a wide

Chart 3. Information Technology Priorities



Source: 2007 Manufacturing and Wholesale Distribution National Survey, RSM McGladrey, Inc.

range of geographies in real time is imperative. Flexibility and adaptability are required in IT systems because of the rapid pace of the global business environment in which SMMs are operating. This is apparent to SMMs because about two-thirds of them "strongly agree" or "agree" that information technology is increasingly critical. Fifty-eight percent are expanding use of their existing IT systems and 50 percent believe that more training would help them make better use of existing technologies. Nearly half will implement new systems in 2007 (see Chart 3 above).[xiv]

Today's value chains demand that SMMs improve their operations, technologies and skills. Government and private resources are on the sidelines waiting to assist you with those improvements. What are you waiting for?

The Opportunity: Operations Excellence, Innovation Edge

SMMs must commit to innovation and new ways of doing business—in products, processes, technologies and strategies—that free up assets and open up selling opportunities. A focus on innovation will keep you from becoming a stagnant operator (incapable of improvement) or a commodity player (always under price pressures). This is especially true during a period when many markets (*e.g.,* the defense industry and "green" products) have insatiable appetites for something new. It's a fact of manufacturing life that businesses big and small have embraced new ways of operating—for example, lean manufacturing on the plant floor—and tools and cultures of innovation for products and services.

High-quality products and on-time delivery no longer guarantee success. Customers everywhere are looking for lower costs and *more*—more support, more value-added services, more innovation, more help in satisfying their customers—and they're willing to look anywhere to get it. Successful SMMs are strategically aligning their organizations to deliver extra value around the globe, from the simple (ensuring that materials are delivered in right-sized containers at the right time) to the complex (taking over lifetime responsibility for industrial equipment, including maintenance) to the new (developing products for end-customers).

In order to deliver more than just good product, SMMs must first recognize that the old equation of success—*price = cost + profit*—no longer works. With competitors springing up around the globe, SMMs must improve constantly to maintain profit and survive. From an operations perspective, successful SMMs have already embraced lean manufacturing and other forms of operational change on their plant floors and are now pushing the same concepts beyond their factory walls (*e.g.,* front office, product development, accounting) and into their own value chains.

"Part of a continuous improvement mindset is the necessity to adopt lean principles of eliminating waste, improving processes and only adding value to the product," says **Dick Strojinc** of **RSM McGladrey**. "In many cases, I look at lean as being a way to make the value chain even more effective." Independent of a company's size, he can't imagine a manufacturer being—or wanting to be—a global company without adopting the principles of lean, when it makes sense, as part of continuous improvement.

Strojinc cautions SMMs about getting caught up in one version of lean versus another and, like many others, sees much of lean as simply sound manufacturing engineering. Just as lean evolved from the Toyota Production System (TPS), TPS evolved from the work of Henry Ford, W. Edwards Deming and others. But through all the versions of lean, Strojinc points to Toyota's seven deadly wastes as common threads. "[It's] the elimination of non-value-added cost. If you do a good job of understanding where your non-value-added costs are, then you can apply the appropriate tools to eliminate those costs."

Within the value chain, OEMs and major suppliers are pushing the responsibility

for innovation down to smaller companies. New challenges arise, with new roles and capabilities required of SMMs, including employees who can perform under these new conditions. There are a number of new communications channels that SMMs need to put in place:

- **A better-informed team.** As your products change, employees need to understand what would happen if new products are not produced correctly. **Stephanie Harkness** at **Pacific Plastics** says, "We are now making replacement heart valves and the liability risk for us is now much greater than when we were making components for laparoscopic devices. Our team needs to be more educated on the repercussions of their actions and the relevance of the products they are making." Similarly, at Radix Wire, all employees are made knowledgeable about the company and even view the income statement.
- **A rewarded team.** When your employees excel with innovative ideas, they deserve recognition. SMMs vary in how they recognize their top performers, from cash bonuses to days off with pay and company-wide recognition.
- **A better-informed customer.** It's important to communicate with your primary customer about your lean experiences and new roles in innovating. Customers should understand that at times they need to share risks and costs for new product development if it is to be a successful partnership. The new value chain works best when there is that kind of trust and mutual support within the chain. Many SMMs report that this is too often missing.
- **A high-tech college partner.** Local colleges, universities and technical schools can provide tremendous assets for SMMs with new innovation mandates, especially when the local college has technological capabilities that the SMM does not have. Kellie Johnson of ACE Clearwater calls this "compute to compete" and has turned to local colleges to help her company simulate never-before-made parts for a whole new unmanned aerial vehicle that a major aerospace company has suggested. This partnership will give her company a competitive advantage.

Improving Performance To Take the Customer to a Higher Level

Chuck VerMerris, president and CEO of Radix Wire Company in Cleveland, Ohio, emphasizes that the manner in which Radix does business is as important to the customer as the products and their prices and a key factor in fending off foreign competition. "I can probably save our customer a lot more money by having what he needs in a short period of time, and high quality, so that he doesn't have to have much, or any, inventory," he says. "We trade in our ability to make relatively small runs in a very short period of time affordably. … We make a very aggressive effort to obsolete our own products as rapidly as possible by creating something that is more advanced, higher performance, more affordable or faster to make. That is the strategy of our business. We listen skillfully to a user who wants to elevate his requirements to a higher level of performance."

"The most important thing is that we got all of top management totally involved in the process. And for us, it's a culture."

Mary Andringa, CEO, Vermeer Manufacturing

There are many paths to manufacturing innovation. We are highlighting some of the ways in which innovation manifests itself in today's manufacturing.

1. Innovating by Mastering Lean

Operational excellence these days is often tied to a true application of lean manufacturing. Some see learning lean as straightforward as —

- reading and absorbing the lessons in *The Toyota Way;*
- focusing on big piles in your plant; and
- figuring out one piece flow so that employees never put a part down until it is sent out the door.

Companies that have succeeded with lean recommend that senior management have a strong buy-in to the program to make it effective. There must be a lean champion in your company to make these changes happen and make them stick.

With lean, work cells are often clustered to make the flow of goods faster and less complicated. Moving large pieces of equipment around to do this may seem daunting to some managers. **Kellie Johnson** of **ACE Clearwater** has some helpful advice for someone just getting started. She says, "There are other ways to accomplish your lean goals without always moving large machinery. We call it 'virtual cells,' co-locating people as much as possible. When we set it up, we identify a team leader who has the overall responsibility for keeping the product flow going. Then, it's all about flow, whether that person is right next to you or on the other side of the floor."

By using some of these procedures, the following three manufacturers have mastered lean manufacturing.

Mary Andringa, CEO of **Vermeer Manufacturing**, says her company started its lean journey in the 1990s to control manufacturing costs. At the time, an outside independent director told the company that it was "absolutely imperative" to start "understanding other production systems, kaizen, lean," recalls Andringa. Vermeer spent about two years sending staff to lean events and on benchmarking trips and then began its lean efforts in 1998.

"The most important thing I think is that we got all of top management totally involved in the process," says Andringa. "And for us, it's a culture. And everybody is expected to be involved on events, at presentations, supporting the work of the team, sponsoring teams. And always looking for where the next breakthroughs are. We've been on this journey nine years and we believe we've just started to scratch the surface."

Today, the company has about 40 people *dedicated* to continuous improvement work, but Andringa notes, "In reality, everyone is dedicated to it. It's 40 people that are very focused on helping all of the plants, all the business units, to continually make improvements, set up for [lean or kaizen] events and do follow-up." Kaizen events are focused groups of cross-functional employees working on a specific problem for anywhere from one to five days; in Japan the term "kaizen" means "continuous improvement." Vermeer company officers have averaged participating in 22 kaizen events, and Andringa alone has participated in 34 events focused on plant-floor issues such as total productive maintenance as well as business process events for the warranty process with dealers and reimbursement of warranty claims. "We use the process in every form of the business."

One big benefit of lean is the ability to do more with less. For example, **Power Curbers** has enjoyed compound growth rates of approximately 7 percent to 7.5 percent since the early 1990s, says CEO **Dyke Messinger,** with earnings generally growing faster than sales. "That's because we have adopted lean manufacturing principles, and as a result of that, we really haven't added employment. Employment has been steady over that period of time." Messinger says that some new jobs have been added, but better processes and streamlined product lines are enabling Power Curbers to grow without commensurate levels of employment growth. That byproduct of lean certainly doesn't solve the workforce shortages that exist across industry, but, as in the case of Power Curbers, can make growth objectives more manageable.

> "In order to be a competitive manufacturer in the United States that pays its people very well and has great benefits… you have to be extremely focused on being an efficient or lean manufacturer."
>
> Dyke Messinger, CEO, Power Curbers

That's not to say that lean is used to cut workforces. Lean companies often guarantee (sometimes explicitly, sometimes not) that an employee's efforts to improve a process won't result in the employee losing his or her job. Why else would an employee be driven to improve? SMMs also find that as operations become more efficient, the firm can redistribute workers into new areas, keeping staff employed and growing a cross-functional workforce in the process. Ideally, new business fills freed-up capacity and available workers' time. "In order to be a competitive manufacturer in the United States that pays its people very well and has great benefits, all those things that used to be commonplace in this country… you have to be extremely focused on being an efficient or lean manufacturer," says Messinger.

