



Advancing U.S. Manufacturing

Solutions to critical challenges including attracting a skilled workforce, strengthening supply chains, and supporting technology and innovation

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Thank you to the experts across the MEP National Network whose work inspired this document.

Introduction

Our nation's economic stability relies on a strong manufacturing sector – one that generates jobs, fosters innovation, and drives economic growth. Because small and medium-sized manufacturers (SMMs) make up a large proportion of U.S. firms, their success is essential to a robust manufacturing ecosystem.

A strong U.S. manufacturing sector benefits everyone:

Jobs. The sector offers employment opportunities across a wide range of education and skill levels. Manufacturing jobs pay competitive wages, contributing to individual and family well-being.

Innovation and competitiveness. Manufacturing drives innovation and technological advancements that shape other industries. The industry plays a critical role in international trade, strengthening the country's trade balance and global competitiveness.

National security. A strong domestic manufacturing sector is vital to U.S. national security, ensuring secure supply chains, and the availability of critical goods and technologies.

U.S. manufacturing continues to face challenges in the wake of the COVID-19 pandemic.

These challenges include:

A national manufacturing workforce crisis with far-reaching economic implications

Supply chain vulnerabilities that extend beyond economic risks to include national security and citizen well-being

Technology-related deficiencies and constraints, posing threats to national security and America's competitiveness in the global marketplace

Solving these complex challenges won't be easy.

Smaller manufacturers play a crucial role in the broader manufacturing ecosystem and finding solutions that meet their unique needs will contribute to a more robust and prosperous U.S. economy.

The MEP National Network can help.



Manufacturing is critical to the U.S. economy

Manufacturing remains important to the U.S. economy. There are nearly 358,000 manufacturing plants that provide nearly [13 million jobs](#). According to the Bureau of Labor Statistics, more than 99% of manufacturing plants have fewer than 500 employees, and nearly 75% employ fewer than 50.

Manufacturing is an important source of cutting-edge innovations that support technological, product, and process improvements that are key drivers of economic competitiveness. According to the [National Science Foundation](#), manufacturers are responsible for approximately 60% of all private sector research and development.

U.S. manufacturing is a global powerhouse. According to data from the World Economic Forum, the U.S. manufacturing sector is the second largest in the world, trailing only China. U.S. manufacturers account for more than 15% of total global manufacturing output and over half of all exports from the U.S. to the world.

The MEP National Network – tackling today’s manufacturing challenges

The [MEP National Network](#) (MEPNN), through its mission to strengthen and empower SMMs, is an essential contributor to the success of U.S. manufacturing. Having served SMMs for over 35 years, the MEPNN understands what it takes to engage the manufacturing ecosystem. MEP experts enable SMMs to respond to challenges – and opportunities.

As part of NIST MEP’s annual survey, we ask [MEP Center](#) manufacturing clients to identify the top three challenges their companies face over the next three years. We have received thousands of client responses, providing us with deep understanding of the current state of manufacturing and insight into where it’s going.

This knowledge helps guide our focus. In fact, the most pressing challenges identified in MEP client surveys over the past 10 years align with the MEPNN’s current strategic plan focus areas: workforce, supply chains, and technology and innovation.

This document highlights how manufacturing has changed over recent years, ways the MEP National Network works to strengthen and empower U.S. manufacturing, and what you can do to help your company – and the manufacturing industry – thrive in the global economy.

Narrowing the Workforce Gap



A look at the challenges

From 2000-2017, the number of manufacturing jobs fell by five million. When the COVID-19 national emergency was declared in March 2020, employment fell by over 1.1 million. After that, manufacturing employment rebounded, eventually exceeding pre-pandemic numbers.

Now manufacturers are dealing with a highly competitive labor market, making it increasingly difficult to find skilled talent. Manufacturers face workforce challenges such as:

- **Aging workforce:** A wave of retirements as baby boomers reach retirement age means fewer people available to work, and a significant loss of institutional knowledge.
- **Skills gap:** There is a gap between the advanced technical skills needed for modern manufacturing technologies and the skills of the available workforce.
- **Perception and image:** Young job seekers may not consider manufacturing as an attractive career option due to outdated stereotypes and misconceptions about the industry's work environment, career growth opportunities and technological advancements.
- **Globalization and offshoring:** When manufacturing jobs moved overseas, it resulted in a loss of skills and expertise in the domestic workforce. This has resulted in a long-term negative impact on the nation's ability to compete in advanced manufacturing sectors.

These problems aren't going away. Based on a [Manufacturing Institute and Deloitte study](#), the National Association of Manufacturers estimates that manufacturers will need to fill 4.6 million jobs by 2028.

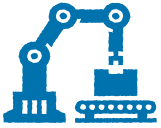
5% of the existing workforce is already beyond retirement age and an additional 20% will reach retirement age in the next decade.

Modern manufacturing

Modern manufacturing offers well-paying jobs and interesting career paths. According to [BEA data](#), average annual compensation per employee in the manufacturing sector was \$98,846 in 2022, higher than the \$83,992 average across all private non-farming sectors..

Manufacturers impact the U.S. economy directly by providing millions of well-paying jobs that support thousands of families across the country. But the impact goes far beyond that – manufacturing supports millions of additional jobs across a variety of other industries. For example, every chemical manufacturing job supports three additional jobs in other sectors, according to Chmura Economics & Analytics JobsEQ.

