



ISMR SAYS: The Starmatik Group has developed software that drastically reduces set-up time on robotic press brakes 'justifying the use of robots even for small batch production', it told ISMR

Focus on bending

Bending made easy

What are the challenges involved in robotising small electric press brakes or developing software to simulate the bending process and control a robot? ISMR visited specialist Italian robotics and software integrators, Starmatik Automazioni and Softmatic Srl, to find out.

The Starmatik Group (encompassing Starmatik Automazioni Srl, Softmatic Srl and Robotec) employs over fifty software and electro-mechanical specialists supplying software and complete robotic handling systems for press brakes as well as automated TIG welding solutions and custom made special machines, including laser profiling and finishing systems. The Group has developed software that drastically reduces set-up time on robotic press brakes 'justifying the use of robots even for small batch production', it told ISMR, and will soon be available for TIG welding cells.

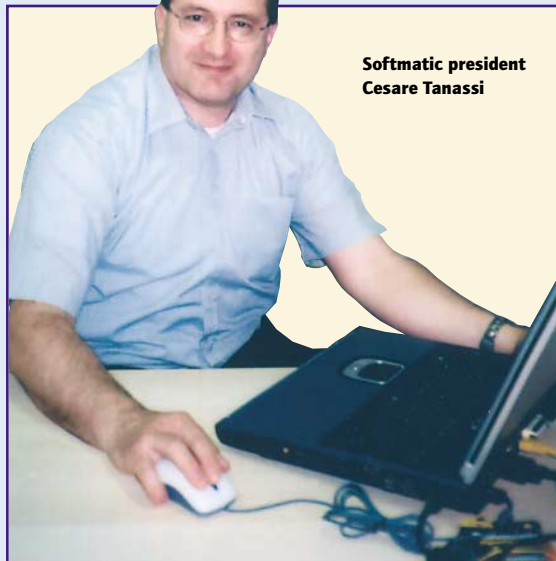
Programming of the component for the press brake and for required robot movements can be set from a DXF file (these two functions have historically resulted in the loss of machine up-time) and Starmatik has developed a handling system that, by separating the component from the pack, checking sheet thickness and then referencing during the bending cycle, increases the rate of production.

Robotising the Minicell

Both Starmatik and its software integrator, Softmatic Srl, have collaborated with press brake manufacturer, Colgar SpA, and robotics specialist, Kuka, to develop the Minicell – a robotised electric press brake cell which was on display at this year's Lamiera sheet metal exhibition in Italy.

"The Minicell demonstrates full integration between robot, small electric press brake (10-axis) and our software. It is simple to move (with no fixed base), can process

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**Softmatic president
Cesare Tanassi**

very small batch sizes and significant time savings can be made because of the level of integration," Ing. Stefano Fava (one of the owners of Starmatik) told ISMR. "Bending a minimum of fifty workpieces (minimum of 0.4mm and maximum 20mm), this robotised press brake is cost effective even for small – medium batch runs."

ISMR watched the Minicell demonstration at the Group's factory near Treviso. The robot controller handles both robot and press brake movements. Softmatic's programming system reduces overall start-up and job-to-job set-up time to allow extremely small batch sizes. Such a concept overturns the traditional view that robotising press brakes is only cost effective for large batch runs.

"We hope that this concept will appeal to a lot of small-medium jobshops," Softmatic president Cesare Tanassi told ISMR. "At the beginning, a customer may be attracted to a small manual system that can be expanded (robotised

etc.) at low cost. Presently, the system is developed to handle 30 tonnes (bending length of 900mm) but we intend to expand this to different models and different payloads. We may use other manufacturer's press brake models for this. We developed a model along these lines last year for EMO.

"Using a robotic press brake saves time and productivity – I would say a 30% increase in productivity," Tanassi added. "Colgar wishes to increase the length of this machine – the final product could be 1.250 metres, a little larger – and the tonnage will be about 30 tonnes. Having one single motor on the beam (a new modification) would also be faster, quicker and more efficient. Colgar wants this machine also as a manual stand-alone system, which should be ready for the EuroBLECH exhibition in Hanover this year.

"Our target is to create a product which can become three of four different final products such as the small integrated system we demonstrated," he continued. "We intend to offer the same machine, but with the option to use the machine as a manual system open for a robotic connection, and the next step will be the machine without the robotic connection (to lower the price). This is a very complex and complete system and we will develop this to become more attractive in terms of performance and price. Kuka will be the supporting developer and we will both try to optimise the value of a small electric manual press brake system."

Setting the parameters

Softmatic Srl was founded in November 2002 as a simulation software specialist and works closely with Starmatik on joint cus-



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Focus on bending

tomer projects involving robotised applications.

Softmatic's EasyBend and SimulEasy software solutions are used to create off-line bending programs for the robot and press brake, a sheet loader with sheet thickness control, a line tracking system, an aligner, an overturner unit, an optical guard or interlocked gates for safety and pallets for the offloading of folded parts.

tional features. This version in the future will have the OFS (Optimal Folding sequence) and OTS (Optimal Tooling Sequence).

"All the raw technology is software-based and we use a simulation software that makes all the calculations for the bending process – everything from robot management and management of bending data etc." Softmatic president Tanassi explained. "All the data is

veyor system, made by Starmatik, picks up the right pieces and bends the parts with a Fanuc robot. All of the bent parts are then moved by another Fanuc robot and then these parts (garage doors) are welded and finished. This is a very large system which is made completely by Starmatik. For the bending solution, Softmatic provided the simulation software.

"Our software can handle complex robots (up to 32 axes, for example) so we can simulate a complex system," he continued. "For Kuka, we are making remote robot controls at the Sellafield nuclear facility in the UK. Our proposal is a robotic system to manage waste in a nuclear plant. They use hydraulic robots, which are very expensive. A similar electric robot is much cheaper – the ratio is about 1/10th."

