

MAKE IT HAPPEN

A Progress Report on the
Blueprint for Manufacturing
in Northeast Ohio 2024



TALENT



TECHNOLOGY



INNOVATION



LEADERSHIP

CELEBRATING PROGRESS

Everyone loves an underdog story – David, Rocky, Apollo 13. Triumph against all odds reminds us that we're infinitely capable when we refuse to limit ourselves and our aspirations. The launch of the *Blueprint for Manufacturing* in 2021 was truly a moonshot. A plan to reinvent the industry in Northeast Ohio and lead in smart manufacturing.

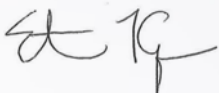
We launched this vision at a time of massive uncertainty. COVID turned our world upside down. We faced unprecedented shutdowns, lockdowns, and furloughs. Unemployment hit its highest level since the Great Depression. But instead of hunkering down, thousands of manufacturers stepped up to pivot production and make millions of pieces of protective equipment – saving lives, saving jobs, and helping the country reopen.

And when it did, our industry roared back to life. In March of 2021, factory activity reached its highest level in 37 years. Unfortunately, the rollercoaster continued when the online shopping that helped fuel the recovery also broke the global supply chain. Then in August 2021, more Americans quit their jobs than in any other month in recorded history: 4.3 million. This plunged manufacturing off a talent cliff it had been teetering on for decades. Then in 2022, war broke out between Russia and Ukraine, further upending the supply chain and leaving many manufacturers scrambling for raw materials and unable to meet orders.

These are certainly underdog odds: pandemic, war, supply chain chaos, and the Great Resignation. But despite all this, manufacturing in Northeast Ohio has emerged stronger. In the almost three years since we launched the Blueprint, together, we've created thousands of jobs, improved the diversity of our industry, laid the groundwork for an innovation ecosystem, boosted Industry 4.0 technology adoption by 80%, and come together in more powerful partnerships than our region has ever seen.

This report tells the story of our collective progress, celebrating the achievements won by sheer determination, smart risk-taking, and bold leadership. It also lays bare the formidable challenges ahead and the once-in-a-generation opportunity before us to transform our industry and make our region better.

MAGNET may have spearheaded this effort, but the work and results belong to all of us. Heartfelt thanks to the hundreds of manufacturing Champions – CEOs, community leaders, educators, governments, workers, and more – who came together to bring the Blueprint vision to life initially. I hope hundreds more will be inspired to join us in the hard work we each need to do on the next leg of the journey when we make the leap from underdog to leader.



Dr. Ethan Karp
President & CEO
MAGNET



FOUR PILLARS TO REINVENT MANUFACTURING

1 TALENT

Build the workforce we need to win in the future, today.



2 TECHNOLOGY

Use Industry 4.0 technologies to unlock advantage.



3 INNOVATION

Pioneer new products and services, and new ways of working.



4 LEADERSHIP

Boldly lead our companies and region.



WE'RE MAKING MANUFACTURING BETTER

Nearly three years ago, we had a dream. Today, we have progress. Thanks to the *Blueprint for Manufacturing in Northeast Ohio*, and the commitment of hundreds of CEOs, companies, and community supporters, we've created thousands of advanced manufacturing jobs. We've laid the groundwork for a vibrant innovation ecosystem. We've rapidly expanded the region's Industry 4.0 capabilities. And we've inspired bold leadership and radical collaboration.

Manufacturing
drives almost
50% of NEO's
economy.

1 out of every 2 jobs, from
factories to restaurants
to banks, **depends on**
manufacturing.



2023 MANUFACTURING SURVEY FINDINGS

To help measure progress over the past two years and spotlight the challenges ahead, MAGNET conducted the 2023 Manufacturing Survey, sponsored by Bank of America.

- Manufacturing is growing rapidly. 10,000 new jobs have been added in the past two years.
- 70% of manufacturers expect to grow in 2024.
- There are 80% more people of color in supervisory and management roles.
- 2,000+ people of color have entered manufacturing in the past two years (data courtesy of Team NEO).
- Investments are rising. 67% of companies are investing in manufacturing capabilities, including Industry 4.0 technologies, and 63% are investing in new product innovation.
- There's been an 80% increase in Industry 4.0 technology adoption since 2019. Still, only a minority of companies – just 28% – are using Industry 4.0 technologies.
- 70% of companies say innovation is not one of their top three priorities.
- 58% of companies launched a new product in 2022-2023, up 10% from two years ago.
- The talent gap has closed slightly over the past two years, but demand for skilled workers is still sky high.
- Starting salaries are getting much more competitive but 40% of manufacturers say these rising wages are hampering their growth.
- 65% more companies are increasing their formal apprenticeship or on-the-job training programs.
- 1/3 of manufacturing companies in Northeast Ohio considered selling in the last year.

Explore the full survey findings on the pages ahead.

METHODOLOGY

MAGNET's 2023 Manufacturing Survey was conducted from June 13 to August 11, 2023, and received 217 responses from manufacturers across Northeast Ohio. The survey reviewed historical data and examined trends year over year to reduce margins of error. Individual responses are confidential, and data is reported in the aggregate. Unless noted, percentage changes are calculated based on MAGNET's 2021 Manufacturing Survey.

BLUEPRINT REPORT CARD

When we launched the Blueprint, we agreed on measurable goals to hold ourselves accountable and drive real change.

For the 12 metrics we have data to measure, we are meeting or exceeding our targets on almost 70% and making progress across all four Blueprint pillars.

