

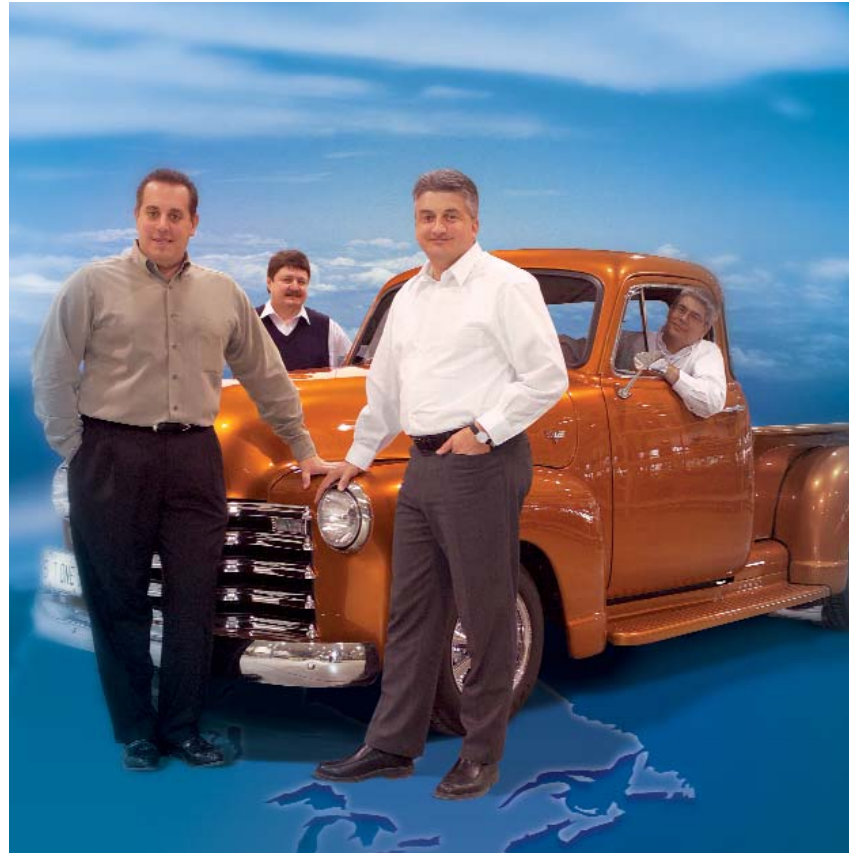
Drive & Control profile

Stamping out a new generation of automobile parts

**Schuler taps Bosch Rexroth/Morrell
for unique partnership to help the
Big Three auto makers**

Germany-based Schuler AG and its Crossbar Transfer Press offers global manufacturing with a local touch. The world's first crossbar transfer press by Schuler AG revolutionized stamping plants throughout the auto industry in the early 1990's. Today's compact crossbar transfer press, however, is used not only for large unstable body panels, but also for two-out production of mid-sized parts such as doors and engine hoods. Major auto manufacturers including Ford Motor Company and General Motors are using five of Schuler's presses here in the U.S. to stamp new body components such as hoods and doors for automobiles and trucks. It took a global effort of Schuler, Bosch Rexroth, and Morrell, Inc. to make it possible.

Schuler AG, headquartered in Göppingen, Germany, is the parent company of the Schuler Group, which includes the U.S. subsidiary Schuler Inc. The company provides sales, engineering and service support for all aspects of metalforming and enjoys



By shifting gears this partnership found a new way to make auto parts.

partnerships with high profile customers in the automotive, domestic appliance and electrical goods industries. From its headquarters in Canton, MI, just 30 miles west of downtown Detroit, Schuler is ideally situated to meet the needs of the U.S. automotive industry.

Morrell, Inc. is located in Auburn Hills, MI, and supplies automation products and services, along with design and engineering support

specifically for motion control solutions. The company is the exclusive provider of Bosch Rexroth drive and control equipment in the Michigan area and offers a full range of motion control products. Morrell teamed with the Bosch Rexroth industrial hydraulics technology group to supply Schuler with the large hydraulic systems and controls to complete each of the five presses. Schuler manufactured the presses with specific support from Bosch



Steven Orlando, VP of Sales and Marketing at Morrell, Inc.

