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THE WELDING EXPERTS®

75% Decrease in Chassis Assembly Time for Dodge NASCAR Teams

Robotic welding cell
with Power Wave® 455M

Chrysler-Dodge Motorsports Detroit, MI

Using standards created by NASCAR to comply with the universal "Car of Tomorrow" design, Chrysler-Dodge Motorsports provides the chassis used as a basis to build each NASCAR team's individual cars.

- CHALLENGE -

- Decrease production time while increasing quality of frame, middle section and front and rear clip welding for each frame kit.
- Minimize inconsistent weld patterns causing distortion and dimensionally unstable assembly.

- SOLUTION -

- Lincoln Electric/FANUC robotic welding cell with Power Wave® 455M.

- RESULTS -

- 75% decrease in assembly time when compared to manual welding the chassis.
- Consistent welds result in a more standardized and complete kit for race team.

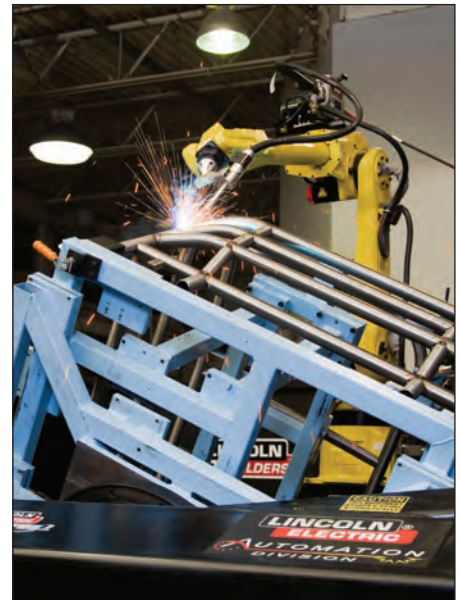


NASCAR drivers work under extreme conditions – making split-second decisions while traveling at speeds nearing 200 mph and precariously looking to move ahead when the next car is mere feet away. The safety, integrity and performance of the car are crucial to the driver and his team. These factors were also front and center with NASCAR when in January 2006 it announced the launch of a universal car design tagged the "Car of Tomorrow" (COT) for its Sprint Cup Series.

Sparked in large part by Dale Earnhardt Sr.'s fatal, final-lap crash at the 2001 Daytona 500, NASCAR set out to create a universal design that would improve safety features, provide for more cost-effective maintenance and level the playing field between fiercely competitive teams. The COT design standardizes a number of components, ranging from sections of the frame to crumple zones, across all manufacturers and race teams.

With NASCAR's rules in hand, Dodge Motorsports initiated a COT chassis manufacturing program. The four, factory-supported Dodge race teams use Dodge Motorsports provided chassis as a basis to build their individual race cars.

Similar to every passenger car manufactured, race cars incorporate thousands of welds. Dodge teams were spending many hours manually MIG welding the frame, middle section and front and rear clips that make up each car frame kit. Wanting to reduce man hours, as well as increase weld consistencies for the teams, Chrysler investigated robotic welding options and decided on a Lincoln Electric/FANUC robotic welding cell.



FANUC robotic arm welds Dodge Motorsports chassis.

Chrysler realized a 75-percent decrease in chassis assembly time when compared to manual welding the chassis.

The Lincoln Electric/FANUC robotic welding cell offered other benefits as well, a more consistent chassis for the teams and the cost savings associated with the reduced man hours to weld the chassis manually.

In the Not-So Old Days

Before installing the Lincoln Electric/FANUC robotic welding cell, the COT center and rear sections of the frame were constructed by the teams using manual welding and assembly techniques.

