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Welding Challenges in Today's Automotive Industry

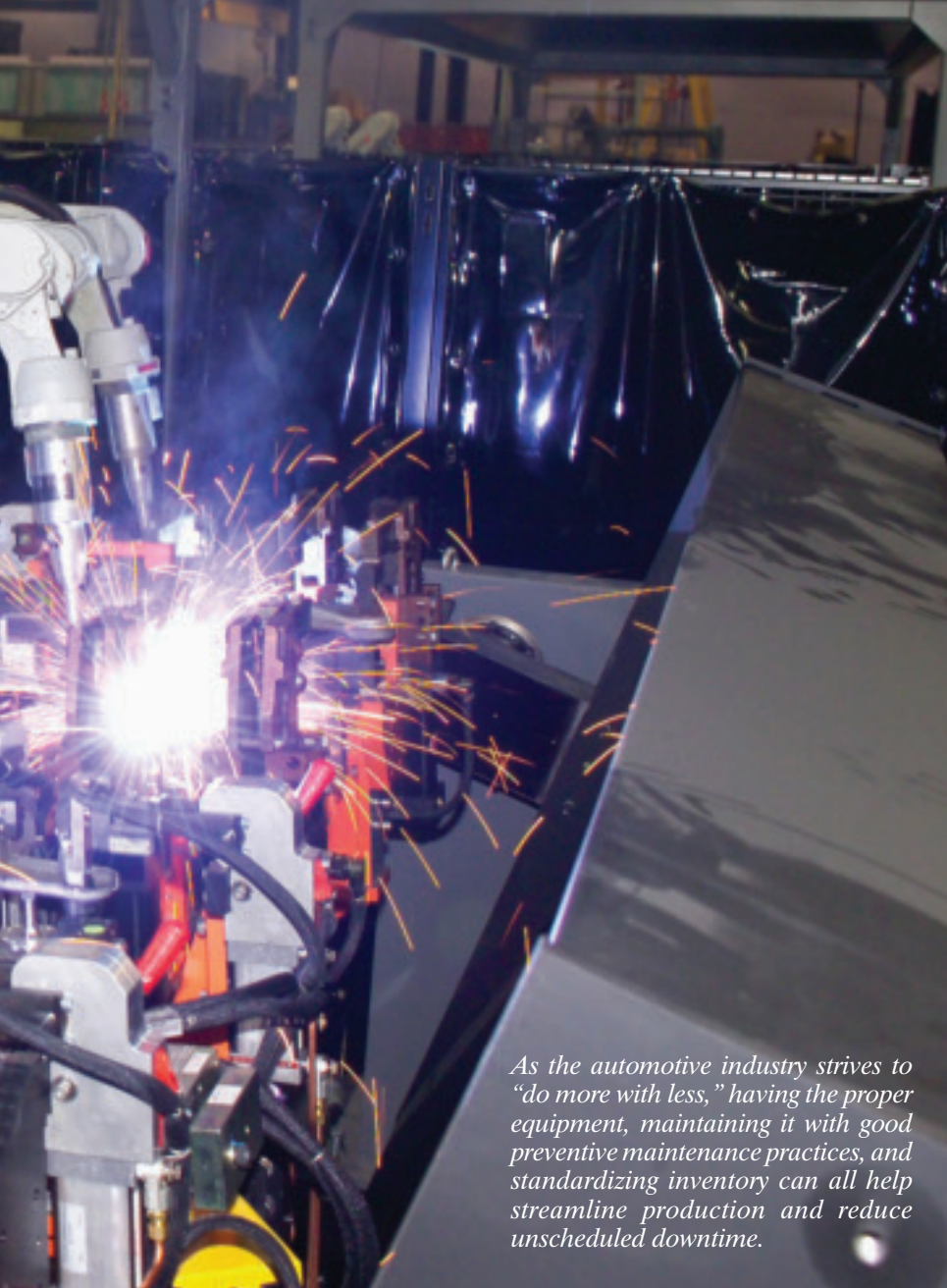
The automotive industry has certainly begun to show signs of rebounding from the economic downturn; however, companies are now being asked to “do more with less” as production volumes approach the levels of several years ago. More than ever, companies require operational efficiencies to maintain process

flow and avoid unscheduled downtime of automated equipment.

Commonly, arc welding process challenges have a significant impact on achieving production goals and maintaining efficiency. Typical contributors to arc welding process inefficiencies include poor part fitup, tool center point (TCP) re-

peatability, and the ability to manage consumable changes, as well as spatter. Effectively managing these elements are essential if companies are to meet their quality requirements and fulfill a high-volume production demand.

As the automotive industry continues to experience an upswing in production



As the automotive industry strives to “do more with less,” having the proper equipment, maintaining it with good preventive maintenance practices, and standardizing inventory can all help streamline production and reduce unscheduled downtime.

