

## Heinrich Georg Case Study: Hulamin

### Strip line upgrade implemented entirely via remote connection

#### Authors:

Nick Kegge, Technical Specialist Slitting, Cutting, and Packing, Hulamin Limited, Pietermaritzburg, Republic of South Africa

Axel Sturm, Manager Service, Heinrich Georg GmbH Maschinenfabrik, Kreuztal, Germany

#### Abstract

**When planning the upgrade of Hulamin's No. 5 cut-to-length line into a multi-purpose line that would additionally be able to recoil and side-trim the strip, nobody expected this project to become an extraordinary challenge. But, the announcement of the travel restrictions in 2019 gave rise to serious concerns about whether the project schedule would still be able to be met. It became impossible for the Georg experts to travel to South Africa to perform any of the project activities at the customer's location. Nevertheless, despite these obstacles, the line could still be started up successfully on the originally scheduled date and within the allocated budget - thanks to a completely remotely performed commissioning phase.**

#### Text

Georg recently upgraded the No. 5 cut-to-length line at the Pietermaritzburg facilities of Hulamin Ltd. (formerly Hulett Aluminium) in South Africa. The works has been operating at full capacity as a result of a constantly growing number of incoming orders, among others from the automotive industry. In order to avoid a bottleneck in the production chain, additional recoiling and side-trimming capacity was necessary. Therefore, the management of Hulamin decided to upgrade the No. 5 cut-to-length line supplied by Georg in 1999 by converting it into a multi-purpose line which, in addition to cutting the produced strips to length, would also be able to side-trim and recoil them.

In concrete terms, this meant that downstream of the levelling unit a new recoiler with a pressure arm, support bearings and a coil lifting car for the removal of coils with outside diameters of up to 2,200 mm and up to 15 t weight were to be integrated into the line.

The installation of the mechanical components did not really pose a challenge for the project team: The space available behind the pinch-roll unit was large enough to accommodate the new components. Hinged roller tables would be installed to bridge the open space below the empty mandrel to enable the machine to continue to serve as a highly productive cut-to-length line.

In contrast to this, upgrading the automation and control systems would be a much more demanding task because the systems, which so far only served one function (cutting to length), had to be converted into a dual system that would

be able to switch between the modes “cutting to length” and “side trimming and recoiling”. What made this task even more challenging was the fact that in the course of the project also the PLC was to be upgraded from Siemens S5 to Siemens S7-1500.

## **The crisis**

Hulamin and Georg signed the contract for this project at the end of 2019. At that time, it was unforeseeable that the implementation of the project would coincide with the third wave of the coronavirus pandemic. In April 2020, the German government imposed a travel ban and in December 2020 it became evident that the project would either have to be postponed for an indefinite period of time or ways had to be found to install and commission the new equipment without any Georg personnel present at the customer’s facilities.

In the light of the fact that without the upgrade the supply capability of the entire works would have been put at risk, the project team investigated the options available to still make it possible to meet the scheduled commissioning date - an undertaking that some of the team members considered as impossible.

The travel restriction and the long distance between the locations were not the only obstacles. The problem was additionally aggravated by the situation that during the pandemic about 50 percent of both companies’ personnel was working from home.

By that time, Georg had already gained comprehensive experience with remote maintenance support via its Connected Service platform. Georg had been using this digital platform to communicate with its customers during equipment installation and commissioning phases. For example, this form of digital communication had proved very successful during the commissioning of five roll grinding machines at the Zhanjiang facilities of Baowu Steel Group Corp., Ltd. in the Chinese province of Guangdong.

Due to this experience, Georg and Hulamin agreed to implement the project to the greatest possible extent remotely from Georg’s headquarters in Kreuztal, Germany. Georg was well aware of the fact that for certain installation activities of the mechanical and electrical equipment, it would be vital to have qualified personnel present at the customer’s site. To assure this, Georg subcontracted a South African company which had supported Georg on several occasions during the commissioning of plants in South Africa in more than two decades. The migration of the PLC from Siemens S5 to Siemens S7-1500 was performed at Georg in Germany by specialists familiar with both systems.

## **The tools**

The basis for the communication between the process control system of the upgraded line and the specialists at the Georg head office in Germany was and still is the Georg Connected Service platform. Quick access to the machine control system and the plant components is assured by a dedicated online-support software. Data is exchanged exclusively via direct VPN connection, which has become a proven and reliable standard among an increasingly growing number of plant operators.