Aspect Medical Systems in Newton, Mass., exemplifies the far-reaching operational benefits of lean for SMMs. Aspect produces innovative brain monitoring technologies. The company won a Shingo Prize award in 2006 based on its pursuit of operational excellence and the application of lean techniques throughout the organization. Because of lean, product cost of goods were reduced by more than 50 percent on products that generate greater than 70 percent of revenue, rework rates improved by 81 percent, scrap was reduced by 37 percent and customer service measures improved by 80 percent.[xv]

2. Innovating Through New Products

Lean and other state-of-the-art improvement approaches enable SMMs to innovate *how* they do what they do, the processes and operations. But you must not forget to innovate the *who* and *what*. A culture of innovation should permeate within the company, fostered by CEOs rewarding innovative ideas and risk-takers — those always on the lookout for new products, new market opportunities, *i.e.,* an old product applied in an innovative way, and new ways of doing business.

While most SMMs are launched by a specific product or line of products, eventually they need to reinvigorate those products and/or thoroughly reinvent the business (which is more common then you might think). Given their smaller markets and larger competitors, SMMs are uniquely dependent on innovation for survival.

"One of the things that American companies, large and small, have done for years, is American ingenuity; we do still create new

products," says Thomas Murphy, executive vice president of RSM McGladrey, Inc. "You need to figure out what your customers need before they know they need it. The entrepreneur is generally the person in the small and mid-sized company that is the true innovator. They have the creativity, the energy, the knowledge of what the extension of their existing product is, what the next product can be. Hopefully they're thinking that far ahead, because it will be ingenuity and new products that keep U.S. manufacturers in the lead."

Some manufacturers believe they can't compete against foreign competition. That's not the case for **James Knott**, president and founder of **Riverdale Mills Corp.**, Northbridge, Mass. In 1979, Knott bought a mill dating to 1852 and quickly set out manufacturing wire lobster traps. The business grew dramatically, as the exuberant Knott convinced the lobster trade to replace heavier wooden traps with his products.

Knott met some skepticism, but eventually the Riverdale Mills Aquamesh displaced as much as 90 percent of the old wooden traps used in North America. However, due to the longevity of the Riverdale Mills wire baskets and the gradual emergence of foreign competition, Knott faced an eroding market. Since he'd grown his wire operation using state-of-the-art equipment and computer technology, Knott began looking for all the other markets—agricultural fence, aquaculture, custom fences, land management, wire-wall fences (such as those in prisons), and cooling towers—for which he could make products. Lobster traps, which once accounted for 100 percent of Riverdale Mills products, now make up just 30 percent. One-fourth of Riverdale Mills products are shipped overseas.

Market expansion and new products were an obvious solution, according to Knott. "What you have to do is figure out what you can do," he says. For example, Riverdale hasn't pursued the backyard-fencing market because it's been cornered by Chinese manufacturers. Even without that, Knott says there are still many untapped markets. "We can use the same equipment and the same technical resources to make products that are used where the market is," he explains. "The trick is if you're capable of manufacturing something, you just have to look for those areas in which you can make money."

For **Al-jon** in Ottumwa, Iowa, a manufacturer of heavy-duty scrap-processing and solid-waste equipment, Europe was an area where it could make money, but not without first revising the size of its massive scrap-processing equipment. Many of their machines sold in the United States are 45 feet long and weigh up to 126,000 pounds, which is the legal limit in the United States but too big for small European communities. So while Al-jon hasn't reinvented its wheel, it has tweaked it with redesign, finding new customers and operating benefits as well—by shrinking the machines, they can be shipped via container rather than bulk freight or on vessels, cutting costs considerably.[xvi]

3. Innovating by Smart Use of Government Programs

Tapping into federal and state programs and procurement is a third way to get your company into new markets. This includes not only outright sales to government but also taking advantage of the research and advanced technology grants that are available to help you realize your potential. Collaboration with governments is an ingredient for some companies in giving them a stronger role in the value chain.

The NIST Manufacturing Extension centers have worked extensively with companies on lean over the last decade, but recognized that process improvements and cost savings were necessary but not sufficient for long-term competition in the global economy. So

Richards Industries Goes Lean

Richards Industries, with revenues of $26 million and 120 employees, is a maker of a variety of industrial valves for the chemical, petrochemical, pharmaceutical and food processing industries. Richards' revenues have increased more than 20 percent per year for the last three years, but the company faced ambitious growth targets: It needed to add $9 million in new sales (excluding acquisitions) over the next 3 years.

Richards benefited considerably from implementing lean since 1999. Building on that, 15 Richards employees participated in a *Eureka! Winning Ways* session in November 2006. Richards' staff and MEP identified multiple growth ideas and decided to focus on their Jordan Valve line of pressure regulators, temperature regulators and pneumatic and electric control valves. Sales of its sanitary valve line had languished, but the product had great potential for growth, given the emergence of the biotech markets. The company decided to pull out the sanitary valve line, rename it Steriflow, and develop it as a stand-alone line with its own product manager, product logo, identity and focus.

Since introducing its new product line, the company has doubled the revenues for the Steriflow segment of the business and is currently booking more than $250,000 in revenues per month. Steriflow is the fastest-growing product line for Richards. Moreover, other ideas from the session are now being fed into a pipeline for the company, creating a culture of continuous innovation.

NIST MEP launched a new growth services product line—Eureka! Winning Ways—in the spring of 2007 that provides a proven, structured process for helping companies grow with respect to new products, new markets and new sales. The service helps companies think about opportunities for growth, narrows those ideas down to the few most likely to succeed based on research and supports the company as they explore feasibility and implement the most promising ideas. Most importantly, it creates a renewable process for generating new ideas that can be explored and implemented over time.

Although SMMs sometimes struggle with how to fund innovation and new product development, there are numerous methods (see sidebar on Minnesota Wire & Cable), such as SBA grant programs: Small Business Innovation Research (SBIR) encourages small businesses (fewer than 500 employees) to explore and profit from their technological potential. SBIR awards are based on small business qualification, degree of innovation, technical merit and future market potential. Similarly, the Small Business Technology Transfer Program (STTR) expands funding opportunities for innovation research and development, particularly expansion of public/private partnerships between small business and non-profit research institutions. STTR reserves a specific percentage of federal R&D funding for awards to small business and non-profit research institution partners.[xvii]

For example, the Department of Defense (DoD) SBIR and STTR programs fund $1 bil-

Federal Grants Drive an Innovation Engine

Many SMMs rely solely on earnings power to drive innovation. That strategy does work for thousands of companies, but ignores the funds available through government programs. Minnesota Wire & Cable Company (MWCC) and CEO and chairman Paul Wagner, on the other hand, are keenly aware of government resources. MWCC has received $3.2 million worth of federal grants—eight Small Business Innovation Research and Broad Agency Announcement grants.

The St. Paul, Minn., company has succeeded on nearly half of its grant bids and gains valuable expertise in the funding process, win or lose. The grants enable MWCC to hire high-end talent that makes innovating and commercializing technologies faster and more efficient. "I have drunk the Kool-Aid, and I will never go back to after-tax-profits driving my R&D budgets," says Wagner.

Wagner says it's unfortunate other SMMs don't leverage their distinct advantages in securing such grants. "How do the small, medium-size guys compete? They're faster. They're more aggressive. If they're smart and they understand their resource allocations, they can use that as a means to have a competitive separation from somebody bigger than them. But they've got to be willing to act. They've got to be willing to get educated. They have to be able to be smart about their resource allocation, not to get over their tips" (*e.g.,* to bid a project competitively in order to complete it profitably and still be able to service other existing and emerging business).

There's a perception among some small companies that the federal grant process is just too difficult and not worth the time. Wagner quickly counters, "If anybody is going to take 150 grand out of your pocket, you ought to make it a little difficult. Come on."

Wagner estimates that about one-tenth of the 400 to 500 government projects that come out quarterly are applicable to his firm. His team reviews that list, determines which ones make sense and then talks with government project leaders (it's a requirement that those individuals are available to discuss the projects). MWCC also follows up when bids are lost as a way to better understand the parameters for the next project, since it may be the same government group putting another project out to bid. Many bidders ignore opportunities to talk about projects, notes Wagner. "The vast majority of people, the guys that are in the know, have confirmed to me that rarely do people pick up the phone and call these guys," he says.

Wagner is proud of the innovations MWCC has provided the defense industry. And in the process MWCC has grown corporate capabilities, such as a culture as a high-end development house for the wire and cable industry, and potential product commercializations (a key component to winning bids in the first place). MWCC innovations include:

- *Stretchy wire:* Potential for patent protection and production and/or licensing into products such as wearable computers and portable electronic devices.
- *Smart wire:* Early warning system for wire faults, such as in aging aircraft.
- *Live wire integrity:* Developed for tactical aviation and a prognostic health monitoring system; potential commercialization in transportation, medical and building markets.

Wagner founded the Defense Alliance of Minnesota to expand Minnesota's defense industry job base (2,400 members and 255 companies). He says many states don't have the infrastructure to help SMMs get grants, but Minnesota has been good at helping SMMs, as have Texas, California and Virginia. But it's still up to SMMs to take advantage. "If you jump in the game and you win one, you're going to be a better company afterward," encourages Wagner.

lion each year in early-stage R&D projects at small technology companies. The DoD SBIR program provides up to $850,000 in early-stage R&D funding directly to small technology companies (or individual entrepreneurs who form a company), while the DoD STTR program provides up to $850,000 in early-stage R&D funding directly to small companies working cooperatively with researchers at universities and other research institutions. Small companies retain the intellectual property rights to technologies they develop under the programs and the DoD claims that "the process is streamlined and user-friendly."[xviii]

4. Innovating with Sustainable Manufacturing

The interest in products that reduce pollution and energy use is growing, along with concerns over global climate change and greenhouse gases. Forward-looking companies are searching for ways improve current products and processes and tap into the public's new "green" priorities. Manufacturers who respond to this new interest with innovative products and processes will be ahead of the curve and see their businesses grow. Larger companies are increasingly expecting their SMM suppliers to produce parts using the three green principles of reduce, reuse and recycle.