TALENT

TECHNOLOGY

INNOVATION

LEADERSHIP

5 YEARS

100% increase in graduates from advanced manufacturing programs

Data only available through 2021

+
3x increase in manufacturing companies on "Best Places to Work" list

0.7X increase

+
3,000 additional manufacturing jobs filled by women and people of color

+2,000

20% of manufacturers piloting advanced manufacturing technologies

16% increase

+
100% increase in adoption of advanced manufacturing technology by manufacturers

80% increase

+
20% increase in manufacturing productivity
Data only available through 2021

2x the number of manufacturing-related startups receiving external funding
MAGNET saw 2X funded physical product companies in its pipeline

+
\$10M increase of seed stage investment in manufacturing startups

\$3M increase

+
20% revenue from new products & services launched by manufacturers

7% revenue is from new products

2x increase in talent, transformation, and innovation investment
No data available

+
2x increase in the number of collaborating organizations as measured by participation in alliances, councils, and clusters

1X increase

+
20% increase in people of color and women in manufacturing leadership roles

80% increase in POC supervisor/manager

10 YEARS

All manufacturing jobs filled upon demand

Unfilled entry roles decreased from 23,000 to 20,000

30k new advanced manufacturing jobs created

10K New jobs

2% manufacturing-related GDP growth (above national average)

Data only available through 2021, predicted to increase

Manufacturing employment equals the diversity of the population

2,000 more diverse candidates entered manufacturing, moving us 3.5% closer to matching the diversity of the NEO population.

TALENT

The industry is becoming more diverse. Our collective focus on recruiting and training new talent from new places is working. 2,000 more people of color have entered manufacturing in the past two years. MAGNET alone has helped more than 750 women and people of color start manufacturing careers since 2021. This moved us 3.5% closer to having the diversity of our regional workforce match the diversity of the population in Northeast Ohio, which requires a total increase of 6%.

Almost 70% more manufacturing companies are on the region's best places to work lists – signaling a renewed commitment to focus on workplace culture to help attract and keep the best talent.

And finally, demand for skilled workers is still sky-high, but the talent gap has closed slightly over the past two years. The number of manufacturing jobs that are vacant and unable to be filled dropped from 23,000 to 20,000 for entry-level to mid-skill jobs. While this slight drop is promising, almost 10% of all manufacturing jobs are still sitting empty.

TECHNOLOGY

MAGNET's new Industry 4.0 Index shows technology adoption is going through the roof, increasing 80% since 2019 (approaching our 5-year-goal of a 100% increase). This represents a rapid increase in our region's Industry 4.0 capabilities. This is great news, but it's tempered by the fact that we started from a very low adoption rate. There is still much more work to do on Industry 4.0 and the gap between the technology "haves and have nots" is widening by the day.

10,000 new advanced manufacturing jobs were added. That's a third of the way to our 10-year goal in just two years. The government hasn't released GDP data since 2021 so, unfortunately, we can't report on GDP or productivity yet.

INNOVATION

A \$3 million Advanced Manufacturing Fund has been deployed to provide seed stage funding for physical product startups – a big step forward for the innovation ecosystem.

Innovation is also driving substantial new manufacturing revenue. Manufacturers reported that 7% of their revenue – about \$3.5B – came from new products launched in the past year. Our five-year goal is 20% of revenue so we need to speed the pace of innovation across the region.

LEADERSHIP

Manufacturers are changing the face of industry leadership. The fact that our factories and executive tables don't look like our communities has been a longstanding problem. In the past two years, we've made remarkable progress with an 80% increase in women and people of color in supervisory and management roles.

We also estimate we've seen double the number of organizations collaborating in coalitions, alliances, and clusters. Like the dozens of organizations Case Western Reserve University rallied together to win a highly competitive \$1M first-round National Science Foundation planning grant to make Cleveland a hub of sustainable manufacturing. Or the businesses and partners in the polymer manufacturing space that University of Akron and the Greater Akron Chamber rallied to win a first-round Economic Development Agency Tech Hub designation. And like the various clusters that are actively working to establish Northeast Ohio as a center of excellence in batteries, additive manufacturing, and water technology infrastructure just to name a few.

SURVEY DEEP DIVE: TALENT

Region makes **gains in jobs, equity and pay**, but open positions remain a threat to long-term success.



10,000
new jobs
Manufacturing
is growing
rapidly.

Starting salaries are getting much more competitive.

\$14.10 ↑ **\$16.30**
per hour for entry-level
low-skill jobs, an average
increase of 16% in two years.

\$17.50 ↑ **\$21.10**
per hour for entry-level
mid-skill jobs, an average
increase of 21% in two years.

Companies are catching up with the realities of the tight talent market and it's changing the industry for the better.

- 2,000+ people of color have entered manufacturing in the past two years. MAGNET alone has helped more than 750 women and people of color start manufacturing careers since 2021.
- 65% more companies are increasing their formal apprenticeship or on-the-job training programs.
- 58% of manufacturers are looking for ways to increase flexibility for workers through hours and shift permutations, cross-training of roles, or more frequent pay to attract *new* employees (87% of companies already do this to retain employees).
- Almost 70% *more* manufacturing companies are on the region's best places to work lists than in 2021 – signaling renewed efforts to help attract and keep the best talent through positive workplace cultures.
- Half of all companies offer tuition reimbursement and almost all companies offer healthcare for all people.
- 25% more companies are recruiting from high schools since 2019.

