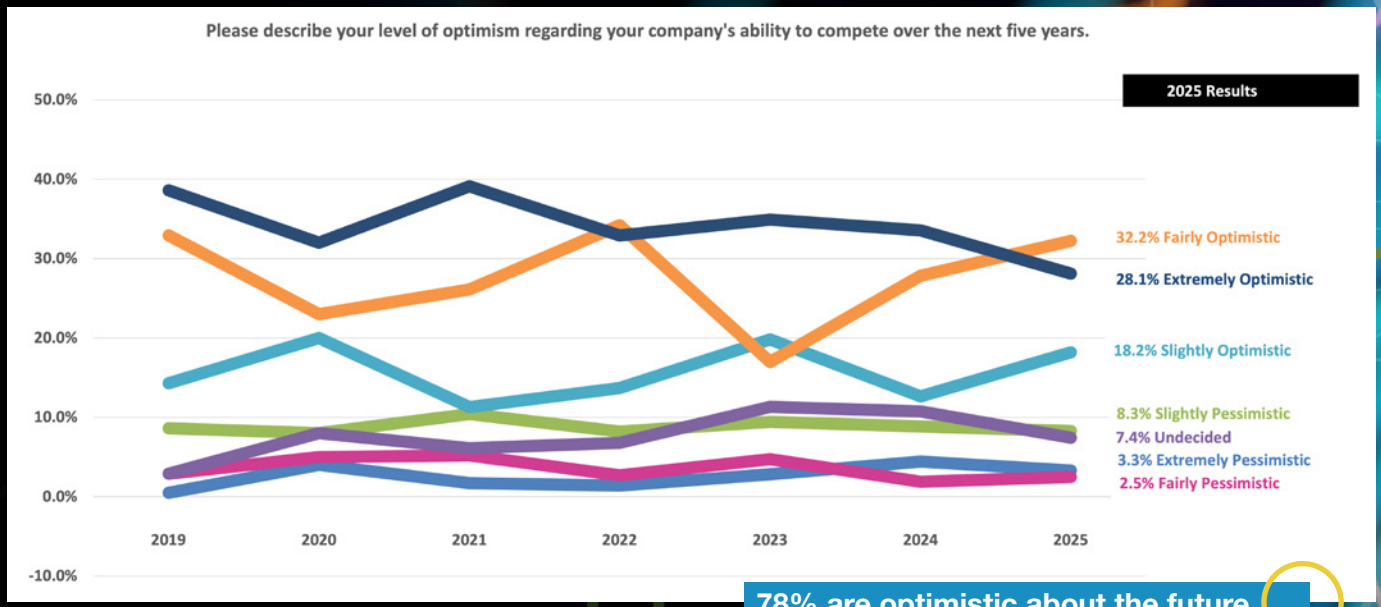
2025 State of the Gear Industry

Insights from the front lines of the gear community

Every year, *Gear Technology*'s State-of-the-Gear-Industry survey takes the pulse of the gear manufacturing world, revealing the latest trends, challenges, and outlooks shaping the industry. Conducted anonymously, the survey gathers insights from subscribers, AGMA members, gear manufacturers, suppliers, and industry experts—primarily from North America but with voices from around the globe. This year, nearly 200 professionals shared their perspectives, offering a real-time snapshot of the industry's health and direction.

Alongside the survey results, *Gear Technology* senior editors Aaron Fagan and Matt Jaster provide deeper analysis through exclusive conversations with leading manufacturers and machine tool companies, delivering firsthand insights into the forces driving today's market.



78% are optimistic about the future

Describe the most important trends affecting your business and the gear industry in 2025.

"President Trump is not a fan of wind power."

"New technology is emerging and the cost of acquiring the equipment has grown higher. Being a small- to mid-sized manufacturer, we are always facing this CAPEX expenditure and also lack of skilled manpower."

"Onshoring is good for American businesses."

"The impact of world trade and tariffs on exporting of gearing to the world."

"Downsides for our company: available product/portfolio, lead times, labor issues. Upsides: Service and repairs, excellent customer and technical support, proximity to customers, supply chain, new technology, excellent quality."

"The electrification trend."

"EV. AI."

"Plastic gears."

"Automotive performance and energy sector."

"Lack of knowledgeable gear machine operators."

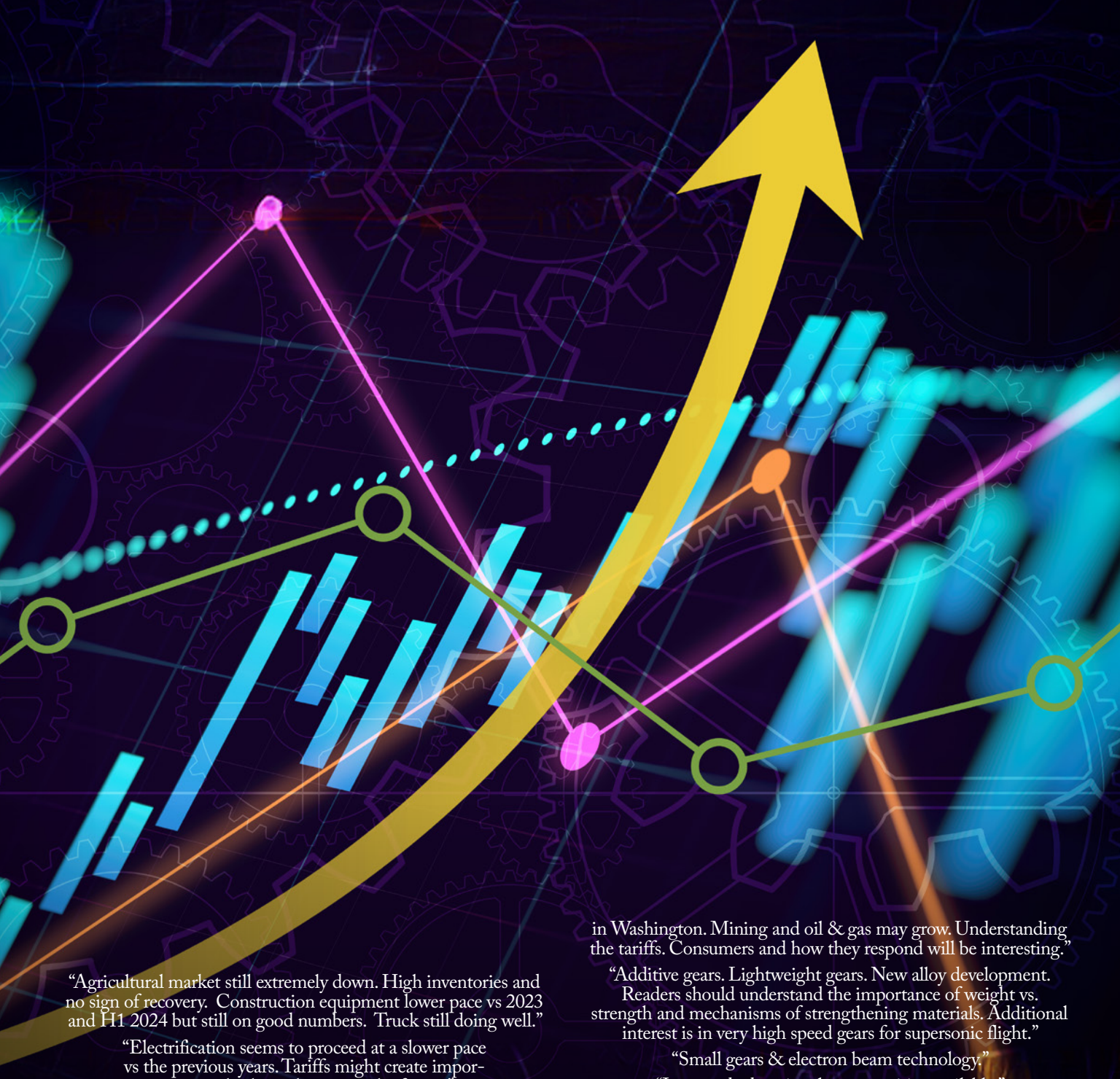
"Domestic capacity. It is hard to work through problems when the solution is multiple days away."

"Increasing influence of AI, CO_2 reduction over the entire life cycle (gearbox efficiency and gearbox production)."

"We in the Brazilian Industry mainly face the lack of a serious Government with well-defined Industrial policies. Especially in the field of gears, a total absurdity for the Brazilian Government is to tax the gear equipment that we need to import from high-tech countries. This makes us totally uncompetitive with other low-cost countries."

"The future is for high-quality gears, where the geometrical testing becomes mandatory!"

"High demand in rail and wind power. Expanding with high capex over next 5 years."



"Agricultural market still extremely down. High inventories and no sign of recovery. Construction equipment lower pace vs 2023 and H1 2024 but still on good numbers. Truck still doing well."

"Electrification seems to proceed at a slower pace vs the previous years. Tariffs might create important supply chain changes in the future."

"Global competition."

"In the second half of 2024, automotive was in decline, gear reducers were stable, other fields (automation, mechanical applications...) showed small growth. No big changes expected for automotive but we see some good signals from other fields."

"Target and trend in the automotive industry are not clear."

"Major changes in the automotive industry."

"High energy prices, high steel prices."

"AM on the one hand and the ever increasing volumes and advanced technology of EV drive lines is a definite threat to ALL conventional Gear Manufacturing Systems."

"Ukraine and Russia war."

"I believe we will see a change in the focus around the EV market. It hasn't gone well so far, but the push will stop happening in Washington. Mining and oil & gas may grow. Understanding the tariffs. Consumers and how they respond will be interesting."

"Additive gears. Lightweight gears. New alloy development. Readers should understand the importance of weight vs. strength and mechanisms of strengthening materials. Additional interest is in very high speed gears for supersonic flight."

"Small gears & electron beam technology."

"Increased educational opportunities available."

"Finding trainable individuals that can work 40 hours per week is difficult."

Car manufacturing has a trend to be supplied more from China, and others are already facing difficulties regarding pricing. Terrible market change if the trend continues for the gear machine makers."

"On the negative side, competition from India, uncompetitive U.S. steel prices, lack of investment in U.S. steel manufacturing, sustainability of U.S. economic growth against the threat of increasing tariffs. Positive trends include increased use of automation and robotics due to labor cost increases and advancements in AI."

"Global economies are in the pits."

"Development of fossil fuel production with the most efficient technical capability of the 21st Century."

"Inflation and uncertainty of the economy."

"Too many programs going to India."

"Gear technology, new gear designs, failure analysis in gear."

"We see a very important decrease in all industrial sectors."

"Technology has been stifled with Biden."

"Labor costs/competition with China."

"Lack of skilled labor, rising costs, diversification."

"I believe customer orders will increase due to economic optimism for the future and continuing advances in engineering technology."

"Workforce development, automation, inflation."

"Increasing offshore competition."

"NEV (neighborhood electric vehicle) transmission with planetary drive."

"Decarbonization of the passenger car industry."

"Electrification of propulsion systems."

"Repair of older equipment will be a larger portion of the market because of inflation."

"Breaking into new hybrid technology markets with government funding. Investments are being made to participate in this emerging market."

"Business is positive. Finding talent is not."

"Scrap."

"Automation and the increasing effectiveness of gear manufacture with 5 axis machines."