SMMs have an advantage because they are often nimble in responding to market shifts. The CEO of multibillion-dollar chemical conglomerate Huntsman Corp. says it's easier to engage small companies as suppliers in creating formulations for the green market. "We can work with large companies and it will take a year to change the mindsets about these long-held formulations," says Peter Hunstman. "But we are seeing an explosion taking place with the smaller operations that make end-use products for consumers."[xix]

SMMs are being pushed by large companies such as Procter & Gamble, General Motors, Toyota, United Technologies, Caterpillar and Whirlpool to join the green movement. Toyota views environmental stewardship as not only good citizenship but also good business. Toyota recognizes the environmental impacts beyond its own facilities and encourages and supports its 500 parts and materials suppliers' efforts to protect the environment as part of its Green Supplier Guidelines. For example, 98 percent of its North American suppliers have become ISO 14001 certified as a requirement to supply Toyota. Toyota also requires suppliers to eliminate the use of 450 toxic chemicals through its global chemical ban list, and requires compliance systems for the handling and transportation of hazardous materials.[xx]

Automakers are also taking steps to reduce their greenhouse gas emissions by developing entire new vehicles, and they will need a different supply chain to support them. For example, General Motors has announced that it will build a family of electric vehicles and the company is looking to suppliers to innovate and develop the batteries that will run these vehicles.

Green among SMMs isn't just about products and markets but also about innovative processes and philosophies. **Marlyn Nutraceuticals**, a Phoenix-based manufacturer of enzyme supplements, was named the Arizona Association of Industries' (AAI) "Small Manufacturer of the Year."

"Marlyn's global earth philosophy and day-to-day operations display their commitment to environmentally friendly production," says James Tunnell, AAI vice president of policy and operations. The design of Marlyn's plant incorporates technological features that conserve energy, such as solar panels to heat water, a NASA-developed ceramic-roof coating to protect against excessive heat and a non-freon air conditioning system. Marlyn does not use chemical solvents or drying agents in the production

of its tablets and sanitizes the plant using environmentally friendly bio-cleaners.

SMMs looking for assistance in going green can turn to the Green Suppliers Network, a joint effort of the U.S. Environmental Protection Agency and the NIST Manufacturing Extension Partnership. The Green Suppliers Network works with larger manufacturers to engage suppliers in low-cost technical reviews to identify strategies for improving process lines and using materials more efficiently. Network success stories include:

- **Metalworks**, a small, family-owned company that manufactures metal filing cabinets and employs 300 in northern Michigan, was able to reduce its water use by more than 16 million gallons a year and trim the amount of chemicals added to its parts-washing process by 20 percent by utilizing the network's Lean and Clean Advantage program.
- **Har-Conn**, an independently owned metal-finishing company, had a Green Suppliers Network Review team identify improvements that can save the company up to $425,000 annually.
- **Sermatech Connecticut**, a small manufacturer specializing in developing and applying high-performance protective coatings, had Lean and Clean experts review a surface coating process line that sprayed helicopter rotor hubs; experts identified opportunities that could save Sermatech more than $1 million.[xxi]

What are the opportunities for improvement and innovation for your company?

U.S. Aerospace Manufacturers Seek Green Suppliers

United Technologies Corporation (UTC) is a diversified company whose products include Carrier heating, air conditioning and refrigeration; Hamilton Sundstrand aerospace systems and industrial products; Otis elevators and escalators; Pratt & Whitney aircraft engines; Sikorsky helicopters; UTC Fire & Security systems; and UTC Power fuel cells and cooling, heating and power solutions. UTC's aerospace customers include governments, aircraft manufacturers and airlines. Its government aerospace customers include both military and civil departments in dozens of countries, including all branches of the U.S. military and NASA.

UTC's supply chain includes more than 50,000 suppliers, with which it spends more than $24 billion a year. Its sourcing decisions to date have been based on a supplier's ability to provide high-quality, best-value products. In 2007, UTC launched a new four-year program to reduce greenhouse gas emissions by 12 percent, water consumption by 10 percent and non-recyclable waste by 30 percent, all on an absolute basis as compared to 2006. It expects its suppliers to follow suit and is expanding its expectation for its suppliers in the areas of environment and health and safety (EH&S). UTC has set five EH&S expectations for their largest suppliers with the greatest EH&S risk. UTC expects all key suppliers to meet these expectations by 2010. The company has developed assessment and training tools for many of its suppliers, helping them plan and design their production processes to ensure environmentally sound operation, high-quality output and competitive cost structures.

The Challenge: A Skilled Workforce

Amid a tight labor market, especially for manufacturers, SMMs are looking for new ways to hire, develop, reward and retain the workforces necessary to compete in new value-chain paradigms. SMMs can and do look for outside assistance and government support in this endeavor, but ultimately, it's up to you to establish the best workforces possible. You have no choice if you want to keep up with a world on the move.

SMMs face a tangled series of workforce challenges:

- Attracting new entry-level and skilled employees;
- Training existing workers so they stay on top of the technology curve;
- Replacing the knowledge skilled workers have when they retire; and
- Handling the competition for your skilled workers from customers, competitors and even smaller companies further down the supply chain.

Manufacturing jobs are changing dramatically, requiring advanced technical and interpersonal skills to support our growing industries and value-chain requirements, but SMM executives see many potential hires lacking the most basic employment skills. Finding the right person for the right job is major responsibility for SMM executives. **Hannes Hunschofsky**, president of **Hoerbiger Corporation of America** in Houston, Texas, says, "I spend nearly 50 percent of my time in human resources and recruiting. Our company is expanding, and finding these skilled workers is among my highest priorities." A few decades ago, manufacturing employees could find a good job with a high school diploma or less; today, most need at least a two-year degree.

This recruiting dilemma is made worse by common misperceptions and outdated images of manufacturing that don't accurately depict life in today's state-of-the-art production facilities. The result? While the SMM economy employs more than 8 million people[xxii], companies are in a perpetual search for skilled manufacturing workers who can perform in the more sophisticated workplace environments of today's manufacturing.

An overwhelming majority of NAM manufacturers (81 percent) face a moderate to severe shortage of qualified workers, with 90 percent reporting a moderate to severe shortage of skilled production employees.[xxiii] Manufacturing talent for many industries, such as tool-and-die, is especially hard to find, and a study by RSM McGladrey, Inc., finds that manufacturers and distribution centers desperately need to fill *all* types of positions such as engineers, CNC machinists, manufacturing technicians, IT personnel, salespeople and warehouse staff. Filling all these positions is critical to strengthening manufacturing value chains, and there is little "breathing room" for manufacturers who need to focus on both filling these jobs now and building a pipeline of skilled workers for the future.

About 7 million skilled manufacturing workers in the baby boomer generation will retire over the next decade, meaning that just keeping a savvy workforce will become more challenging than ever before. Erick Ajax of E.J. Ajax & Sons says, "I will lose more than half of my employees to retirement in the next five to seven years — people who have been with my company for decades.

This is an amazing amount of knowledge leaving our organization and replacing them is mission critical for us."

Some manufacturers say their biggest challenge is finding skilled workers who can step in and start work right away. Others have a bigger problem finding entry-level workers. **Collie Hutter** at **Click Bond** notes, "The thing that scares me the most is that the applications coming in from high school students are incomprehensible. They can't even fill out an application. We have to educate them on basic skills, not just on technology."

A quick review of employment numbers explains the shortage: The U.S. unemployment rate through June was a seasonally adjusted 4.5 percent, with quarterly averages for 2007 unchanged from 2006. For manufacturing, unemployment was 4 percent in June 2007, compared to 3.8 in June 2006 (not seasonally adjusted).[xxiv] CEO **Miles** of **Miles Fiberglass & Composites** asserts that in the Portland, Ore, area, a recent unemployment rate of around 5 percent is the functional equivalent of full employment.

Because it is hard to find the right employees in a full employment situation, Miles has reached out to the public workforce system in Clackamas County and became chairman of the group's Workforce Investment Council.[xxv] The council is reaching out to teachers "and getting students more engaged with what's going on in business and what it takes to be a good employee, down into the grade-school level." The intent of this outreach is to help students better understand what is required of them personally and educationally when they go to work. By starting with the schools, manufacturers are being proactive in influencing educational curricula that creates the future workers they'll need. And by working with students, they are helping them realize the exciting jobs waiting for them if they graduate with the right educational background.

"The thing that scares me the most is that the applications coming in from high school students are incomprehensible. They can't even fill out an application. We have to educate them on basic skills, not just on technology."

Collie Hutter, COO, Click Bond

In addition to the requisite technical skills, SMMs need to develop employees who possess:

- *Interpersonal skills* that enable frontline workers to communicate with and understand customers and suppliers. For

Table 2. Annual Training per Employee

	U.S. plants	Parent company less than $1 billion	Parent company $1 billion or more
Fewer than 8 hours	29.0%	32.9%	11.7%
8-20 hours	38.0%	39.1%	33.8%
21-40 hours	23.2%	19.5%	38.6%
More than 40 hours	9.8%	8.5%	15.9%

*Source: IndustryWeek/*Manufacturing Performance Institute 2006 Census of Manufacturers.

example, if a plant is delivering line-side to a customer every half-hour, line associates are responsible for reacting to and communicating delivery problems. Experience shows that many of today's young people grew up focused primarily on online communications, where personal interaction is nil. It's emerging as a growing problem for workforces that require face-to-face interaction.