10%

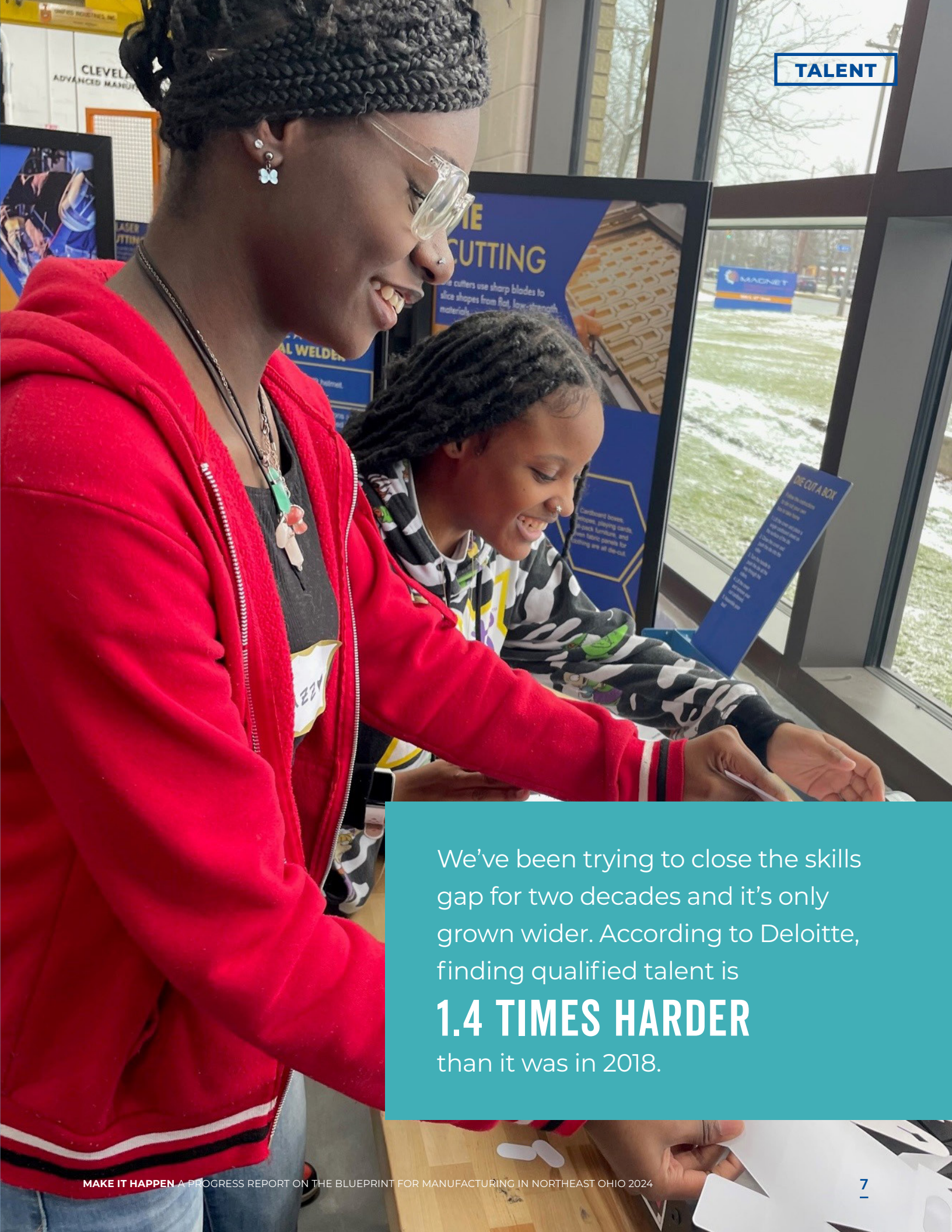
open entry-level
positions

Demand for skilled workers is still sky-high, but the talent gap has closed slightly over the past two years.

↑
DIVERSITY
TRAINING
FLEXIBILITY
BENEFITS



Retirements are a key reason for job vacancies and many more are coming.



We've been trying to close the skills gap for two decades and it's only grown wider. According to Deloitte, finding qualified talent is **1.4 TIMES HARDER** than it was in 2018.

TOP WAYS TO BUILD THE WORKFORCE



Offer more flexibility. Flexible work is a magnet for job seekers - particularly younger generations. Consider allowing workers to do three, 12-hour days per week or go part-time and knock off 10, four-hour shifts every two weeks. Maybe offer multiple scheduling options to start and end the workday. Some manufacturers are even re-working their factory lines so workers can come and go as they please. With advanced scheduling software, workers are notified when other team members have completed tasks and it's their turn. Some companies are also paying employees based on production, rather than hours.



Raise wages. If you're struggling to staff shifts, consider pumping more money into pay and benefits, trusting that the cash will come back to your bottom line via output. A competitive starting salary of at least \$16 per hour, and as much as \$20, has become table stakes to get the people you need and keep them. This may seem difficult, particularly for small manufacturers, but the immediate hit is often much less than the cost of high turnover and lost production due to empty jobs.



Offer continuous (and innovative) training. According to the World Economic Forum and PwC, upskilling in manufacturing could add an additional \$850B to the GDP by 2030. Invest in cutting-edge, technology-forward training, ideas, and ways of working. The options are abundant, including Cuyahoga Community College's Advanced Technology Academy, and they come at a wide variety of price points. This will help attract new talent and upskill and retain the people you already have.



Create "Earn and Learn" Opportunities. Start your own German-style apprenticeship or internship program or hire students from a program in your community. Hands on learning, combined with training and college tuition payments, is the most proven way to attract young people into manufacturing careers. For example, in MAGNET's Early College, Early Career (ECEC) program 87% of students went straight into a manufacturing career, into college, or a combination of both upon high school graduation.



Cross-train employees. A flexible factory floor can positively impact your production because workers can easily move around to fill the specific needs of the day. It also helps retain employees because it keeps people engaged and can even open new career paths within your company. Consider using advanced technology like virtual reality to make training faster, better, and more engaging - particularly for younger generations.

OF THE FUTURE



6

Incentivize recruitment. Time and again we hear from manufacturers that there is nothing more powerful than a word-of-mouth recommendation from a friend or family member. Team members you already trust often bring in the best new hires. When you treat people well and create a place where they want to come to work, they become your best advertisers and biggest recruitment allies. Reward the enlistment efforts of the existing personnel on your shop floor with cash, prizes, or paid time off.



7

Actively recruit new people from new places. Talk to other manufacturers about ideas to innovate recruitment and tap into new populations. Ensure your website and recruiting materials reflect the diverse talent you are trying to attract. Work with community programs who are recruiting and training people historically underutilized by manufacturers. MAGNET's ACCESS program is just one example of the many places you can start.



