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Industry 4.0

Connecting with the Future

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Industry 4.0 in the American Midwest - Opportunities for German Companies

Today, advanced robots perform many tasks in factories across the globe, ranging from welding to thermoforming, and everything in between. Within the fourth industrial revolution, known as Industry 4.0, autonomous robots are monitored through advanced sensors, allowing AI and Big Data processors to make real-time decisions about production on the shop floor. Supported by the Industrial Internet of Things (IIoT), devices in factories around the world are becoming more interconnected than ever, increasing efficiency and reducing costs for every manufacturer. Industry 4.0 has started to transform production facilities by connecting every area of the shop floor, as well as creating digital links between machines, assembly lines, and robotic cells. Ultimately, Industry 4.0 integrates engineering, design, inventory management, shipping, and eventually the entire supply chain into one seamless production system.

In the US, the integration of production and automation technology with modern information and communication technology is just now gaining more traction. In particular, manufacturing companies have an interest in advancing the development of fully automated and networked facilities: “Smart Factories.” As some US companies are not adapting as quickly to Industry 4.0 developments as their competitors in Europe or Asia, investment opportunities for German companies in the US are many.

Germany has long struggled in the realms of connectivity, cloud computing and storage, and willingness to invest. The US offers direct advantages over Germany in these areas, and presents an excellent opportunity for investment. On the other hand, German companies conducting business in the US may find older machinery that requires retrofitting, dramatically reduced policy-based support for Industry 4.0 technologies, and a shortage of skilled labor, particularly with training in advanced manufacturing practices.

GACC Midwest provides assistance that helps German companies navigate the United States’ unique landscape. We hope this publication serves as a helpful guide to Industry 4.0 in the US and opportunities for German businesses. Please get in touch with us to discuss how we can support your company.

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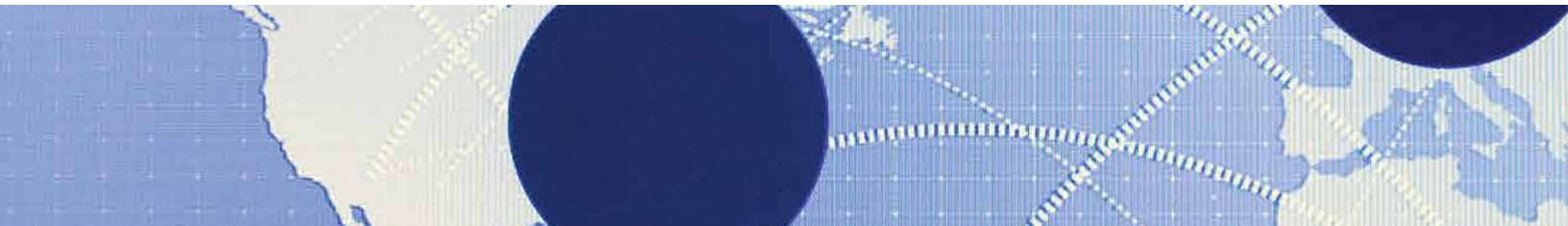

Trends in Industry 4.0 in the US

US companies have been relatively cautious surrounding Industry 4.0, but are becoming more willing to make investments. Most of these companies predict that their investments will pay off: According to the PWC Industry 4.0: Global Digital Operations Study 2018, 86% of surveyed manufacturers are expecting to see reduced costs and increased revenue over the next five years as a result of digitization efforts.

However, based on a 2017 study by Automation Alley, only 27% of manufacturing executives were familiar with Industry 4.0. Among the same group of executives, an impressive 85.4% stated that they are interested in investing in improving technological processes, increasing production and reducing costs. The technological trends associated with Industry 4.0 are the best way for manufacturers in the United States and abroad to reach these goals.

The market for intelligent machinery and other devices within the manufacturing sector is seeing strong growth and will continue to strengthen. Estimates suggest that the North American market for Industrial Internet of Things solutions will grow to nearly $600bn over the next two years. Worldwide, over the last five years, roughly 1.3 million industrial robots have been installed in manufacturing facilities, with the largest share belonging to China and Europe. This trend toward automation and digital industry can be seen in every part of the world.