Rexroth in Germany. In addition, the Bosch Rexroth industrial hydraulics group in Bethlehem, PA, helped supply the components, subsystems, and manufacturing of the hydraulic power units for the final assembly, test and run-off, which was completed at Morrell's facility in Auburn Hills.

Compact Crossbar Transfer Press

Compared to conventional lines, the Schuler compact crossbar transfer press offers considerable advantages in productivity, flexibility and quality of auto body parts. It also meets manufacturers' demands for further reductions in unit part costs.

At the heart of the crossbar transfer press lays a modular transfer system, which guarantees the safe transport of parts between the various forming stations. In contrast to conventional mechanical or electrical transfer systems using a central drive system, the modular transfer system consists of autonomous units equipped with their own electronic drives. This allows the



Bernhard Kristen, VP of Engineering at Morrell, Inc.

auto manufacturer to optimize the transfer motion for two forming stations at one time according to the particular part shape. Independent drives also mean press speed and transfer motion can be adjusted separately, so even difficult shapes with inclined forming positions in the die can be produced in continuous operation.

In addition to the independent control, the machine is also considerably more flexible than a conventional transfer press and can produce a wider range of parts. The press is capable of increasing output by 15 to 20 percent across the entire part spectrum. This is further complemented by its transfer motion possibilities and flexible part orientation with seven axes, permitting more simplified die designs.

Despite its advances in part output and design flexibility, the compact crossbar transfer press actually incurs lower investment costs. Numerous mechanical drive components have been replaced



Tim Quinn, Vice President, Technical Operations at Schuler, Inc.

by less expensive electronic systems, and a modular design simplifies maintenance and spare parts inventory. The number of part-specific transfer accessories has also been drastically reduced. Plus, shaped templates for the intermediate stations have been eliminated while the number of toolings is reduced by nearly half. In addition, parts are no longer deposited between forming stations, so the press requires approximately 15 percent less space than a conventional crossbar transfer press.

Steven Orlando, Morrell vice president of sales and marketing, noted that the challenges of this project were the high degree of technical design as well as the logistics of working with engineers from Germany. "We assigned a team of Morrell engineers from Auburn Hills and Bosch Rexroth engineers from the press group in Bethlehem to work closely with the Schuler team to identify their needs," explained Orlando. "Our team visited Schuler in Germany several times to discuss the project

and work on engineering solutions. It was determined that the best way to meet the customer's needs was to have Morrell and Bosch Rexroth share the project's manufacturing burden between their respective facilities. All sub-assemblies supplied by Morrell would be run-off and tested at our headquarters in Auburn Hills-about 30 minutes from the Schuler USA offices."

According to Orlando, Morrell was awarded the Schuler contract due to the technical ability of its engineering staff and the support of the Bosch Rexroth press groups in the United States and in Germany. "The ability to provide local support to Schuler and their customers, including Ford and GM, coupled with the global support and communications between Schuler and Bosch Rexroth, was a combination unmatched by our competitors," said Orlando.

Mike Tonyan, Bosch Rexroth Industrial Hydraulics regional manager and Jeff Grube, Bosch Rexroth Industrial Hydraulics project manager, said installation of the presses is a six- to ten-month process. "The goal of these presses is to provide greater capability and performance, increase per-hour throughput and decrease per-hour rejects," said Grube, who explained that the Bosch Rexroth Industrial Hydraulics group provided pumps and valves, while Bosch Rexroth in Germany supplied high-response manifold assemblies and control systems to coordinate the cushion cylinder stroke and function. Tonyan added, "This was truly a global effort with support regionally,

nationally and internationally from every member of the team."

According to Bernhard Kristen, Morrell vice president of engineering, Schuler was looking for a local source to build the required power units for their presses. "Since Morrell is the local Bosch Rexroth distributor near Detroit (where Schuler is located) and we had the in-house expertise to build these units, the Bosch Rexroth/Morrell team was the obvious choice," he said. "This is a good team effort to satisfy Schuler as the Morrell customer."