Manufacturing Jobs



What MEP is doing

Employee recruitment and retention are the greatest challenges facing MEP manufacturing clients according to results of NIST MEP's annual manufacturing client survey. These concerns have heightened during the COVID-19 pandemic and subsequent workforce disruptions. The market forces driving these challenges are not likely to improve soon.

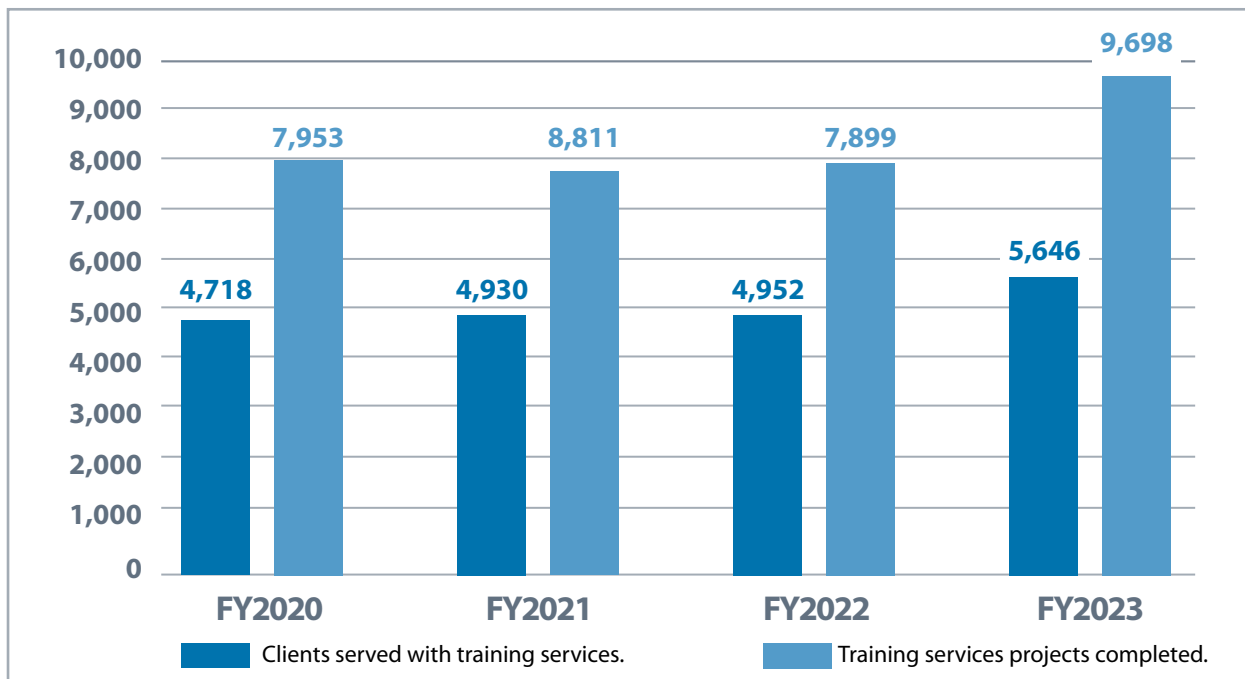
The MEP National Network is focused on narrowing the workforce gap and helping manufacturers build a future talent pipeline through:

Workforce assessments and planning. MEP Centers conduct workforce assessments to identify skills gaps and future workforce needs in the manufacturing sector. Based on these assessments, they help manufacturers develop workforce plans and strategies to address skill shortages, attract talent, and retain skilled employees.

Training and skill development. MEP Centers provide training programs and skill development opportunities for the manufacturing workforce. They also collaborate with local workforce development organizations, educational institutions, and industry partners to deliver comprehensive training solutions. These programs focus on enhancing technical skills, fostering innovation, and promoting best practices in manufacturing. To learn about training available in your state, visit our [workforce training interactive map](#).



Workforce Projects



Source: MEP

Apprenticeship programs. MEP Centers work with employers to develop and implement apprenticeship programs that provide on-the-job training and mentorship to individuals interested in pursuing careers in manufacturing. These programs combine classroom instruction with practical work experience, helping individuals acquire the necessary skills while earning a wage.

Career pathway development. MEP Centers assist in creating career pathways within the manufacturing industry. They work with educational institutions to align curriculum with industry needs, develop industry-recognized credentials, and provide guidance on career advancement opportunities within the manufacturing sector.

Collaboration with educational institutions. MEP Centers collaborate with colleges, universities, and technical and trade schools to develop manufacturing-focused educational programs and certifications. They work to align educational curricula with industry requirements, ensuring that graduates possess the skills needed to thrive in the manufacturing workforce.

Engagement with underrepresented groups. MEP Centers actively engage with women, minorities, veterans, transitioning military, refugees, and other underrepresented groups to promote manufacturing careers and provide resources for their entry into the industry. They collaborate with community organizations to create targeted outreach programs and support inclusion and diversity in the manufacturing workforce.

Workforce innovation. MEP Centers stay informed about emerging technologies and industry trends to help manufacturers adapt to changing workforce needs. They provide guidance on implementing innovative workforce practices, such as Industry 4.0 technologies, advanced manufacturing techniques, and digital skills development.

Since 2020, the MEP National Network has provided employee training for more than 20,000 manufacturing clients. Overall, including multiple trainings for the same manufacturer, the MEP National Network completed over 34,300 client training projects during fiscal years 2020-2023.

What you can do

Get involved with Manufacturing Day (MFG Day). MFG Day is the first Friday of October, with events continuing throughout the month. Manufacturers across the country open their doors to showcase the potential of modern manufacturing and foster interest in manufacturing careers. Organizations show the public what manufacturing really looks like through more than 3,000 events in each of the 50 states and Puerto Rico. More than 325,000 students, parents, and community members attend MFG Day events each year.