"The growing trend towards automation in industries is leading to an increased demand for precision-engineered bevel gears, as well as improving the durability and performance of gears."

"Deep discounting by competitors."

"Impacts of emerging technology on how we conduct business and how we manufacture."

"Electric vehicle growth, general economic conditions."

"Reduction or even elimination of the production of conventional transmissions with manual gearboxes."

"Firstly, the Chinese competition, with machines and labor cheaper than what we have access to. Then, I would say the demand for gears in new mechanical transmissions, or even the replacement of mechanical transmissions."

"Electrification and decarbonization of manufacturing. Staffing and training—how to find and develop highly capable team members."

"Gears are the heart of our equipment. The cost of manufacturing medium-accuracy gears is increasing, which is a major concern."

"Transmission performance increase, efficient gear cutting processes, energy-efficient gear cutting machines, digitalization, process monitoring, new closed-loop manufacturing strategies ."

"Increase in electric vehicles and stagnation of ICE vehicles."

"New high-quality requirement in EV gears."

"Robots."

"New materials, treatments along with need to reduce wear and friction."

"In my opinion, too much attention is being given to advanced technologies and not enough on learning the basic technologies; everyone wants to run when they can't even walk."

"My specialty is large gears for mining. Little work. Other specialty is high precision For defense. Also very little work."

"Gear noise, plastic materials for gears."

"Tighter tolerances in gear accuracy. Also, automation even in low volume applications."

"Hiring qualified personnel to train as machinist."

"The USA is not competitive with China, Europe, especially eastern Europe, South America."

"Mergers and acquisitions."

"Chinese tariffs."

"Effects in the EV market and a need to expand the ID/OD grinding capacity for gear manufactures."

"Consolidation."

"Lack of consistent policy and direction in the EV market. This could be a great opportunity to scale up consistently, but political flip-flopping on policy creates an unpredictable environment that is highly risky to make scale-up investment into."

"As a machine builder, the trend towards manufacturing gears on lathes and other standard pieces of equipment has affected our business and will likely continue to affect our business in a greater capacity as the ability make better quality gears on lathes is further developed."

"Tariffs."

"EV markets."

"EV and alternate fuel vehicles."

"Electrification is rolling out at uneven speeds across different industries."

"EV Market. Scope of the impact for an ICE to EV transition."

"Economy strength."

"Decrease in production due to election year."

"International gear standards.."

"The continued long deliveries of gear processing machines."

"Gearing in robotics applications."

"Tariffs. Strong dollar. Available and skilled workforce."

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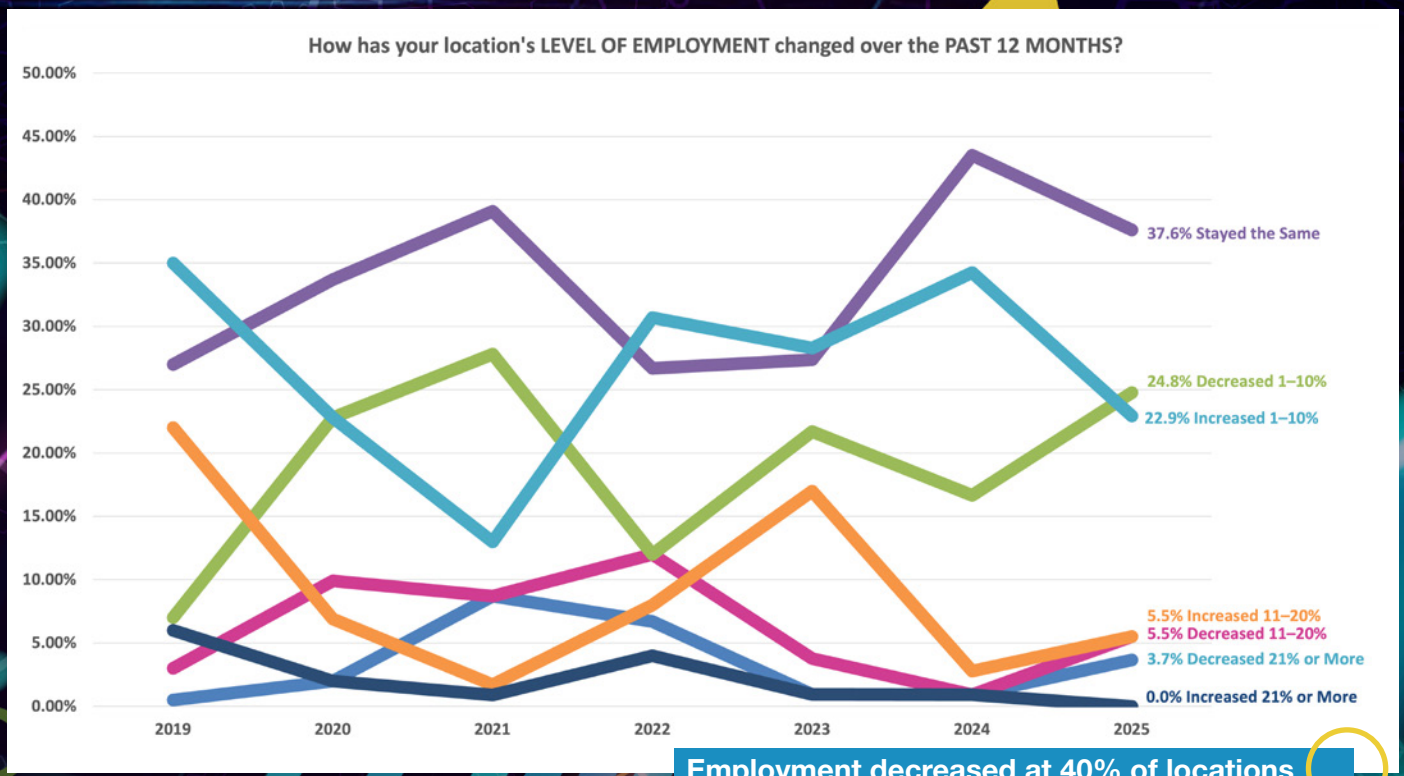
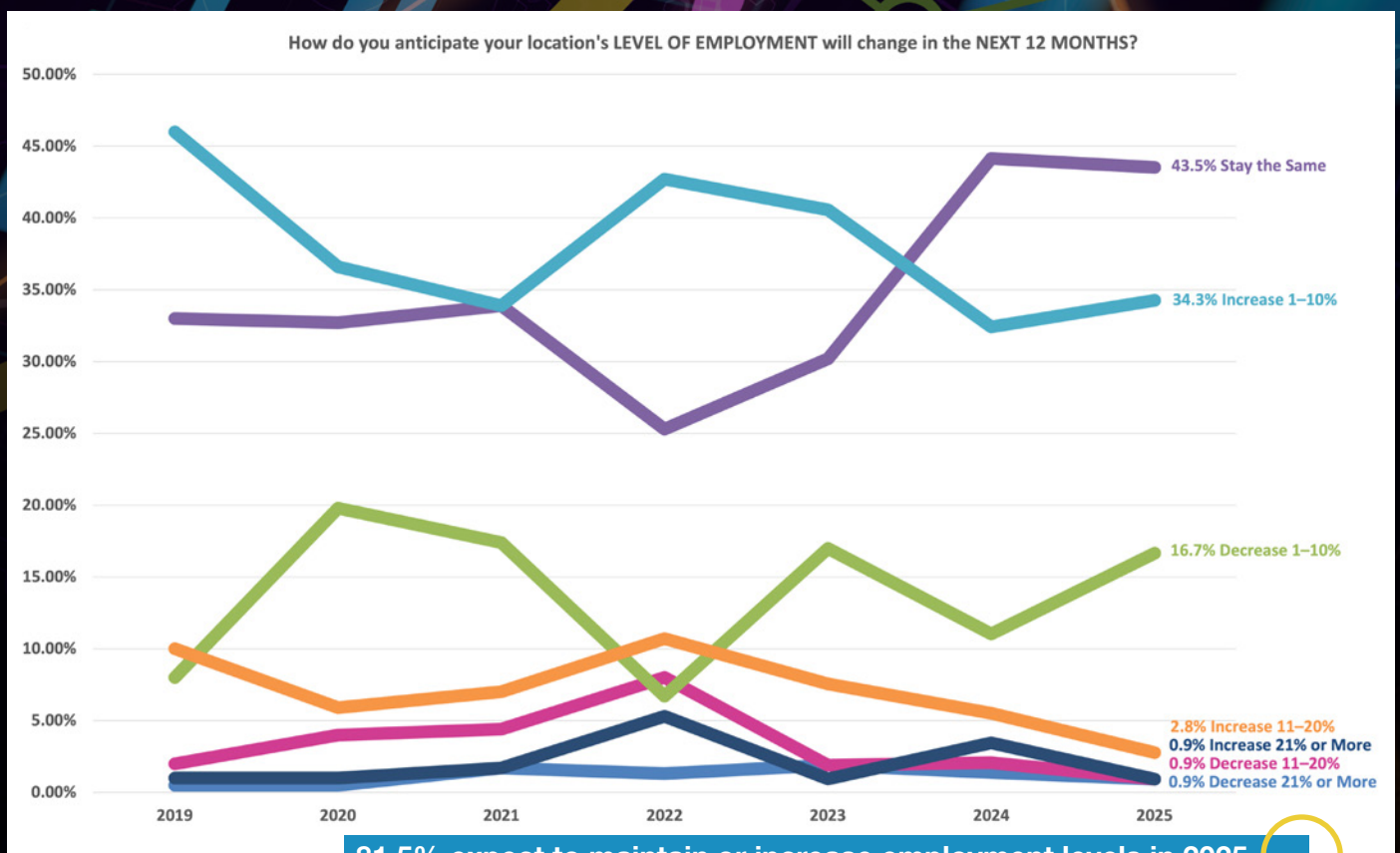
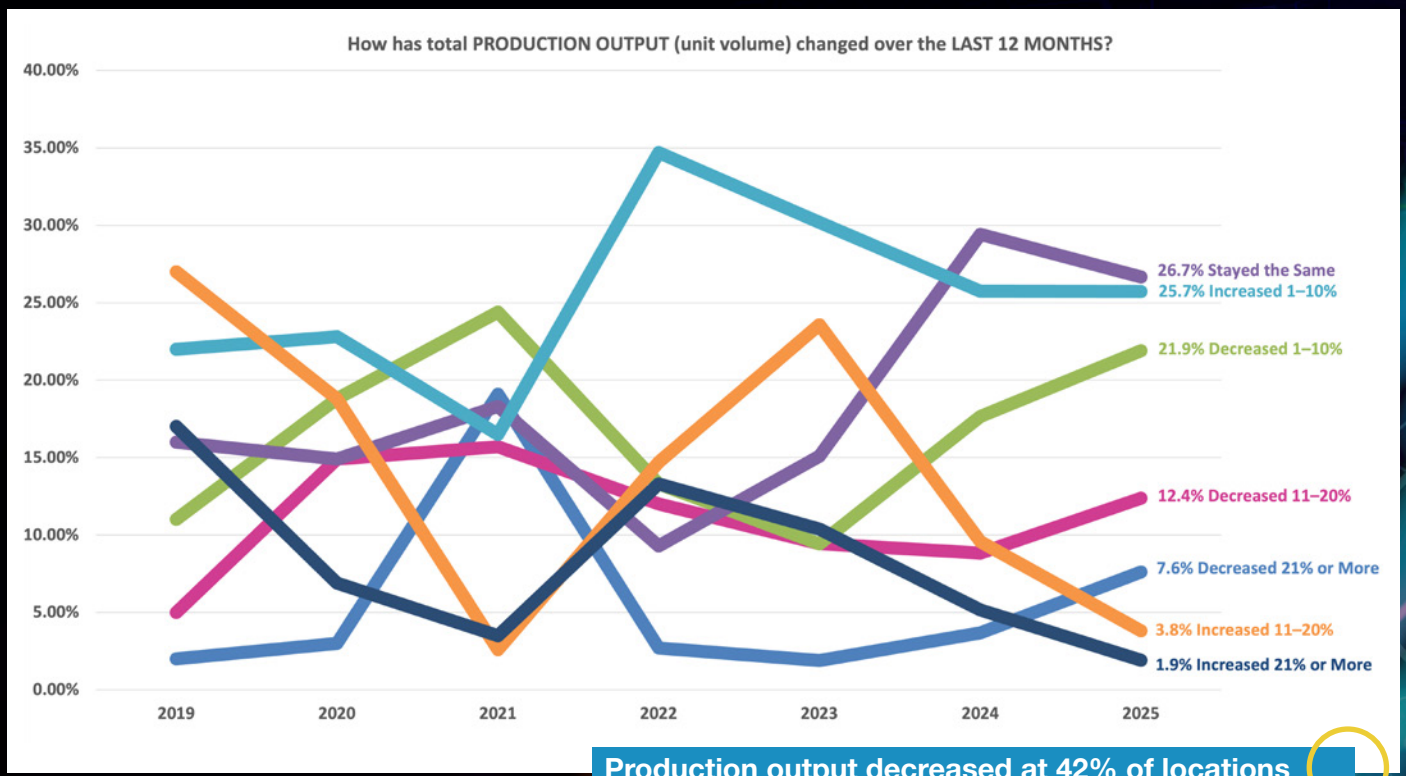