For activities directly on the equipment, the project team used Virtual Reality devices. While working on the equipment, the staff at Hulamin was wearing

helmets with mounted-on cameras, enabling the team members at Georg to watch from Germany what was happening. In certain situations, Artificial Reality goggles were used in order for the team members in Germany to have an even more realistic view of the situation, which could even be enhanced with additional plant data as desired.

Project meetings with a greater number of participants were usually held via Microsoft Teams®. Direct communication between the team members or within small groups usually went via WhatsApp®. For this, it did not make a difference whether the persons were at their work places or whether they were working from home.

## **The preparations**

The cut-to-length machine has been in operation for more than 20 years. During such a long period, some modifications had of course been made to it. In order to avoid any unforeseeable surprises, Hulamin performed a complete 3D scan of the machine itself and of all the connected equipment.

A digital twin of the facility was generated based on the data from the 3D scan and the seamless documentation material available at Georg in Kreuztal. This digital twin was used as the basis for the design of the new components and their integration into the existing equipment. The digital twin also served as an ideal tool to analyze and simulate how the additional number of coil moves resulting from the increase in production would affect the overall plant logistics. Based on this analysis it was decided to integrate a shuttle car for the transport of up to three coils at the line entry, as the analysis had shown that the existing crane used to transfer the coils to the line was reaching its capacity limit.

Apart from this, the digital twin was also extremely helpful in identifying safety issues and taking appropriate precautions. The 3D scan showed in detail, for example, where along the passage of the coil shuttle clearances were too small.

Eventually, it turned out as an additional benefit that the digital model was available almost one year before the commissioning as this made it possible to train the future operators of the multi-purpose line well in advance and in a very realistic environment.

## **The implementation phase**

During the implementation phase weekly project meetings were held via Microsoft Teams®. These meetings were used to bring the team members together and discuss in detail all relevant aspects of the project. Those involved in the current activities had daily online calls.

As production at Hulamin continued during all these activities, arrangements had to be made to ensure that the line would be available for one shift per day to cut-to-length the produced strip. The production management succeeded in organizing the production processes such that this usually took place during the nights, so that the conversion activities on the line could generally be performed in the daytime.

For the programming staff this meant that by the end of each day all the systems had to be ready for operation again in order to enable reliable and safe strip cutting during the night shift. On the one hand, this required quite some extra effort from the team, but on the other hand, it guaranteed that even the

smallest modification would be thoroughly tested long before the final acceptance of the overall plant.

Consequently, the final acceptance tests went extremely smoothly. The required results were achieved instantly. On April 30, 2021, precisely on the originally scheduled date, the project team handed over the multi-purpose line to Hulamin's production team. Ever since that day Hulamin has been using the line on a three-shift basis - one shift per day as a cut-to-length machine and two shifts per day as a side-trimming and recoiling line.

## **The bottom line**

Under the given circumstances it would have been absolutely impossible to implement the modifications and successfully commission the upgraded line without the extensive use of digital communication via channels as the Georg Connected Service. Otherwise, the project would have had to be put on hold for many months.

The new multi-purpose line provides Hulamin much more flexibility and will assure that the company will be able to meet the growing demand for high-grade products. With the new, state-of-the-art S7 PLC, Hulamin is perfectly set up for the requirements of the next ten to twenty years.

The used digital tools have proved highly successful in the installation phase of the equipment and during the integration and connection of the electrical, hydraulic and process control systems. The management of Hulamin values this project as a phenomenal success: the allegedly impossible has been achieved. This successful upgrade will continue to be the talk of the company for some time.

Nevertheless, the direct interaction with people would have made things much easier, especially during the final stage of the project. Most of the programming was performed highly efficiently at the Georg head office in Germany. However, finetuning the machines from a distance was definitely a challenge. Especially, for these activities it would have been very helpful to have specialists physically present at the location. No diagnostic tools can "feel" the machine, grasp with all senses the quality of the strip, and talk face-to-face with the future operators of the machine. And finally, one last topic on the agenda is still open: drinking a toast together on the successful completion of the project. This will definitely be organized as soon as circumstances permit.

## **The future**

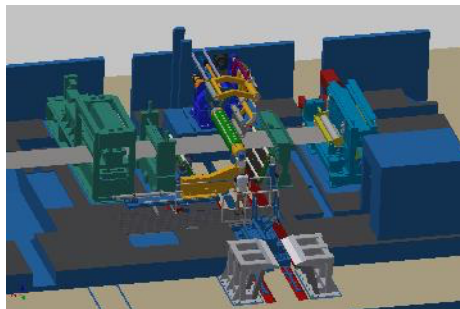



This project has also positive effects for the future cooperation between Hulamin and Georg. Even after the completion of the project, the online connection is used to facilitate the cooperation between the two companies. Features like the Remote Diagnostics tool, for example, make it possible for Georg to respond to support requests even more swiftly.

