YASKAWA MOTOMAN CANADA LTD.

MOTONEWS CANADA

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Preventive Maintenance season is fast approaching. Call 905.569.6686 and speak to Brian Smith to schedule your appointment.

INSIDE THIS ISSUE:

Robots Make Graders Greater

By Mary Kay Morel

Volvo Motor Graders (a member of Volvo Construction Equipment) in Goderich, Ontario, Canada, is a leading manufacturer of motorized graders used for road maintenance and construction site work. In 1998, the company began incorporating robotic arc welding into their manufacturing processes and now has four Motoman FabWorld® systems. In December 2005, they implemented a fifth robotic welding cell – this time, a custom-designed solution that uses advanced tandem GMAW technology to perform heavy-deposition welding on a new grader model.

"The majority of this new grader was redesigned from the ground up and planned with robotic welding in mind," according to Al Menheere, a Welding Process Specialist for Volvo Motor Graders.

"The new robot cell was implemented along with the new grader model, so the new model has never been welded manually. It would have taken about 10 or 11 skilled manual welders, but with the robot cell, it only takes two operators," Menheere explains. "With the new robot cell we can now build on two shifts what would have taken three shifts. The frame cell is no longer a bottleneck." he adds.

"We had several goals for the new robot cell. Improving productivity and shortening lead times were important factors. The shortage of skilled welders is becoming more and more of a factor," Menheere says.

"We use the new tandem arc welding process in the Frame Cell to weld three different parts -- rear frames, front frames and mid-section frames -- that are then joined together manually to make a complete grader frame assembly," says Menheere. "One complete cycle through each positioner gives us one complete grader frame," he adds.

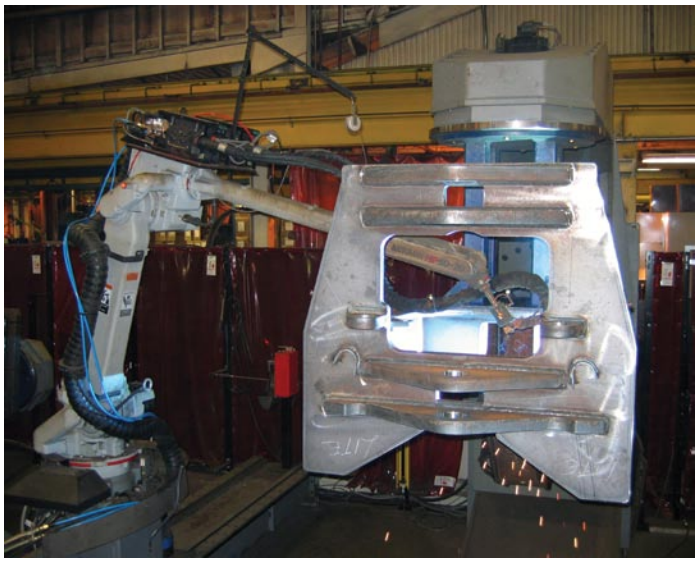
The large, heavy parts are comprised of mild steel plate between 0.75-in. and 3-in. (19.05 mm and 76.2 mm) thick. Depending on the model, rear frames weigh more than 2,000 kg (4,410 lbs -- well over two tons) each; front frames weigh approximately 1,450 kg (3,197 lbs) and mid-section frames weigh about 1,500 kg (3,308 lbs). Each frame section requires between 50 and 150 welds, which range from four inches to nine feet (101.6 mm to 2,743.2 mm) long.

TANDEM GMAW

The extended reach Motoman HP50-20 robot mounted on a 1,000-kg (2,205 lb) capacity servo track with five meters (16.4') of travel is equipped with a Fronius tandem arc GMAW torch package, Fronius TPS5000 digital welding power sources, and Fronius interface to the Motoman NX100 robot controller.

For this application, Volvo Motor Graders uses Lincoln L56 0.045-in. steel wire in 1,000 lb bulk reels located outside of the robot cell along with high-speed wire-assist feeders. Shielding gas is a mix of 92 percent Argon and 8 percent CO2. Welding peripherals include automatic wire cutter and tandem torch reamer.

(cont'd on page 2)



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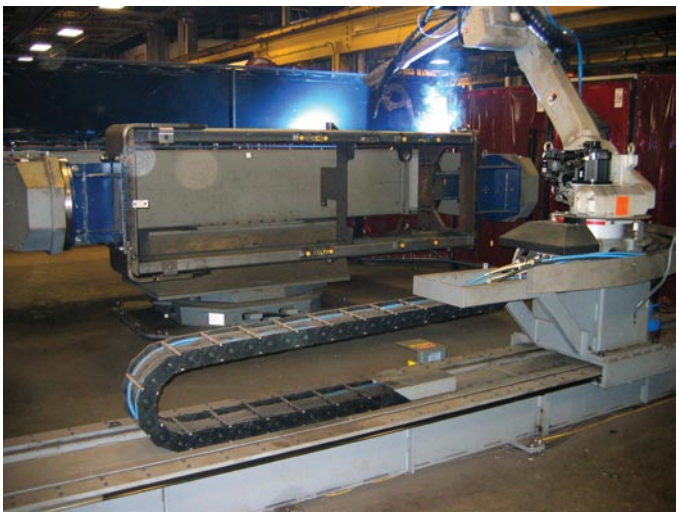
Robots Make Graders Greater *(cont. from page 1)*



With the tandem arc process, both wires feed through the same torch, allowing heavy-deposition welding with faster cycle times and at a lower capital equipment cost than using two robots with individual welding torch packages.