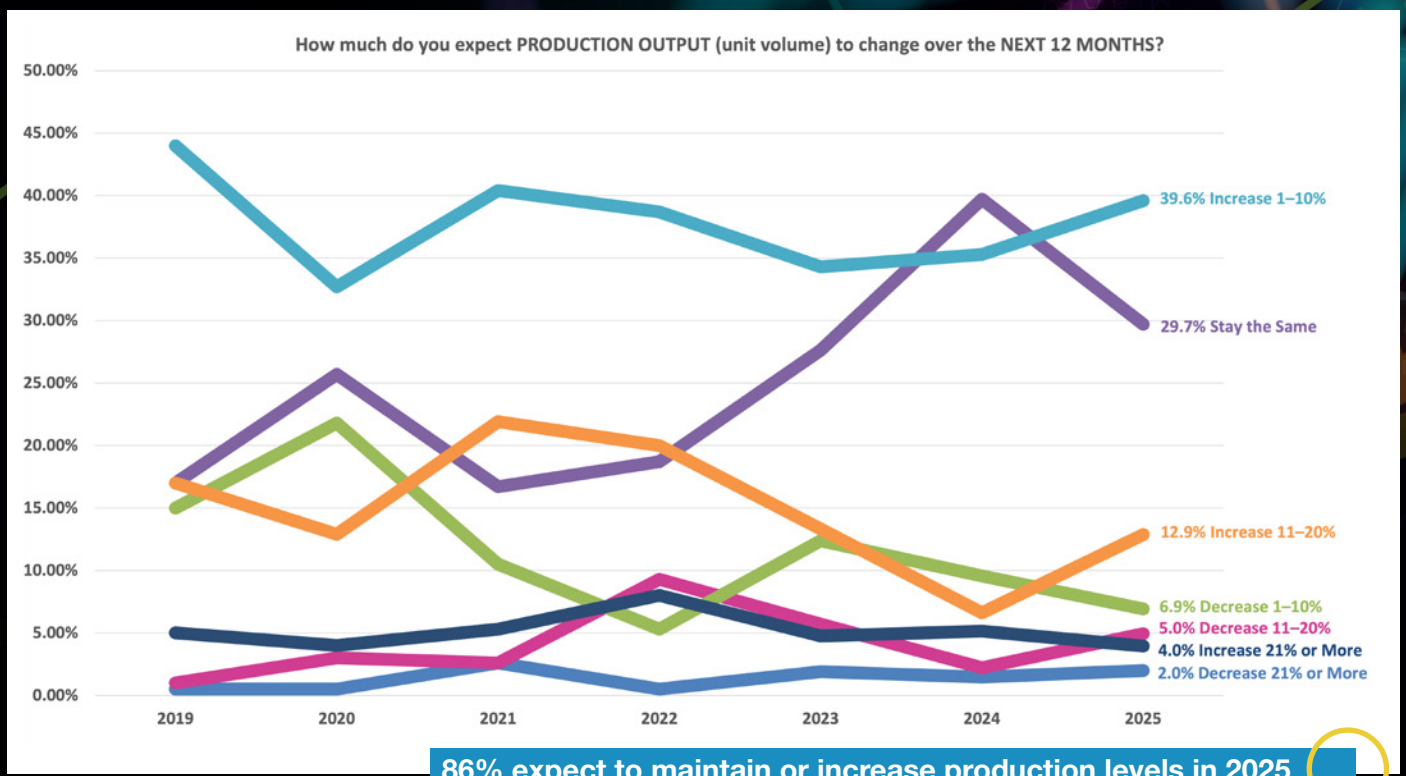
Employment decreased at 40% of locations



81.5% expect to maintain or increase employment levels in 2025



Production output decreased at 42% of locations



86% expect to maintain or increase production levels in 2025

The State of Gear Machine Tools 2025

Challenges, opportunities, and emerging trends

Aaron Fagan, Senior Editor

As the gear industry steps into 2025, manufacturers are navigating a landscape shaped by geopolitical uncertainties, evolving workforce dynamics, and rapid technological advancements. Alongside *Gear Technology*'s annual State of the Gear Industry survey, we like to gather insights from leading machine tool manufacturers on the challenges, opportunities, and trends defining the year ahead.

Global Uncertainty Shapes Industry Outlook

Manufacturers cite geopolitical tensions and economic instability as primary concerns. Peter Wiedemann managing director of Liebherr-Verzahntechnik GmbH underscores, "U.S./China tensions. European political instability. European bureaucracy." Felix Scholz, managing director of Liebherr Gear and Automation Technologies, Inc., adds that uncertainty surrounding industrial tariffs is a lingering challenge. John Perrotti, chairman and CEO of Gleason Corporation, concurs, noting that, "As we enter 2025, geo-political uncertainties still remain." Shane Hollingsworth, vice president of sales at Kapp Technologies highlights the difficulty of positioning products effectively, stating, "It's been difficult to predict, and considering the worldwide landscape, it will be interesting to see how the U.S. market converges or diverges from the rest of the world's major economies."

Perrotti further elaborates, "While global instability continues, we are focusing on leveraging our strengths in automation and precision manufacturing to ensure long-term competitiveness. The companies that can rapidly adapt to geopolitical shifts will be the ones that thrive."

Amid these concerns, reshoring efforts and supply chain shifts offer optimism. Wiedemann highlights India's growing role in global supply chains, stating, "New (potential) suppliers will need to continuously invest in sophisticated technology." Scholz points to the "positive trend of reshoring activities bringing manufacturing back to the United States." Jeffrey Smith, president of NIDEC Machine Tools America, also sees growth as the primary objective: "The biggest challenge is the same as always—grow!"

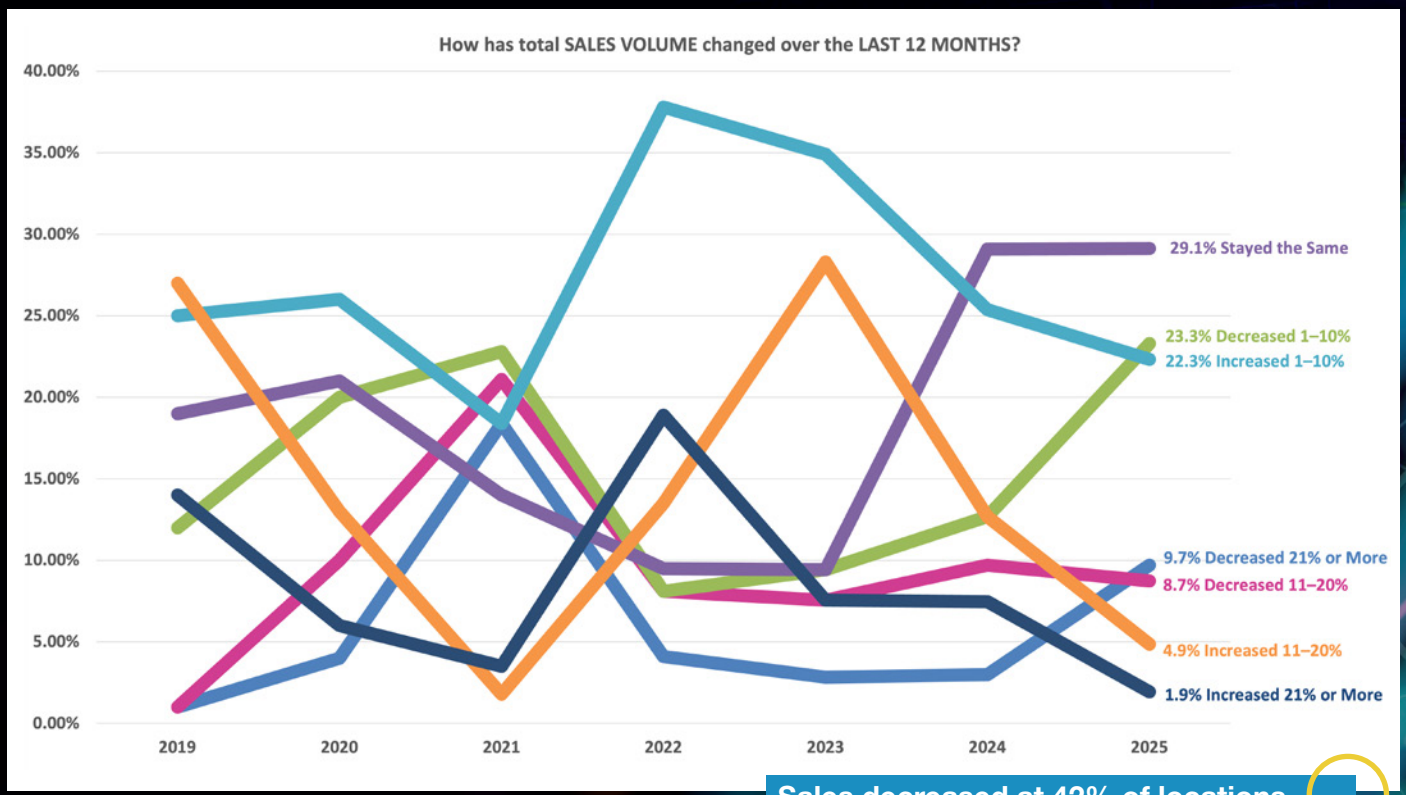
Bridging the Skills Gap

The industry continues to grapple with workforce shortages, but companies are evolving training programs to meet changing demands. Gleason Corporation offers a broad range of training options, from fundamental classes to specialized technology training, while Liebherr emphasizes its ongoing commitment to in-house training for employees and customers alike.