Tonyan concurred with Kristen that one of the main reasons Schuler chose Bosch Rexroth and Morrell was because development, testing and long-term part supply and support could be offered here in the U.S. in close proximity to Schuler and its customers, Ford and GM. It was of utmost importance for Schuler to have the units built nearby so they could be inspected and run off with all the engineers present. Morrell and Bosch Rexroth split the manufacturing work of the hydraulics/control portions to complete a total of five presses.

Uwe Kreth, head of product management and technical support for Schuler in Germany further describes the crossbar transfer press system as unique in the U.S., measuring 11 meters above floor and 5.5 meters under floor, with a total length of 60 meters and a total weight of 3,000 tons.

"There are no manual operations on the crossbar transfer press," described Kreth. "The crossbar



Hydraulic Power Unit for Schuler's Compact Crossbar Transfer Press

transfers each part using vacuum cups in an across-flow direction with no drop and much less vibration. Die changes are completed in two steps, with one die set in and one die set out in 10 to 15 minutes. The seven programmable axes drastically improve flexibility and expand design freedom," he said.

Kreth noted two of these presses have been in operation in European automotive manufacturing facilities for two years. "Rexroth provides the same supply and support in Germany, China or wherever we are," said Kreth. "They are a very important company to us."

Currently, the compact crossbar transfer presses are slated to begin production in Ford and GM Michigan facilities in early 2005 with the first of the presses expected to be up and running at GM's Mansfield plant in the spring.

Depending on the number of teeth, the "idler" gear may be driven directly by the "drive" gear. The teeth on gear pumps can be spur (straight), helical (slanted),

herringbone, etc., and these variations have different effects on the efficiency, strength and smoothness of operation. Two pairs of valves can be added to create a reversing gear pump, which pumps in the same direction regardless of which direction the gears rotate. Fixed-displacement gear pumps are the most common hydraulic component. They are simple in design with few moving parts and are designed to meet the rigors of industrial use. In this particular case, the gear pumps chosen produce very low noise to help meet the strict automotive noise level requirements.

Proportional pressure-relief valves limit the pressure in a hydraulic circuit and allow this limit to be adjusted by electronic control. While relieving the pressure, excess flow is returned to the tank. Proportional pressure-reducing valves regulate downstream pressure in a branch circuit and allow this set limit to be adjusted by electronic control. Bosch Rexroth reducing valves are optimized to reduce the effect of pressure changes due to varying flow rates. Their transient response prevents excess pressure, or overshoot, and underpressure during changes in desired pressure conditions. Therefore, very low pressures can be controlled accurately and the valves continue to operate if the flow becomes static.

High-response proportional directional valves offer the greatest performance in proportional directional valve technology. These valves are used in closed-loop systems to control position, velocity, pressure or force. They approach a servo valve performance without the associated higher costs for the same flow range. Directional control valves are typically the most universally applied products available for controlling the start, stop and direction of fluid flow in a circuit. Directional valve technology in the form of sliding spool, poppet type, screw-in cartridge valves and DIN cavity installations offer precise tolerances, exact machining methods and highly engineered spool profiles. This provides flexibility and variability to individual circuit or system solutions.

The cushioning system was designed by Schuler and supported by Bosch Rexroth using proven standard Rexroth components. Ideal cushioning is used, which means there is no end of stroke bounce. The direction of piston travel is the same throughout the entire cushioning sequence and its velocity is exactly zero when it reaches the end of its travel.

Bosch Rexroth in Germany supplied the main control manifolds for the press cushion along with the MX4 controller, which is the heart of the cushion system.

A Closer Look

With the exception of the servo manifolds which are supplied by Bosch Rexroth in Germany, all of the pumps and valves on the power units are provided by Bosch Rexroth in the U.S., including axial piston pumps and internal gear pumps, relief valves, proportional reducing valves, directional valves and logic valves.

Gear pumps are simple and reliable.

Rexroth
Bosch Group