- *Problem-solving skills,* including the use of PDCA (plan, do, check, adjust) and the scientific method. While it's difficult to get rid of firefighting mentalities that Band-Aid problems (especially among supervisors), the ability to uncover and eliminate root causes of production problems is crucial.
- *Teaming skills,* which are increasingly necessary as production associates manage work cells and lines as groups. SMM employees must also collaborate with value-chain partner teams for product development, logistics/transportation, quality, etc.
- *Leadership skills* that are required to support changing strategic and management paradigms. As the command-and-control model becomes a relic of the past, leaders at all levels are being asked to be teachers, coaches and mentors.

Just as SMMs lag behind larger firms in continuous-improvement efforts, they also trail larger enterprises in workforce development. For example, more than half of large-company U.S. plants train each plant employee more than 20 hours annually, but only 28 percent of SMM plants train at those levels. Conversely, 33 percent of SMM plants train each employee fewer than 8 hours annually versus just 12 percent of larger enterprises that train at such low levels (see Table 2).[xxvi] If you're training your workforce less than 8 hours annually, as one-third of SMMs are, can you really expect your workforce to be capable of competing on a global basis?

These are demanding times for SMMs: Too little skilled talent is available, yet even more skills are now required. And, as we'll see next, customers aren't making it any easier for SMMs—or their employees—either.

The Opportunity: Build a High-Skilled Workforce

SMMs who pay attention to recruiting, hiring and worker development programs, often with outside partners, develop a deep talent pool, from entry-level workers to executives, that brings them a competitive advantage. An agile workforce will help your SMM business fend off challenges and leverage opportunities.

Finding, hiring and retaining the workforce for tomorrow's value-chain needs is well within reach of most SMMs—if you plan ahead. Even as workforce shortages make it difficult to find skilled workers, successful SMMs are developing their own talent. This requires that you bring the same process and rigor you use in your operations to developing talent, assessing the current state of your workforce to fill skills gaps, and promoting continuous educational improvement and lifelong learning.

SMMs who actively pursue their own skilled workforce plan find that the benefits are worth the effort: success in retaining employees, better innovative ideas, higher profitability and quality and a continuous improvement atmosphere throughout the organization.

There are different levels of engagement:

- *Take a Look*—Not every SMM has the same workforce needs. Speak with your workers, managers and team leaders so that you can determine the skills to be developed that best serve your company's objectives.
- *Go Deep*—Savvy SMMs know what they'll need to assess the entire organization's capabilities, starting at the warehouse door and moving to the top with a leadership succession plan.
- *Seed the Field*—There's not enough talent to meet the demands of SMMs, from operators to skilled positions. And while companies will always compete for talent, manufacturers are now banding together in regional, state and local collaborations to develop their own talent, change perceptions of manufacturing, and attract workers through apprenticeships and internships.
- *Invest Now or Pay Later*—Many studies estimate that the cost to replace an existing employee is as high as 100 percent of the worker's salary. What do you think real costs are of losing your intellectual capital, relationships with customers, organizational knowledge, process expertise, etc.? Retaining talent is a challenge that requires a commitment to human capital development. Successful SMMs realize that even the best money won't hold an employee who believes that his or her learning and advancement opportunities have stagnated. Minnesota-based E.J. Ajax provides 100 hours of training a year for every employee in the company and devotes more than 5 percent of payroll for this purpose every year.

Human-capital management approaches differ from company to company. But the first step for SMMs is understanding where they are so they can improve. The *SMM Human Capital Success Matrix* on page 44 will help you benchmark your human resource strategies and plan for the future.

This matrix highlights the eight strategic areas for a well-thought-out, competitive human resource strategy: hard and soft skills, training, wages, benefits, organizational culture, human resource policies and return on investment. See where your company stands in creating a modern workplace and workforce. As you go from left to right, you

can see where you should be on the continuum of good company practices.

Some SMMs expand on these external matrix strategies in ways that are unique to their companies and industries:

- Establishing internships for high school and community college students builds a pipeline of young people. They get to see what today's manufacturing is really like and you get to assess the best ones.
- Participating in job fairs with other local employers, offering new hires a 90-day job training program to get them up and running.
- Turning to technology when skilled workers can't be found. A Texas SMM has created an "electronic engineer" and is using more and more robots. They have put much of their knowledge into a software program that less skilled engineers operate.
- Publicizing your industry in local publications. When a group of Florida manufacturers did this, they were flooded with inquiries.
- Helping start a local charter high school geared toward industry with career ladders built into the curriculum. One SMM helped found a charter school with ladders for manufacturing, construction, health care and automotive.
- Working with manufacturers in your state to get skills back into the high schools. In California, manufacturers have started a "Get Real" campaign to do just that. It would require every high school graduate to have two years of foundational technical education.

Building the workforce of tomorrow isn't just about HR infrastructure and training—it's about culture, too. And while SMMs are often family-owned, they're also on the forefront of throwing out those old-fashioned command-and-control leadership structures and implementing work teams with responsibility for production and decision-making. This is especially true in organizations pursuing lean manufacturing and similar strategies, where a premium is put on an employee's ability to problem-solve.

Forty-two percent of world-class manufacturing plants that have made significant progress toward or have achieved world-class status have the majority of their workforces participating in empowered or self-directed teams. In fact, 15 percent of world-class plants have *all employees* in self-directed or empowered teams (see Table 4 on page 45). An RSM McGladrey study also indicates that more than half of manufacturers have high-performing teams in place or in process and another quarter of manufacturers plan to put them in place.

E.J. Ajax provides 100 hours of training a year for every employee in the company and devotes more than 5 percent of payroll for this purpose every year.

Teaming is necessary to succeed. An RSM McGladrey study describes the value manufacturers see in teams and how they are putting them in place to create flexible workplaces.[xxvii]

However, even top-notch technicians won't necessarily be an ideal fit in your workplace, if they don't have the right "soft skills." Teaming and group activities, such as those required in the cellular layouts of lean, require interpersonal skills and communication capabilities. **Mary Andringa** of **Vermeer** says her company does a significant amount of training across the company to supplement the skills among new hires and when implementing new processes. "Everyone will receive at least 25 hours of training per year," she says. "That's an average. Some people [get] much more than that. In addition to that, many

Table 3. SMM Human Capital Success Matrix

	Bottom	Mediocre	Good	Excellent
Technical Skills Required or Developed	Minimum skills. No formal job descriptions or requirements.	Skills defined per job description and sought based on description.	Skills per job description and some one-up/one-down job understanding, based on value-stream importance.	Skills per job description combined with one-up/one-down job understanding; apprenticeship/intern programs in place; ability to teach technical skills.
Business/ Soft Skills Required or Developed	None.	Company-specific HR fundamentals, *i.e.,* how to work within the company.	Company-specific HR fundamentals; business/ financial fundamentals; teaming; problem-solving.	Company-specific HR fundamentals; business/ financial fundamentals; teaming; problem-solving; lean expertise.
Training	None.	"About the company" and HR basics.	Technical training to stay current; teaming and problem-solving; training necessary for advancement; business basics.	Education reimbursements; lean skills; technical; teaming and problem-solving; training for advancement; business basics.
Wages	Low-wage region/ industry.	Some benchmarking of wages, but usually to find lowest acceptable wages.	Competitive wages supplemented with some bonus/gainsharing.	Region/industry leader; bonus/gainsharing for individual, teams, and/or companywide; employee-ownership options.
Benefits	No benefits.	Employee-paid health plan.	Employer-contributed health plan; dental and/or eye.	Employer-contributed health plan; dental, eye; health-and-wellness programs and facilities.
Culture	Command-and-control; heavy firefighting.	Command-and-control; heavy firefighting; maybe low-level work teams.	Operator and cross-functional teaming; back-and-forth dialogue between workforce and management; joint problem-solving.	Enlightened management and ingrained problem-solving culture; managers and supervisors are coaches, mentors and teachers.
HR Structure	No meaningful HR programs and/or employee-enhancing practices in place; likely no HR function.	HR function in place, primarily for benefits administration.	Formal HR programs for recruiting, hiring, development; detailed job descriptions and required competencies and/or certifications.	HR programs for recruiting, hiring, development; corporate workforce events/ rewards; community/ charity initiatives.
ROI	High turnover and absenteeism, low quality and productivity; revolving door.	Moderate turnover and absenteeism; troubles with quality and productivity.	Stable, engaged workforce; support continuous improvement; good quality and productivity.	Stable, engaged workforce; drives continuous improvement; world-class metrics; employees recruit new employees.

of our employees are involved in cross-training, and that's probably another 50 hours."

When recruiting employees, Andringa says it's more important today than in the past to carefully screen candidates "to make sure that they either have the skills or we believe (they) can easily acquire those skills when they come in." Vermeer works with community colleges across the state and in nearby states to find and develop employees, and has established internship programs that together employ about 35 interns at Vermeer, of which half are engineers. Internships are also used in Vermeer's welding and machine shops, two areas that have been hard to staff at firms across the country.

"But there is definitely a skills gap which is getting wider and wider for professionals and skilled labor," warns Andringa. "It's a challenge to find design engineers, machinists and techs in both those areas, engineering techs and machinist techs. It's also a real challenge to find really good, experienced, continuous improvement or lean people."