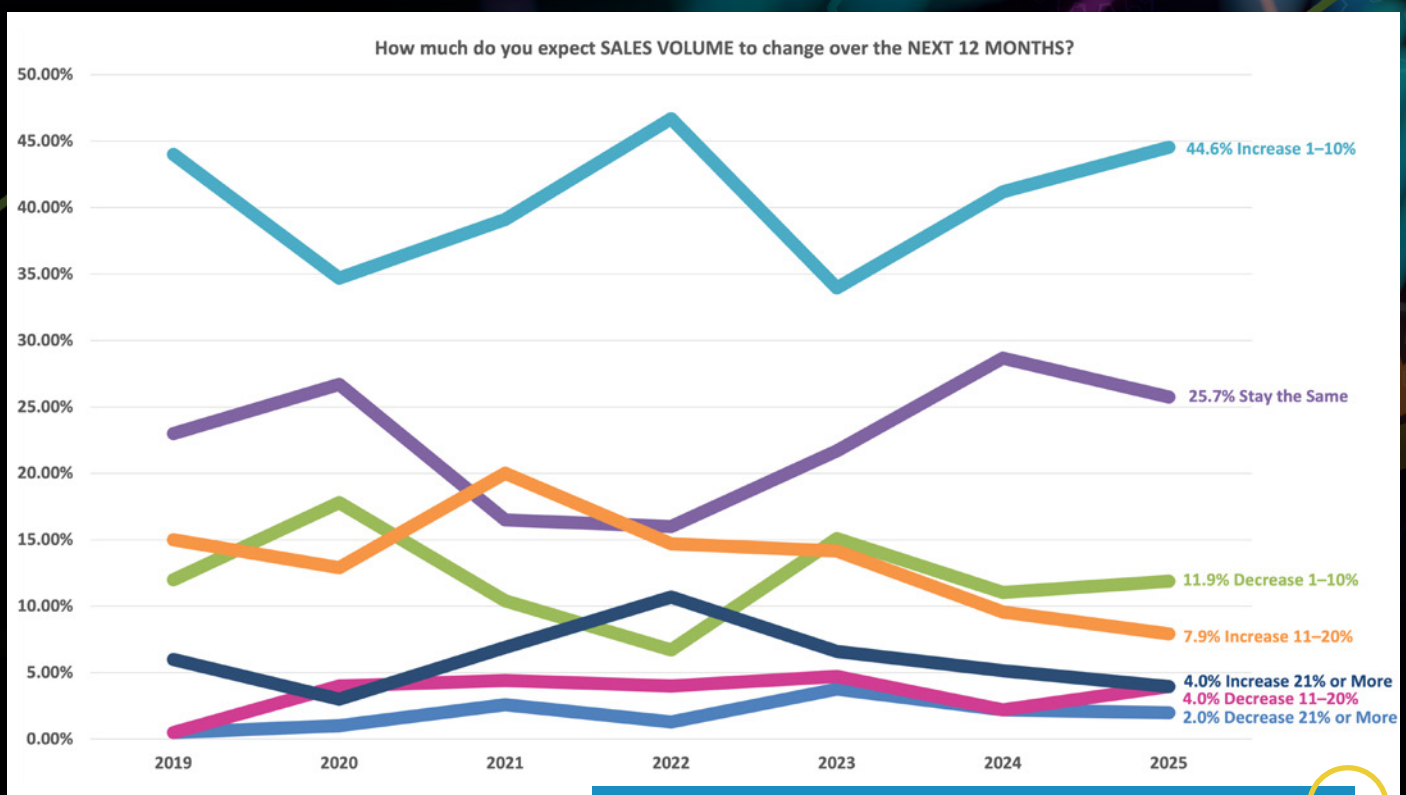
Peter Wiedemann, managing director, Liebherr-Verzahntechnik GmbH.

Felix Scholz, managing director, Liebherr Gear and Automation Technologies, Inc.

John Perrotti, chairman and CEO, Gleason Corporation.



Sales decreased at 42% of locations



82% expect to maintain or increase sales in 2025

Shane Hollingsworth of Kapp Technologies underscores the challenge of onboarding new employees in such a specialized industry: "The world of gears is quite unique, and most new employees start with no experience. Utilizing not only in-house training but also industry courses such as AGMA's is key for our future employees."

Meanwhile, GMTA's Claudia Hambleton sees apprenticeship-style training as a crucial tool: "We still have a large skills gap, but more companies are working to close it with educational opportunities and real-world skills." She also notes that "Online and virtual learning is one of the few positive outcomes of the pandemic. The opportunities to learn new information are extensive."

Smith at NIDEC takes a straightforward approach: "Education at its core still remains the same—people need information and experience to dovetail as fast as possible to get the knowledge to stick."

Perrotti adds, "We are heavily investing in cross-training and skill development because the modern gear industry requires a workforce that is adaptable and ready for next-generation technologies."

The Rise of Smart Manufacturing

The adoption of Industry 4.0, IIoT, and Industry 5.0 continues to transform manufacturing. Liebherr-Verzahntechnik GmbH is focused on developing digital tools to enhance productivity, while Gleason Corporation integrates digital twins and smart-loop manufacturing to improve precision and efficiency.

Perrotti explains Gleason's approach: "Binding design, manufacturing, and metrology together with digital solutions is one of our core strategies." Meanwhile, Liebherr's Peter Wiedemann emphasizes the need for data-driven decision-making, stating, "We are constantly designing new digital tools for our customers to support them in keeping productivity up, identifying potential bottlenecks in the production environment through data analysis, and defining the right corrective actions, such as preventative maintenance."

Regarding the role of AI in manufacturing, Perrotti states, "Artificial intelligence and machine learning will play a critical role in predictive maintenance and production optimization, making factories more efficient and resilient."

E-Mobility's Uncertain Trajectory

The e-mobility market remains a wildcard. While China continues to lead innovations, North America's demand has not met expectations. Felix Scholz notes, "The market demand for e-mobility in North America did not match predictions and will remain an uncertainty for the U.S. automotive market."

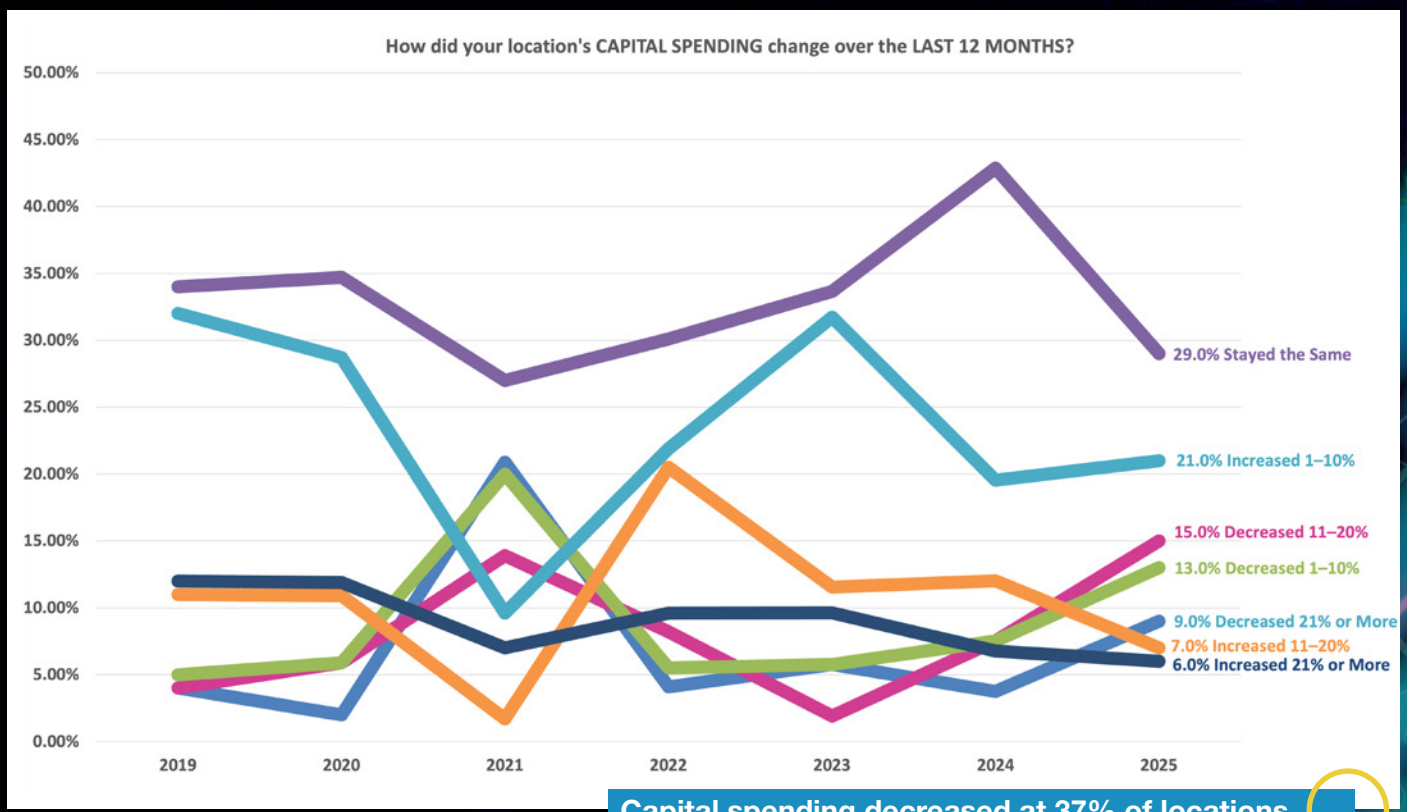
Hambleton from GMTA adds, "We have been greatly impacted by the hesitation in the EV market. Hybrid vehicles seem to be the most viable option right now." John Perrotti sees a mixed picture, observing that "E-mobility is still growing, but, in most markets other than China, it is growing at a slower rate. Plug-in hybrids have gained momentum in the U.S. market, but incentives are disappearing, which may put downward pressure on the growth rate."

Jeffrey Smith, president, Nidec Machine Tools America.

