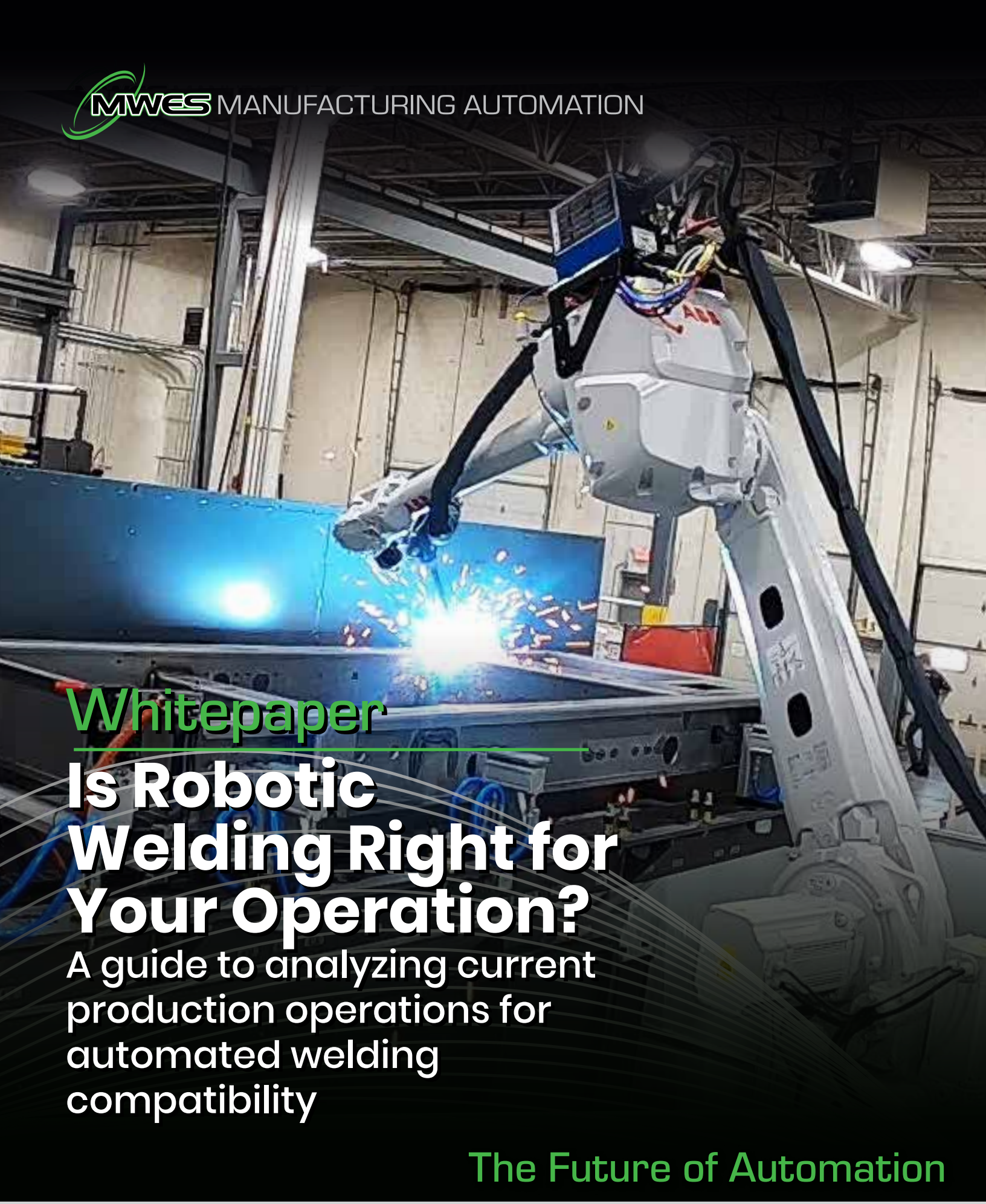
MWES MANUFACTURING AUTOMATION



Whitepaper

Is Robotic Welding Right for Your Operation?

A guide to analyzing current production operations for automated welding compatibility

The Future of Automation

Knowing the current production welding process is key.

Robotic welding offers a lot of advantages over manual processes including the potential for better quality and more consistent welds. In certain conditions, industrial welding robots can produce shorter welding times than manual welding. Automated welding isn't the best for every situation, though. Knowing your production processes is key to determining whether automation is right for your operations.