The two welding power supplies share a master controller that coordinates wire feeding and current control between the two wires. This central control can control the wires independently with different feed rates or modes of transfer, and can also fine-tune each arc independently. The Fronius controller can also provide single-wire operation by turning off one of the power sources.

The system supports touch-sensing and seam-tracking capabilities that are typically required on large weldments. Provided that part fit-up is good, as it is at Volvo Motor Graders, the Tandem GMAW process can weld at least 2.5 times faster and can eliminate the need for multi-passes on long, heavy-deposition welds, saving cycle time.

All frame components are manually pre-tacked in specially designed fixtures prior to robotic welding. "Our biggest challenge is aesthetics -- making the welds on the outside of the grader frame look pristine." Menheere says.

POSITIONERS

The robot cell includes extremely large, heavy-duty positioners located on opposite sides of the single-axis robot shuttle track. Grader frame mid-sections are welded on the Motoman MT1-3000 S2X two-axis servo-tilt/rotate skyhook positioner.

A Motoman VMH-3000 S3X three-axis, two-station servo-powered positioner is located on the opposite side of the robot shuttle track. This heavy-duty positioner includes two headstock/tailstock positioners mounted on a rotating base axis. Span between headstock/tailstock faceplates is 3.75 meters (12.3'). Front frames are welded on one of the headstock/tailstocks and rear frames are welded on the other.

OPERATIONS SEQUENCE

Operators load parts onto the positioners using an overhead crane and manually bolt frame parts to the positioners. "Our ideal flow is to load a mid-section frame on the servo tilt/servo rotate skyhook positioner (MT1-3000 S2X) and have the robot weld on that, which takes about an hour. Meanwhile, we can load and unload parts from the two stations at the indexing headstock/tailstock positioner," Menheere explains.

When it finishes welding on the mid-section frames, the robot can immediately start welding on front or rear frame sections located on one of the headstock/tailstocks on the other positioner. "Front frames take 20-30 minutes to weld, and rear frames take 40-50 minutes, depending on the model," Menheere says.

Volvo Motor Graders plans to add additional robots a year or two down the road. "Motoman robots have enabled us to improve productivity, quality and safety and have contributed to our bottom line performance," Menheere says. "We want to continue to build upon the success we've achieved in the Frame Cell by switching to similar tandem arc welding robots as we replace existing equipment or add new cells in the future," he adds.

Disponibilité des cours en français:

Savez-vous que c'est possible de contacter MOTOMAN pour organiser un cours en français selon vos besoins, soit en programmation, soit en programmation avec soudage, soit en l'entretien du robot?

Si un cours en français vous intéresse, n'hésitez pas a contacter Neil Alexander au 905-813-5937.

Aftermarket News

Gus Theodoropoulos has joined the YMC team as After Market Sales Specialist. Gus brings 6 years of automotive industry experience to the position and chose YMC because of his desire to work with a company known as an innovation leader. He looks forward to creating new opportunities while continuing to support our existing clients' robotic needs with the same level of superior customer support you've come to expect from Motoman.

Welcome aboard, Gus!

NEXT

Welding Troubleshooting 101

By Greg Butler

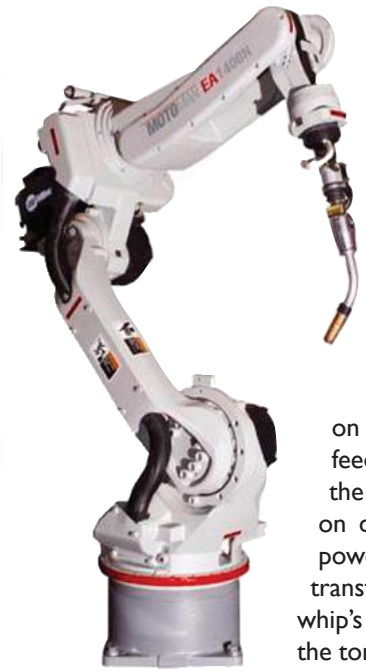
Frequently we receive calls from customers about "welding problems". They refer to them as, arc-stops, tip faults, tip-sticks and burn-backs. These problems can sometimes be solved without an on-site service call by first checking the "basics".

Basics refer to proper welding connections, proper wire feeding and gas-flow, and proper programming. Due to time and space considerations, let us assume the welding parameters are suitable for the application.