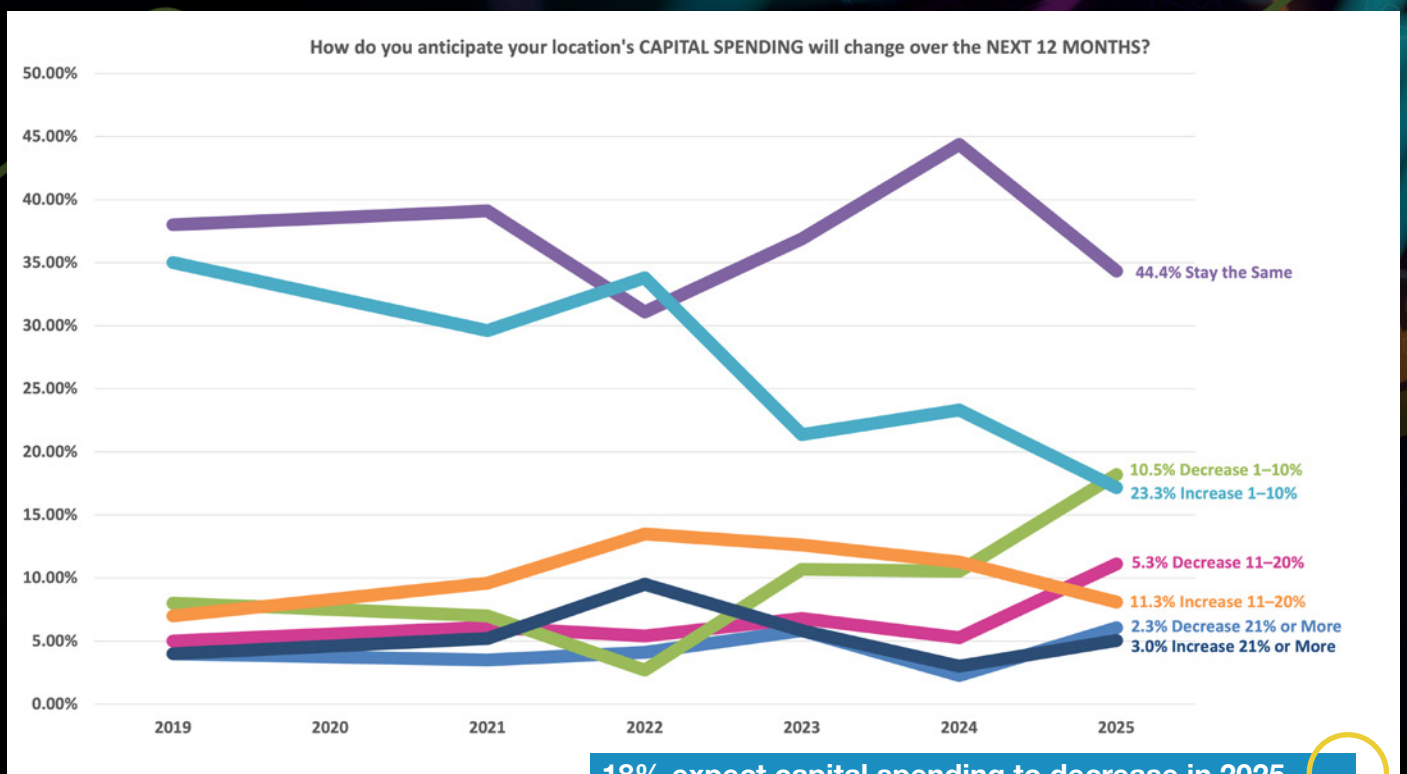
Shane Hollingsworth, vice president sales, Kapp Technologies.

Claudia Hambleton, office manager, GMTA.

Scott Yoders, vice president sales, Liebherr Gear and Automation Technologies, Inc.



Capital spending decreased at 37% of locations



18% expect capital spending to decrease in 2025

Sustainability Is More Than a Trend

Manufacturers are taking a proactive approach to sustainability. Scott Yoders, Vice President Sales at Liebherr Gear and Automation Technologies, Inc., highlights their real-time energy monitoring system, allowing customers to track and optimize energy consumption: "This helps our customer base reduce their costs and also makes a significant contribution to sustainability."

Gleason Corporation similarly integrates energy efficiency and emission management into its long-term strategy. Perrotti adds, "This is a continuous, long-term strategy also in 2025."

Industry Blind Spots

Beyond well-known issues, some challenges are not getting enough attention. Peter Wiedemann calls for pragmatic U.S.-Europe trade agreements to counteract bureaucratic inefficiencies.

Perrotti points to aerospace, defense, and robotics as growing markets that deserve more focus, adding, "Western economies are still running short in protecting and rebuilding key industries to become less dependent on Asian supply." Jeffrey Smith also highlights the growing role of AI and automation in manufacturing: "Generalists with a good comprehension of a variety of skills will be needed. In manufacturing, we can see this as cobots and industrial AI come to market."

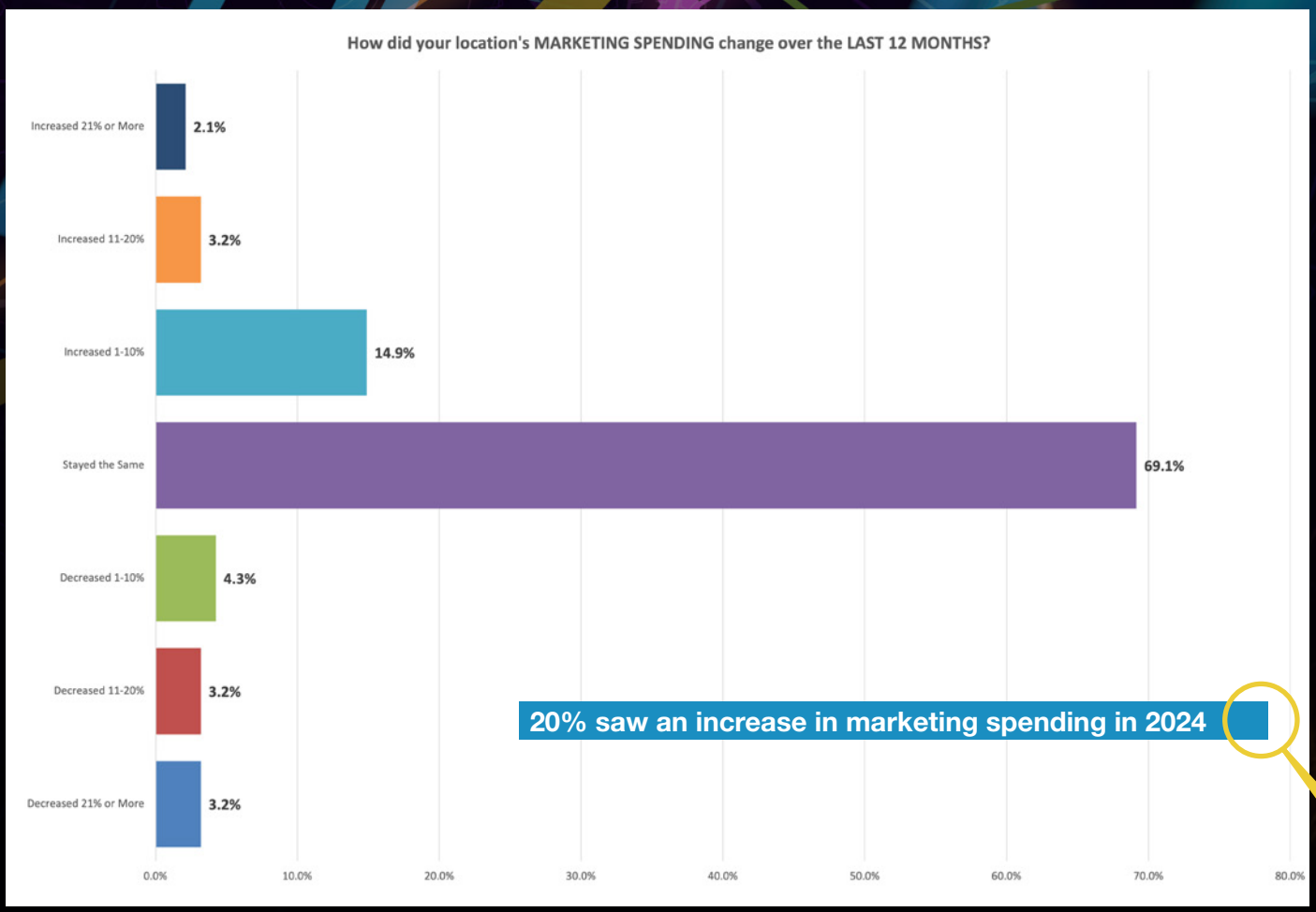
Policy Landscape: Waiting for Clarity

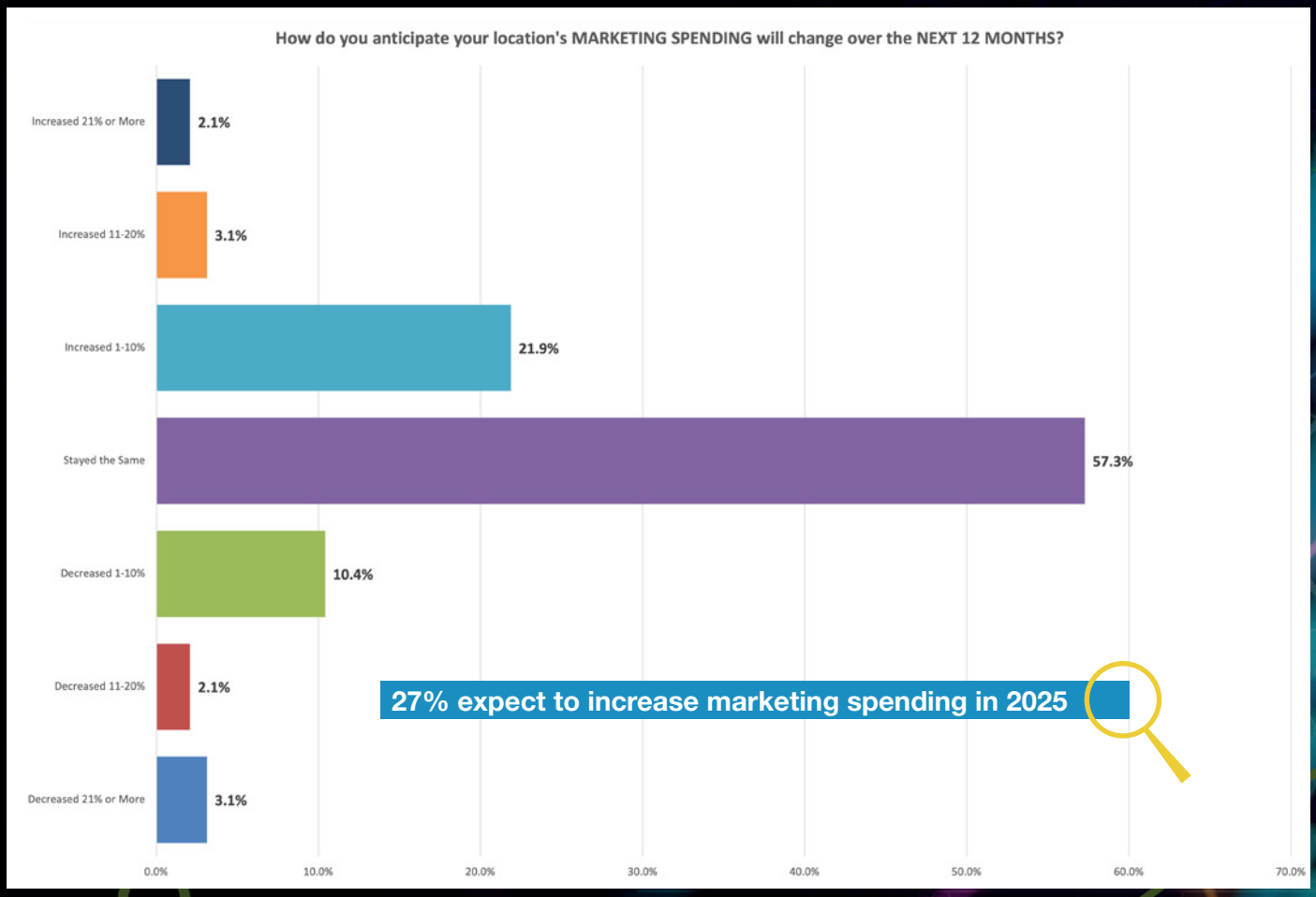
Recent U.S. trade, energy, and workforce policy shifts create both challenges and opportunities. While Gleason Corporation and Kapp Technologies are cautiously monitoring domestic energy policies, NIDEC's Jeffrey Smith emphasizes flexibility in response to changing political landscapes: "Given the switch in parties in power, we are being cautiously optimistic, taking care to prepare for as many outcomes as possible."