The rallying point for a growing movement, MFG Day empowers manufacturers to come together to address their collective challenges so they can help their communities and future generations thrive. The MEP National Network participates in MFG Day by hosting, coordinating and promoting events.

Whether you are a manufacturer, school or other organization that supports manufacturing, there are opportunities to get involved. You can contact your local MEP Center to learn more about events in your community.



MEPNN Workforce Success Story

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TechHelp is an integral partner for Idaho Forest Group's talent development and continuous improvement strategies. Preparing on-the-floor trainers to deliver standardized job-specific training enables new employees to learn tasks and build confidence faster, which helps improve retention. The project management resources shared by TechHelp have enabled our supervisors to plan, organize, and deliver on improvement initiatives, which impacts key performance indicators.

”

*– Marie Price, Director for
Training and Development*

The situation

From its Coeur d'Alene, Idaho, headquarters, Idaho Forest Group (IFG) is a closely held, family-owned company that is now one of America's largest lumber producers. The company has a capacity for over one billion board feet per year and markets around the globe. IFG is a growing company that values employees and has a reputation for high-quality products. IFG operates five sawmills and a finger-joint facility in northern Idaho, and an up-and-coming sawmill in Lumberton, Mississippi.

Over the past 10 years, several members of IFG's leadership team have collaborated with [TechHelp](#), part of the MEP National Network, to develop customized solutions for IFG's challenges. This has included working with IFG's Director for Training and Development, Corporate Controller and numerous mill superintendents.

When IFG recognized a need to introduce better training methods for new employees and effective tools for developing their future leaders, the company turned to TechHelp again.

The solution

TechHelp and IFG leadership developed a comprehensive approach to enabling IFG to meet their current and future workforce challenges. Courses were developed and deployed in mills located in four towns, as well as their corporate headquarters, to train new employees based on the proven training within industry methodology.

Technical employees were trained on fundamentals of project management as well as Lean Six Sigma tools, to ensure the successful rollout of new methods and equipment. Lean manufacturing training was also implemented into the leadership development program, to enable these concepts to be part of the culture of their future leaders.

Whenever possible, these courses were deployed in a workshop format where the participants were expected to bring their current challenges to the class and work on solutions as part of the course. These classes were also typically split into shorter time frames, enabling the students to work on implementing changes between class sessions and report back on their results.

Mitigating Supply Chain Vulnerabilities



A look at the challenges

In the 1970s and 1980s, U.S. manufacturers underwent a significant restructuring process. At first focusing on their core competencies, manufacturers aimed to streamline operations and allocate resources more efficiently. As part of this restructuring process, manufacturers began to rely more heavily on supply chains to meet their production needs.

As time went on, the focus of many companies shifted. Instead of emphasizing core competencies, companies concentrated on cutting costs and short-term financial performance. This led to a shift in supply chain strategies. Manufacturers increasingly outsourced parts of their supply chains to foreign suppliers. Outsourcing components of the supply chain enabled them to reduce expenses, improve efficiency, and gain a competitive edge through cost savings. It also provided access to global markets and resources.

However, this shift in supply chain strategy brought with it challenges and risks. Managing a complex and globally dispersed supply chain posed a significant challenge. Communication, logistics, and quality control became more difficult as companies had to coordinate with suppliers in different countries and ensure consistency across the supply chain. Outsourcing supply chain functions to foreign suppliers also introduced risks related to quality control, intellectual property protection, geopolitical factors and potential supply chain disruptions.