Bison Gear & Engineering Corporation in St. Charles, Ill., has teamed up with other manufacturing, government and education leaders to develop a 12-week, 140-course-hour training program designed to counter skilled-labor shortages. The company is promoting the training program as an option for everyone from manufacturers to retired workers to high school graduates. The program—which includes learning shop math, blueprint reading, use of hand tools, safety skills, employment/life skills, quality improvement and business success fundamentals—will enable those completing it to seek an entry-level position at one of the approximately dozen organizations participating in this sector workforce development initiative.[xxviii]

While the efforts of SMMs such as Vermeer and Bison set the pace for their industries, they're leading a race that's been slowed nationally by a dearth of skilled workers. Most of today's manufacturing jobs require some type of education beyond high school, and many potential new hires lack the types of skills needed for even an entry-level job in manufacturing. That's why successful SMMs are leveraging partnerships to find new hires, train existing staff and generally expand the pool of qualified workers in their areas. Across the country many collaborative efforts are underway, such as:

- *Competency Development*—Led by the Corporation for Manufacturing Excellence (Manex), the California Future Workforce Development Project helps students in high school and college to develop the competencies necessary for future entry-level positions in the electronics, metals

Table 4. Production Workforce in Empowered or Self-Directed Teams

	U.S. plants	Significant progress or achieved world-class	No progress toward world-class
0 percent	27.4%	13.6%	51.8%
1-25 percent	37.4%	27.6%	33.5%
26-50 percent	12.4%	26.9%	5.9%
51-75 percent	7.8%	14.0%	2.9%
76-99 percent	6.1%	12.8%	1.8%
100 percent	8.9%	15.2%	4.1%

Source: IndustryWeek/ Manufacturing Performance Institute 2006 Census of Manufacturers.

and plastics industries. The project also assists companies in training current employees. By partnering with federal, state and local agencies, the project partners offer programs to train and develop manufacturing workers. Manex and its partners have received a grant from the U.S. Department of Commerce's Future Workforce Development Program, which pays for most of the program's services.[xxix] A manufacturing competencies framework has also been developed by the U.S. Department of Labor Employment and Training Administration to help guide training providers to better understand the competencies needed for modern manufacturing and to open a dialogue between manufacturers, schools and employees regarding what it takes to work in manufacturing today.[xxx] This framework will enhance the training efforts between manufacturers, manufacturing organizations, education providers and One-Stop Career Centers*, and will provide a roadmap for training and developing workers throughout their manufacturing careers. The NAM's Manufacturing Institute/Center for Workforce Success partnered with the Labor Department to reach out to manufacturers, especially SMMs.

- *High-Tech in High School*—The non-profit SEMI Foundation sponsors the High Tech U program, which encourages high school students to pursue math- and science-based careers. High Tech U consists of a three-day curriculum that demonstrates semiconductor manufacturing concepts and discusses educational pathways and career planning. A teacher-targeted program, High Tech U Teacher Edition, reinforces the student program by providing teachers with a curriculum and teaching materials. High Tech U is built on a partnership among the semiconductor industry, local secondary schools, higher learning institutions and the parents of children attending the program. Sponsoring companies provide financial support, teaching venues, help with curriculum development and teaching assistance. Since 2001, 46 programs have been delivered to more than 1,200 students and more than 300 teachers in the United States and Singapore. Through teacher course curriculum integration, the program has reached nearly 25,000 students.

- *Creative Job and Skills Matching*—Across the country, manufacturing organizations are helping SMMs connect job seekers with employers in need. At the local level, MAGNET, a NIST manufacturing extension partnership (MEP) center in Cleveland, Ohio, is leading a regional Dream It. Do It. campaign to raise awareness of the outstanding careers in manufacturing and to connect interested individuals to employers. As part of Dream It. Do It., they recently launched JobMagnet.org, a Web site that uses spider technology to collect manufacturing job openings from job boards, employer Web sites, recruiting and staffing sites, and newspapers and niche sites. Students and job seekers can look for jobs and post résumés, while manufacturers registered with the site can list their open positions and search the site's résumés.[xxxi] At a national level, the NAM Manufacturing Institute/Center for Workforce Success offers a specialized service to connect manufacturers to veterans leaving military service. These

* *One-Stop Career Centers are locally based, publicly funded centers to help match job seekers with employment opportunities.*

veterans have just the types of skills manufacturers are looking for: technical skills, strong work ethic, desire to learn and an understanding of leadership.[xxxii]

- *Partnerships for Funding and Action*—Acting as a "workforce intermediary," the South Florida Manufacturers Association (SFMA) educates its members on the availability of public training funds open to all counties in South Florida—Incumbent Worker Training, Employed Worker Training and Quick-Response Training grants—and has assisted member companies with grant applications and training opportunities. More than $860,000 of public training funds have been awarded to SFMA members to train upwards of 2,600 employees. Partnerships such as this among multiple workforce stakeholders—community colleges, employer organizations, unions, community-based organizations, economic developers, the public workforce system and employers—are important to the success of workforce training initiatives. Workforce development, especially within specific industry sectors, is now understood as integral to economic development and business competitiveness. Partnerships that include all stakeholders, whether at the city, region, state or national levels, can ensure that our workforce has the skills it needs for the high-wage, high-skill jobs of today and that America maintains it economic competitiveness. Many grants are available for initiatives such as "sector workforce development" from state governments and workforce investment boards (WIBs), national foundations such as the Ford Foundation or local foundations. For more information, visit www.nam.org/workforcepartnerships.
- *Business Champions*—CEOs around the country are mobilizing and amplifying their "business voices" in support of higher education that is more closely aligned with the needs of the current and future workforces. These business leaders, under the leadership of the NAM and The Manufacturing Institute, work with policymakers, legislators, higher education officials and employers in their regions and states to improve the workforce development capacity of community colleges. Examples of their efforts include Elizabeth Abraham, CEO of Top Tool, hosting Hennepin Technical College president and staff at her workplace and speaking with the Minnesota Higher Education System Trustees on workforce issues; Mike Smeltzer, CEO of the Manufacturers Association of South Central Pennsylvania, speaking before the Michigan and Pennsylvania Community College Presidents and Trustees; Sandy Westlund-Deenihan, president of Quality Float Works, writing an op-ed on the skilled workforce crisis for the *Chicago Business Ledger;* and Vermeer's CEO Mary Andringa, talking to the National Council of State Legislators about how to develop policy and legislation that promotes a better American workforce.
- *Dream It. Do It. Manufacturing Careers Campaign*—In order to make manufacturing a preferred career choice by 2010, the NAM's Manufacturing Institute/Center for Workforce Success is reaching out to young adults, their parents, educators, communities and policymakers to promote manufacturing's future and its careers. The campaign forms strong and committed regional and state coalitions that include local civic, political, education and business entities. It has a focused awareness campaign and a Web site highlighting today's manufacturing careers. Currently, the campaign is underway in ten regions

around the country including Kansas City, Mo.; Northeast Ohio; Nebraska; Puget Sound, Wash.; Southwest Virginia; North Central Texas; Will County, Ill.; Southeast Indiana; Greater Phoenix; and the Commonwealth of Virginia. For more information, visit www.dreamit-doit.com.

At the heart of all these initiatives stands the manufacturer. Few know this better than **Ronald Boles**, president of **General & Automotive Machine Shop**, Huntsville, Ala., a 60-year-old auto parts manufacturing and remanufacturing company (started by Boles' father). For the last 25 years, Boles has been heavily involved in his local school systems, technical schools and two-year colleges, talking about manufacturing and his company.

"I serve in an advisory capacity on all those [schools and colleges] and I've given field trip tours through my operation every year to all of them."

Ronald Boles, president,
General & Automotive Machine Shop

"I serve in an advisory capacity on all those and I've given field trip tours through my operation every year to all of them," he says. "And for that reason, I've had a terrific relationship with the instructors and the presidents or heads of those institutions." Boles adds that those relationships have provided his firm "first pick" of the local candidates.

But despite his own workforce success, Boles is concerned about the tremendous workforce issues facing the rest of Huntsville, the birthplace of NASA and a world leader in missile defense. He says hundreds of new job openings are on the way and that the region needs a system to generate quality employees. To that end, Boles has begun encouraging workforce development and Dream It. Do It. throughout the area, first at a local level and eventually out to 23 counties (tens of thousands drive into Huntsville each day, many from up to 70 miles away). Boles explains to manufacturers and civic organizations how to get behind the program, but it's ultimately up to owners and executives to step up: "They have got to be willing not only to put up some money, but put a little skin in the game. They have got to put their time into it."

As companies develop their skilled workforce pipelines, certificates of skill acquisition have become more important to both employers and job seekers—sometimes in combination with and sometimes in lieu of traditional academic credentials. Manufacturers want to make sure that employees are certified as "work ready" and have the knowledge, skills and abilities needed to work in their facilities. Employees want certificates to prove they have the competencies desired by employers. Too often these days, a high school diploma no longer ensures that workers have even basic workplace skills.

In light of this interest, certificates of accomplishment such as the WorkKeys system, the MSSC Certified Production Technician certificate and NIMS (National Institute of Metalworking Skills) credentials are now being used to determine work and skill readiness by acknowledging accomplishments in math, technology, engineering, problem-solving, analysis, blueprint reading and basic learning-how-to-learn skills. Sometimes certificates are granted by community colleges and technical schools, but certificates can also be awarded by business associations and training providers. MEPs can also provide credentials in disciplines such as lean manufacturing and Six Sigma, so there are myriad ways manufacturers can provide valuable credentialed and certified training to their employees.

What do you imagine or hope your workforce will look like tomorrow? And what are you doing today to make that a reality?

The Challenge: Identifying the Right Financing

Doing business in the global value chain increases the level of complexity in all aspects of the company, including financing. The environment for securing capital to finance operations and growth is no longer as easy as filling out a loan application or placing a call to your neighborhood banker. SMMs should look to a wider range of financing sources to grow.

Financing has become more complicated as many different alternatives are now available as a means of securing capital for working capital investments, new product development, growth initiatives, new machinery, technology, exporting and other international activities. The complexity of financial instruments has also increased significantly as investors work diligently to protect their investments and mitigate risks.