The Road Ahead

Despite challenges, manufacturers remain optimistic about growth, innovation, and new market opportunities. As Shane Hollingsworth aptly puts it, "We want all of our organization to feel we are in the boat and all heading in the same positive direction, even if we hit a few waves along the way."

The year ahead will test the resilience of the gear industry, but with strategic investments in technology, workforce development, and sustainability, companies are poised to navigate the uncertainties of 2025—and beyond.





In what ways has your company implemented AI, and how do you feel about it?

"Document search."

"We are working on adding it to our CNC programming through software."

"AI is still in its infant stage in manufacturing."

"None yet."

"We have made limited progress using Copilot, but not for internally generated data. It brings benefits for web research and software development."

"Order processing, options selections—improved the overall time."

"None."

"We don't implement AI yet."

"In product design and responding to expectations."

"We are currently in a testing phase in all departments."

"We don't have this topic on the agenda, and little knowledge about AI."

"In the advanced gear metrology field, the AI does not have much to contribute. Most of the software solutions are black boxes."

"We are in process of implementing AI in our design & technology center."

"Still working on it. I do not have yet a clear picture."

"We do not use AI."

"Production planning."

"Just chatbot. Not so fearful."

"Not at all."

"Not yet. In some areas of analysis and research, it will help the Industry."

"Only in coding area. We are using AI to improve system management."

"We are currently using it in creating documents, communication, marketing and research in sales."

"Doesn't exist."

"Not implemented."

"We are watching what is happening. I have concerns about copyright infringement and accuracy of the large language models required for AI to be of value."

"Primarily in machine vision in support of final part inspection and internal inventory/part handling and management. I personally feel excited about the prospects of expanding our use of AI across all parts of our organization."

"AI has selective potential."

"Have not implemented AI."

"We have always had robotics. Not sure if AI has caught up to our industry yet to make a difference, but it is coming."

AI (continued)

"Not applicable ."

"At the moment we haven't implemented inside the company. We think it can be an opportunity for better understanding the market industry variation."

"Not up to speed."

"None, and I really do not have an opinion of it as yet."

"We have not implemented any AI."

"No implementation."

"Basic use in database and as digital assistant in meetings."

"We are developing a qualified database that may be used as the LLM for AI."

"Minimal usage related to improved internet search tool."

"Very early stages of using."

"Not implemented."

"We have not yet implemented it."

"Limited use of AI—don't know enough about it yet."

"We are implementing custom AI throughout our business and feel that it has a tremendous positive impact on our business."

"No IA implemented."

"No, it doesn't help small businesses at this point."

"Just for some office jobs like reports, presentation etc. My feeling is neutral so far."

"We are learning about it."

"We have not implemented AI and I am feeling rather negative about it."

"It hasn't yet. I am glad of this as AI is still in its infancy and poses a huge risk until it is strongly regulated and its datasets are effectively controlled to prevent compounding biases."

"It is in the beginning stage yet."

"Still experimentating, it is ok but need to define the use."

"Only around email, policies, sense checking documents."

"Marketing and research."

"I am not aware of any AI projects in my area at this time."

"None."

"Prospect mining, feel pretty confident it will pay off."

"In a bit of automatic drawing."

"Engineering, HR, marketing, tooling answers, heat treat. Think it's great!"

"We don't."

"None, but intrigued."

"Simply ChatGPT for productivity improvements. Low level application as of yet."

"We have had 'Lunch and Learns' with IT on ways to use AI in your daily work activities. On a personal level, I use it regularly to solve problems."

"We occasionally use AI to generate text or summarize web search results. We think most of the problems AI could help us with could also be solved by conventional computing."

"Limited, but I like it."

"Very little. Still trying to understand it"

"Only using AI for press releases and other marketing tasks."

"We have not implemented any AI into our company yet."

"Nothing tangible."

How do you anticipate U.S. trade policies in 2025 will affect your supply chain and costs?

"Will get better."

"We are expecting them [costs] to increase."

"They will increase the demand for our American-made products."

"Likely to increase costs but outlook is clouded due to not having a clear direction from the Federal Government."

"Not too much, due to access to local supply chain."

"Will affect but I don't know how much."

"Depends on the new policies."

"Hinder procurement and increase costs."

"From European perspective there will be most likely a cost increase."

"We produce in Europe. The future U.S. policies will not be friendly!"

"Do not see major change."

"We expect relevant effects due to US trade policies."

"We try to buy material in big stock at the beginning of the year."

"In a positive way we expect."

"Probably not at all."

"It is too early to comment. It depends upon how Europe, the Middle East and Ukraine situations respond to the not-yet-clear Trump Policies. Oil prices and climate change issues will also come to the forefront."

"Not at all."

"I have no idea."

"Unsure at this time. We use all American made products in our gear production. It will be interesting to see if demand will create shortages and allocation again. It could push prices up again for steel and other products."

"2025 U.S. trade policies that have yet to be announced will likely put a damper on near-term growth and cause an increased costs. Trends will likely continue during the new regime's policies."

"Not at all."

"Increase the cost of doing business."

"I expect supply chain costs to increase."

"Neutral."

"Most likely decrease demand due to higher prices."

"Depending on how the elected administration does, it could harm current customers."

"We will do much better, even if cost of raw materials rises."

"I believe (hope) costs will drop somewhat."

"Increased cost of materials."

"The business will remain similar."

"Increased cost."

"Negatively."

"Uncertain on direct impact but likely neutral based on balance of positive and negative changes to our industry."

"Potential tariffs could have a big impact. This is an unknown for now."

"They will have a significant impact on supply chains and business costs due to tariff and protectionism policies and the regionalization of production."

"High potential to have a substantial impact on my business."

"Minimally."

TRADE POLICIES (continued)

"In 2025 everyone will be passive and cautious. Effects will show up later."

"Raw material prices will be adversely affected; may see some growth from domestic customers."

"I think no impact."

"Probably there is no good news in the coming months."

"Costs will go up."

"Minimal. Maybe raw materials."

"Positive."

"I expect supply chain and costs to continue to rise."

"None."

"I expect it will increase costs."

"Don't anticipate any negative effect."

"HELP!"

"Will increase costs."

"Should make the industry more competitive."

"Positive."

"They will increase, but not sure by how much."

"I expect they will stay the same, as over 50 percent of or supply chain is in Northern Illinois and, of the remaining 50 percent, 40 percent is based in the United States."

"Expecting increased input costs due to tariffs."

"Tariffs will likely increase our cost for raw materials and some purchased parts."

"Tariffs and the strong U.S. Dollar may force higher prices in the future. The strong USD hurts the global market for domestic suppliers."

"Tariffs would have a significantly negative effect on our business."

"Highly unpredictable but likely negative."

Describe the importance of sustainability in your company's overall strategy, including specific initiatives your company has implemented, if any.

"We have tried to digitize files."

"Not much."

"Not yet started."

"Not much. We recycle when we can."

"We have updated corporate literature, but it plays a minor role in product development and manufacturing operations."

"Very important. Our customers are asking to comply."

"I believe sustainability is important to my employer. We are always looking at manufacturing techniques that reduce consumables. We are designing products that will reduce greenhouse gases."

"Sustainability becomes a more and more important aspect for the entire industry. We are developing an integrated management system in order to cover all requirements beyond a conventional quality management system."

"Important topic. We meet all government requirements."

"From the beginning our sustainability was based on original ideas and dedicated technology applications. The strategy will be the same: Do more with less."

"This is of paramount importance. We have implemented a detailed plan with several actions ongoing. First of all, we did it because we believe in it. In addition this is becoming mandatory to work with certain companies and countries."

"To maintain the ISO 14000, Reach and Rohs."

"It is important. We have installed solar cells in our plant roof."

"Most important concept."

"It is an important topic. We have implemented ISO 14001 standards and installed solar power plant."

"Nil."

"Sustainability is going to become a bigger driving force in our company. We are being asked by our customers to become sustainable. We use returnable dunnage now with our customers."

"Taken seriously."

"Both finical and environmental sustainability have been ongoing since the 1980s."

"We are focused on reducing our operations CO2 emissions through the purchasing and/or implementation of green energy."

"Sustainability is a BAD Word here."

"Global economies must improve to provide potential of sustainable development."

"None."

"We see CSR (corporate social responsibility) getting more embedded in the manufacturing sector. Large OEMs are demanding more carbon data, recycling data, energy consumption and efficiency data, etc…"

"It's only going to get more prevalent."

"Very important."

"This is important for us. We are implementing a program."

"Not important."

"Part of our values: reclaim of material, energy reduction."

"I have always tried to balance financial sustainability and environmental sustainability. This month I celebrate 50 years of being self-employed doing machine work and welding at the same location."

"Focus and investment on hybrid technologies to help customers improve efficiency."

"Sustainability is in the forefront. However, it takes a back seat as technology for sustainability is not there yet."

"There are some specific initiatives that we have implemented energy efficiency, waste reduction and education and awareness."

"It is important."

"It will become more important to our customers. Measures are available but are too expensive to sell them right now."

"Neutral. Limited focus beyond simply not being wasteful."

"Sustainability is very important in my company. We are focusing on a new product most suitable for the new drive of vehicle."

"Very important. We will change out heating system and install solar panels this year."

"Heading in that direction. Looking at ISO14001."

"Very important."

"We are actively looking at ways to decrease our carbon footprint and energy costs through the use of solar panels and other energy saving initiatives, but they need to make sense for a return on investment."

"Highly important."

"Top priority."

Outlook 2025

Gear manufacturers weigh-in on state-of-the-gear-industry today

Matthew Jaster, Senior Editor

The ever-volatile election cycle has ended. Gear companies—and metalworking organizations in general—must now shift their focus toward customers. Can they meet orders in a timely fashion? Is it time to strengthen the talent pool? How is their equipment stacking up against the competition? Overall, there is a feeling business will turn the corner in the 3rd and 4th quarters of 2025. *Gear Technology* spoke with representatives from Atlanta Gear Works (AGW), Croix Gear and Forest City Gear (FCG) on the state of gear manufacturing in 2025.

A Shifting Gear Market

The gear market—and metalworking in general—has witnessed a tumultuous couple of years in manufacturing. A couple of things happened with COVID according to Ruthie Johnston, CEO, Croix Gear.