8

Leverage gig talent supply companies. Gig work is now growing faster than traditional work and that could be a massive opportunity for manufacturing. Companies like Veryable are building talent pools that can slide in for a shift here and there as replacement workers. It's worth exploring whether a solution like this could help you. You could even consider training your own on-demand talent pool for gig workers.



9

Build a positive workplace culture. Build a people-first workplace culture where employees want to work. Post-COVID, the employer-employee dynamic has dramatically shifted. This has created an environment where you simply must meet more of the wants and needs of employees. That could mean things like subsidizing an employee's way to work when their car breaks down, creative scheduling to work around childcare schedules, or finding ways to help employees manage stress. If you don't, another employer will.



10

Join a Sector Partnership. The Ohio Manufacturers' Association worked with the state to create 17 Sector Partnerships to tackle systemic workforce issues. These partnerships are led by the people who know the industry best: local manufacturing leaders. Everyone needed to make change is at the table: manufacturers, community groups, funders, nonprofits, education institutions, and more. These are the kind of powerful partnerships that will finally fix the talent gap, so we need to support them whenever and wherever we can.

REGIONAL KEY WINS TO DATE

TALENT

1. The State of Ohio recently rolled out a major EV and automotive workforce strategy to drive career awareness, broaden the EV workforce talent pool, and establish new scaling and training programs. MAGNET and the Mahoning Valley Manufacturers Coalition are leading the initial phase, focused on Northeast Ohio, with funding from the state and U.S. Department of Labor.
2. Through a grant of \$23.5M from the U.S. Economic Development Administration, the Ohio Manufacturers' Association is scaling statewide manufacturing career advancement opportunities through the industry sector partnerships. Manufacturing workers can receive various training and placements leading to higher-paying positions.
3. MAGNET opened its \$20M Manufacturing Innovation, Technology and Job Center in October 2022 and has already hosted 3,500+ students for hands-on career awareness experiences, placed hundreds of graduating students and adults into manufacturing jobs, and hosted 5,000+ adults for events, training, education, and inspiration.

TECHNOLOGY

1. CESMII, the national Smart Manufacturing Institute, established a satellite with Case Western Reserve University and MAGNET to help small and medium-sized manufacturers adopt smart technologies and bring people and data together to maximize efficiency and profits.
2. Hundreds have attended MAGNET's Lighthouse Tours. Companies who have adopted Industry 4.0 technologies, like real time machine monitoring and advanced robotics, open their doors to other manufacturers so they can learn about new equipment, new processes, and see the benefits of smart manufacturing in action on the shop floor.
3. The U.S. Department of Defense has designated Ohio as a Defense Manufacturing Community – one of only six in the nation. This will support long-term community investments that strengthen national security innovation, accelerate technology adoption, and expand the capabilities of defense-related manufacturing. The designation also brought a \$5 million grant to improve defense manufacturing processes and train workers for next-generation jobs.



INNOVATION

1. International companies are investing in Ohio and our supply chain. For example, Intel's \$20B semiconductor plant in Columbus and Ford's \$1.5B investment in all-new commercial electric vehicles in Lorain County will encourage significant new product development.
2. Northeast Ohio developed a vision for sustainable manufacturing that was the only Ohio awardee of the National Science Foundation's Regional Innovation Engines Phase 1 grant. Led by Case Western Reserve University, MAGNET and more than two dozen other organizations and corporate leaders are currently working on how to unlock up to \$160M in innovation funding in a second phase.
3. A three-state collaborative of Ohio, West Virginia, and Pennsylvania secured a \$7B federal investment to spur the development and use of hydrogen as a clean energy source and ultimately reduce carbon emissions. Cleveland State University was a key partner in laying the groundwork for Ohio's major role in the project.



LEADERSHIP

1. The Cleveland Water Alliance created a water accelerator test bed which provides a wide variety of instantaneous water quality data to companies around the world as they test their unique products. This will drive innovation and help pioneers in the water technology and IoT spaces who are eager to develop, test, and scale their ideas to make a positive impact on our water resources.
2. University of Akron was named the top polymer school in the world for polymer science and plastics engineering. Intertwined with that work, the region's Polymer Industry Cluster and the Greater Akron Chamber secured the only Ohio-based Tech Hub designation through the U.S. Economic Development Administration to develop a plan for accelerating sustainable polymer manufacturing and commercialization and raising hopes of securing up to \$70M in federal funding.
3. MAGNET and EDGE, two regional economic development nonprofits, came together to create a one-stop-shop for operational consulting and leadership development. This will help grow manufacturing leaders and companies at every level and equip them with the strategy, skills, and mindset required to leapfrog our regional industry into the future.



SURVEY DEEP DIVE: TECHNOLOGY & INNOVATION

Companies adopting **Industry 4.0 technologies** are rapidly advancing, but the rest are falling behind.



80% **jump in adoption since 2019**

Manufacturers embracing Industry 4.0 technologies are rapidly increasing adoption.

72% are still not making the Industry 4.0 leap.



32% are innovating for sustainability.

Sustainability is the largest driver of innovation.

One-third of NEO companies are investing in technologies to reduce waste, water usage or energy consumption.

Our new Industry 4.0 Index measures and tracks the adoption rate of advanced technologies.



- We considered eight technologies: Basic 3D printing, Advanced 3D printing, Use of 3D printing in products, Smart/Connected Machines, Smart/Connected Products, Artificial Intelligence/Big Data, Virtual/Augmented Reality, and Collaborative Robots.
- Adopters are defined as those driving ROI or maximizing the use of the technology, not those piloting or experimenting.
- For all companies, the index has risen from 25 to 45 since 2019 which represents a rapid increase in our region's Industry 4.0 capabilities.
- The 80% increase is great news, but it is tempered by the fact that we started from a low adoption rate. This means there is still much more work to do on Industry 4.0.



70% of NEO manufacturers say innovation is not one of their top 3 priorities.



Smart manufacturing in the U.S. is predicted to be a **\$146** billion industry by 2030.