Here are a few things to check:

Welding Connections

Welding connections include the positive and negative weld cables. What is the condition and routing of the positive weld cable to the wire feeder? What is the condition and routing of the negative weld cable to the fixture? If the negative weld cable is passing through any auxiliary grounds, what condition are these in? Are the cables connected properly at the welder's positive and negative studs? Are these cables overheating during welding? If so, are they undersized?



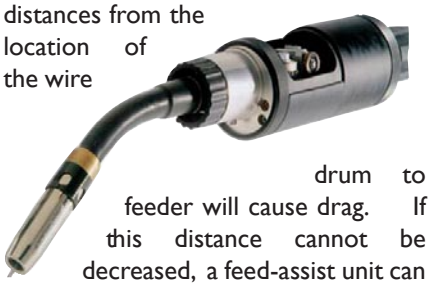
Welding connections also refer to the transfer of welding current. From the wire feeder's positive connection, current transfers to the power pin on the front of the feeder or back-end of the whip (depending on design). From the power pin, current transfers through the whip's power line to the torch, then from the torch to the tip-holder, and then from the tip to the wire. What condition are all of these connections in? Over time, all will wear and will need to be replaced. Welding connections also refer to correct sizing of the contact tip to welding wire. Obviously, worn contact tips will cause problems and should be replaced at regular intervals.

With regard to current transfer, one common problem encountered in automated MIG welding is in the area between the contact tip and the wire. There is a tolerance between the center bore of the contact tip and the wire. As bulk wire, which is very straight is fed through the tip, contact between the wire and tip can be intermittent. This causes unstable weld conditions. With the robot changing posture through the weld path and long lengths of wire feed, the problem is compounded. Two solutions are possible. Running an undersized contact tip or bending the wire enough to make contact more consistent. Both have worked for our customers.

Welding connections also refer to the communication cables between the robot controller and welding machine and welding machine to wire feeder. What condition are these in? Are these cables tight? If they are removed, are there any damaged or misaligned pins? If an external volt sensing lead is being used, is it placed in the weld circuit the way manufacturers advise?

Wire Feeding

With the drive rolls open, one should be able to pull wire easily. When troubleshooting problems related to feeding, the best method is to start at the tip working methodically to the wire. If liners are not cut to correct length, if they are worn or plugged, they will cause problems. Guide tubes rubbing on drive rolls will interrupt feeding. Worn drive rolls can damage wire and slip. Sharp bends in conduit can damage wire and cause feeding restrictions. Excessive distances from the location of the wire drum to feeder will cause drag. If this distance cannot be decreased, a feed-assist unit can be added.



Gas Flow

Gas flow problems result in porosity. A simple, inexpensive tool for troubleshooting gas problems is a hand-held flow meter that fits over the welding nozzle. Pressure at the nozzle should be the same as the supply pressure. What is the condition and routing of the gas line to the back of the wire feeder? Is the gas solenoid in the wire feeder functioning? When the whip is removed from the front of the wire feeder, is the same gas pressure present at the source? Is there any damage to the gas line in the whip? Examine the diffuser and nozzle.

Programming

Proper programming includes work angle, travel angle and stick-out (the distance from the contact tip to the work-piece). An example that can be given is the positioning of an arc-start. If the work and travel angle are not correct the wire can have a tendency to skip off the part for a time before an arc is established. If the time before an arc is established is long enough, a failure can occur. Suppose the previous arc-end had a programmed point giving a stick-out of ½ inch, if the next arc-start had a programmed point giving a stick-out of ¼ inch, the wire would already be on the part and an unstable start would occur.

A series of basic corrections can streamline any system. A series of basic mistakes can cause costly down time.

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PC Software - *2nd of a 2-part series*

By Scott Smith

In part one of this issue, I talked about a few software programs that help automate your file management. Now that you have the files on your computer, you may want to view and maybe even edit them. Motoman offers a couple of solutions that will let you explore your programs with ease.

Solution #2 – Program Editors

Job Editor
Job editor provides you with an effective tool for creating and modifying robot programs quickly without having to worry about any syntax errors. The teach pendant INFORM list you are already familiar with, is re-created on your computer screen, making it quick and easy for you to use.

Concurrent I/O Ladder Editor
Our ladder editor software enables programmers to perform off-line editing of the concurrent I/O ladder logic in a convenient drag-and-drop manner. Users can create their own or modify what exists. Ladder Editor will allow you to maximize the potential of your inputs and outputs.

Of course, once you have made your changes using Job Editor/CIO Editor, you can use our communication software to transfer the files back into the robot -- all without having to leave your office.

If you would like more information on any one or more of these software programs, please contact your Regional Sales Manager.

Data sheets are currently available via fax or email for the following software options:

- MotoAdmin
- MotoFTP (File Transfer Protocol)
- VDE (Visual Data Exchange
- Visual DCI (Data Communication Interchange
- MotoCom SDK (Software Development Kit)

data sheets