



## **In-House Tooling and Offline Programming Drive**

### **Great Plains' Unique and Versatile Robotic Welding Systems**

Like the lush wheat fields of Kansas that rise abundantly throughout the colorful Midwest landscape, Great Plains Manufacturing has taken robotic welding to a height that surpasses most factory automation. Many companies who consider robotic applications seek manufacturing automation solutions based on producing a large number of similar parts by a dedicated robotic system. Innovative thinking, creative minds and the combined efforts of Genesis Systems Group, the largest independent robotic systems integrator in North America based in Davenport, Iowa, and Great Plains Manufacturing in Kansas, resulted in unique and versatile automation solutions.

Great Plains had its vision and beginnings in 1976 in a small shop in Salina, Kansas. Today, still headed by its founder, Roy Applequist, it is one of the largest privately-held agricultural equipment manufacturers in the United States. Salina houses the corporate headquarters while manufacturing facilities have expanded to Assaria, Kipp, Abilene, Lucas, Salina, Enterprise, Tipton, and just recently, Ellsworth, Kansas. Great Plains manufactures agricultural implements such as seed planting equipment, tillage equipment and crop sprayers through its Great Plains Division. Finish mowers, rotary tillers, rotary cutters and other landscaping equipment are products of the Land Pride Division. Great Plains Manufacturing remains a solid, growth-oriented company with over 1,000 employees.



Manufacturing growth and expansion doesn't happen without foresight and the ability to adapt to changes in technology and the market. Great Plains knew that manufacturing automation was necessary. But their needs were not conducive to what some perceive as typical robotic welding applications—the large volume assembly line of mass-produced parts. Their manufacturing demands required a system that could accommodate short runs of a variety of different parts with minimum operator intervention, tooling changes and downtime.

These requirements created questions. How could they justify utilizing robots for small batches of parts? Would the need for multiple tooling be cost prohibitive? How could a robotic system be configured to weld several different parts in one shift and still be efficient? Would the cost of programming the system to run an assortment of parts be too expensive?

“Great Plains had unique manufacturing needs,” says Bill Reid industrial business development manager of Genesis Systems Group. Reid explains that Great Plains could have 10 to 12 tooling changes and part changes across a robot system in a shift. “We had to think outside the standard automated solutions.”

“Our production run may be anywhere from five to 1,000 pieces, with cycle times varying from 10 seconds to 60 minutes,” says Brandon Luthi, Great Plains' Robotic Technical Facilitator. “We don't run high volume so we are always changing the fixtures to accommodate what we need to manufacture. It's not unusual to produce 30 product lines in one month.”



Justification for robotic systems would require some innovative thinking. How could they develop versatile robotic systems and still achieve productivity and profitability? Great Plains looked to Genesis and Luthi for answers. Luthi's prior robotics experience is one of the key factors behind the installation and success of over 20 robotic welding systems within their plants today. Working together, Luthi and Genesis Systems perfected what could be dubbed cost-efficient and self-sufficient system installations that have served them well over the years.

The adage, "the answer lies within us," proved true for Luthi's automation challenge. He found some of the answers within Great Plains' own facilities. Luthi realized they could use manufacturing resources already at hand. When Great Plains designs new equipment for their markets, they do product research, development and fabricating in their in-house research facilities and fabricating shop. "Now," notes Luthi, "when our fabricating department is not being used for new product development, we make use of the shop and the workers to build tooling for our robotic systems. In-house tooling is one of the key elements in the success of our systems. Doing our own tooling saves us money, utilizes our manufacturing tooling facilities when they are in a slow cycle and gives us more control."

According to Luthi, in-house tooling has additional advantages. "We don't have to coordinate the tooling with an outside source and wonder if it will be delivered on time and if the tooling will meet our specifications. We can design and build our own tooling and make adjustments and corrections as we go," states Luthi. "When the robotic welding system arrives the tooling is ready."



Not only does that make delivery and installation on new systems more predictable, but also in-house tooling capabilities reduce manufacturing downtime on existing systems. “If something breaks down on a system in production we can fix it right away and not have to wait for a tooling company to respond to our needs.” In-house tooling and DELMIA offline programming software, that Luthi refers to later, also enable manufacturing to react to changing production schedules almost immediately. “We can modify our robots quickly,” says Luthi. “We can often do the changeover without interrupting the robot.”

In addition to in-house tooling, Luthi utilizes Dassault Systemes DELMIA Ultra Arc off-line programming software. He explains, “I receive a DELMIA 3-D model of the cell that Genesis is building prior to shipment. Then, with the DELMIA software I develop off-line programs, so when the system arrives at our facility and is installed, we simply add our tooling. I download the programs, do some tweaking, and the robot is ready to run. Generally, the systems we have received from Genesis were installed and running in full production the same day they were delivered.” This ability to create the programs offline is very critical to their robotic success.

Genesis Systems’ Market Segment Manager, Bryan Fleck, agrees, “Because Brandon does the offline programming before the robotic system is delivered, we can often install the system on the first shift and it is running parts by the second shift. Our competitors often struggle for two to three weeks to get a similar system running.”



The DELMIA software is also an asset prior to purchasing a new system. It helps determine the best and most efficient application for a new part or product. “We are frequently introducing new products to our lines and I have an idea how I want a new system to function,” says Luthi. “By using this software, I can do a reach analysis on each design, to discover and solve potential problems before the project ever leaves the virtual world.”

In-house tooling, software, innovative thinking and a commitment to automation success have resulted in unique and profitable robotic welding systems for Great Plains. Reid comments, “Theirs is an unusual use of robotics, but they make it work—and it works extremely well. They have self-sufficient systems and know how best to use their resources. Great Plains is a progressive thinking company that utilizes automation to the fullest.”

This working partnership between Great Plains and Genesis is also vital to their accomplishments. “When we’re considering a robotic application we work as a team,” says Luthi. “Genesis helps us determine what we need and how to achieve our goals. They are always willing to listen to me and my ideas, and their engineers are a great resource for our manufacturing processes.”

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**Great Plains Manufacturing, Inc.**  
1525 East North Street  
P.O. Box 5060  
Salina, KS 67401-5060



www.greatplainsmfg.com  
785-823-3276

**Genesis Systems Group, LLC**  
8900 Harrison Street  
Davenport, IA 52806  
[www.genesis-systems.com](http://www.genesis-systems.com)  
888-693-5600