Stepping into automated welding – or any robotic application - can be more complex and possibly confusing than many realize. Gathering the right information about the current production process can go a long way to determine if automation is a good fit. We've put together some areas that a firm can analyze to understand how their production process matches with the constraints of these robotic systems, as well as locating potential conditions that may indicate automation may not be the best fit for their process.

Many of these aspects do not require in-depth understanding of robotics to determine if there would be automation trouble spots. After all, the process of welding is the same regardless if done by an experienced welder or an industrial robot. To be prepared for the automation conversation, a firm may need to perform a clear-eyed look at the following areas of the current production operation.

Measuring quantities and lengths

Automated welding requires specific conditions to achieve an adequate return on investment. One of those conditions is having the throughput necessary to tip the numbers to automation's advantage.

Generally high mix, low volume applications are not the best for robotic systems. Changeover times and the investment in programming for each unique part can add up quickly. It can add up in time sunk resetting the automation system for frequent part changeovers and it can drive up costs quickly if every part needs a new fixture and programming for support.

Much like human workers, idle robots are robots costing money. Ideally, operations that swing towards high volumes of a few or singular part configurations are the best candidates for automation. These instances allow the robotics to run as continuously as possible. Even better are situations where the system would be continuously run for more than one shift. Where these aspects are not possible a firm may need to consult an experienced robotic welding integrator to determine if value could be possible from automation.

While the above is true for most cases, it must be mentioned that there are certain cases where high mix, low volume can make sense with automation. One condition is when there's a substantial amount of welding needed for each part. Large components with considerable distances of welded content can turn low volume production into automation winners, as robotic weld speeds typically are about twice as fast as hand welding operations as well as provide consistent quality and fewer restarts.

Another corner case is where high precision, high quality is required and the cost to achieve it can be absorbed. Robotic weld systems are known for repeatability in quality and weld position. The benefit may outweigh the added cost of installation and operation of a robotic welding system, but a careful cost/benefit analysis should be pursued in this instance

Consistent upstream processes

As mentioned previously, there's a lot to robotic welding that's similar to manual welding. There are some key differences that can be deal breakers for whether automation can be effective. One of the biggest differences are that robots require part fit up to not only be of close tolerances, it also needs these parts to be consistent across the run. Parts have to be in the right place and shape at the same precision, every time.

The reason for the high tolerance requirements is robots don't have the ability to adapt weld processes at the speed and understanding that a manual welder could. While seam tracking can account for a bit more tolerance variance, weld automation does not have the abilities to see differences and adjust accordingly as humans can.

Components to be welded have to fit up closely enough where the variation is within the programmed welding operation of the robotic system. A good guide to determine whether the fit will be problematic is whether any part of the gap is larger than the diameter of the welding wire to be used. For example, if the wire being used is 0.045in in diameter but the gap between parts is 0.06in then automating the process may be problematic.

Areas that would cause fitment issues typically stem from processes before welding is done. The method of cutting parts can contribute to poor fit up. Cleaner processes like laser cutting offer better ability to retain tolerances than plasma cutting or hand methods. "Go-No Go" fixtures can sometimes help ferret out parts that land outside of the needed tolerances when more precise processes cannot be used.

Other processes like punching, bending or other forming operations may add more variance to part fit as well. In these operations, tooling and fixtures that are worn or contain too much flex may cause enough variance to give a robotic system problems. Possible areas where issues may occur is where features are placed in positions that are outside of the tolerance of the robotic system or where worn tools may add textures, rippling or other changes to a surface that will cause greater than anticipated gaps in the weld area.

Ready to weld

The condition the parts arrive in also play a part in the effectiveness and reliability of robotic weld cells. Since robots cannot identify surface condition of components to be welded, it's important to perform this function before the parts arrive in the cell. Keeping parts clean of oils, coatings, scaling and other surface issues will help guarantee high quality welds.

Depending on the welding process and parts to be assembled, particular attention may need to be given to specific edge finishes. The removal of excess material after upstream processes may also need attention, as well. Subtle differences in shape caused by errant material may cause confusion with seam tracking welding systems or obstacles that could throw off the machine's operation.