"First what we found is that companies over bought and over stocked believing the panic orders that their customers placed to be in line to get their products. The supply change shortages didn't allow them to build. So, the shelves were full. With that in mind, customers were not buying as much. They were using up the stock they had."

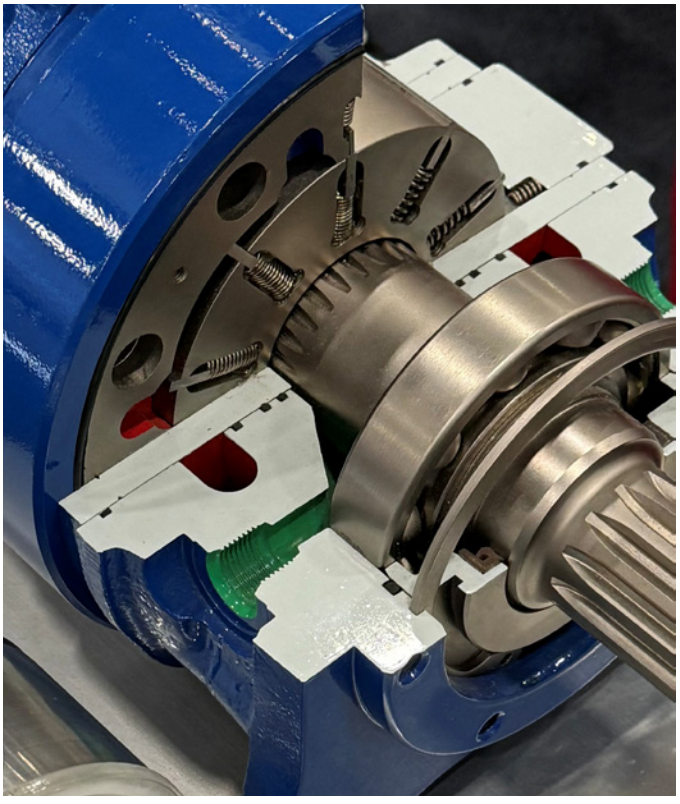
In 2024, Johnston saw companies laying off nearer Q3 and Q4.

"The election happened, and we started to see the orders coming in for 2025. We have brought in new customers this year. We decided to enter some new market spaces. We are excited because have added outstanding talent to our arsenal to take us into '25 and beyond," Johnston said.

Croix Gear serves a remarkably diverse customer base. "We make gears for cars, forklifts, robots, commercial food mixers, tooth grinders for horses. The list goes on. We are in the process to be certified for aerospace, Johnston added. "We have customers that will be requiring more from Croix in this area. It will trickle down to our vendors and suppliers."

Atlanta Gear Works is a total-solution process-critical rotating equipment design, engineer, manufacture, and repair company headquartered in Dawsonville, Georgia, less than an hour north of Atlanta, at the entrance to the Blue Ridge Mountains. For more than 30 years, the company has served some of the country's leading manufacturers with innovative power-transmission solutions, high-quality products, and beyond-the-expected service. "For our business we see more carburized, hardened and ground gearing today. We have adapted by adding grinding capacity," said the AGW executive team.

AGW recently finished rebuilding two 50-year-old damaged gearboxes from one of the largest water pumping plants in the world—the W.G. Huxtable Pumping Station, which protects the livelihoods and lives of thousands of vulnerable



Ruthie Johnston, CEO, Croix Gear.

Kika Young, president of Forest City Gear.

SUSTAINABILITY (continued)

"Our company has continuously operated with a focus on our environmental impact."

"There is no national policy support for U.S. gear train development."

"We supply renewable technologies as an important piece of our customer base."

What role will emerging technologies (including, but not limited to IIoT, additive manufacturing, robotics, automation and artificial intelligence) play in your organization in the coming years?

"Small."

"Automation, Automation, Automation... We are trying to implement automation in all areas where it's possible."

"Need to implement IOT in the future but no definite timeline."

"Increase in robotics."

"We are already active in IIoT, need to have more standardization (rating practices) before additive manufacturing becomes useful."

"Slowly implementing some where there are benefits from such technologies."

"IoT and Robotics will be developed more and more."

"Very important role because the technologies are rapidly changing."

"Little to none."

"Don't know. We are currently using additive manufacturing in our test lab."

"AI will change the working world for all of us. Mainly seen positive as a support in daily business. However, there are numerous risks. Other emerging technologies have a limited effect on the heavy industry gearbox manufacturing."

"We do not have this topic dealt with in our Industry, but I believe it will be irrelevant. High costs are part of the impediments to this."

"Target is to maximize technology over operator capabilities."

"We are very much engaged with automation that we expect to play a key role to partially offset the labor cost."

"We are working on different coating technology like HiPIMS."

"It is important and we are working on it."

"We will have to upgrade out test facilities and add futuristic tech and knowhow."

"IIoT is one of very important things to manage all industrial process. It will not die."

"Those are currently important to our production. We are looking to bring IIoT in this year. We look at robotics, AI, and automation for any purchase of equipment. We have some of those in place now. Incorporation of 3D has many options for us now and the future from workholding design to prototype.

Labor is typically the number one cost of a company. If labor can be replaced through other means I expect our future workforce will look very different than it does today."

"Will increase opportunities for us to aid in the design of advanced gear systems."

"We use 3D printing and robotic welding some now. As a low volume (1 to 10 of a part number) manufacturer, robotics and many other forms of automation don't work."

"It is one of the most important issues to take into account for having better business."

"Adoption of AI is a fundamental part of our business strategy across all facets of our business. We expect to continue investigating ways to increase competitiveness and reduce cost through the application of new technologies."

"Emerging technologies is like counting your chickens before they've hatched."

"They are requirements for success."

"None. It doesn't work for our business model."

"It will continue to increase."

"Robotics and artificial intelligence."

"No primary role."

"We are currently researching these technologies. They will be instrumental in our manufacturing business."

"Additive manufacturing is currently being reviewed for continued applications along with automation."

"None."

"We will work on predictive maintenance."

"Growing exponentially."

I hope our product knowledge software provides a way to make my experience and knowledge available to others so they don't have to pay for learning what I have already paid for."

"Additive manufacturing projects are under investigation along with IIoT but implementation expected to be relatively slow."

"Continue to look for more opportunities for automation."

"Machine improvements will likely have a bigger impact than emerging technologies."

"Here I think we will only implement robotics."

"Significant impact that will require increased capital spending to benefit from these new technologies."

"Heavy on automation and AI."

"AM is a primary business stream; no others will be impactful in the near term."

"The new technologies will play bigger roles especially robotics and automation. Two reasons: decreasing labor market and lower prices of robots and automation."

"I think AI will be important at our company."

"Additive manufacturing."

"Hopefully a very big role."

"Maybe 5-8 percent overall contribution."

"Robotics and automation (lights out) are key strategies for us in the short term. We will be exploring AI and how we can potentially use this for quoting / estimating / planning / programming in the future."

"I suspect these emerging technologies will distract my organization from doing what needs to be done for our recovery and to meet growing demands."

"None."

"We do not make use of this tech."

"It will continue to grow at a steady pace."

"Not very much as we are a large job shop."

"Big role."

"Robotics and automation will become an important part of our organization."

"Significant as we move more into production."

"Huge."

"Every change in technology affects our products, how our customers use them, and what their expectations are. This is true in established as well as emerging markets."

residents in the rural Mississippi Delta. The importance of keeping Huxtable ready to pump is undeniable. And the key to readiness is keeping all ten of its identical 50-year-old gearboxes operational. The contract to repair the remaining gearboxes runs through 2026. AGW added a new Kapp Niles Gear Profile Grinding Machine ZP 24 in combination with two other Kapp Niles grinders in order to cut down on total repair time.

FCG announced the groundbreaking of new warehouse in October. The 50' x 100' climate-controlled warehouse will serve as storage for finished goods, while prioritizing storage space in the existing footprint for in-process items for Cut Teeth Only jobs.

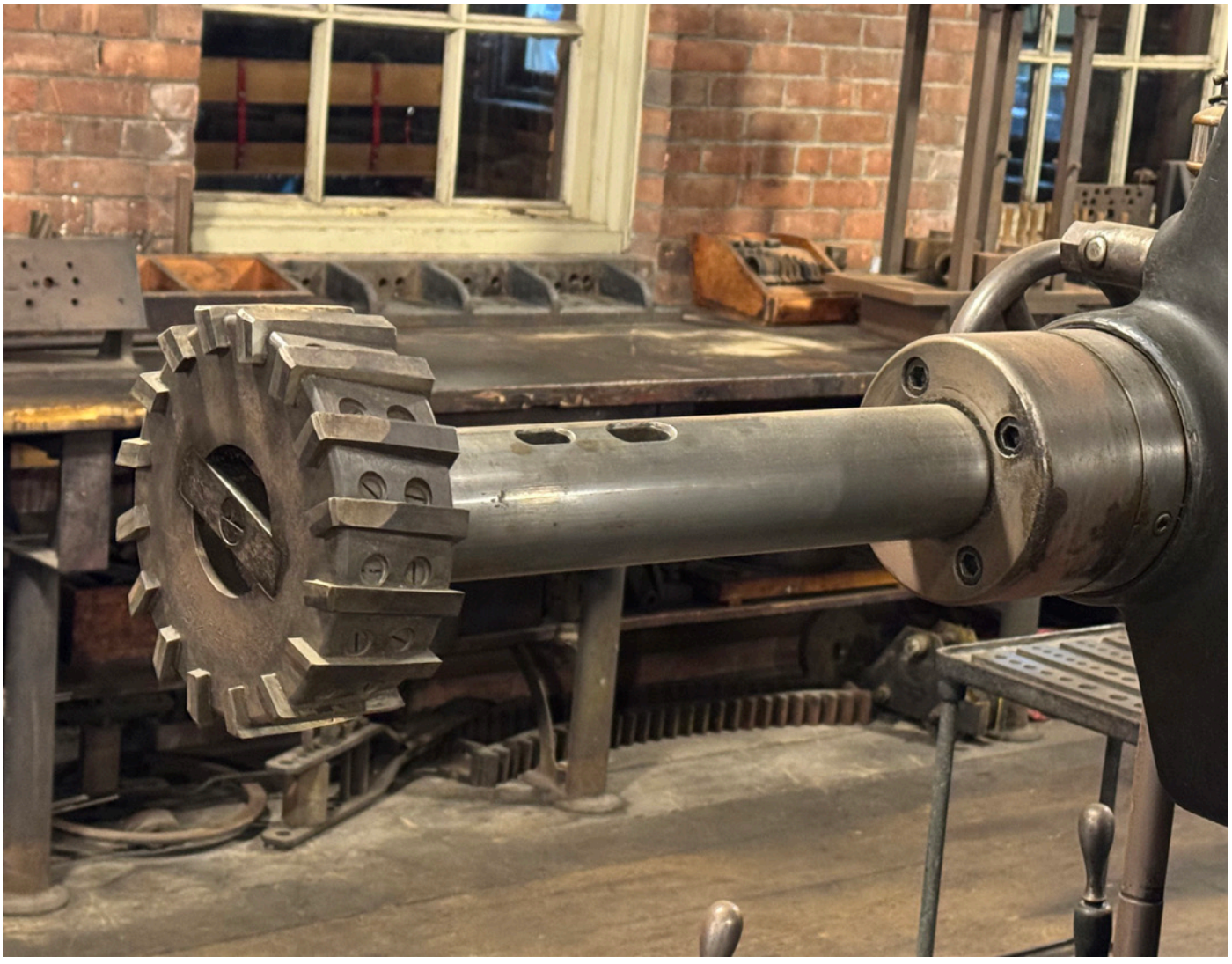
"Really since 2008, U.S. manufacturing has been on a roller coaster ride. From offshoring to the manufacturing renaissance, advances in 3D printing, IoT, AI advancements, robotics, COVID, remote work, and now (hopefully) a strong stance toward re-shoring—things have been interesting!" said Kika Young, president of Forest City Gear.