Top-Technologies for Investment

The Smart Factory:
Industrial automation and predictive maintenance

Big Data and the Cloud:
Cyber security, cloud storage, and big data analysis

Artificial Intelligence:
Robotics, autonomous devices, and machine learning

Collaborative Innovation:
Open-source development

Smart Factory

The most tangible representation of Industry 4.0 is the Smart Factory. As devices become more interconnected and data is communicated more effectively, production facilities can begin to make fundamental changes in how they operate. The Smart Factory is a highly flexible digital manufacturing center that can prioritize tasks, self-optimize, adapt to device failure, and order changes in real time. The goal of the Smart Factory is to produce smaller lot sizes of increasingly complex products with fewer mistakes, ultimately resulting in single-unit batches of fully customizable products.

The Smart Factory may seem like a daunting proposition, but large (and even medium-sized) companies are building them throughout the world. Working toward the full Smart Factory is an incremental process and can be taken one step at a time – even by small manufacturers looking to improve efficiency or reduce costs for their customers. According to Peter Maier, SAP Industries Co-President, Smart Factories track the health of their machinery in real time. They use their sensor data on performance, efficiency, and error rates to predict and avoid deteriorating quality and unplanned downtime. Remote and mobile monitoring removes employees from dangerous shop floors and distant sites. Applying the insights to optimize production processes and equipment operations drives efficiency and ensures quality – making the smart factory even smarter.

Manufacturing Execution Systems (MES) are one of the most crucial aspects of the Smart Factory. An MES provides transparency of the entire facility, optimizes operations, and allows remote control to increase productivity. Individual machines are excellent at performing tasks, but cannot prioritize actions taking into account an entire factory. The MES is a higher-level system that helps the shop floor run optimally and perform tasks with efficiency and precision.

Predictive Maintenance

Sudden machine downtime costs manufacturers roughly $50bn worldwide per year, with equipment failure causing nearly half of this downtime. Predictive maintenance uses advanced monitoring to predict, and ultimately, reduce these failures. The goal of predictive maintenance is to schedule service and component replacement at the exact moment it is required, rather than too soon or too late, which can lead to costly production downtime. The US Department of Energy indicates that predictive maintenance could reduce costs by more than 25%, with downtime falling by up to 45%, and a 75% decrease in machine breakdowns.

In order for predictive maintenance to be successful, equipment must be monitored closely through methods including vibration analysis, acoustic monitoring, or infrared thermography. Data from these sensors can be processed internally, or via cloud storage and computing, allowing for partially or fully remote maintenance. According to Markus Zimmermann, Director of the TRUMPF Smart Factory, predictive maintenance is a tremendously important consideration for German companies coming to the US. “In Germany, you can visit any customer within six hours, but in the US, time needed to see a service technician could be much longer, simply because the country is so large. Predictive maintenance helps reduce the risk of waiting around for machines to be fixed,” he explained. With predictive maintenance, companies need fewer technicians in the US as they begin operations, saving time and money during market entry.

MES HYDRA

Innovative Software Solutions for the Smart Factory

Keep pace with the digital transformation, ensure your company's competitiveness, and make your production fit for the future. Our modular Manufacturing Execution Systems (MES) will help you connect your shop floor, create the necessary transparency in your production processes, increase efficiencies and lay the foundation for a Smart Factory.

Learn more about MES HYDRA, Smart Factory and Industry 4.0:

http://mpdv.info/meshydra-us

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German Innovation in Industry 4.0

Saving Energy Costs and Predicting Maintenance through Smart Energy Measurement

German company Janitza electronics GmbH is a family enterprise focusing on development and production of energy efficiency systems. As a manufacturer of digital measurement equipment, universal-measurement devices, power factor controller, and peak demand management systems they are amongst the leading suppliers in this market segment. Janitza measurement devices are used in more than 60 countries worldwide and GACC Midwest supports the company in their exploration of the US market. In our interview, Christian Laurenzano, Director of Sales, North America, at Janitza LP, shares some insights on their innovative Industry 4.0 solutions.

Which challenges do you see for today's manufacturers?