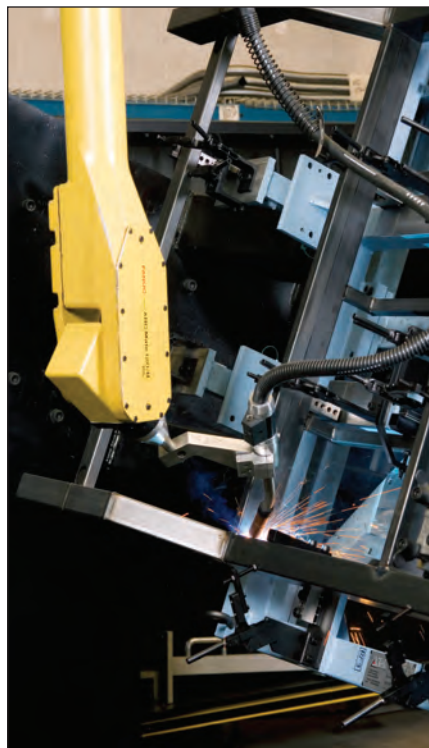
"This was extremely time consuming and very inefficient," says Tom O'Dell, Specialty Vehicle Engineer – Dodge

The future of welding is here.®

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Motorsports Engineering. “Manual welding also caused variations in the process, making each COT center and rear section slightly different than the one before.”

O'Dell explains that the consistency of the weld, including torch angles and travel speeds, was difficult to keep consistent during manual welding, especially if different people welded different sections of the chassis. This translated into variations in weld quality, which could result in lower strength welds. Too often, an inconsistent weld pattern resulted in distortion on the center and rear sections that were unpredictable and resulted in a dimensionally unstable assembly.

The Robot Takes the Driver Seat

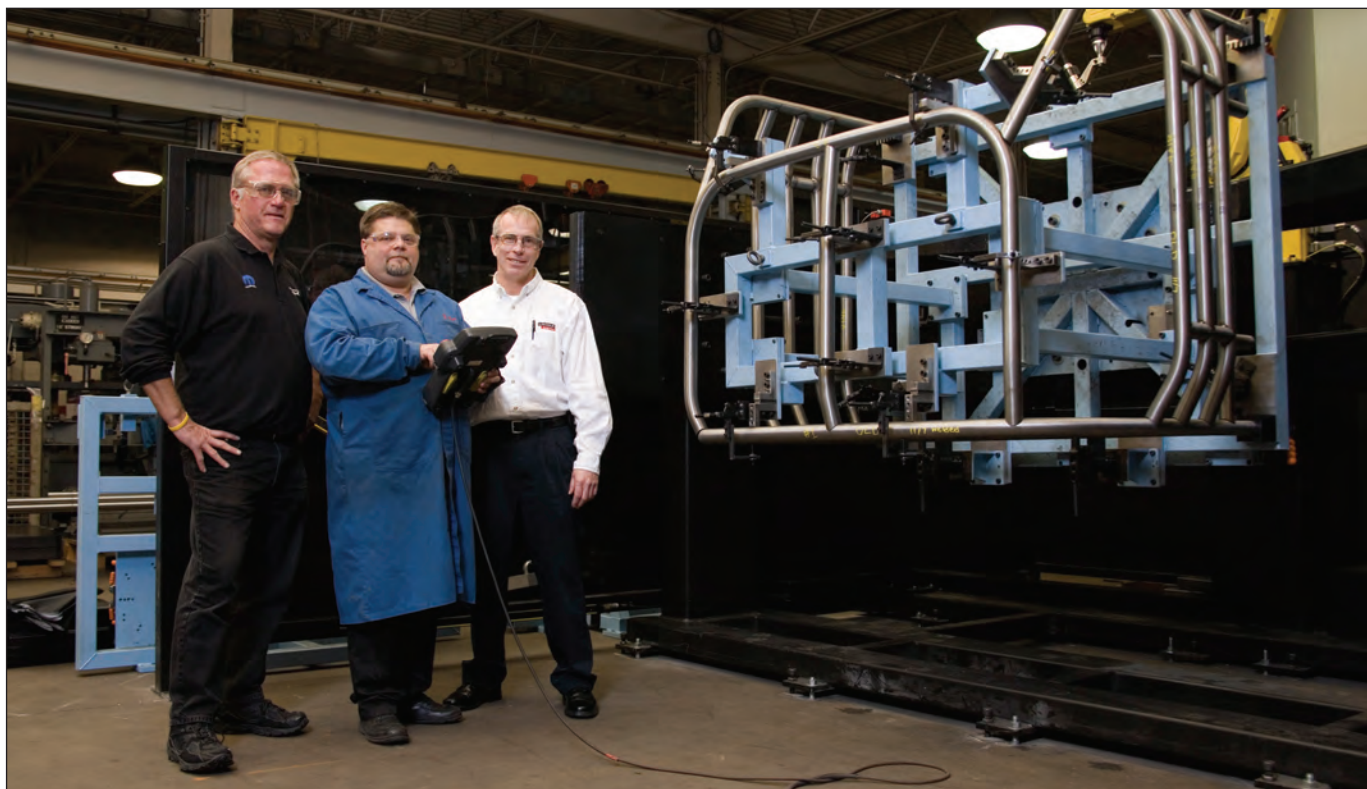
The Lincoln Electric/FANUC system consists of a six-axis robotic arm and controller, powered by a Lincoln Electric Power Wave® 455M. The system includes several subassembly fixtures and one final assembly fixture.

