

Decisions to Make before Automating

There are many factors to assess before a decision to implement automation is made

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In a society where technology is advancing on a daily basis, many industries are faced with the question of whether or not to replace manual laborers with machines. In the welding and fabrication industry, several recent advances have been made to allow the transition to automation to occur, but there are several factors that need to be considered first. It is important for anyone wishing to use automation to consider the overall investment when making the decision to convert to automation, and how that investment affects things such as your facility, equipment, training, personnel, and support.

Evaluate the Facility

The first aspect of the investment that needs to be considered is the facility. It is important to understand that many existing facilities will require changes and improvements to accommodate welding automation. While incredibly efficient, often times doubling output, both fixed automation and robotics use more space due to size of machines and the room needed for the flow of raw materials once production increases. There likely will be requirements for additional power sources and ventilation. Additionally, an obvious decision will need to be made on the type of equipment. Will you be using robotics or

fixed/hard automation? There may also be an investment of personnel involved. In some instances, workers may need to be trained to operate the automation system, and in others, training may not be logical and new employees brought in.

Automation Advantages

Along with automation comes a multitude of cost-saving opportunities. Automation will provide faster setup, which will result in less downtime and increased production. Since the automated system will be set up for repeatability and will involve less downtime, there will be less of an opportunity for outside variables to affect the equipment resulting in longer equipment life and improved consumable usage. The ultimate consistency and repeatability of automation will in most cases prevent a need for human touch up or clean up.

What Really Is the Payback?

In addition to immediate cost savings, those wishing to transition one or all of their applications to automation usually ask about the payback. While some of the larger weld shops in the industry, specifically the big three automakers, have the

ability to begin profiting from automation within a year, most will take one to two full years to see the initial returns. The average shop can expect a return of about \$100,000 within two years of substituting one person with automation. A smaller shop could require up to four years and the substitution of two persons in order to see that kind of return on their investment, so it is extremely important to consider all the economic factors involved.

Choosing the Automation

The final part of the decision process is to determine whether you will be using fixed/hard automation (Fig. 1) or robotics — Fig. 2. The majority of manufacturers will provide a thorough cost analysis including process recommendations and the projected cost for each. If what is needed is a variety of welds and processes, then robotics is more than likely going to be the recommendation. Most robotic cells are capable of storing a variety of programs making them extremely versatile. However, if you wish to replace just a few applications, fixed or hard automation would be the most efficient investment and fixed systems can almost always be customized to fit your specific needs. It may also be helpful to look forward to the future as well to determine future costs of parts as well as whether or not you



Fig. 1 — An example of hard automation where the welding gun is clamped in a fixed position.



Fig. 2 — Typical robotic weld cell.

have intentions of adding additional automated applications.

When the Decision Is Made

Once a decision is made to automate, it will be time to revisit earlier steps beginning with the facility. At that point you will need to determine if you have adequate space. There will need to be space for the equipment and also increased space for incoming materials and finished product once the automation increases output.

Despite decreasing the need for manual labor when switching to automation, the effect on personnel is very positive. The addition of automation can provide the opportunity for advancement and technicians could be needed to monitor the automation equipment. There will also be opportunities in training as well. Not only will there need to be trainers hired but the existing employees may have the opportunity to learn more about and how to operate the new technology. The automation systems will also reengage and involve employees as they work to come up with and test the improved automation processes.

Cooling the Equipment

Another extremely important aspect to consider during the equipment selection process is whether your automation system will be air cooled or water cooled. Duty cycle, amperage, wire size, and shielding gases are all important factors in making this decision in order to keep the highest level of safety possible. Any systems with a duty cycle of 80% or above or amperage higher than 250–300 A normally will be water cooled. Additional guidelines for a water-cooled system would be any system using wire sizes larger than $\frac{1}{8}$ in. or high concentration of shielding gasses.

Auxiliary Equipment and Technology

There are several other smaller issues and options to consider once you have made the decision to go with automation. The first is that a wide variety of automated accessories and peripherals are available to help further increase the efficiency of your automation system. A nozzle cleaner, wire trimmer, and antisplatter mist applicator are all available as well as an alignment fixture and tool center point (TCP) verification tool. Each of these automated accessories helps reduce downtime, increase the life of equipment, and enable continuing repeatability.

Next, there are all kinds of specialized technologies available, especially for robotic systems. The various technologies, almost all of which are tied to improving repeatability and production, include nozzle sense, touch sense, TCP, emergency stop, and compact cables and storage. There are many more as well.

A common concern is that because of the new equipment, you may have to bring in a new separate line of consumables. However, if addressed up front, manufacturers can work with you to consolidate as much consumable use as possible such as contact tips, gas diffusers, nozzles, and conduit/liners. It will also be important to connect with your robotics manufacturer and welding supplier to increase efficiency in areas such as training, programming, maintenance, and process changes.

Remember Technical Support

Finally, you will want to make sure that there is always support in place. Ongoing training for employees will help them

handle most issues that may arise and will help them to become more efficient in daily operational tasks. For the instances when issues cannot be handled internally, you will want to make sure there is technical support provided by your manufacturer. Also be well aware of equipment availability to further help you quickly respond to any issues or problems that may come up. Since the whole reason for automating was to increase production, you want to be sure you are prepared to handle any emergency situations in an efficient manner.

Be Informed

By considering the guidelines I have laid out, I hope the automation process has become a little clearer. It is important not to jump into making decisions such as transitioning to automation without knowing all the facts and details. It is hoped you can now make a well-informed decision about automation and how it can help advance your business. ♦

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