10 WAYS TO TRANSFORM YOUR COMPANY



1

Start small. Invest incrementally. The best, low-barrier way to begin is real-time data monitoring. Spend a few thousand dollars installing sensors to track and analyze how your machines are performing. This can improve efficiency, cut costs, and boost quality. Plug your numbers into a simple ROI calculator to begin to understand how your investment in real-time tracking will come back to you.



2

Take a step-by-step approach. Prove technology investments are worthwhile in smaller projects, then move to larger, more transformational projects. This staggers your cost burden and allows you to gain valuable insights to shape where and how to invest for the highest return, snowballing into more successful implementations as time goes on. It also helps demonstrate that technology adoption enhances jobs, not reduces them.



3

Explore technology to help reshore production. The supply snarls of the pandemic and increasing tensions with China are putting pressure on manufacturers to bring home production. Automation and other advanced technologies are the only way to competitively do this. You can even choose to start with just a single collaborative robot before moving on to entire sections of your manufacturing floor, and eventually your entire factory.



4

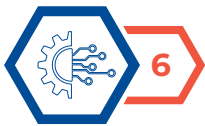
Build more flex capacity with robotics. Industry 4.0 technologies like collaborative robots and machine monitoring can help increase surge capacities and efficiencies. Batch your technology upgrades – for example, doing 20% of your manufacturing floor per year over five years – and you'll see your company make incremental efficiency gains without as heavy a price tag.



5

Take advantage of computer modeling. We're at the point where we can recreate an entire warehouse, and its individual physical components, in digital form. These digital twins enable us to get an up-close, digital look at what's happening inside any given machine, while accurately simulating future performance. This unlocks a new level of precision, efficiency, productivity, and quality.

WITH TECHNOLOGY



6

Use technology for training. Consider advanced technology like artificial intelligence, machine learning, and virtual reality as you update how you onboard new talent and design training to upskill your existing teams. The options are abundant, they come at a wide variety of price points, and they can make training faster, better, and more appealing – particularly to younger generations.



7

Look for avenues into the electric vehicles industry. EVs represent an incredible opportunity for manufacturers willing to think ahead and invest early. Injection molders, for instance, should be looking at the thick plastic boxes that form the outside of EV batteries. Cable makers and connection makers should be assessing the wiring needs of the EV industry. Now is the time to enter the EV ecosystem and advanced technology is the key to pivoting your production.



8

Pursue grants and investment to help fund technology transformation. From the \$280 billion CHIPS Act to new funding at all levels of government that's sprung up to help improve the post-COVID strength of American manufacturing and the resilience of the supply chain, there is money to be had. Get educated about the opportunities, build relationships with all different types of funders, and hire advisors to help you navigate the process.



9

Learn from other manufacturers. Reach out and share learnings with other companies. Take part in MAGNET's lighthouse factory tours that showcase local companies who are leading the way in Industry 4.0. Most companies are very forthcoming with their peers, and this is an excellent way to learn from early adopters. It can help you find partners, technology providers, and avoid costly mistakes.



10

Get expert help. There are many people and organizations who can help guide you along your technology transformation journey. Find a local consulting firm or experts from the Manufacturing Extension Partnership network who can help you get started with Industry 4.0 technologies. Start small if you have to – but start now!

TOP WAYS TO FUEL MANUFACTURING



1

Embrace intrapreneurship. Encouraging people to think and act like entrepreneurs inside an established company is a proven way to nurture innovation. It rewards risk-taking but also provides the buffer of an experienced team to support, shepherd, and pressure test new ideas. There are countless examples in Northeast Ohio of manufacturing firms who have spun off lucrative new companies with products they innovated and incubated inside their traditional businesses before launch.



2

Look for innovative funding. There are various types of funding available to help manufacturers innovate and boost physical product startups. For example, loan-loss guarantee programs help companies invest in innovative technology with less risk because the loan only has to be paid back if the innovation works and helps generate revenue. There's also funding available through groups such as JumpStart, a venture development organization that provides capital, services, and connections to help entrepreneurs unlock their potential.



3

Collaborate with colleges and universities. If you need help with an idea, reach out to local professors and colleges. They often have applied research and innovation capabilities that can help. Lorain County Community College, for example, created the Great Lakes Innovation & Development Enterprise, which provides support services and funding to technology-oriented startups. Tapping into this expertise by collaborating on ideas can be invaluable.



4

Innovate contract manufacturing. Innovation is not just for start-ups. Most of our industry in Northeast Ohio is “build to print” where companies make parts for larger manufacturers. We're seeing great examples of these contract manufacturers successfully innovating what they do and moving up the value chain. Instead of simply making parts for other companies, they're using technology to prototype faster, optimize quality, and even design and propose innovations and enhancements.



5

Try before you buy. Innovating your production line is an enormous investment and it can be difficult to know where to start. To help with this, organizations like MAGNET offer services that allow small manufacturers to “try-before-they-buy” new technologies. This could mean experimenting with a new machine in MAGNET's experience space or even borrowing or renting equipment to see firsthand how it will integrate into and impact your factory floor.

INNOVATION



Reframe risk. Risk may have a bad reputation but taking smart risks on innovation and technology is what it takes to lead the world. Ask yourself if now is the time to invest in Industry 4.0, if you should explore nearshoring production to avoid future supply chain disruptions, or if there's a strategic move you can make into green energy or electrical vehicle manufacturing. Constantly seek new ways to create value and remind your team that obsolescence is the greatest risk of all.



Build a culture of innovation. Encourage your team to speak up when they have ideas. Give people the time and space to pursue innovation. Encourage thoughtful experimentation at all levels of the company. Reward new ideas. Make it okay to take smart risks and fail. Talk about innovation at every team meeting. It's not all about creating new physical products. Explore product, process, and service innovation.



Attend pitch nights. Get inspired and excited about the possibilities of innovation by attending local pitch nights for entrepreneurs. Take your team to these events. You never know what ideas these will spur and what connections you will make that might boost your own innovation efforts. MAGNET's Mspire is a great place to start. It's Northeast Ohio's only pitch competition exclusively for manufacturing-focused entrepreneurs.