A key success factor for modern companies is transparency across all data levels. Data from all company divisions must be acquired and consolidated in order to optimize planning for production processes, establish safety measures to protect systems, personnell and machines, and save costs. This objective entails a number of challenges, because different standards, interfaces, and communication options must be coordinated with each other. Networking areas that were previously examined separately, from the machine level to ERP and building management systems, is very complex.

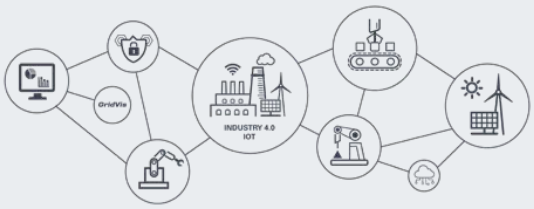
How does Janitza tackle these challenges?

OPC UA is a data transmission standardization that simplifies this consolidation across the shop floor. The Janitza UMG 801 energy measurement device offers various communication interfaces and enables direct data transmission to higher-level systems via OPC UA, eliminating the need for costly integration. Janitza uses real-time, decentralized energy and production data to lower energy costs and predict maintenance.
The modularly expandable UMG 801 is ideally suited for the complete acquisition of an energy management system (e.g. ISO 50001). Customers can gain transparency about energy consumption and energy costs at all measurement levels. In addition, critical deviations in power quality as well as residual currents (RCM), which load or even put systems at risk, can be detected.

Solutions at a glance

Janitza utilizes energy and production data to tackle the challenges of today's manufacturers' in four steps.
Step 1: Make energy cost transparent with maximum data security
Step 2: Regulate peak demand and save cost
Step 3: Connect production data to energy data via OPC UA
Step 4: Predictive maintenance and avoidance of unintended standstills

Janitza®



Future with tradition – made in Germany

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Cloud Storage and Cyber Security

More than any other area of criminal activity, rates of cyber crime continue to rise. In fact, nearly half of all German internet users have been a victim of cyber crime, with half of those attacks leading to financial loss. Cloud computing and storage are two of the most important topics within Industry 4.0, since advanced information processing cannot occur without the cloud. Storage of data on cloud servers, however, exposes companies to some risks. While cyber security is not a legal requirement, it is absolutely essential for companies to protect their own data and the knowledge of their customers. As Industry 4.0 progresses and factories become smarter, devices and data will become more interconnected. Breaches and attacks on these devices will become more common and more profitable for criminals.

The global cost of cyber crime per year is estimated to be around $600bn. In Germany, roughly two thirds of manufacturers have dealt with cyber crime, with SMEs being particularly vulnerable to attacks. When considering operations in the US, companies can consider avoiding areas where cyber crime is more common like the coastal states. No Midwest states were ranked in the top five for total money lost to cyber crime or money lost per attack. Companies wishing to take extra precautions may consider investing in cyber insurance to protect themselves from financial loss or other costs of business interruption.

Collaborative Innovation

The US manufacturing sector is characterized by collaborative hubs and networks, which are very beneficial for manufacturers to be aware of and interact with. One very important network is Manufacturing USA. It was created in 2014 and consists of 14 institutes spread all across the United States. The network is based upon the Fraunhofer Institute model from Germany.

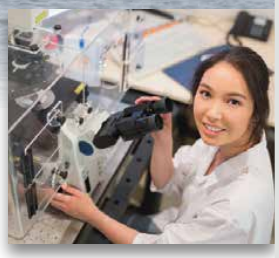
The goals of those networks are:

- Identifying collaboration opportunities between industry, academia, and other stakeholders
- Catalyzing innovation and new technologies
- Developing a skilled workforce for the manufacturing sector

One of the institutes, Manufacturing x Digital (MxD), located in Chicago, IL, focuses on Smart Manufacturing and provides a platform for manufacturers to experiment, test, and train on their shop floor. Manufacturers can also benefit from networking with these institutes and their members.

Other networks and collaborative environments can be found at incubators, accelerators, and co-working spaces focused on manufacturing. One of the more relevant institutions in this regard is mHUB in Chicago, IL. mHUB is the largest and fastest-growing innovation center focused on physical product development and manufacturing in the US. GACC Midwest works closely with mHUB on a variety of initiatives and events both in the US and Germany. Manas Mehandru, COO at mHUB, was involved in one of GACC Midwest's programs in Germany and appreciated being "immersed not just into the technicalities of Industry 4.0 but also the ecosystem that drives sustainable industry growth." It became apparent to him how German "manufacturers (are) truly implementing I 4.0 technologies into their facilities. From end to end, the ecosystem structure became very clear throughout the (program) and the conversations were very insightful."

