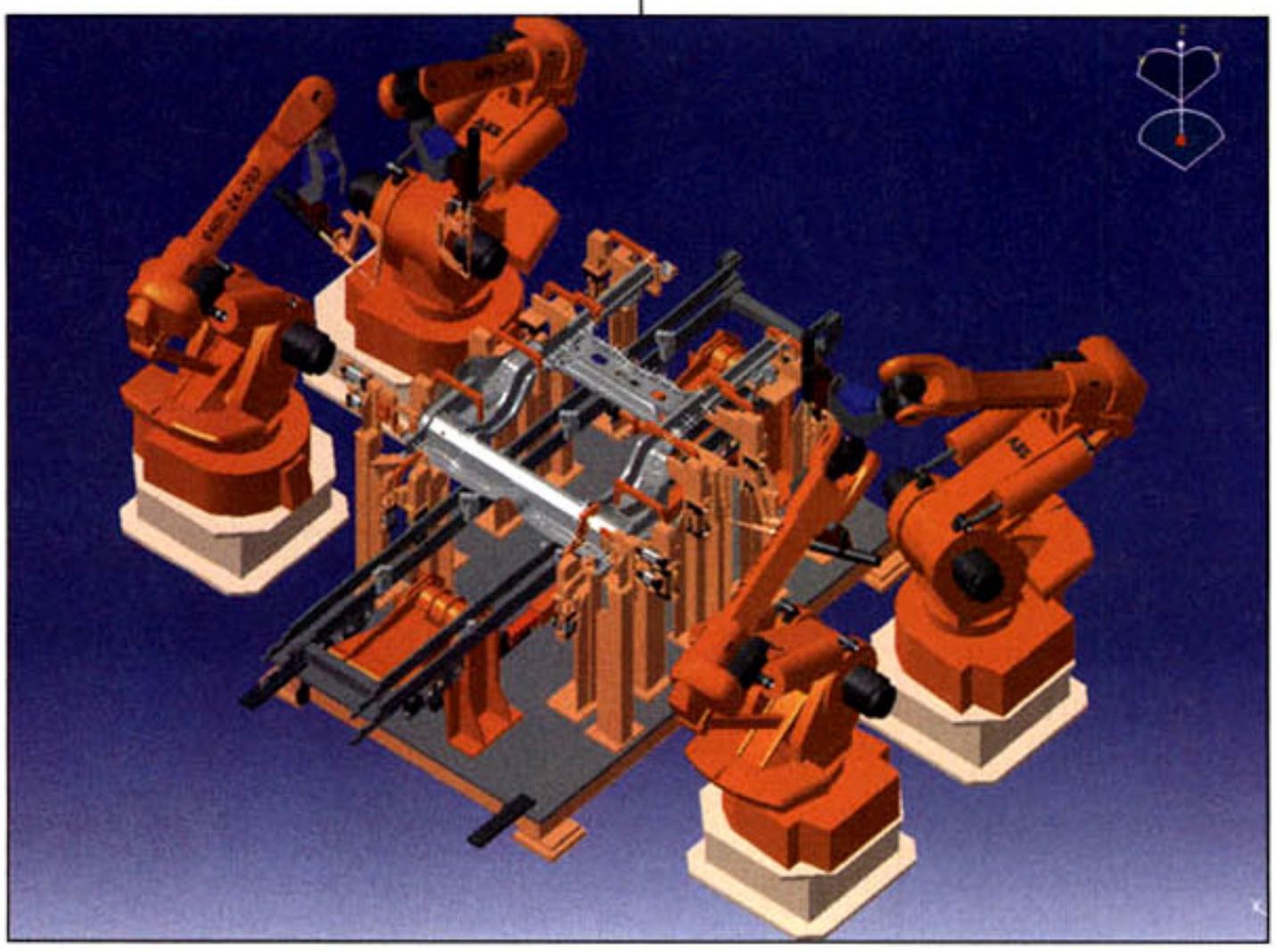
SIMULATION SUITS SUPPLIERS

Automotive customers for sheet metal components such as hoods, doors, and fenders constantly intensify the demands they place on Tier 1 tooling suppliers. This often forces toolmakers to bid against bare-bones shops in low-wage areas, which drives many out of business and leaves others with thin profits. However, three Detroit-area tooling companies and many other Tier 1 suppliers are fighting back by incorporating simulation and digital-manufacturing software packages.

Such software, used from one end of sheet metal processing to the other, speeds designing, engineering, and building workcells for these suppliers. It ensures that off-line programming (OLP) and debugging won't delay startups, even if everything else runs late. Simulation also handles trouble-shooting programmable logic controllers (PLCs) that monitor and control workcells.



Delmia's digital-manufacturing software speeds designing, engineering, and building workcells for automotive tooling suppliers.

At Ogihara America Inc. in Howell, Mich., designing and programming a robotic workcell once took 16 to 20 weeks, but thanks to simulation and digital-manufacturing software such as Delmia Corp.'s Igrip for robot simulation and OLP, the shop does it in 11 weeks, which includes six weeks of waiting for outside suppliers to build assembly tools and prototypes. The software cuts OLP time 75% and robot teach-time 80%.

Complexity at Ogihara keeps simulation an everyday event. For instance, the shop developed multiple-use tools as part of a workcell with indexable tooling. The cell makes hoods on first shift and fenders on second, and both shifts share its six ABB robots and assembly tools.

"Building a line for different components probably wouldn't have happened without Igrip," says Ogihara's Jason Raines, a senior assembly engineer, and Gary Haras, an assembly engineer. Simulations verified for customers that multiple-use tools wouldn't interfere with their coordinate geometric dimensioning and tolerancing methods.