— up 12.16% year over year through March 19, 2011 (Automotive News) — maintaining an effective and efficient operation will become even more challenging. Reductions in the workforce over the last several years have left the industry with fewer employees to monitor welding operations, and the overall shortage of skilled welders has compounded the challenge. Whereas 10 years ago a large automotive supplier may have had one welding technician for 20 robots, today that ratio has increased to as few as one welding technician for 50 robots — or more. Clearly, the lack of resources creates challenges, but eliminating nonvalue-added activity (or that which doesn't contribute

directly to throughput) can help overcome those. Practices such as equipment standardization, preventive maintenance, and product selection can promote a leaner operation and provide opportunities to improve process flow and operational efficiency.

Well-Managed Inventory Equals Greater Uptime

In recent years, the consolidation of automotive suppliers and facilities has resulted in welding operations made up of multiple brands of welding equipment, including power sources, robotic con-

Standardizing GMAW guns and consumables can help to avoid unscheduled downtime for changing out incorrect consumables or reworking quality issues

BY ROBERT RYAN AND DAVID BELLAMY

trollers, robotic manipulators, and gas metal arc welding (GMAW) guns. The outcome is often a wide breadth of products to manage and, with fewer resources, an increased potential for costly errors and unscheduled downtime.

Not surprisingly, in an industry that requires repeatable, high-volume welds — some up to 500 parts in a single shift — consistency is critical and any deviation in quality could result in downtime, scrap, or rework.

Ideally, standardizing on a single GMAW gun brand can help companies in the automotive industry avoid unscheduled downtime for changing out incorrect consumables or reworking quality issues. It can also reduce the amount of time spent managing inventory and provide a built-in poka yoke (mistake-proofing) system by eliminating (or significantly reducing) the opportunities for incorrect installation. Some companies have found that such standardization, along with a vendor-managed consumable system, works well and contributes positively to their goal of maintaining process efficiency and equipment utilization. The process of standardization may take time — replacing older GMAW guns as they wear, for example — but in the long term it can yield positive results in quality, performance, and cost. It also allows the production team to have one point of contact for technical support should questions arise about the performance of a GMAW gun or consumable, as opposed to having to contact multiple manufacturers.

To help with the transition to one

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GMAW equipment supplier, front-end conversion kits are widely available and allow companies to standardize on a single brand of consumables, regardless of the type of GMAW gun being used. These kits are a good alternative to replacing an entire fleet of GMAW guns, while still offering the benefits of standardized inventory.

In some cases, there is an opportunity to maximize the value of welding consumables by using the same contact tips and nozzles for semiautomatic applications (such as those for repairs or rework) after they are too worn for the robotic application, which further reduces inventory.

The Right Equipment Maintained Properly

Most welding technicians, supervisors, and operators in the automotive industry will attest to the fact that proper part fit-up is a constant concern. But not only do the parts that move into the weld cell need to be of the proper dimension and fit, the welding gun and consumables being used also need to provide accurate, repeatable, and durable performance.

Robotic GMAW guns are intended to weld at the same location every cycle by providing a consistent tool center point.

Some products are more durable than others, but they all require preventive maintenance to optimize performance and prevent unscheduled downtime for replacing items like contact tips or liners.

Air-cooled robotic GMAW guns are among the most durable products available. Many applications in the automotive industry, such as suspension components, use thin materials (2 to 4 mm) that are ideal for an air-cooled robotic GMAW gun since the typical operating range is approximately 200–300 A at an average 60% duty cycle.

Water-cooled products improve performance at higher duty cycles, yet they are inferior to air-cooled products from a durability perspective. This is primarily due to the addition of water channels and other mechanical requirements of a water-cooled design. In the automotive industry, it is rare to experience applications that truly require a water-cooled GMAW gun. Even for end users welding thicker base metals (truck frames, for example), they are still likely to be within the comfort range of an air-cooled GMAW gun. In some cases, however, the addition of water cooling will help manage excessive heat and prolong the life of welding consumables (e.g., nozzles and contact tips). In these instances, there ex-

ists an opportunity to use a hybrid air-cooled/water-cooled gun. This type of product has the underlying construction and durability of an air-cooled robotic GMAW gun while offering some of the benefits of water-cooling.

Regardless of the welding application, it is important for companies to use the most appropriate type of GMAW gun for the job and properly maintain the equipment to ensure a maximum return on investment.

Good preventive maintenance procedures include inspection of all connections in the entire system: GMAW gun, wire feeder, ground cables, etc. Also include regular inspections for proper wire feeding and proactively replacing worn components during scheduled downtimes. Preventive maintenance procedures can be performed at the beginning of the shift to avoid interruptions to production.

Meeting the Demands

As the automotive industry returns to the production levels of several years ago, taking steps to standardize inventory, implement good preventive maintenance techniques, and select the right product will help companies become more efficient and do more with less. ♦



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