THE MINNESOTA ADVANTAGE



TALENT, INNOVATION AND BRAINPOWER

Innovation is a Minnesota hallmark. The state's legacy of high-tech breakthroughs includes the implantable pacemaker and the black-box flight data recorder. At the dawn of the computer age in the 1950s and '60s, pioneering companies like Control Data Corp. and Engineering Research Associates got their start in Minnesota.

Now Minnesota is leading the technology revolution again, attracting and nurturing companies that create Internet of Things systems and other advanced tools that improve how we live and work.

SmartThings of Minneapolis is developing smart technology for the home that can get the coffee maker going in the morning and dinner cooking at night. Minnesota med-tech powerhouses Medtronic and St. Jude Medical deliver remote patient monitoring systems that are revolutionizing the medical field. ZTR Control Systems in Minneapolis offers applications that reduce carbon emissions on locomotives.

It takes brainpower to develop this next-generation technology, and Minnesota has that in spades. One-third of the state's workforce has a bachelor's degree, and more than 250,000 people are employed in the technology sector. CNBC this year gave the state an "A" for its technology and innovation prowess and ranked Minnesota sixth in its annual Top States for Business rankings.

Minnesota has top-tier talent, a diverse and robust economy, and a culture that encourages entrepreneurs and new ideas. Minnesota companies don't just succeed here, they are helping to change the world.

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EMPLOYMENT AND ECONOMIC DEVELOPMENT
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GACC Midwest Supports Your Business

GACC Midwest with its offices in Chicago and Detroit has broad experience and knowledge of the market conditions in the US and in Germany. In our role as an advisor, we help German companies identify opportunities for cooperation and growth in the US market. Our intercultural, bilingual team is specialized in effectively assessing and evaluating the market potential for German companies in the USA.

Our consulting teams support German companies in the US market and help you become and remain successful. Through market analyses, targeted business partner searches, virtual offices, site selection services or trade show support, we facilitate your market entry activities in the US. We also support companies from both countries through various transatlantic initiatives and industry projects, such as the Transatlantic Cluster Initiative or the Transatlantic Apprenticeship Dialogue. Join us and benefit from our vast experience, deep market knowledge, and industry expertise.

"We became involved with GACC Midwest during a trade mission relating to Industry 4.0 in 2018. During a site visit, delegates were able to interact with us and our products directly, and our company made solid, lasting business connections with American businesses and industry experts. Since then, GACC Midwest has been supporting us with inquiries and facilitating our market entry in the United States via virtual office. Their skilled and helpful employees continue to represent us at North American trade shows, where they run our booth, establish new connections, and create new business relationships for us."

Johanna Bellenberg, Director Marketing & Communications, Picavi GmbH

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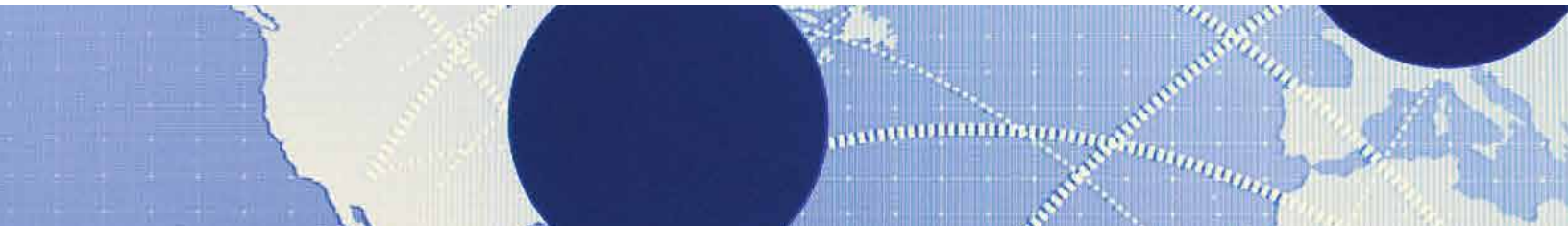

About GACC Midwest

The German American Chamber of Commerce® of the Midwest (GACC Midwest), headquartered in Chicago with a branch office in Detroit and an extensive chapter network across the American heartland, was founded in 1963. GACC Midwest is an integral part of the German Chamber Network (AHKs) with 140 offices in 92 countries around the globe.