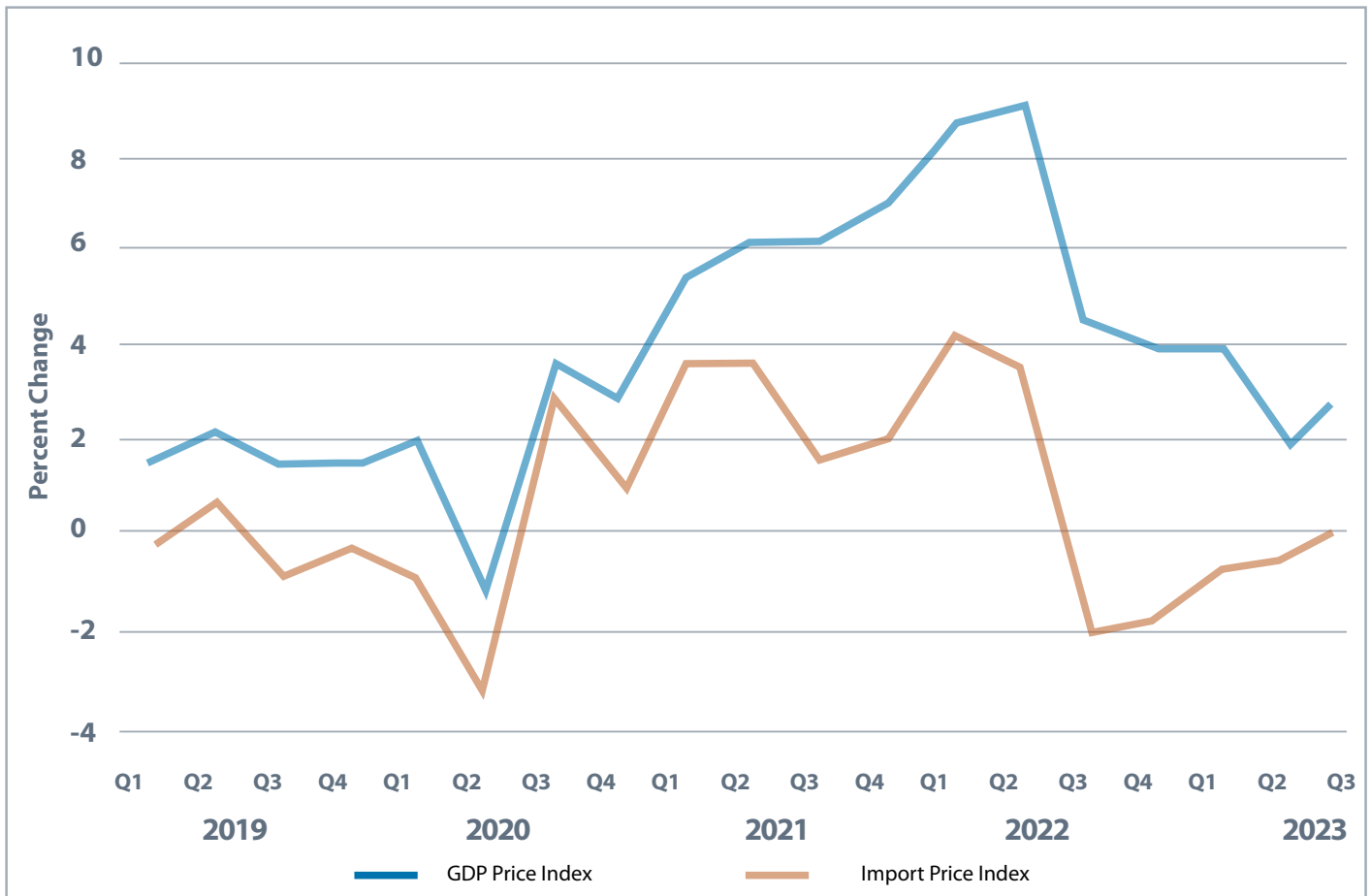
While outsourcing became more prevalent, many U.S. manufacturers maintained domestic production capabilities, especially for functions that require close proximity to customers, stringent quality control, or intellectual property protection.

The pandemic highlighted our vulnerabilities due to dependence on overseas industrial and consumer goods. The situation brought to light the many missing pieces – and gaping holes – across the U.S domestic manufacturing base. The pandemic also demonstrated how fragile many supply chains are.

According to the Manufacturers' Outlook Survey: First Quarter 2023 from the National Association of Manufacturers, over half of respondents listed supply chain as a primary business challenge.

The U.S. depends on a robust domestic supply chain. It's essential for enhancing industrial competitiveness, enabling economic growth, and strengthening national security. Reshoring established global supply chains is a significant obstacle to growing and restoring U.S. manufacturing. It will take time and effort.

Import Inflation Q1: 2019 - Q3: 2023




Source: Bureau of Economic Analysis and Bureau of Labor Statistics

Supply chain disruptions

According to data from IBISWorld, nearly a third of U.S. demand for manufactured goods is met by imports. Nearly half of a typical manufacturer’s purchased materials are imported – placing firms at great risk if global supply chains shut down. This risk poses a significant threat to the U.S. economy, public health, and national security.

The manufacturing industry faces critical domestic supply chain gaps. Manufacturers find resources spatially scattered, missing, and hard to find. Information about quality and performance is lacking. This impacts the entire manufacturing ecosystem – everything from capital and technology resources, to workforce training and other services that support a deep source of domestically produced industrial supplies.

Supply Chain Disruptions

 Natural disasters	 Cybersecurity
 Pandemics	 Production/quality issues
 Logistic difficulties	 Supply availability



What MEP is doing

Increasing supply chain visibility

As previously mentioned, the pandemic exposed vulnerabilities in domestic supply chains. This underscores the need for greater visibility and resilience. To address these challenges, the MEP National Network is enhancing its supply chain services and capabilities. One initiative establishes a National Supply Chain Optimization and Intelligence Network (SCOIN). SCOIN will expand existing MEPNN capabilities to provide national supply chain optimization services. It will also:

- Map the capabilities and interconnections within manufacturing supply chains.
- Scale-up and enhance the impact of supplier scouting services, which help organizations source domestic products and expand their capabilities.
- Enhance resilience and reduce supply chain vulnerabilities for manufacturers.
- Strengthen and revitalize regional manufacturing ecosystems.
- Connect original equipment manufacturers (OEMs) with SMMs.

SCOIN goes beyond simply connecting organizations with domestic suppliers – it seeks to optimize and strengthen the entire supply chain ecosystem. SCOIN will enable a more rigorous assessment and analysis of domestic manufacturing capabilities, allowing for a deeper understanding of the strengths, capacities, and potential areas of improvement within the U.S. supply base.

By leveraging the expertise and knowledge of each MEP Center, SCOIN will facilitate the expansion of local manufacturing ecosystems. It will not only focus on individual suppliers but also consider the broader context of regional manufacturing clusters and their interdependencies.

Through a data-driven approach, the MEP National Network will gather and analyze information on manufacturing capabilities, capacities and specialties across different regions. This comprehensive intelligence will enable a more informed decision-making process when it comes to supplier scouting and strategic sourcing. It will empower organizations to identify the right suppliers, assess their suitability, and make more effective decisions to strengthen their supply chains.