Past and present

"Starmatik was founded in 1995 but in 1998/9 installed its first bending application in Italy with ABB," Fava told ISMR. "We are the largest integrator in Europe in the bending field and also the only one to make everything in-house. Nearly everyone working here is under thirty years old – young and creative, flexible and dynamic.

"We believe that robotic bending is the future because of operator safety issues, time savings and the lack of limits on the speed of the press brake for a robot (increased efficiency). We currently make about forty bending applications and started installing them in Italy although our main market is now in Germany. Two years ago, we started a relationship with Softmatic Srl.

"Our 2003 turnover was 5 million Euros and, in 2002, it was 5.5 million Euros. This year, I expect to see a turnover of more than 6 million Euros."

In fact, the Group has a lot of experience working with a range of press brake manufacturers (Trumpf, LVD, Colgar, Gasparini etc.) and robotic developers (Kuka, Fanuc, ABB etc.). It currently makes specialist simulation software for developers like Kuka and Fanuc. It



SimulEasy is, at its most basic, sheet bending work cell simulation software. SimulEasy automatically creates and controls robot tracking. It can be applied to any robot and the results of the calculations made by the software can be viewed during simulation. The software will edit parameters for the loading pallet, press brake, overturner, unloading pallets, gripper and all elements taking part in the application. It imports DXF files and features a 'Profile Wizard' and an updateable press brake tooling library in DXF format. When the piece has been completely defined, the software will automatically generate the bending sequence using the tooling parameters from the library and incorporating collision control.

This SimulEasy product comes in two versions – the generic version is SimulEasy and there is a version for Kuka with some addi-

Both companies have collaborated with Kuka and Colgar SpA to produce the Minicell

then prepared for a generic controller (i.e. Cybelec, our own controller etc.). A bending database is the next step for us.

"We also have proprietary motion planning software which helps users to resolve how to automatically route the motion of the robot with a gripper or attachment through components of the workshop. This helps to process the manual carriage of parts and avoids collisions etc. Our Remote Robot software allows manual/automatic control of a 6/7-axis industrial robot, up to 500 kg payload, performing real-time collision detection between the robot and a simulated environment."

As an example of a joint project, Starmatik is currently finishing an installation for a customer with a Stopa sheet magazine, which brings all the parts into a conveyor loading system. The automatic con-



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Focus on bending

has good links with robot and press brake manufacturers and was among one of the first companies in Italy to confront the challenge of robotising press brakes. Its biggest project to date incorporates two robots (420kg each) handling sheets weighing 475kg each for a customer in West Germany (BSC).

"The market is open and robot manufacturers generally do not provide any application-specific software for their customers so there is open space for integrators like Starmatik/Softmatic," said Tanassi. "Technology expertise in this market is generally quite poor – a press brake manufacturer, for example, might not be able to help a customer with a specific problem with a robotised press brake because he may not own that robotic technology. We can make flexible process software for specific applications to provide robotic bending solutions for customers. I see a very large market for us because we have made a lot of agreements with different press brake manufacturers, those who want our bending software."

Future plans

The Group is in the process of moving Softmatic and Robotec into a new special purpose building near Treviso (northern Italy) this year (800 square metres office plus workshop) and has plans to develop a joint welding and bending system as well as new software development initiatives.

"We have a tooling system inside the simulation software and should shortly have finished our Optimal Folding Sequence software, included in the simulation software, which will expand the current implementation into a fully automatic system," Tanassi confirmed. "We are missing, at the moment, the automatic side at the beginning (i.e. the automatic folding sequence and automatic tooling system) and we are developing these two software areas to fully complete our software product.

"Our strategy was to make a manual solution which makes easy work from the robotic side and

then, afterwards, to concentrate on the automatic side. This strategy has worked for us because customers like to develop their own sequences and tooling. Often, they don't use the fully automatic software at the beginning, they want to play with the system and make a product using their own sequence/tooling etc. In this situation, the user is forcing a manual or semi-automatic mode for the software and we decided to

He also sees a future in coordinated robot technology - multiple robot controllers working together to accomplish a task. For bending, it is common to use two robots to handle the same product. Kuka has already exploited a dual 500kg robot to handle glass and now Starmatik and Softmatic are completing a project to use two 500kg robot to bend a 6m x 2m single metal plate weighing about 470kg.



The group has a lot of experience working with a range of press brake manufacturers

accept this mentality into our software development plans."

"We will continue to try to expand into different fields," Tanassi added. "We are trying to create a general and basic library to develop software for the bending process. Our simulation software can take into account the fact that, for example in an FMS system, the part is now punched, now partly bent and then palletised. You need complete simulation of the process – it should be part of the process. We have already implemented in Stuttgart one system which is connected automatically from a Finn Power bending system into a Gasparini press brake for final bending (in November last year)."

Tanassi's strategic view is that there is a lot of growth in the European and Asian markets. Softmatic provides software support over the internet and, for new clients, is opening a support contract service.

"There are a lot of challenges with this," Tanassi explains. "The next step is real simulation of the process. In metalforming, coordinated robots can do a lot for heavy payloads or large parts and materials which are difficult to handle by hand or for coordinated work i.e. metalforming plus welding plus other operations. The market, however, is not yet quite ready in my opinion. Production and even software products like CATS are not ready to simulate or manage processes like laser cutting, bending, welding, packaging etc. in one single solution. If this process can be handled by one software package, then this would be our target but not until two or three years' time.

"We now have a UK distributor (UK Machine Tools) and we expect that market to develop," he adds. "I would also like to see the US market develop next year. We are also hoping to have the palletisation software simulation ready for EuroBLECH." ISMR