Look for post-pandemic opportunities. The pandemic turned the world upside down and changed the way we work and live. This has created an incredibly rich opportunity to innovate products and services to meet new consumer demands and solve emerging problems in our post-COVID world. Innovation can be a growth engine for the entire industry – but it all starts with individual companies boldly innovating what they make and how they make it.



Get expert help. There are a growing number of resources available in Northeast Ohio to help manufacturers innovate. Here are two examples of many. BRITE Energy Innovators are experts in supporting startups and existing companies in the transition to a clean energy economy. MAGNET's new Manufacturing Innovation, Technology and Job Center has a state-of-the-art prototyping lab with engineering services for innovators.

FIVE TRENDS

SHAPING THE FUTURE OF SMART MANUFACTURING



Sustainability and EVs: The future of manufacturing in America is intrinsically linked to sustainability, particularly in the \$50B Electric Vehicle (EV) market. Sustainability is already the largest driver of innovation in manufacturing in Northeast Ohio and we're seeing many companies make the leap into the EV space, such as Lincoln Electric expanding from welding machines to smart chargers. The EV pendulum will swing back and forth, as we've seen, but all indicators point to this being a good long-term bet for manufacturers looking for growth opportunities.



Industry 4.0 Technology Transformation:

Industry 4.0 (advanced technologies like IoT, artificial intelligence, big data analytics, and automation) is the single greatest opportunity manufacturers have to increase competitiveness, optimize efficiency, reduce costs, and drive profitability. Generative AI will produce between \$170 billion and \$290 billion in value for the advanced manufacturing industry alone, according to McKinsey & Company. While the average small to medium manufacturer won't have to invest heavily into AI until it's integrated into major systems and products on the shop floor, now is the time to join the rest of the smart manufacturing revolution.

In 2022, China installed more robots than the rest of the world combined. Automation, sensors, and robotics have become competitive table stakes and even with recent adoption gains, Northeast Ohio is woefully behind with 72% of manufacturers still not using them.



Workforce Challenges: The talent shortage is here to stay and will have to be managed continually just like productivity or quality. With 20,000 jobs already unable to be filled in Northeast Ohio and 10,000 baby boomers in the U.S. reaching retirement age every day, the Silver Tsunami is here. Plus, Gallup's 2023 State of the Global Workplace report reveals that an astonishing six out of 10 employees are quiet quitting – a majority of the workforce. All manufacturers will have to raise the game in employee retention, workplace culture, flexibility, upskilling, and innovative recruitment to attract and keep the workforce of the future.



The CHIPS Act and Government Investment:

The \$280B CHIPS Act (Creating Helpful Incentives to Produce Semiconductors for America) is a pivotal force shaping the manufacturing landscape – aiming to prevent the computer chip shortages that devastated the supply chain post-pandemic and break China's growing sway on the global economy. It's providing a massive boost of technology research and investment for manufacturing. Along with other sizable programs to invest in green manufacturing, the federal government's commitment to prioritizing state-side resilience and create a thriving and high-tech ecosystem is a major opportunity for companies to seek grants and investments.



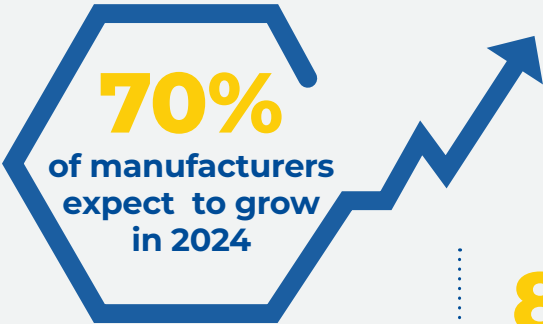
Supply Chain Resilience: One quarter of all manufacturers continue to report ongoing supply chain disruptions, underscoring the urgent need for more resiliency, including supply chain integration, transparency, and surge capacity. This will continue to drive nearshoring and reshoring. But the largest gains in local production will come from companies capturing new opportunities at home – like those driven by the CHIPS Act and a wave of major spending by the Department of Defense. Every manufacturer needs to reevaluate and restructure their supply networks to ensure adaptability, flexibility, stability, and security.

In Northeast Ohio, we should be looking to secure as many new semi-conductor opportunities as possible. Plus, contract manufacturers should be proactively seeking opportunities as major OEMs look for more stateside suppliers.



SURVEY DEEP DIVE: LEADERSHIP

Manufacturing leaders are investing in their companies and collaboration, but many are also considering selling.



Corporate leadership is highly optimistic about the year ahead.

Following several years of growth, 43% of companies expect to see at least another 5% revenue jump and 45% expect that same increase in headcount next year.



80% increase in people of color in supervisory & management roles

That lack of diversity is finally starting to change with an enormous increase in people of color entering leadership roles.



1/3 of NEO companies considered selling in the past year

In addition to those currently considering selling, approximately 20% of manufacturers were either acquired or were part of an acquisition last year. This is a 45% increase over the last two years.

More company and community leaders are working together.

The collaboration by dozens of nonprofits, educational institutions, manufacturers, and government agencies has helped secure regional planning grants and designations through EDA's Build Back Better, NSF's Regional Innovation Engines, and EDA's Regional Technology and Innovation Hubs, among significant other philanthropic and government funding.



Companies are investing in the future.

- **54% of manufacturers are investing in their workforce.**
- **67% are investing in manufacturing capabilities**, including Industry 4.0 transformation, and 63% are investing in innovating new products.
- **Leaders of companies with 100+ people** are more frequently looking for technology and innovation.
- **27% of companies increased their capital expenditures by 10+% last year** and 21% plan another 10+% capital outlay in 2024.

**People.
Industry 4.0
Technologies.
Innovation.**



In 2004, U.S. manufacturing output was more than double China's. In 2021, China's output was almost double the U.S. If we want to rebalance the scales it will take **BOLD LEADERSHIP** at every level to lead the world.