As SMMs seek new sources of financing, the challenges, as well as the rewards, increase disproportionately in the global value chain. The recent RSM McGladrey 2007 *Manufacturing and Wholesale Distribution National Survey* reports that one of the leading barriers to pursing international growth is the inability to obtain suitable financing. As the value chain expands around the globe, the risk associated with unanticipated losses rises substantially. The variables affecting the chain are numerous, including: different languages and cultures, lack of expertise, adverse weather, geopolitical concerns and information technology inequities.

These variables increase the risk associated with participation in the global value chain. Investors and lenders require carefully developed strategies as well as annual business plans to ensure that their investments are protected and the risk of losses is minimized. More often than not, bankers will require specific experience in foreign countries and established business relationships before even considering setting up some sort of loan program.

Also contributing to the challenge is the high level of involvement in the global value chain. With so many countries and companies playing a role, those SMMs who have the experience and savvy to have already gotten involved in the global economy are the ones investors and banks are more willing to finance since they are already established and pose a lower risk.

Table 5. Top Three Reasons for Not Participating in Government Programs

Reason	Number of Times Cited
Not familiar with these programs	294
Not interested in government involvement	196
Not sure how to get started	187

Respondents were permitted to choose more than one reason for not participating.
Source: RSM McGladrey, *Manufacturing and Wholesale Distribution National Survey,* 2007

Two Companies That Harnessed New Financing Tools

SMMs around the country are finding that new financing tools from the federal government and their own state government are helpful in growing their business in the value chain.

At Bison Gear & Engineering in Illinois, CEO Ron Bullock used the proceeds from an industrial revenue bond to build a new plant and buy equipment. He also tapped a state of Illinois training grant and received a small business innovation research (SBIR) grant (through the National Science Foundation) to conduct research on new motor technology. "On the training grants, our state trade association helped lead the way and it was their grant writing people on the association staff that helped us," Bullock says. "Getting the SBIR grant on our own was more complicated, but but now that we have moved up the learning curve, we plan to make additional targeted research proposals to augment our Innovation Center's research program." He notes that many states are coming up with matching grants for companies that receive an SBIR. In Illinois, the state government would give as much as $50,000 to match an SBIR grant of $100,000.

Pacific Plastics & Engineering in California has utilized similar financing. Chairman and CEO Stephanie Harkness says, "We received grant money from the state for worker training and were assisted in filing it by a grant writer who specializes in employment training grants." She says that her company is also applying for a federal Trade Adjustment Assistance grant that's part of a "transformational pilot program for the supply chain in the innovation corridor in California."

The 2007 McGladrey survey demonstrated that SMMs often overlook some of the best financing options available, especially in the federal tax and program areas. In that survey, 15 percent of companies with less than $15 million in annual revenue report that they use no tax credits for programs that would increase their cashflow and resources for investment. This indicates smaller companies may be less likely to employ tax credits than larger companies.

State and federal government programs are another underused source for SMM financing, as shown below. In the same McGladrey survey, only about one-third of the 947 respondents said their companies make use of state or federal government programs. While some companies have become adept at tapping these sources—one company reported using government funding in 14 different instances—most SMMs are not availing themselves of this resource. Interestingly, among SMMs, smaller companies are slightly more likely to use these programs, probably because of the Small Business Administration's outreach program for companies with 500 or fewer employees.

The Opportunity: Finance the Future

Doing business globally and participating in the global value chain increases the level of complexity in all aspects of the company, including the financing piece. SMMs need to make investments based upon rigorous analysis to ensure that operational and financial strategies are synchronized for controlled growth and ready for the demands that today's value chains impose.

Funding of investments for new product development, global expansion, increased production, improved efficiencies, lean programs, and workforce retention, recruiting and training, which are key aspects of today's value chains, require SMMs to consider a wide range of financing alternatives from maximization of internal cash flow to undertaking debt to consideration of outside investors.

With capital being a scarce resource in today's competitive environment, key investments need to be high impact. They should, for example:

- Generate revenue growth through new product innovations and new market penetration particularly in foreign countries;
- Control costs through lean, energy conservation and other efficiencies; and
- Provide streams of cash for rapid payback of investments and to provide the funding for additional investments.

SMMs doing business globally need to recognize that U.S. common law, state laws and the Uniform Commercial Code make doing business domestically easier and provide protections for the company and their financing partners that often don't exist in foreign countries.

Doing business abroad is based on relationships. Initial transactions are rarely, if ever, completed based on an open line of credit. If an SMM plans to begin exporting, he or she needs to require 100 percent payment upfront or have the buyer provide a Letter of Credit (LC) to ensure the payment is received since a trusting business relationship has not been established. An open line of credit is rarely put in place until having done business for several years without ever missing a beat.

If an SMM is sourcing materials, components or products from foreign companies or through foreign-based contract manufacturers, it's typically working with companies it has established relationships with over several years. This is key to ensure quality requirements, product specifications and delivery schedules are met.

When it comes to the financing of global receivables, there are alternatives. LC's are used extensively and have some added cost, but they virtually guarantee payment as long as the proper documents are filed with the bank issuing the LC's. Another very reasonable alternative is to use the Export Import Bank, which will guarantee a major portion of global accounts receivable. Insurance that provides great protection can be purchased but is one of the higher cost alternatives. **Kristy Schloss**, president and CEO of Colorado-based **Schloss Engineered Equipment** reports, "Ex-Im was very helpful. We were exporting to Jordan at a time when it wasn't the most stable place to be. We received financing and backup from them. Ex-Im was there for us and helped us through the process. I think they are very effective and we should get the word out about them more."

Realizing the risk associated with doing business globally is higher than domestic

risk, commercial banks are in the position of being able to require specific conditions before they will finance accounts receivable or inventory abroad. Ron Bullock, chairman and CEO of **Bison Gear & Engineering,** says, "I think the financing of your export receivables is a challenge with your domestic bank. We had to get credit insurance to have those receivables included in our borrowing base." If SMMs can't meet those conditions, they need to provide the banker with a comfort level that the SMM is protected and then in turn the bank is protected. Comfort is reached through advance payments, LC's or a long history of timely payments from foreign customers.

If SMMs desire to invest in hard assets, such as plant and equipment in another country, they will need to look at financing alternatives besides their commercial bank. U.S.-based banks will rarely loan money for capital investments in a foreign country because they don't know that country, the regulatory requirements and the applicable laws. They may be willing to lend some short-term money, but any term debt will require you to have an established relationship with a bank in the destination country. "On our first overseas investment, which was in India, we established a relationship with an accounting firm and a legal firm in Bangalore," indicates **Stephanie Harkness,** chairman and CEO of California-based **Pacific Plastics & Engineering.** "These firms provided the introductions to fairly large India based banks, who then worked with our bank, and together they came up with the financing. We had the relationships in place first, before we put the financing in place," says Harkness.

These conditions for lending not only apply to trade in the Asia Pacific countries, Central America, South America, Russia and Eastern Europe, but also in Western Europe. One way of handling European trade is to establish a subsidiary in the United Kingdom and handle the financing through UK banks. Germany is another possibility where an SMM could set up a subsidiary and partner with a bank that is "in country."

"A financing entity should be helping you to protect yourself. Since you haven't done business globally and established the trusted relationships needed to do business in foreign countries, you need to work with others that know the traps and sinkholes which are out there."

Tim Sammond, vice president of commercial banking, Associated Bank

"Those SMMs that are not wanting to do business globally because it is too difficult and complex haven't worked with the right professionals" says **Tim Sammond,** vice president of commercial banking for **Associated Bank** (a Midwest-based bank focused on mid-market companies). "A financing entity should be helping you to protect yourself. Since you haven't done business globally previously and established the trusted relationships needed to do business in specific foreign countries, you need to work with others that know the traps and sinkholes which are out there."

It would be a simpler world if SMMs could sit back and watch their equipment continue to stamp out products for their markets just like the old days. But the reality is that SMMs must invest to modernize processes and equipment to keep pace with competition around the globe—and they must do so in a strategic context that allows them to differentiate their products.

For example, Marlin Steel Wire in Baltimore, Md., used to produce hand-weld wire

baskets for bagel shops, but that niche business was being devoured by offshore competition. CEO Drew Greenblatt invested more than $1 million in robotic welding and bending machines, and Marlin Steel Wire began making industrial baskets to exacting specifications for clients such as Toyota, Boeing and Pfizer. Sales are nearly four times what they were at the time of the market switch.

Good times and expanding markets also can trigger the need for investment. In these circumstances, manufacturers need to be especially careful in evaluating their funding options. A piece of that decision will be how, or if, they intend to keep growing. Some SMM owners choose to cease operations and seek the most lucrative means to end their roles in the business, either through succession planning, transfer of ownership in part or whole, or sale of the business. Those decisions will impact funding options for the remaining company.

In addition, SMMs should rely on sound financial counsel to review the funding sources applicable to their unique business circumstance, looking for the best possible

Influx of Cash and Expertise

Al-jon Inc., is an Ottumwa, Iowa, manufacturer of heavy-duty scrap-processing and solid-waste equipment, such as the devices that turn automobiles into bales of metal or that clear a swath through a mammoth landfill. Al-jon recently opened a new 40,000-square-foot facility, doubling capacity for the firm. The physical expansion was the culmination of a thorough search for investment and business knowledge for the rapidly growing firm by CEO Kendig Kneen, who recognized a need for new skills to take the company from its current $30 million in revenues to $150 million.

Kneen looked for investment partners to facilitate immediate expansion as well as create an opportunity for his father and brother to take equity out of the company. "It's tough taking cash out of a small manufacturing company," notes Kneen. "If you don't continually reinvest in yourself, you die."

In assessing opportunities, Kneen says there was plenty of money, but he wanted more than "somebody who's willing to write a check." He also was looking for someone who would help the company through a transition to lean manufacturing processes, expansion, redesigning its service distribution and a number of other objectives identified prior to the investor search.