Our continuing mission is to further, promote, and assist in the expansion of bilateral trade and investment between Germany and the United States, especially the Midwest. Our organization combines elements of a trade commission, a membership association, and a professional consultancy - quite a unique concept in international trade promotion.

www.gaccmidwest.org

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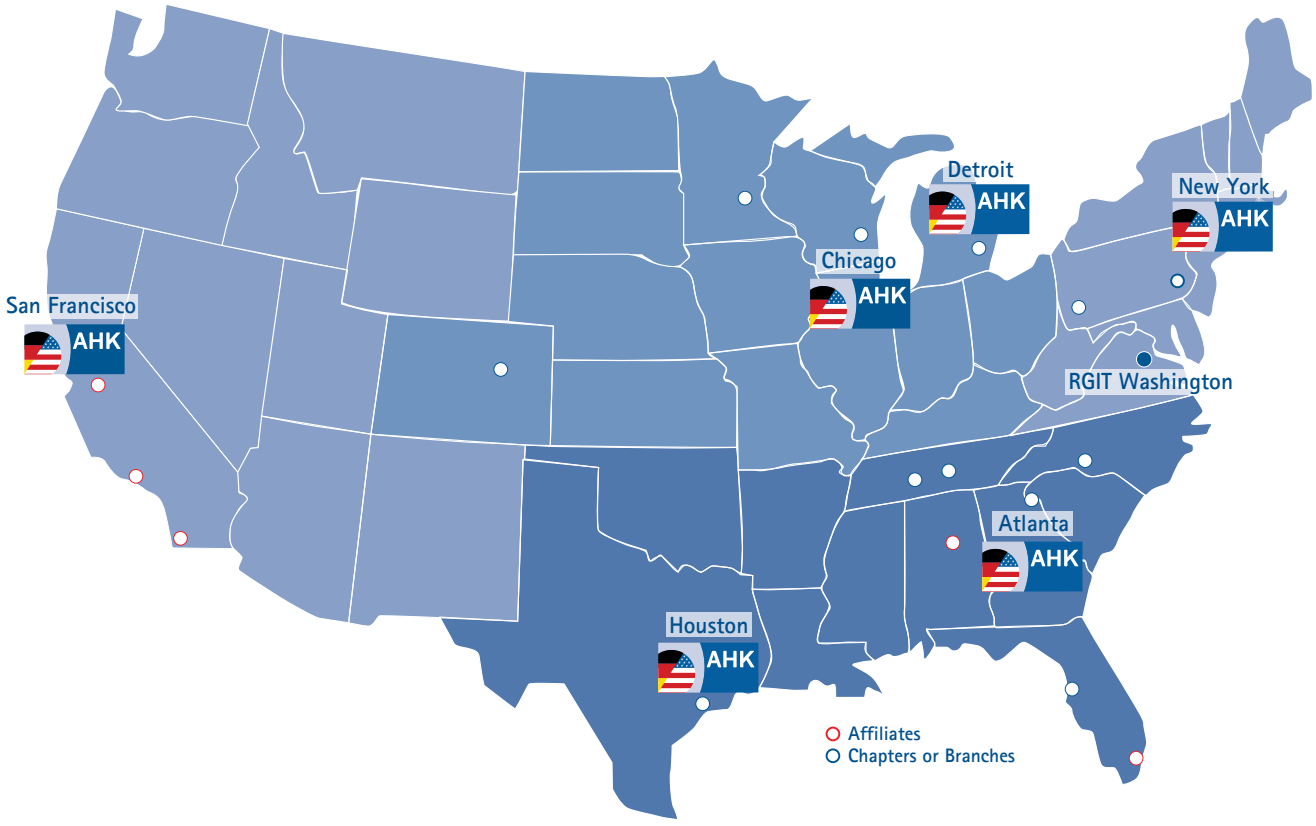

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