Bringing it all together

Many of the above aspects can be determined by experienced internal staff well before reaching out to automation system integrators. Discovering the answers to these questions will better position a firm for investigating robotic welding. These questions may conclude that the firm's operations are not yet ready to see benefit from moving forward with automation. Further, customers have even reported that doing this research on their own systems has uncovered necessary changes in upstream processes regardless of whether automation was adopted.

If you're considering automating a welding application, contact Midwest Engineered Systems today. Our automation engineers are highly experienced not only in what's possible with robotic welding but what will bring the best return on investment to your processes. Trust MWES, we can guide you through the process.

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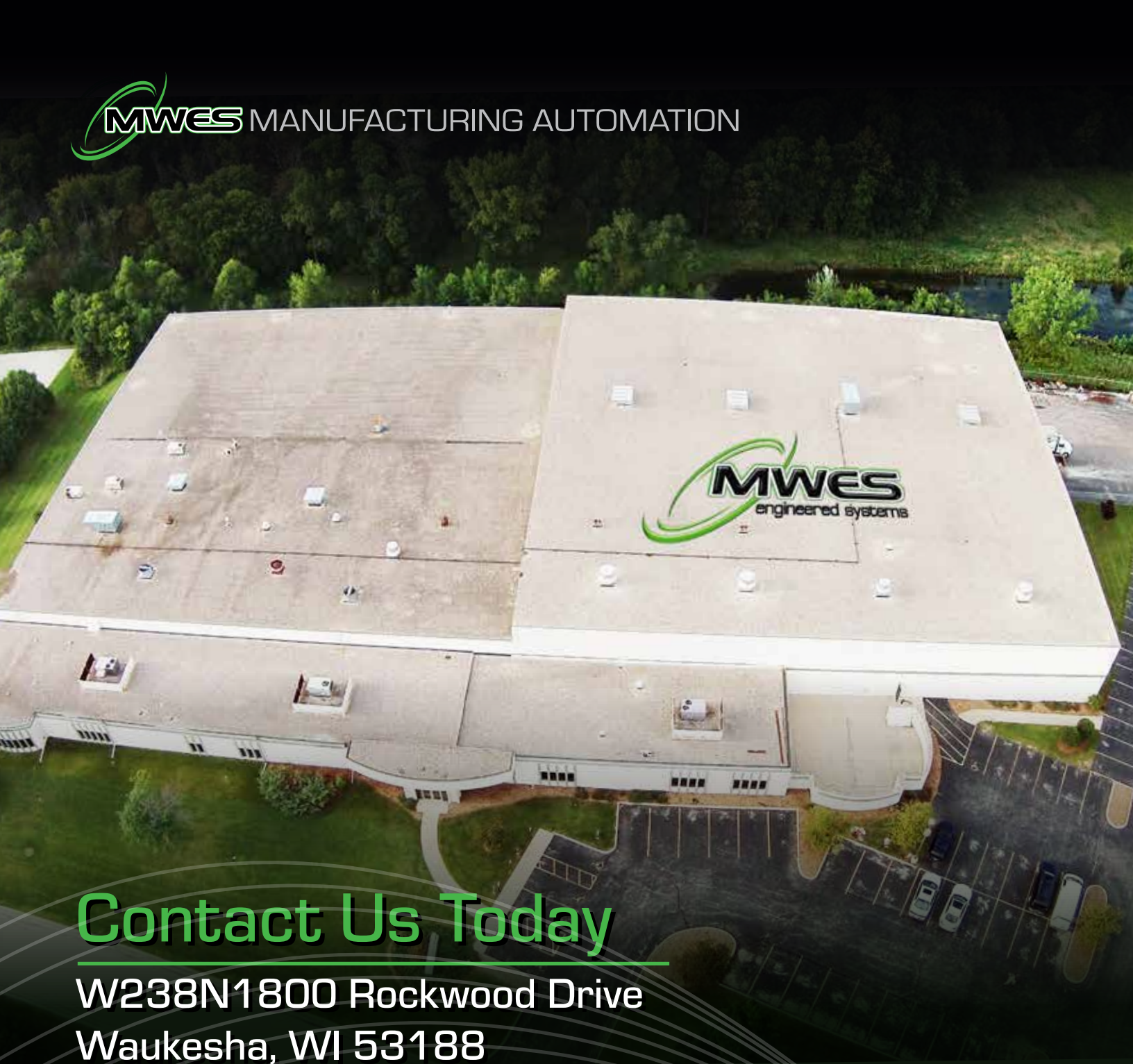

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