Strengthening the U.S. supply base will enhance the overall resilience of U.S. manufacturers. By expanding the domestic supply chain and reducing reliance on foreign sources, we will help to create a more robust and self-sufficient manufacturing ecosystem. This increased resilience will not only help address immediate challenges like disruptions and shortages, but also ensure long-term sustainability and competitiveness in the global marketplace.



Buy American

In 2021, The White House announced Executive Order (EO) 14005, called Executive Order on Ensuring the Future is Made in All of America by All American Workers. The intent of EO 14005 is to make sure the U.S. government, whenever possible, procures goods, products, materials, and services from sources that will help American businesses compete in strategic industries and help America's workers thrive.

The legislation states, *"To the extent appropriate and consistent with applicable law, agencies shall partner with the Hollings Manufacturing Extension Partnership (MEP), discussed in the Manufacturing Extension Partnership Improvement Act (title V of Public Law 114-329), to conduct supplier scouting in order to identify American companies, including small and medium-sized companies, that are able to produce goods, products, and materials in the United States that meet Federal procurement needs."*

Supplier scouting

To support domestic demand, strengthen U.S. supply chains, and respond to EO 14005, the MEP National Network expanded its supplier scouting services. The MEPNN's supplier scouting services are designed to help organizations find reliable, high-quality domestic suppliers for various goods and services. The search can be applied on a national, regional or local scale.

The Network's extensive relationships and knowledge of U.S. manufacturing plays a key role in supplier scouting efforts. We identify manufacturers with production and technical capabilities, and connect them with the more diverse supply chains of larger companies and government agencies. We also identify and connect suppliers with purchasers, responding to the specific needs of agencies to meet [Build America](#), [Buy America](#) [PDF] requirements.

The U.S. manufacturing industry has the capabilities and capacities to produce almost any item required by our nation's supply chains. The MEP National Network's supplier scouting service is a practical means to stimulate domestic manufacturing and enable the production of essential items within the U.S.

What you can do:

Use the MEPNN Supplier Scouting service. Companies in need of supply chain support should reach out to their [local MEP Center](#) for supplier scouting. Government agencies seeking assistance with supply chain needs can detail their specific requirements by completing the [Supplier Scouting Opportunity Synopsis form](#).

Once the form is submitted, NIST MEP disseminates the information to MEP Centers across all 50 states and Puerto Rico. This nationwide distribution ensures a comprehensive search for U.S. manufacturers with the necessary capabilities and business interests to meet the specified requirements. MEP Centers then conduct thorough research and analysis to identify potential suppliers that align with the stated needs. The results of the supplier search are compiled and summarized by NIST MEP. The final report is then provided to the organization that submitted the initial request for supplier scouting.

Typically, the MEPNN Supplier Scouting process takes 30-45 days. This time frame allows for a comprehensive search across the extensive network of MEP Centers and their connections within the manufacturing industry.

Make your product and capabilities known. MEP Centers across all states and Puerto Rico actively engage in gathering comprehensive information about local manufacturers, their products and their unique capabilities. MEP Centers use their extensive relationships in the manufacturing industry to facilitate this mapping process. They work closely with manufacturers to gather accurate, up-to-date information about their products, production capabilities, technological expertise, certifications, and any other relevant details. This collaborative approach ensures the completeness and accuracy of the cataloged information.

Manufacturer participation is vital to these efforts. Manufacturers can highlight production capabilities, specialized equipment, processes, or expertise in specific industries. Manufacturers can also share information about quality certifications, compliance with industry standards, and any other relevant qualifications. By doing so, manufacturers contribute to a comprehensive database where potential customers can find suitable suppliers. As a result, U.S. manufacturers increase their visibility and enhance their chances of being discovered by potential customers. This helps foster business opportunities and connections within the domestic supply chain.





If you are a U.S. manufacturer, contact your local [MEP Center](#) about your company's products and capabilities so potential customers can find you.

Consider reshoring or nearshoring: Reshoring refers to moving production back to the U.S., while nearshoring is moving manufacturing operations closer to the U.S. There are several reasons why companies may choose to reshore or nearshore their production:

Costs. While offshoring initially offers lower labor and production costs, factors such as rising wages, transportation expenses, and currency fluctuations can erode these cost advantages over time.

Quality control. Reshoring or nearshoring enables companies to have better oversight and direct monitoring of manufacturing processes, leading to improved product quality and reduced defects. It also ensures adherence to stricter quality standards and regulations in the home country.

Intellectual property protection. Protecting intellectual property rights can be more challenging in some offshore manufacturing locations. Reshoring or nearshoring mitigates the risk of intellectual property theft and unauthorized production of patented products.

Ultimately, the decision to reshore or nearshore production requires careful analysis of costs, market dynamics, supply chain considerations, and business strategy. It is a complex decision that should be evaluated based on the specific circumstances and objectives of each company.

You can use a free, online [total cost of ownership estimator](#) to account for all relevant factors – overhead, balance sheet, risks, corporate strategy, and other external, and internal business considerations – to determine the true total cost of ownership. Using this information, you can better evaluate sourcing, identify alternatives and even make a case when selling against offshore competitors.

MEPNN Supply Chain Success Story

Responding to the urgent need for medical supplies in the wake of Hurricane Ian

The situation

[FloridaMakes](#), part of the MEP National Network, received an urgent request in the aftermath of Hurricane Ian, which hit Florida as a Category 4 hurricane on Sept. 28, 2022. The storm destroyed buildings and roads, and left many people without power and water. The call to FloridaMakes came from CDR Maguire, a company that provides disaster health and medical services. They needed help locating defibrillators and related accessories, some likely hard to source, as they set up field hospitals in southwest Florida. The request was urgent – the items were needed within 48 hours to help evacuees in need of medical attention.