Two or three years ago, nobody would have seriously considered using digital tools for a project of such an extent. But in the future we will definitely see a growing number of even more complex projects being handled remotely. Especially for younger people the use of these innovative tools will become daily business.





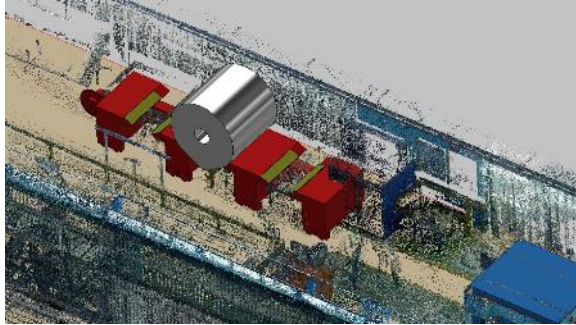
**1,900 words including the abstract**

|  |   |
|--|---|
| <b>Contact:</b><br>Heinrich Georg GmbH Maschinenfabrik<br><br>Thomas Kleb<br>Manager Marketing & Communication<br>Langenauer Straße 12<br>57223 Kreuztal/Germany<br>Fon: +49.2732.779-539<br>www.georg.com<br>Email: thomas.kleb@georg.com | <b>Press contact:</b><br>VIP Kommunikation<br>Die Content-Agentur für Technik-Themen<br>Dr.-Ing. Uwe Stein<br><br>Dennewartstraße 25-27<br>52068 Aachen/Germany<br>Fon: +49.241.89468-55<br>www.vip-kommunikation.de<br>Email: stein@vip-kommunikation.de |
|--|---|

## Figures and captions

|  |  |
|--|--|
| <b>Fig. 1:</b> The digital twin showing where the Georg engineers will be integrating new recoiler.<br><br><b>File name:</b><br>Georg_3d.jpg   |   |
| <b>Fig. 2:</b> The digital twin was generated by overlaying data from the design documentation and from the 3D scan.<br><br><b>File name:</b><br>Georg_u2.jpg                            |  |
| <b>Fig. 3a:</b> In the cut-to-length mode, the guide tables are closed, enabling the strip to pass below the recoiler mandrel.<br><br><b>File name:</b><br>Georg_20210318_105445 (1).jpg |  |
| <b>Fig. 3b:</b> In the cut-to-length mode, the guide tables are closed, enabling the strip to pass below the recoiler mandrel.<br><br><b>File name:</b><br>Georg_NVW08135.jpg            |  |



|  |  |
|--|--|
| <p><b>Fig. 4:</b> In the recoiling mode, the guide tables are lowered.</p> <p><b>File name:</b><br/>Georg_Besäumtes-Coil1.jpg</p>  |    |
| <p><b>Fig. 5:</b> A special challenge for the project team: conversion work could only be performed at daytime because during the night shift the machine was used for cutting strip to length.</p> <p><b>File name:</b><br/>Georg_20210308_115414.jpg</p> |    |
| <p><b>Fig. 6:</b> Contacting GEORG via the HMI of the Hulamin line.</p> <p><b>File name:</b><br/>Georg_connectedservices_2.jpg</p>   |   |
| <p><b>Fig. 7:</b> Troubleshooting via table PC</p> <p><b>File name:</b><br/>Georg_remote-service.jpg</p>   |  |
| <p><b>Fig. 8:</b> The data of the 3D scan was used to adapt the design of the coil shuttle car to fit into the confined installation space available.</p> <p><b>File name:</b><br/>Georg_Coilcar.jpg</p>   |  |

Photos: courtesy Heinrich Georg Maschinenfabrik

## About Heinrich GEORG Maschinenfabrik

GEORG is specialized in the design of advanced, cost-efficient solutions for strip processing lines and for the construction of machine tools. In its solutions, GEORG combines classical mechanical engineering expertise with smart process optimization and service know-how. Whether high-performance strip processing lines, machining tools for roll shops or state-of-the-art facilities for the transformer industry, which are leading in the world – machinery and systems from GEORG are in use the world over at well-known companies. There they make a significant contribution to the optimization of processes and the companies' business success. GEORG machines are characterized by a high level of automation for use in highly customized and standard applications. The portfolio is complemented by a broad range of services, including consultation, engineering and maintenance.

The family-owned company with its more than 500 employees is now in its third generation. Via its global network of sales and service offices, GEORG supplies its products to key markets, including energy, mobility and manufacturing.

**[www.georg.com](http://www.georg.com)**