Al-jon finally came to terms with Republic Financial Corp. and its private equity group, which, in addition to providing the influx of cash, has been instrumental in helping Kneen work through a strategic planning process and other growth challenges by offering a deep bench of experienced executives.

"They cause you to think, they cause you to go through a process that a small manufacturer isn't used to going through because [SMMs] make so many decisions off their gut rather than through a long, strategic planning process," says Kneen. "They appeared to me to be somebody that could bring the expertise I needed, and in fact, they have proven themselves to be just that."

tax and regulatory scenarios available, such as:

- *Conventional financing/debt financing*—the use of borrowed money in exchange for debt securities or a note has always been a cornerstone of SMM financing.
- *Public equity*—taking an SMM public is a time-consuming and fairly expensive process, but one that can provide significant amounts of capital.
- *Private equity/venture capital*—relinquishing a healthy piece of corporate ownership is not for all SMMs, but for those business owners who find the right venture partner, fast growth and/or the ability to get money out of the company are attractive options.

Where will you find the capital to grow? How will you ensure it's the right strategy?

Conclusion: A Matrix That Matters

SMMs can thrive amid new value-chain paradigms. You'll need to embed your SMM within the operations of suppliers and customers; with that familiarity comes stability, as customers rely on your SMM value-added services and shared resources, intellectual property and assets.

On the sell-side, relationships will naturally progress to where SMMs get first access to customer contacts, markets, processes and improvement tactics (you're no longer a commodity player). On the buy-side, your suppliers receive the same benefits in return for improved pricing, enhanced products (high quality, right product, right time, right container, etc.) and direct access to supplier value-add services. Isn't this the type of firm you'd want to lead?

The SMM Value-Chain Matrix on page 56 will help you assess your current state of value-chain effectiveness and point you toward steps that can help achieve value-chain excellence.

The improved productivity and performance of an efficient value chain—made stronger by SMMs embracing broader, value-adding roles and new partners as described throughout this booklet—will ultimately enable both top-line (revenues) and bottom-line (profit margins) growth via—

- increased inventory turns and improved cash flow;
- greater worker productivity (while also improving worker safety and job satisfaction);
- increased capacity without facilities investment (more production volume occurring in a smaller footprint);
- breakthrough leaps via new process and technology innovations;
- business growth from new product markets, new geographic markets and new customers in existing markets; and
- lasting corporate "partnering" relationships.

While there are challenges and risks to accepting an expanded role for your SMM in value chains here and abroad, the only real obstacle that will prevent your firm from capturing value-chain success is a lack of vision—or commitment.

What does your value-chain future look like? More importantly, where in the world will you, as the leader, take it tomorrow?

Table 6. SMM Value-Chain Matrix

	Weak Link	Commodity Link	Emerging Link	Partner Link
With Suppliers				
Current Situation	No leverage. No consistent purchasing habits, *i.e.,* unable to leverage supplier consolidation.	Consistent procurement habits, but focused on price. Not receiving any value-add from suppliers.	Supplier certification and rationalization in place. Long-term agreements and growing value-add (*e.g.,* vendor-owned inventories, just-in-time deliveries).	Company and suppliers work in unison as partners. Long-term agreements allow open sharing of resources, intellectual property, assets, etc.
Buy-Side Benefits	No benefits.	Low pricing but unsure of "total cost" of procurement.	Logistics benefits apparent; collaborative benefits emerging; total costs clearer.	Access to tools, talents and ideas beyond four walls of company; total costs clearer and dropping.
Buy-Side Next Steps	Standardize procurement; seek to understand total costs.	Begin conversations with core suppliers about their value-add offerings.	Reward supply-base for margin-improving support; expand their role.	Strengthen and expand partnerships.
With Customers				
Current Situation	No consistent sales patterns; low customer retention.	Good delivery performance to stable base of customers, but commodity-based and no value-added offered.	Expanding product offering with basic value-add (*e.g.,* just-in-time service, product-design participation).	"Partner" relationship with core customers; customers rely on company resources, IP and assets.
Sell-Side Benefits	No benefits.	Revenues improving, but margin improvements mostly come through internal efforts (not market efforts).	Increasing margins as customers rely on value-add services; expanding credibility with customers and market.	Access to customers' markets and customers; higher margins for value-add service; long-term agreements provide financial stability.
Sell-Side Next Steps	Communicate with customer base; seek to clearly identify customer demands.	Improve operations to efficiently delight customers on cost, quality, delivery—ask, "What else?"	Apply any resources available to help customers' solve their problems; work to become critical ally.	Strengthen and expand partnerships.

Partners To Enhance Your Success In the Value Chain

Organizations and programs available to help SMMs compete more effectively in today's value chains include:

Manufacturing and Business Development

Manufacturing Extension Partnership (MEP) Program—The National Institute of Standards and Technology's (NIST) Manufacturing Extension Partnership program is a nationwide network of centers in nearly 350 locations providing technical assistance and business support services to SMMs to enhance growth, improve productivity and expand capacity. MEP centers—staffed by specialists with experience on manufacturing floors and in plant operations—work with companies willing to invest in their future, to make improvements in the short term and position themselves to be stronger long-term competitors both domestically and internationally. As a federal-state-private partnership, the network makes it possible for even the smallest companies to tap into the expertise of knowledgeable manufacturing and business specialists all over the United States. Over the past 17 years, the MEP program has assisted more than 330,000 firms, delivering $1.3 billion in cost savings annually and $6.25 billion in increased or retained sales in one year, based on an independent follow-up with clients served. (www.mep.nist.gov)

National Association of Manufacturers (NAM)—The NAM's mission is to advocate on behalf of its members to enhance the competitiveness of manufacturers by shaping a legislative and regulatory environment conducive to U.S. economic growth and to increase understanding among policymakers, the media and the general public about the vital role of manufacturing in America's economic and national security for today and in the future. The NAM is:

- The leading advocate of a pro-growth, pro-manufacturing agenda;
- A partner in reinforcing the legislative and regulatory activities of its member firms; and
- A primary source for information on manufacturers' contributions to innovation and productivity. (www.nam.org)

Office of Manufacturing and Services (MAS)—This unit of the International Trade Administration (ITA) is dedicated to enhancing the global competitiveness of U.S. industry, expanding its market access and increasing its exports. MAS industry experts and economists perform strategic research and analysis in order to shape and implement trade policy, create conditions that encourage innovation, lower the cost of doing business and promote U.S. economic growth. (www.trade.gov/mas)

Small Business Administration—The U.S. Small Business Administration is an independent agency of the federal government to aid, counsel, assist and protect the interests of small business concerns, to preserve free competitive enterprise and to maintain and strengthen the overall economy of our nation. The SBA helps Americans start, build and grow businesses. Through an extensive network of field offices and partnerships with public and private organizations, SBA delivers its services to people throughout the United States, Puerto Rico, the U. S. Virgin Islands and Guam. (www.sba.gov)

PRO-Net—The SBA's PRO-Net was integrated with the Defense Department's Central Contractor Registration (CCR) database. Together they serve as an electronic gateway of procurement information for and about small businesses that serves as a search engine for contracting officers, a marketing tool for small firms and an Internet-based database of information on more than 180,000 small, disadvantaged, 8(a) and women-owned businesses.(www.ccr.gov)

Global Sales and Competition

Export.gov—This portal helps SMMs learn how to export, provides information about major markets such as China or the Middle East and provides answers to questions about tariffs and logistics. (www.export.gov)

Commercial Service and Export Assistance Center—The U.S. Commercial Service is the trade promotion arm of the ITA. The Commercial Service has 108 offices located throughout the country and 150 around the world, covering 96 percent of U.S. export markets. Its Web-based services are provided through Export.gov, where you can locate a U.S. Export Assistance Center, a network of export and industry specialists located in more than 100 U.S. cities and more than 80 countries worldwide who provide counseling and a variety of products and services to assist small and mid-size U.S. businesses in exporting their products and services. (www.export.gov)

Customized Market Analysis (CMA)—This custom-tailored research service provides U.S. firms with specific information on marketing and foreign representation for individual products in particular markets. Interviews or surveys are conducted to determine the overall marketability of the product, key competitors, prices of comparable products, customary distribution and promotion practices, trade barriers, possible business partners and applicable trade events. (www.export.gov)

Import Administration—ITA's Import Administration is the agency's lead unit on enforcing trade laws and agreements to prevent unfairly traded imports and to safeguard jobs and the competitive strength of American industry. From working to resolve disputes to implementing measures when violations are found, Import Administration is there to protect U.S. companies from unfair trade practices. (www.trade.gov/ia)

The U.S. Export-Import Bank—The Export-Import Bank (Ex-Im Bank) has a renewed focus on working with small companies and has devoted considerable resources to making ExIm products and services more available to small businesses, including trade advisors who specifically address small business needs. Information on this and other U.S. export services can be found at www.exim.gov/smallbiz/index.html.

A list of Ex-Im small business specialists (with phone numbers) both in Washington D.C., and around the country can be found at www.exim.gov/contact/SmBizSpecialists.cfm.

In addition, Ex-Im online is a new, interactive, Web-based process that now allows exporters, brokers and financial institutions to transact with Ex-Im Bank electronically: www.exim.gov/news/exim_online_spl.cfm.