10 WAYS TO LEAD THE WORLD IN SMART



Commit to the Future. Growth happens when companies lead well for today and tomorrow. The key is to keep one eye firmly focused on the future and invest accordingly. That's what the Fund for Our Economic Future does every day. By combining leadership, resources, and influence with research and analysis, they are supporting systemic changes that will make the long-term future of Northeast Ohio shine.



Rethink risk. By its very nature, manufacturing is defined by testing, measuring, and constantly improving production. It's no surprise that risk is an unwelcome visitor. Leaders, however, must overcome risk-aversion to fully embrace the future. "Manufacturing CEOs need to understand that successfully adopting digital technology is actually about limiting risk. The upfront costs are real, but failure to adapt will lead to obsolescence," says Mike Garvey, President & CEO, M-7 Technologies.



Embrace Collaboration. Manufacturing is not a solo sport. Collaborating with other manufacturers, funders, researchers, schools, and community groups can help smaller companies fight above their weight class, embrace new technologies, and tackle massive issues like the talent gap. Our local economic development organizations such as the Canton Regional Chamber, Greater Akron Chamber, Greater Cleveland Partnership, Stark Economic Development Board, and Youngstown/Warren Regional Chamber, offer unparalleled networks for growth.



Actively inspire the next generation. Raise awareness of great manufacturing careers, sponsor tuition for employees, or get involved in innovative training programs for high school students. Lincoln Electric is a founding partner of MAGNET's Early College, Early Career apprenticeship program. Chris Mapes, Retired President & CEO of Lincoln Electric recounts a memorable conversation with the mother of one apprentice who hoped her son would get a permanent job at Lincoln. "I remember telling her, I don't just want him to come and just work for Lincoln Electric, I want him to be a leader at Lincoln Electric."



Build an inclusive industry. A "big tent" mentality is the only way the talent shortage is ever going to be solved. At Jergens, Inc., that thinking created a pioneering online program called Tooling U that's trained 800,000 people. Jergens also started a first-of-its-kind training program for special needs students. "The manufacturing community has to open up a big tent. We have to be inclusive," says Jack Schron Jr., President & CEO of Jergens.

MANUFACTURING



6

Focus on technology, innovation, and talent. Investing in technology, constantly innovating, and finding new ways to train workers are signs your company is on the right path to a successful, resilient future. At National Safety Apparel (NSA), they've attracted an incredibly diverse workforce from 40 different countries by working with refugee settlement agencies and starting their own sewing school to train new employees on the job. "Innovation is in everything we do. How we approach work, how we train people, how we work with each other," says Sal Geraci, Chief Operating Officer at NSA.



7

Reinvent your future. With work and the world rapidly changing, it's up to each company to innovate the way forward. Lumitex is a lighting company that's constantly reinventing it's future. It started in automotive lighting and then went on to invent the world's first backlit keyboard, light-up sneakers, and a light blanket to treat babies with jaundice. Most recently it's spun off a medical device company. "I think there's a deep mine of potential in midsize companies throughout Northeast Ohio, many of which have ideas that they could incubate, develop, and potentially spin off," says Peter Broer, CEO of Lumitex.



8

Build your community as you build your company. For manufacturing to thrive, our communities need to thrive too. In the 1980s, Pierre's Ice Cream Company outgrew its factory and made a bold and risky decision to revitalize an 8-acre brownfield site in MidTown Cleveland – back then, an economic wasteland. "Once we moved in it was another 20 years for things to fill in around us. So, we stayed here alone that whole time and now it's really transformed," says Shelley Roth, retired President of Pierre's Ice Cream Company.



9

Invest in Industry 4.0 at scale. This is no longer an option, it's an imperative. "Investing in innovation, investing in transformation, is required not only to grow your business, it's required to sustain your business. If you're not willing to make those investments today, I guarantee one of your competitors across the world is making those investments, positioning them to take business from you in the future," says Baiju Shah, President & CEO of the Greater Cleveland Partnership.



10

Push progress in the same direction. As we rebuild our post-pandemic world, we have a singular opportunity to build a better future for manufacturing. A more resilient supply chain. A diverse, technology savvy workforce. A digital, connected, innovative industry. We can all lead, no matter where we are or what size our company is. And if we come together to catalyze change, we can build an industry that leads the world. "We need powerful partnerships that push progress in the same direction," says Dr. Ethan Karp, President & CEO of MAGNET.

BRINGING THE BLUEPRINT TO LIFE

ENGAGE

1

- Join the Blueprint as a Champion:
[manufacturingsuccess.org/blueprint-champions](https://www.manufacturingsuccess.org/blueprint-champions)
- Share the Blueprint (and this report card) with your network:
www.manufacturingsuccess.org/blueprint-report

CHANGE

2

- Execute the Blueprint talent, technology, innovation, and leadership strategies in your company wherever possible. Ideas here:
[manufacturingsuccess.org/blueprint-take-action](https://www.manufacturingsuccess.org/blueprint-take-action)
- Partner with other manufacturers in coalitions, sector partnerships, alliances, clusters, and centers of excellence to catalyze broader industry changes. Ideas here: [manufacturingsuccess.org/blueprint-resources](https://www.manufacturingsuccess.org/blueprint-resources)

ACCELERATE

3

- Collaborate and partner on big ideas, major grants, and investments that move the industry forward, particularly focused on EVs, polymers, water, additive manufacturing, defense supply chains, and other areas where the region has a leading position.
- Invest in people, technology, and innovation as if it's "now or never," being ever mindful that every day we aren't transforming ourselves, the value of our businesses and our opportunities are shrinking.

Please share your success stories. Use [#makeitbetterohio](#) on LinkedIn so we can all learn, celebrate, and stay on the journey together!

OUR VISION FOR SUCCESS

3,000
new advanced
manufacturing jobs
every year.

\$10B
increase in
manufacturing GRP
by 2030.