The solution

FloridaMakes immediately mobilized, despite having no power or internet. They reached out across the state and the country, using every available resource to locate the needed equipment. In less than a day, FloridaMakes received a flood of responses, including an introduction from the [Massachusetts MEP](#) to Zoll Medical Corporation, a company that manufactures the needed defibrillator systems.

Zoll and CDR Maguire arranged for immediate procurement and delivery of the equipment for deployment in Southwest Florida. This nearly \$2 million procurement was executed in record time. CDR Maguire had a huge task ahead of them, as the hurricane completely destroyed several hospitals and the need for medical services was high. With the help of FloridaMakes and Zoll Medical Corporation, CDR Maguire was better equipped to serve people impacted by Hurricane Ian in Florida.

Leveraging Technology and Innovation



A look at the challenges

The U.S. manufacturing industry faces numerous challenges, both domestically and globally. Until 2009, the U.S. led the global in manufacturing, but its ability to compete on a global scale has declined. China is now the world's largest manufacturing economy and a major exporter of goods. In 2022, China accounted for 30% of total global manufacturing output, according to data from the United Nations Statistics Division.

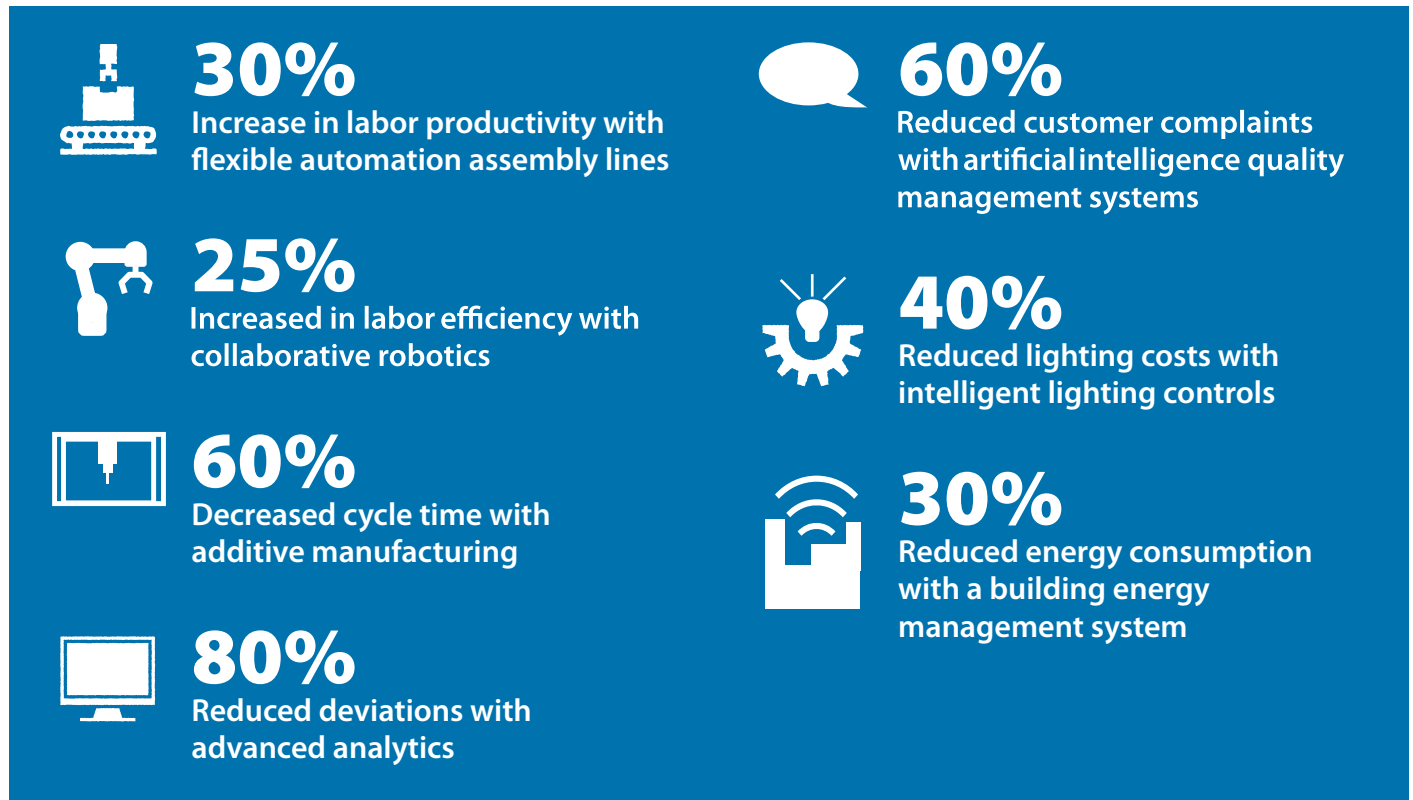
The 2023 Bloomberg Innovation Index indicates that the U.S. is falling behind many other countries as an innovation leader. The index assesses countries based on indicators related to a nation's innovation ecosystem. These include research and development spending, the number of patents filed, high-tech company density, manufacturing capabilities, and other factors. According to the Bloomberg index, between 2013 and 2023, the U.S. dropped from first to 11th worldwide in terms of innovation.

The Bloomberg index finds the U.S. lagging in science, technology, engineering and math grads, advanced degrees, and workers in research and development.