“We saw the benefits of the robotic cell immediately,” O'Dell explains. “The new process gave us a competitive advantage in the repeatability, weld quality, cost, accuracy and part consistency at the end of assembly. This is why we chose the Lincoln Electric/FANUC robotic weld cell.”

It now takes the robotic cell just 39 minutes to weld the frame. Even when you add in the fixture change out and final assembly, it takes less than two hours to complete the center and rear sections.

When compared to the manual welding, Dodge Motorsports decreased the assembly and weld time by approximately 75 percent.

The car frames have to perform under extreme speeds and conditions, making quality and weld integrity crucial. With the robotic weld cell, welds are made in the same sequence and position every time, resulting in better consistency, travel speeds, torch angles, depth of



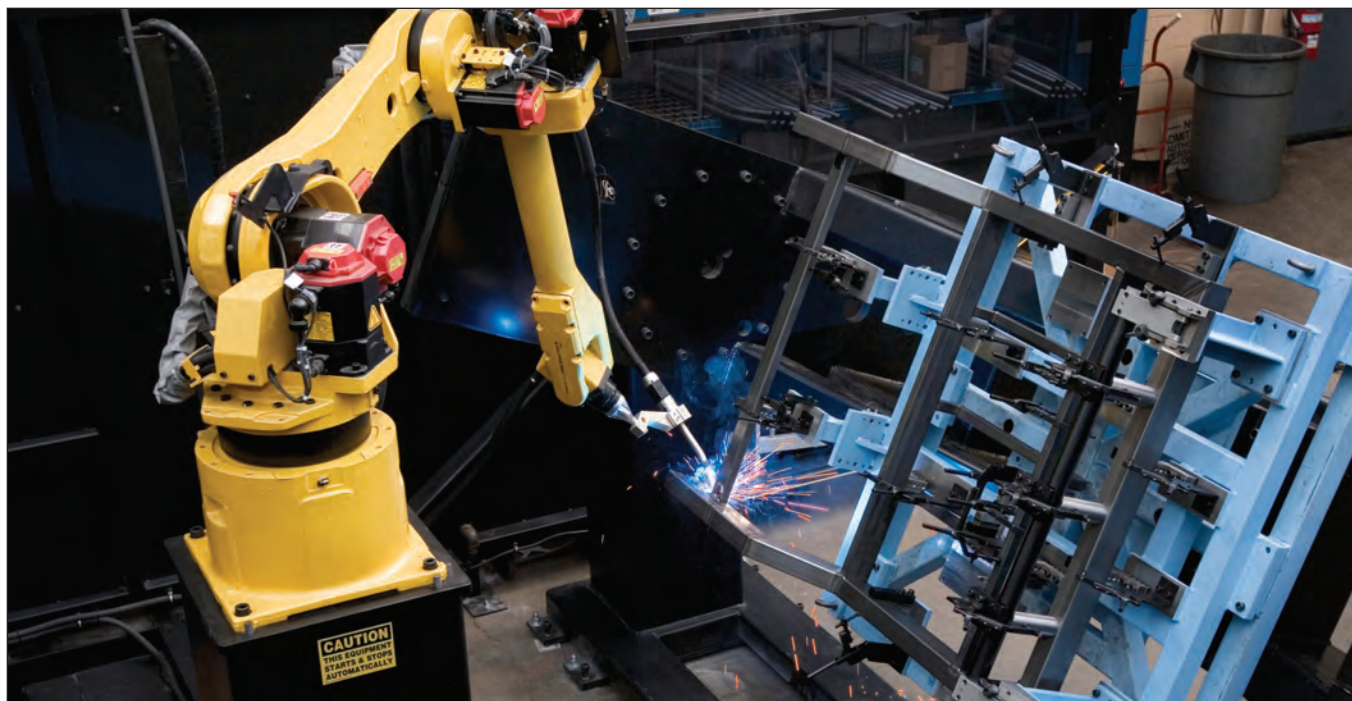
Tom O'Dell, Specialty Vehicle Engineer—Dodge Motorsports, John Mueller, Contract Welding Engineer — Chrysler, and Lincoln Electric Technical Sales Representative, John Ludwig.