Annex Design Service of Sterling Heights, Mich., designs, but doesn't build, weld-assembly systems for car-body panels, structures, and SUV doors. For its cells that position, gage, and weld loose-loaded parts using robots, early evaluation prevents costly rework down the road.

A few years ago, the shop won a tooling-design contract for wheel-house assemblies, which are notoriously difficult because the cell area is congested and assembly tooling complicated. Without simulating such a cell, robots are clamped to floors, moved several times, and then reclamped to get the cell right.

Annex, on the other hand, uses Delmia's UtlraSpot software for resistance or spot welding to simulate such assembly systems. As a result, there aren't a lot of different bolt holes in the floor from moving robots around, and end effectors aren't chopped up and butchered from several modifications.

According to Utica Enterprises Inc.'s Don Marx, lead engineer in the simulations group at the Utica Township, Mich., shop, building virtual cells as simulations with Delmia software is the final defense against building failures. This especially holds true when car companies need flexibility in their tooling.

Carmakers want to run a system for a few years and then drop in a new tooling kit that changes the shape or size of what a cell was originally designed to produce.

At Utica, these kits are big business.

Kitting is reworking cells to take advantage of "white space," or underused room in a cell. And as much as possible, these kits should reuse existing tooling and floorspace.

Utica also designs and builds flexible systems. For example, one such door system produces two or three different styles, with a third or fourth style projected for the future. With the software, the shop simulates the system, making sure future styles, when dropped in, are accommodated with minor rework, if any.

Until recently, Utica offered mostly OLP with the basics such as motion. Users got robot programs with, maybe, 20 robot positions and general comments to help with robot logic. While this was simple enough, there were often another 40 to 60 lines of robot-logic code for such things as clamps to open, states to clear, entering the cells, and so on.

Now the shop does all robot logic from simulation at the OLP stage with Delmia software. And its off-line programs usually need minor touch-ups and require less manpower and time when either teaching new programs or modifying existing ones on the factory floor. delmia.com

SHOP CENTERS ON AUTOMATED GAGING FOR HUB PRODUCTION

Ill.-based Mennie Machine Co. Inc. sustained and grew during the last recession by automating a lot of its manual processes, including part gaging. The shop, a subcontract manufacturer of machined castings and forgings for the construction, off-road heavy equipment, and automotive industries, first automated inspection of rear-axle wheel hubs for heavy-duty pickup trucks.

Automating wheel-hub machining and inspection increased production using less operators. But more importantly, it reduced scrap and eliminated system errors.

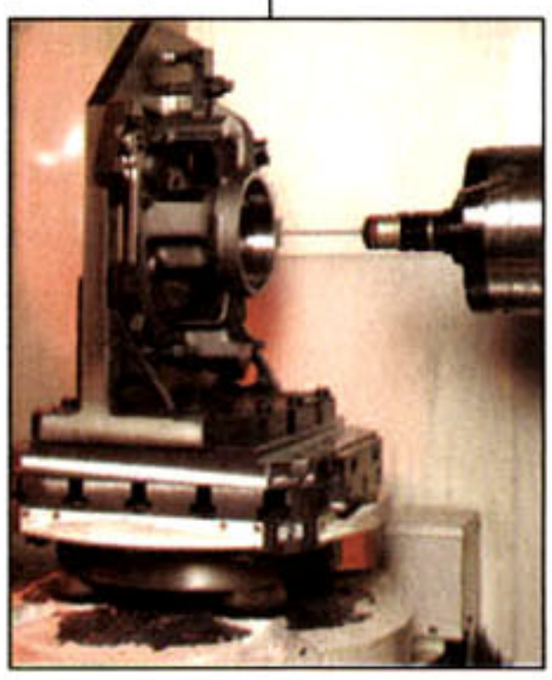
Hubs ran on four CNC vertical lathes, and two operators manually set up, loaded, unloaded, and gaged critical main-bearing bores using dial bore gages, which was time-consuming and unprofitable.

Along with a Fanuc S430i robot for loading/unloading, Mennie installed two Marposs inter-operational gages to monitor and control the machining cell. The robots transfer parts from two Daewoo Puma V10 vertical lathes into a Marposs Universal Quick Set gaging system, which automatically measures I.D.s and O.D.s from the shop's Op 10.

Robots then remove the gage and place it in the Op-20 lathe for inspecting parts coming off of that operation. Again, the gage checks part I.D.s and O.D.s, and a Marposs Quick Block measuring unit, moving on a pneumatic slide, measures lengths.

The Universal Quick Set gages connect to Marposs E9066 PC-based industrial workstations that process data and interface with the system controller. Gage data automatically compensates machine tool offsets without human intervention, and a trending function in the gage amplifier prevents over-compensating.

"No one wanted the automatic gages," says David Mennie, company vice president. "Once convinced this technology works with little maintenance and makes their jobs easier, they were sold."



As part of its inspection automation efforts, Mennie incorporates a Marposs Mida spindle touchprobe for accurately setting up its cast ductile-iron parts for machining.

Besides its hub production, Mennie automated measuring and inspection for its transmission-component cells using Marposs Mida spindle touchprobes to accurately set up the cast ductile-iron parts for machining. The probe, along with innovative fixturing, reduced part handling, and by automating the process, one less machine was required.

Two vertical lathes and an HMC make up each cell for the transmission components used in off-road vehicles. In an Op 30 on the HMC, all machined surfaces must be held in relation to a central bore, and the Mida probe loaded in the machine's spindle quickly and precisely locates the bore's center for adjusting machine offsets according to actual part position.

Probing takes less than 1 min and involves contacting the part's main bore in four places for automatically calculating center. According to Joe Smoode, plant manager at Mennie, the shop always took a gamble on whether fixtures were correct or if parts were loaded properly before acquiring the Mida probe. In addition, he says that using the probe lessens the chance of fixture wear influencing part quality.

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