The Bloomberg Innovation Index includes manufacturing capabilities because manufacturing plays a crucial role in fostering innovation and driving economic growth. Manufacturing capabilities reflect a country's ability to produce and develop advanced, high-quality products and technologies. Innovation is not limited to research and development alone. Innovation also relies on practical applications and translating ideas into tangible products and processes. Manufacturing capabilities involve the efficient use of resources, advanced production techniques, and the integration of technology and automation.

Unfortunately, there is a growing gap in the adoption of product and process innovation between small and larger manufacturers. Based on data collected from the Census and National Science Foundation, smaller firms are nearly two times less likely to have implemented a product or process innovation. Less than a third of small manufacturers adopted an innovation, compared to over half of larger firms.

Adopting advanced manufacturing technologies offers many benefits to manufacturers. The World Economic Forum's report "[Fourth Industrial Revolution: Beacons of Technology and Innovation in Manufacturing](#)" (WEF report, link opens PDF) cites truly meaningful business results that manufacturers achieve with new technologies. These include:



What MEP is doing

The MEP National Network provides assistance to SMMs in overcoming obstacles related to technology adoption and innovation. Our experts recognize the specific challenges that SMMs encounter and offer tailored recommendations that align with each company's distinct business needs.

MEP Centers support manufacturers to innovate and adopt appropriate technologies through a variety of services, including:

Technology assessments. MEP Centers conduct technology assessments to evaluate manufacturers' current technological capabilities and identify areas for improvement. They help manufacturers understand the potential benefits of adopting new technologies and provide guidance on selecting and implementing appropriate technologies for their specific needs.

Technology roadmaps. MEP Centers also assist manufacturers in developing technology roadmaps, which are strategic plans outlining the integration of new technologies into their operations. They help manufacturers align technology investments with business goals and create a clear path for technology adoption and innovation.

Connections to resources. The MEP National Network also fosters collaborations and partnerships between manufacturers, research institutions and technology providers. By facilitating connections, they help manufacturers access expertise, funding opportunities, and resources for technology adoption and innovation. These collaborations promote knowledge sharing, technology transfer, and the development of innovative solutions.

Innovation support. One of the most difficult barriers for many manufacturers is how to take a great idea to market. MEP Centers offer assistance in product development, prototyping and commercialization. They help manufacturers navigate the innovation process, determine market needs, refine ideas, and bring new products to market. MEP Centers also provides guidance on intellectual property protection and access to innovation grants and funding programs.

Continuous improvement. MEP Centers support manufacturers in implementing continuous improvement methodologies, such as lean manufacturing and Six Sigma, which focus on streamlining processes, reducing waste, and increasing efficiency. These approaches often involve the use of technology and automation to optimize manufacturing operations.

By providing personalized assistance, training, collaboration opportunities, and strategic guidance, MEP Centers enable manufacturers to enhance their competitiveness and drive sustainable growth through technological advancements.



What you can do

Prioritize cybersecurity. As manufacturing becomes more digital, businesses must prioritize cybersecurity and educate their employees about best practices. Employees are often the weakest link in a company's defense against cyberthreats. Serious consequences can result when sensitive information – such as employee records, customer information, or proprietary data – is compromised. After a data breach, companies must work hard to regain their customers' trust. This can be time-consuming and expensive. Here are a few things you should consider:

- **Lack of awareness.** Many cybersecurity breaches occur due to simple mistakes or lack of employee awareness. Employees may inadvertently click on malicious links, fall for phishing scams, or mishandle sensitive data, leading to data breaches or system compromises. Proper training helps employees understand common threats and teaches them how to recognize and respond to potential risks, reducing the likelihood of human error.
- **Social engineering attacks.** Cybercriminals often exploit human psychology and manipulate employees through social engineering tactics. They may pose as trusted individuals, use persuasive techniques, or trick employees into revealing sensitive information. Training employees on social engineering tactics can help them recognize these manipulative techniques and avoid falling victim to such attacks.
- **Weak passwords.** Weak passwords or poor password management practices can make it easier for hackers to gain unauthorized access to systems or accounts. Employee training can educate them on the importance of strong passwords, multifactor authentication, and regularly updating passwords. This helps in strengthening the overall security posture of the organization.





- **Incident reporting.** Prompt reporting of cybersecurity incidents is vital for timely response and mitigation. Training can educate employees on how to recognize and report potential security incidents or suspicious activities. This enables the organization’s information technology or security team to take immediate action, minimizing the impact of an incident.

NIST has created a practical [cybersecurity framework](#) that can be adopted by businesses of any size. This framework is available online and can be further explained by local experts from the MEP National Network. These experts can assist companies in implementing cybersecurity best practices for both the short- and long-term security of your business.

Consider free MATTR+ services. MEP-Assisted Technology and Technical Resource Plus (MATTR+) service helps U.S. manufacturers find suitable solutions to their real-world problems. MATTR+ provides direct access to the [wide-ranging expertise of the NIST labs](#) to help address technical issues with manufacturing products or processes. Organizations can seek assistance from NIST scientists and engineers to solve challenges and overcome barriers to success. It is difficult to capture the full range of NIST expertise available through MATTR+. Possible topics include:

- **Innovative technology development:** U.S. manufacturers or organizations enabling manufacturing can work with NIST scientists and engineers through the MATTR+ service to better understand manufacturing methods like metal-based additive manufacturing (3D printing). They can also learn practical applications of the technology.
- **Materials research and characterization:** Material characterization is the process of measuring physical, chemical and mechanical properties of materials. NIST researchers are experts in experimental determination of materials’ properties for manufacturing applications, and can help in technique selection for comprehensive analysis.