75% Decrease in Chassis Assembly Time for Dodge NASCAR Teams

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The Lincoln Electric/FANUC system consists of a six-axis robotic arm and controller, powered by a Power Wave® 455M.

penetration, bead size, heat input and bead shape. This allows for greater predictability in cage stiffness, bending and twisting standpoint for the cage, eliminates variation and increases weld accuracy. The fixtures control the geometry of the subassemblies and final assembly, further controlling the accuracy of the overall piece.

What It Means for the Teams

"Moving to robotic welding allows us to deliver a more standardized and

complete kit," O'Dell says. "The result is less welding required on site in the team's shop and a more efficient manufacturing process."

The roughly 50 hours the teams previously spent welding the center and rear sections can now be used to focus on other aspects of assembling the car.

"We want to see our teams succeed and win. We're focused on building

"We're focused on building the best, most consistent car kits in the industry. The move to Lincoln Electric/FANUC robotic cell allows us to do that."

the best, most consistent car kits in the industry," O'Dell says. "The move to the Lincoln Electric/FANUC robotic cell allows us to do that."



The robotic weld cell improves weld consistency, travel speeds, torch angles, penetration, bead size and bead shape.

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Featured Lincoln® Product



Power Wave® 455M

For welding thicker materials in robotics, hard automation and semiautomatic applications, choose the Power Wave® 455M. For those applications where heat input control, minimal distortion, and reduced spatter are essential, opt for the Power Wave® 455M/STT®. Both models feature Waveform Control Technology® for superior arc performance on a variety of materials, including steel, stainless steel, aluminum and nickel alloys. Both deliver custom control of the arc for a given wire type, size and shielding gas configuration for consistent welds time after time.

The Power Wave® 455M and 455M/STT® are designed to be components in a modular, multi-process welding system capable of digital communication with other industrial machines to create a highly integrated and flexible welding cell.



WHAT IS NEXTWELD®?

The challenges facing industrial fabricators today are growing in number and complexity. Rising labor, material, and energy costs, intense domestic and global competition, a dwindling pool of skilled workers, more stringent and specific quality demands all contribute to a more difficult welding environment today.

Through our commitment to extensive research and investments in product development, Lincoln Electric® has established an industry benchmark for applying technology to improve the quality, lower the cost and enhance the performance of arc welding processes. Advancements in power electronics, digital communications and Waveform Control Technology® are the foundation for many of the improvements.

NEXTWELD® brings you a series of Process, Technology, Application and Success Story documents like this one. NEXTWELD® explains how technologies, products, processes and applications are linked together to answer the important questions that all businesses face:

- *How can we work faster, work smarter, more efficiently?*
- *How can we get equipment and people to perform in ways they've never had to before?*
- *How do we stay competitive?*

NEXTWELD® is the future of welding but its benefits are available to you today. Ask your Lincoln Electric representative how to improve the flexibility, efficiency and quality of your welding operations to reduce your cost of fabrication.



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