Workforce Development

The Manufacturing Institute and Center for Workforce Success (MI/CWS) is the 501c (3) research and educational affiliate of the NAM. The Manufacturing Institute builds intellectual support and raises understanding among policymakers, the media, educators and potential workers about manufacturing's contributions to the quality of American life, the challenges facing the sector and its excellent career opportunities. The Center for Workforce Success researches, designs, promotes and implements work-

force solutions for manufacturers in a global economy. The MI/CWS offers access to skilled workers, education on manufacturers' issues with decision-makers, involvement in making change happen locally, and research and best practices to keep manufacturers informed. Among its signature initiatives and publications are:

- *Business Champions for a Competitive Workforce*—Business Champions engage business leadership across the country to amplify the business voice in support of policies that expand educational opportunities at the post-secondary level to build a competitive U.S. workforce. (www.nam.org/workforce)
- *The Dream It. Do It. Manufacturing Careers Campaign*—Dream It. Do It. is a grassroots economic and workforce development initiative fostering growth, innovation and jobs for the next generation of American manufacturing talent. Dream It. Do It. builds entrepreneurial, regional alliances and provides youth-oriented awareness and education to prepare the next generation of skilled American manufacturing talent. (www.dreamit-doit.org)
- *Filling America's Jobs Series*—This series of how-to guides addresses the manufacturer's critical workforce issues: *Working with CEOs To Communicate the Importance of a Skilled Workforce in Sector Workforce Development; How Businesses Can Implement Sector Workforce Development Strategies for Jobs and Economic Growth; How Employer Associations Can Help Small Firms Be More Competitive by Improving the Productivity of Entry-Level Workers; How To Increase Supervisory Impact on Retention; A Guide for Public Workforce Professionals;* and *A Guide for Employers To Benefit from the Public Workforce System*. (www.nam.org/workforce)
- *The 2005 Skills Gap Report: A Survey of the American Manufacturing Workforce* (series)—The results of this survey have provided a picture of the broadening gap in the availability of skilled workers and the employee performance requirements of the 21st-century manufacturing. An updated skills gap survey is released every five years. (www.nam.org/workforce)
- *Improving Workplace Opportunities for Limited English-Speaking Workers*—This publication details good practice models for employers interested in providing training and career ladders for their limited English-speaking workers that strengthen their communities economically, socially and educationally. (www.nam.org/workforce)

Public Workforce Development

The WIRED Initiative (Workforce Innovation in Regional Economic Development)—This U.S. Department of Labor initiative stresses the critical role talent development plays in creating effective regional economic development strategies. WIRED goes beyond traditional strategies for worker preparation by bringing together state, local and federal entities; academic institutions (including K-12, community colleges and universities); investment groups; foundations; and business and industry to address the challenges associated with building a globally competitive and prepared workforce. The ultimate goal of WIRED is to expand employment and advancement opportunities for American workers and catalyze the creation of high-skill and high-wage jobs. The initiative provides regions with funding, ongoing technical assistance and support from a group of experts to implement a transformational approach to their workforce and economic development systems at the regional level. Individual grants are awarded through a

competitive grant solicitation. (www.doleta.gov/wired)

Workforce Investment Boards—The National Association of Workforce Investment Boards (NAWB) represents the interests of the nation's Workforce Investment Boards (WIBs). Across the country, more than 600 state and local WIBs are providing workforce development leadership in their communities. The business-led WIBs have the critical role of governance and oversight of the federal resources that support the operations of the national network of taxpayer-supported One-Stop Career Centers and federal training investments. Workforce Board membership consists of private sector businesses and employer representatives, working in concert with public sector representatives to design effective workforce development services for job seekers and employers alike. (www.nawb.org)

High Growth Job Training Initiative—This Department of Labor initiative is intended to grow industries with advanced manufacturing occupations, preparing workers to take advantage of new and increasing job opportunities in the high-growth, high-demand and economically vital sectors and industries of the U.S. economy. At the foundation of this initiative are partnerships that include the public workforce system, business and industry, education and training providers, and economic development authorities. Training programs are tailored to meet local workforce needs. (www.doleta.gov/BRG/JobTrainInitiative)

Community-Based Job Training Initiative—The purpose of this program is to improve the capabilities of the U.S. workforce through community-based job training grants, a new, employer-focused competitive grant program for training in community and technical colleges. Manufacturers work regionally to define parameters for retraining that can be implemented by community colleges. (www.doleta.gov/business/Community-BasedJobTrainingGrants.cfm)

Bureau of Apprenticeship and Training—Assists private industry in developing and improving apprenticeship and other training programs designed to provide the skilled workers needed to compete in today's global economy. (www.doleta.gov/OA/bat.cfm)

Operations Improvements and Lean

Lean Enterprise Institute (LEI)—This non-profit organization publishes books, workbooks and case studies; runs workshops and conferences; and conducts research that helps companies transform themselves into lean enterprises, based on the principles of the Toyota Business System. LEI also helps managers and executives develop the leadership behaviors that sustain lean enterprises. (www.lean.org)

Baldrige National Quality Program—The Baldrige Award is given by the President of the United States to businesses—manufacturing and service, small and large—and to education, health care and non-profit organizations that apply and are judged to be outstanding in seven areas: leadership; strategic planning; customer and market focus; measurement, analysis and knowledge management; human resource focus; process management; and results. It was established to recognize U.S. organizations for their achievements in quality and performance and to raise awareness about the importance of quality and performance excellence as a competitive edge. Three awards may be given annually in each of these categories: manufacturing, service, small business, education, health care and non-profit. (www.quality.nist.gov/)

Shingo Prize—"The Shingo Prize for Excellence in Manufacturing" is named for Japanese industrial engineer Shigeo Shingo, who distinguished himself as one of the world's

leading experts in improving manufacturing processes. Shingo has been described as an "engineering genius" who helped create and write about many aspects of the revolutionary manufacturing practices that comprise the renowned Toyota Production System. The Shingo Prize was established in 1988 to promote awareness of lean manufacturing concepts and recognize companies in the United States, Canada and Mexico that achieve world-class manufacturing status. (www.shingoprize.org)

Federal Government Funding

Grants.gov—This portal was established as a governmental resource to—

- improve the effectiveness and performance of federal financial assistance programs;
- simplify federal assistance application and reporting requirements;
- improve the delivery of services to the public; and
- facilitate greater coordination among those responsible for delivering the services.

Today, Grants.gov is a central storehouse for information on more than 1,000 grant programs and access to approximately $400 billion in annual awards. By registering once on this site, your organization can apply for grants from 26 federal grant-making agencies. (www.grants.gov)

Small Business Innovation Research (SBIR)—SBIR is a program that encourages small businesses (fewer than 500 employees) to explore and profit from their technological potential. Because the risk and expense of conducting serious R&D efforts are often beyond the means of small businesses, SBIR funds the start-up and development stages of entrepreneurial companies and encourages commercialization of technology, product or service in order to stimulate the U.S. economy. Eleven federal agencies and departments are required to set aside a portion of their R&D funds for SBIR. SBIR awards are based on small business qualification, degree of innovation, technical merit and future market potential. (www.sba.gov/aboutsba/sbaprograms/sbir)

Small Business Technology Transfer Program (STTR)—STTR expands funding opportunities for innovation research and development, particularly expansion of public/private partnerships between small business and non-profit research institutions. STTR reserves a specific percentage of federal R&D funding for awards to small business and non-profit research institution partners. STTR combines the strengths of both entities by introducing entrepreneurial skills into high-tech research efforts and then transferring technologies and products from the laboratory to the marketplace. Each year, five federal departments and agencies are required by STTR to reserve a portion of their R&D funds for awards to small business/non-profit research institution partnerships, which then move through a three-phase program of joint public/private development. (www.sba.gov/aboutsba/sbaprograms/sbir)

Basic 7(a) Loan Guaranty—This program serves as the SBA's primary business loan program to help qualified small businesses obtain financing when they might not be eligible for business loans through normal lending channels. The program is delivered through commercial banks. (www.sba.gov/financing)

504 Certified Development Company (CDC) Loan Program—This program provides long-term, fixed-rate financing for small businesses to acquire real estate or machinery or equipment for expansion or modernization. Typically, a 504 project includes a loan secured from a private sector lender with a senior lien, a loan secured from a CDC (funded by a 100 percent SBA-guaranteed debenture) with a junior lien

covering up to 40 percent of the total cost and a contribution of at least 10 percent equity from the borrower. CDCs are private, non-profit corporations set up to contribute to the economic development of their regions. (www.sba.gov/financing)

Export Express—This program combines the SBA's lending assistance with its technical assistance to help small businesses that have exporting potential but need funds to buy or produce goods or to provide services. (www.sba.gov/services/financialassistance/SpecialPurposeLoans/exportexpress)

Export Working Capital Program (EWCP)—Supports export financing for small businesses when that financing is not otherwise available on reasonable terms. The EWCP is a combined effort of the SBA and the Export-Import Bank of the United States. (www.sba.gov/services/financialassistance/SpecialPurposeLoans/ewcp)

Green Practices

Green Suppliers Network—This joint effort of the U.S. Environmental Protection Agency (EPA) and the NIST Manufacturing Extension Partnership, a program of the U.S. Department of Commerce, works with larger manufacturers to engage suppliers in low-cost technical reviews to identify strategies for improving process lines and using materials more efficiently. (www.greensuppliers.gov)

Small Business Environmental Home Page—This EPA-sponsored Web site will help small businesses access environmental compliance and pollution prevention information. (www.smallbiz-enviroweb.org)

Suppliers Partnership for the Environment—This partnership of the EPA and NIST MEP centers makes available environmental management tools, best practices and lessons learned based on the experience of OEMs and tier-one suppliers in the automotive supply chain. (www.supplierspartnership.org)

Industrial Technologies Program—This Department of Energy program works with U.S. industry to improve industrial energy efficiency and environmental performance, and invests in high-risk, high-value R&D to reduce industrial energy use. It also provides information to manufacturers on energy efficiency and renewable energy best practices. (www.eere.energy.gov/industry)

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