ARTICLE

AI in Manufacturing: Dos and Don’ts for Smart Adoption

By Bill Remy and Gary Freburger

OCT.08.24

Key Takeaways:

- AI is a tool for better decision-making, not a silver bullet. AI can help uncover opportunities for improvement in manufacturing, but it cannot replace human expertise and execution.
- The effectiveness of AI in manufacturing depends heavily on the quality and organization of data. Poor or unorganized data will lead to unreliable AI analytics, so it’s essential to invest in proper data management systems.
- Build a phased “crawl, walk, run” approach for AI adoption. Manufacturers should start with basic analytics and establish regular performance metrics before gradually integrating AI. Establish a strong foundation for AI implementation and prove its value before scaling up.

There’s a lot of buzz about the potential for artificial intelligence (AI), especially Generative AI (GenAI) to transform manufacturing, and many companies are ready to go all-in.

According to Rockwell Automation’s 9th Annual State of Smart Manufacturing Report, 83% of companies planned to implement AI this year and it’s the #1 new area for investment over the next 12 months. Many have already achieved significant productivity and efficiency gains by strategically implementing AI solutions for things like standard work, time study and other process analytics.

Unfortunately, because of all the buzz, there’s also a common misconception that AI will be the silver bullet that solves all of the manufacturing challenges. The truth is that AI can help uncover opportunities for improvement, but execution is what matters. Finding the issues and implementing solutions are vastly different challenges—and the latter depends entirely on humans making smart decisions.

Here, we’ll provide some actionable insights on how to properly integrate AI into manufacturing and avoid some of the most common pitfalls—including that false sense of confidence.

Set Realistic Expectations

Do

Expect that implementing AI will be a lot of work. Even if AI analysis uncovers a huge number of insights for improving operations, you still need domain expertise to interpret those insights, create effective plans to address them and then execute. All the AI in the world can't replace someone turning a wrench, welding a part or devising smart strategies based on insightful data.

Don't

Expect AI to solve all your challenges. AI is a tool for better decision-making—it can't make the decisions and implement the changes for you. A good example is Kaiser Permanente, which is implementing AI across various areas of its healthcare delivery systems. They're certainly not allowing AI to make medical care decisions, but they are using it to help get staff on the case faster and better informed to make smarter decisions about care. Putting that in a manufacturing context, AI will never replace your Six Sigma or lean manufacturing principles, but it can help optimize those practices.

Educate Yourself to Understand AI's Role

Do

Invest time in learning about AI's capabilities and limitations. Just like any other tool, you have to know how to use it properly. Consult experts, read literature and media articles or consider taking a college course or bootcamp program about using AI in a business environment.

Don't

Assume AI can replace domain expertise or solve problems without human input. AI has limitations and depends on human operators. It doesn't work well in rare or complex situations with insufficient data, and it struggles in environments where failures are infrequent or unpredictable. Remember that AI models often lack context as well. For example, AI might recommend strategies to generate massive savings, but if it means eliminating an entire department, does that make sense for your operations?

Democratize Data

Do

Utilize AI to process and analyze vast amounts of manufacturing data. AI has an incredible capacity to process large datasets, identify and predict patterns, and enhance decision-making. It can find anomalies in processes—deviations in time sequences or standard work, for example—that can uncover opportunities to improve workflows.

Don't

Rely on AI if your data quality is poor or unorganized. AI output is only as good as the input, and if your data is "dirty" or unreliable, the analytics will be as well. According to Rockwell's Smart Manufacturing Report, most manufacturers are struggling to use data effectively: those with less than $500M annual revenue use only 38% of their data effectively and even those with over $30B in revenue still only use just over half. Before diving into an AI deployment, tap into your IT teams to figure out what data you have, where it's stored, how it's managed and who controls it. In order for AI to be effective, you have to democratize data, making it accessible to the tools and people who need to use it and have systems in place for good data hygiene.

AI Should Enable, Not Replace, Diagnostics

Do

Use AI as a tool to provide diagnostic insights. It can enable predictive maintenance, demand forecasting, and resource management by looking at historical patterns and predicting how they'll play out. That includes things like repairing or replacing equipment before it breaks down and determining that a line process would work faster if you moved the feedstock material from one location to another.

Don't

Expect AI to replace human expertise on the factory floor. While AI can forecast when a fluid filter needs to be changed or a machine needs to be calibrated, it cannot do the work. There will always be a need for skilled operators and those who can use AI-generated insights to do their job better.

Scale AI for Small to Mid-Market Manufacturers

Do

- Consider cloud-based AI solutions or cooperative models for smaller companies. AI can feel out of reach for small operations, but there are options for shared AI resources and partners who offer platforms that can be implemented for your use case. In much the same way Software-as-a-Service models made new tools widely available, companies are working to make AI-as-a-Service a cost-effective option, too.

Don't

- Dismiss AI as out of your league. It's a mistake to ignore this opportunity completely or to assume it's too overwhelming or expensive. Certainly, there are budget considerations, but you can do a lot with a small budget: a ChatGPT subscription is only $25 a month for the team bundle, which includes the ability to create custom GPTs for your specific use cases.

Crawl, Walk, Run

Do

- Start with the basics. Look at the data you already have to identify key processes and perform basic analytics. Establish regular performance metrics and KPIs, along with monthly performance reviews. Then, gradually integrate AI once the foundational analytics are in place and build on those insights. Prove, then move.

Don't

- Dive in headfirst without a phased approach. Focus on understanding what your existing data can reveal before jumping straight to AI. Analyze KPI trends and identify where AI adoption might make the most sense. Be sure you have the data management foundation in place to support an AI implementation before you kick off. Otherwise, your AI program will fall flat and never deliver ROI.

AI's Role in the Factory of the Future

Most experts agree that we've only begun to scratch the surface of AI, and the future will bring much broader and deeper applications for workflow optimization and production enhancements. For example, we're already seeing the emerging use of video analytics for process improvement, automated line balancing and real-time decision-making based on live data. And there's no doubt that, like any other technology, access to AI tools and resources will become more affordable.

Still, manufacturing leaders must take a careful, informed and methodological approach to implementing AI to avoid overpromising and underdelivering. AI is a complement to human decision-making, not a replacement, and ultimately, humans (and their reputations) are on the line for the results.

Meet the Experts

Bill Remy

CEO, TBM Consulting Group

bremy@tbmcg.com

Gary Freburger

Board of Directors
at TBM Consulting Group