82% of breaches involved the human element, according to the 2022 Verizon Data Breach Investigations Report



- **Interconnected systems and the Industrial Internet of Things (IIoT) applications:** The IIoT and interconnected systems gather and analyze real-time manufacturing data across an entire production operation. NIST researchers can help develop trustworthy, connected manufacturing systems and networks. They contribute to creating IIoT standards needed for current and next-generation challenges.
- **Information on NIST Standard Reference Materials® and Standard Reference Data:** NIST supports accurate and compatible measurements by certifying and providing over 1,300 Standard Reference Materials with well-characterized compositions and/or properties. These materials are used for instrument calibrations as part of overall quality assurance programs. They're also used to verify the accuracy of specific measurements and to support the development of new measurement methods. In addition, NIST produces and maintains standardized reference data (SRD). SRD is quantitative information related to a measurable physical or chemical property of a substance. For example, SRD can characterize the properties of structural steel. The data is critically evaluated to verify its reliability.

MEPNN Technology and Innovation Success Story

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It has always been the goal of Impact Recovery Systems, Inc. to be the premier manufacturer of safety products. From early on, we knew that to do so, we would have to continuously review our manufacturing processes. As Impact Recovery Systems has grown, added new products, and people, it is imperative that we continue to focus on quality, cost, and delivery to allow more flexibility and responsiveness for our customers.

— Greg Hannah, President

It's great that our leadership is committed to investing in the business to help it grow and thrive.

”

— Barbara Cheatham,
Production/Purchasing/
Inventory Manager,
Impact Recovery Systems

The situation

At the forefront of Impact Recovery Systems, Inc.® is the mission to provide quality safety products to its customers. Since 1991, they have manufactured flexible, high-impact traffic and safety devices for roads, pedestrian safety, warehouses and facilities worldwide.

Impact Recovery Systems, Inc. experienced rapid growth and was feeling the growing pains. They reached out to Texas Manufacturing Assistance Center (TMAC), part of the MEP National Network, for assistance in automating processes and for improving production flow based on new processes and product mix.

The solution

Part one of the solution involved automating a key process step. Dexterous handling of components during a plastic spin-welding process created an obstacle for affordable automation integration. Plant engineers wanted to know if it was possible to use a robotic pick-and-place solution for the spin-welding process that could coexist with human operators on a busy factory floor.

TMAC re-created the spin-welding work cell at TMAC's Collaborative Robotic Facility to demonstrate how a collaborative robot can reliably assemble components for the spin-welding process. TMAC engineers demonstrated the collaborative robotic solution in various configurations that completed the pick-and-place process within the required time.

At the same time, TMAC analyzed the company's products, processes, technologies and people. One of the key tools involved was value stream mapping, which allowed the Impact Recovery Systems team to clearly analyze their current process and identify opportunities. Once key opportunities were identified, the team used tools such as cellular manufacturing, total productive maintenance, and 5S to further delve into areas of improvement.

At Impact Recovery Systems, the leadership team involves employees in process improvement initiatives. They also reward employees who engage in process improvement. By incorporating process improvement practices into its daily manufacturing practices, the culture of continuous improvement will become second nature at Impact Recovery Systems.

The results

As Impact Recovery Systems continues to grow, they have confirmed that an automated spin-weld process will improve throughput by more than 20% and yield a more consistent product. With the implementation of flow manufacturing, work-in-process inventory was reduced by 40%, which significantly improved turnaround time. Customer satisfaction improved while costs were reduced through improved quality and elimination of nonproductive time by rearranging equipment and personnel.



The MEP National Network is Here to Help You



Every day, MEP experts around the country help manufacturers find the solutions they need. The MEP National Network has a proven track record and has helped U.S. manufacturers produce real impacts for more than 35 years. Since 1988, MEP has worked with 154,031 manufacturers, leading to \$148.7 billion in new sales and \$31.6 billion in cost savings, and it has helped create and retain 1,677,425 (over 1.6 million) jobs.

In fiscal year 2023, for every one dollar of federal investment, the MEP generates \$24.20 in new sales growth and \$27.10 in new client investment. This translates into more than \$4.3 billion in new sales. For every \$1,661 of federal investment, MEP creates or retains one manufacturing job. This translates into more than \$5.6 billion in new sales.

In surveys, MEP Center manufacturing clients consistently rated their customer experience well above industry benchmarks and indicate they're likely to recommend the MEP Center they worked with to another company or colleague. Last year, MEP had a Net Promoter Score of 85.4% (above 80 is considered world class).

The MEP National Network's ability to serve manufacturers depends on support from the entire manufacturing ecosystem. We work with local and federal government, workforce development organizations, educational institutions, economic development organizations, federal labs, among others, to provide manufacturers with the resources and support that meet each firm's unique needs.

If you are interested in learning more about the MEP National Network or how to work with us, please contact mfg@nist.gov. You can also [visit our website](#) for more information and resources.

[Contact your local MEP Center](#)



MEP
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The MEP National Network is a unique public-private partnership that delivers comprehensive, proven solutions to U.S. manufacturers, fueling growth and advancing U.S. manufacturing.

Focused on helping small and medium-sized manufacturers generate business results and thrive in today's technology-driven economy, the MEP National Network comprises the National Institute of Standards and Technology's Manufacturing Extension Partnership (NIST MEP) and 51 MEP Centers located in all 50 states and Puerto Rico.



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