"For the industries we serve, we are seeing an uptick in quoting across the board, from industrial food applications to military, and defense to outer space and aerospace. Industrial applications, pump gears, and robotics are also holding strong, "Young said. "The new administration is very friendly toward U.S. manufacturing, and we are eager to continue our current growth trajectory. We are excited, literally, and figuratively, to keep being out of this world!"

Companies are looking for greater efficiency, collaboration, and meeting delivery dates. Some companies have sourced their gear manufacturing out which opens opportunities for companies like Croix Gear, according to Johnston.

While electric vehicles, and electric applications in general, still require some gearing, it is far less than a typical internal combustion engine and has had an impact on industry. Counterintuitively, FCG has seen an uptick in quote requests relative to EV gearing due to the higher quality requirements needed to offset the acoustic signatures that are no longer masked with an internal combustion engine, Young added.

"Gears in an EV engine need to be quieter because there is no noisy motor to cover up the sound. FCG does not have TS certification and refrains from automotive work, EV or otherwise. However, it is becoming apparent that battery production (specifically lithium requirements) nor the electrical grid can support widespread EV use at this time. While FCG doesn't dabble in the automotive world, we hold that the gearing within automotive will stay strong across the board," Young said.



Utilizing Emerging Technologies

As a job shop, widespread automation has also not been an option yet for lower-volume work at Forest City Gear.

"I am personally interested to see what we can do with cobots soon. Adapting around COVID—when our main end-user was aerospace and most of the world stopped flying—was certainly a challenge! We moved our focus toward robotics during that time. At FCG we're constantly working to stay on the cusp of leading technology and being aware of market and economic changes. If you are not evolving, you are dying. Luckily, we can utilize the excellent resources, market research, webinars, and networking made available by the AGMA to further our efforts in these areas," Young said.

Atlanta Gear Works does not see an emphasis on robotics soon but according to the executive team, the company *will* be exploring additive manufacturing.

"At AGW, the focus will remain on reliability and uptime for our heavy industrial customers. "All of our customers and vendors say they are enthusiastic about 2025 and we're also very optimistic."

According to a recent report from BDO, many manufacturers were figuring out where they land on the innovation adoption curve as it relates to artificial intelligence (AI) in 2024. BDO anticipates 2025 will be the year that manufacturers advance their AI maturity. Manufacturing will see a variety of AI use cases proliferate. Beyond streamlining routine tasks, some manufacturers—especially those who were early adopters or early majority—will use AI in more sophisticated ways.

For instance, they may use AI to accelerate product development, including prototyping, machine-learning-informed engineering processes, and models that can simulate product performance and design. Other manufacturers may use AI to enhance employee experience. For example, AI can translate instructions into multiple languages in real-time. In doing so, manufacturers can teach new skills and programs to their workforce, despite language barriers, enabling more efficient upskilling across the enterprise.

Another significant trend will be building and maintaining a strong data infrastructure. However, many manufacturers continue to face challenges working with a dozen or more disparate systems that have unique and asynchronous data inventories, resulting in weaker data foundations.

In 2025, BDO expects manufacturers with greater data maturity will not only expand their AI use cases but also take a more data-driven approach to all operations to gain a competitive advantage. Some manufacturers, for example, will analyze plant floor data to optimize production practices and help cut costs. Others may leverage data to bolster their employee retention efforts, identifying turnover trends and understanding how employee churn impacts output quality from their warehouses.

Education and Training

Staffing gear manufacturing shop floors remains one of our industries' greatest challenges. Recent engineering graduates tend to focus on software, research and computer science. The gear industry needs system specialists able to manage the growing demands in both mechanical and electrical engineering.

"We have one fully–trained full–time mechatronics tech already part of our team," Johnston said. "We also have one that we have cultivated at Croix Gear. He is in his last year of school. I am looking to hire new engineers. I can find mechanical and manufacturing process engineers, but it is very difficult to find one that has gear training or knowledge."

FCG will continue to develop a local labor pool, starting in middle schools and high schools in the area. "We are active in many local organizations to stay proactive in this area and have recently joined the wonderful program, Craftsmen with Character, which is the brainchild of the brilliant Dave Hataj of Edgerton Gear. We are active with the National Tooling and Machining Association's apprenticeship program, several area robotics clubs, national manufacturing days initiatives, and much more," Young said.

In 2024, AGW added two engineers and 15 machinists and assembly technicians. As a result, the company has added a second shift. The executive team continues to focus its efforts on minimizing customer downtime.

Keeping an Eye on Changing Markets

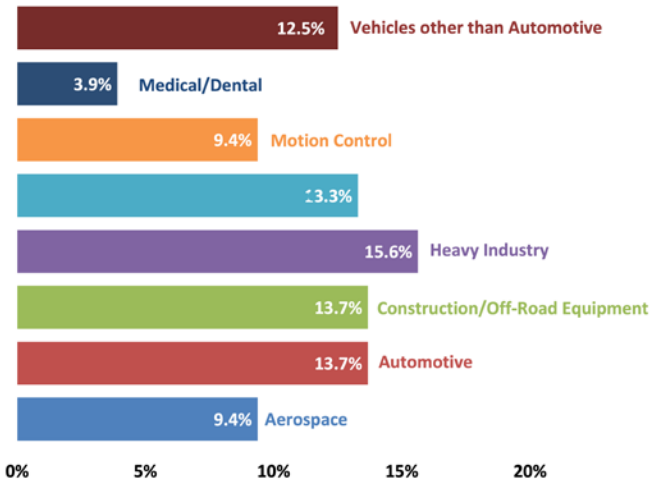
What will the EV and hybrid markets look like in 2025? How will wind, solar and clean energy projects fare under the new administration? What surprising end markets will gain momentum this year in gear manufacturing?

"FCG is very intentional in not letting any individual customer, or even end market, take too big of chunk of gross sales. As we saw through COVID, diversification is key to weathering the storm. While putting all your eggs in one basket might make you a lot more efficient (and a lot more money in the short term), it's just too risky an approach for us," Young added.

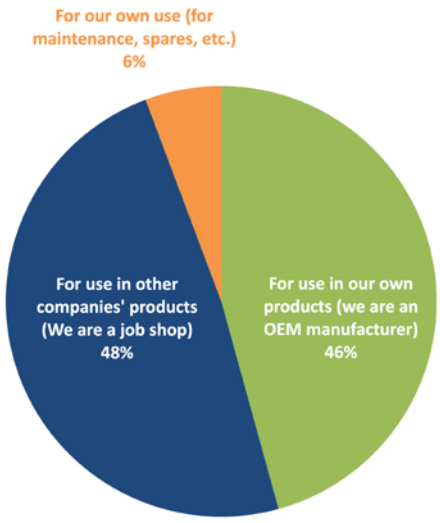
Big picture, we will keep a close eye on potential mergers and acquisitions and gear companies looking for potential buyers in 2025.

"I'm curious what succession will look like?" Johnston said. "There are so many buyers out there today!"

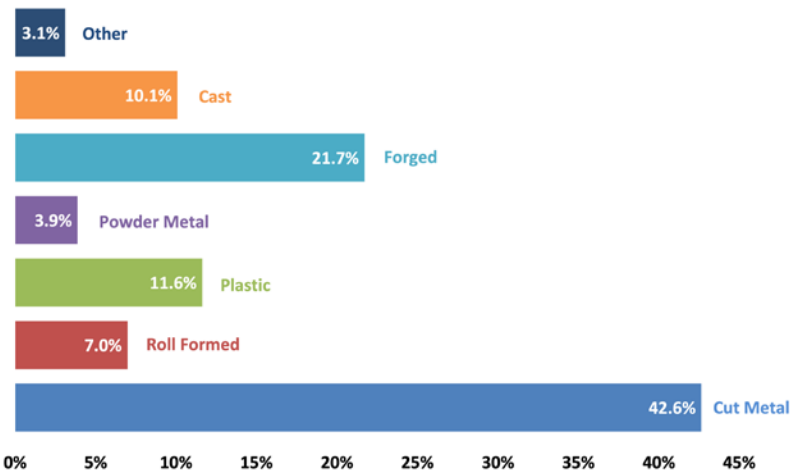
The gears (including sprockets, splines, worms and similar components) made at this facility are used for (check all that apply):



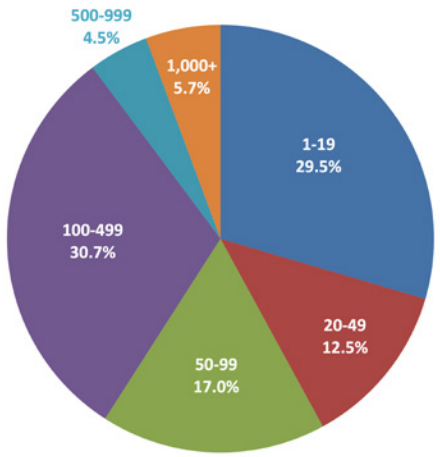
Gears (including splines, sprockets, worms and similar components) are manufactured at this location:



The gears manufactured at this location are (Check all that apply):

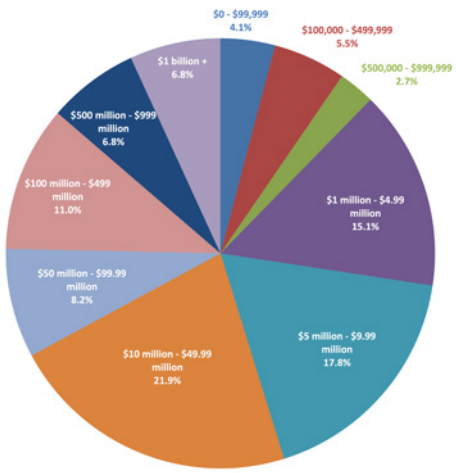


How many employees work at your location?

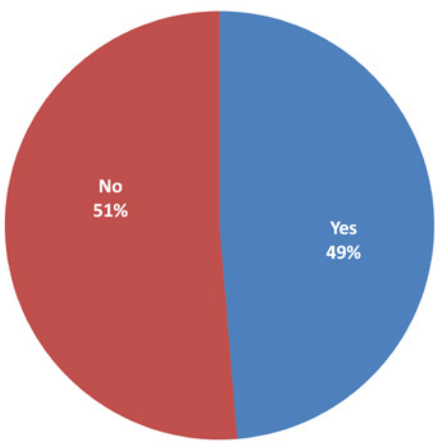


Which category best describes your job title/function?

What is the approximate annual revenue for your company?



Is your company currently a member of the American Gear Manufacturers Association (AGMA)?



Thank you to all who participated in this year's survey!