\$40B
boost to the
regional economy
by 2030.



CEO INSIGHTS: HOW CAN WE LEAD IN SMART MANUFACTURING?



I just saw in The Wall Street Journal a graphic of all the new electric vehicle and electric battery plants that are going to be built in the next five years or so. There's a huge density of them between Michigan, Ohio, Indiana, Kentucky, and Tennessee. If you look how close we are in Northeast Ohio to that population of activities, it's great for a supplier like us who has products that can go into all of those applications. So, I think we're in a great geographic location. Land is available, resources are available to continue to expand and grow.

- Rebecca Liebert, President & CEO, Lubrizol



If we just get individuals around the United States and around North America to recognize that Cleveland, Ohio has positioned itself as an advanced manufacturing region, that will be a huge benefit to the region long term. I see a huge opportunity for success, and it's one of those things just like manufacturing, there's no light switch. There's no one thing that if we could go do that, that means it's going to happen. It's going to take all of us continuing to be committed to the Blueprint, committed to the process, committed to continuing and getting better.

- Chris Mapes, Executive Chairman and former President & CEO, Lincoln Electric



We have world-class educational systems, world-class health care. We have an educated workforce, both blue collar and white collar, and you need them both. We fixed many environmental issues. We've fixed corruption issues. All the things that sort of hold cities and areas back. And the beauty of it is we have fresh water. And that's the thing that's going to drive us forward and make us better than any other place. We're sitting on a reservoir of water that's unparalleled.

- Tom Lix, CEO, Cleveland Whiskey



Cleveland can absolutely be the smart manufacturing epicenter. We just have to choose to do it. We have to decide that's who we want to be. And the desire to do it requires a lot of people to put down certain egos. To say, okay, we're doing this together. I think as a community we need a philosophy of 'Cleveland or nowhere' in terms of how we want to approach our business and build these new ways of manufacturing.

- Andrew Hurst, CEO, Delivered, Veroot, and Ark Transportation



What can we do that will allow us not just to go big, but to go big, smart? Go big smart means creating competitive advantage that's hard to duplicate somewhere else. Everyone is doing smart manufacturing. So, we've got to create unique competitive advantage. There are things we do in polymers. There are things that we do in bio. There are things that we do and should be doing with our freshwater. The value of this geo is in the uniqueness of this geo. We have a ton going for us. The strategy needs to tie some of this together and create opportunities to grow the pie. That's where we create that big value add.

- Kevin Johnson, Managing Partner, NexGen Interactive



I think the future is very, very bright and that was one of my hypotheses when I came back. Manufacturing is thriving in the United States. We've gotten rid of a lot of the lower end manufacturing, and it's gone to cheaper places. But for high-end manufacturing, this region is absolutely fantastic in material sciences and automotive. There are lots of industries where we have leading positions, and we need to continue to build upon those. With the right leadership, I think we will have the manufacturing renaissance everyone's been talking about.

- Brian Gale, Chairman, Malley's Chocolates

Want More CEO Insights?

MAKE IT: Frank Conversations on the Future of Manufacturing



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THE ROAD AHEAD

In the 1920s, Henry Ford didn't just invent the Model T and the assembly line. His innovative principles called Fordism transformed manufacturing globally and changed society with the introduction of revolutionary concepts like mass production and minimum wage.

This reminds us that one person, one company can revolutionize an entire industry. But we can't wait to be transformed. We must lead the transformation. In the last two years we've made progress, but there's much more work to do. So, even as we celebrate, we ask, "where do we go from here?"

We build on the foundation we've built brick-by-brick, decision-by-decision over the past two years since we joined forces to reinvent our future. And we keep our vision firmly in our sights.

If we lead the world in smart manufacturing, here's what our future can look like. Our talent shortage becomes a talent influx. People are lined up for manufacturing jobs and we are the capital of manufacturing education in the United States. We put everyone to work. Our plants are as diverse as our cities. Manufacturing is a career of opportunity. It gives more people a pathway to prosperity. We are no longer the "rust belt," we are the "technology belt." We adopt Industry 4.0 faster than our competition – giving us huge productivity, quality, and lead time advantages. We leap ahead with ideas and innovation. Northeast Ohio is the first choice for manufacturing start-ups and has one of the highest rates of R&D in the country. As a result, we are a hotbed for investment. And all of this is powered by partnership. Companies and communities work together to solve systemic problems because we all believe that manufacturing is our future.

We have a bold vision. We have the legacy. We certainly have the grit and pride. The challenge now is to use the lessons of the past two years to fuel our progress going forward by:

- Doubling or tripling our investments in advanced technology, leaving no company behind as we accelerate Industry 4.0 adoption across Northeast Ohio.
- Scaling our workforce programs to create a steady stream of new, diverse entrants into manufacturing, while simultaneously making our factories great places to work, with great cultures that help retain and promote talent in a highly competitive market.
- Driving more innovation across the board – process, product, and service – while also creating a thriving innovation ecosystem that invests and nurtures physical products startups and spinoffs.
- Coming together in powerful partnerships to chase big ideas and big projects in strategic areas where Northeast Ohio can lead due to proven capabilities and differentiated competitive advantage – areas like EVs, polymers, additive manufacturing, and water.

Together, with renewed focus on these four things, we can train a new generation of high-tech talent. We can transform our factories with technology. We can innovate to make things that haven't been made here in decades – or ever. We can lead the way with bold ideas powered by partnerships.

Our success to date proves that everything we need to lead the world in smart manufacturing is already here. We just need to come together and do much more of it. Like Henry Ford, we need to make it happen, not only for ourselves, but for generations to come.

MEET OUR MANUFACTURING CHAMPIONS



Join the movement to reinvent manufacturing: manufacturingsuccess.org/blueprint-champions

MAGNET's Manufacturing Innovation, Technology and Job Center was designed to bring the Blueprint to life. We are grateful for the support of many donors who made it a reality: manufacturingsuccess.org/funders