

— From the coil to tailor-made, edge-finished blanks: KOHLER Maschinenbau GmbH in Lahr, has recently commissioned a new production line at SCHRAG Kantprofile GmbH in Kirchartd-Berwangen for edge-finished boards, which are subsequently edged to produce edge profiles for hall construction.



ALL IN ONE PRODUCTION LINE

FROM COIL TO LEVELLED, PERFORATED, AND EDGE-FINISHED BOARDS

More than ever before, flexible and economical levelling technology for strip and sheet metal working requires automated manufacturing solutions. This is especially true for the edge profile manufacturer SCHRAG Kantprofile GmbH, with its numerous special solutions. A unit meeting these requirements should be space-saving, mostly automated, and require little maintenance, just like the one at the SCHRAG Heilbronn subsidiary in Kirchartd-Berwangen, Germany. Top marks were awarded here to the unit's manufacturer, KOHLER Maschinenbau GmbH based in Lahr, mostly because of its outstanding skills with regard to plant engineering and an automated strip feeding line with a decoiler, levelling and punching technology, and shear. By acquiring the machine, SCHRAG has taken a clear step towards Industry 4.0.



The name “SCHRAG” has been closely linked with the concept of “sheet metal working” since 1892. Founded by Friedrich Schrag in Hilchenbach, Siegerland in Germany, SCHRAG still focuses on the manufacturing of wall cladding and roof tile sheeting. Friedrich Goswin, one of the grandsons of the company’s founder, directed the company’s focus towards the manufacture of edge profiles and molded components for industrial and commercial building. Now the SCHRAG name is synonymous with steel metal parts essential for steel hall construction, and the company has a turnover of some 100 million euros and 460 employees at six sites in Germany, the Czech Republic, and Poland.

SCHRAG Kantprofile GmbH mostly manufactures structural components for roofs and walls, purlins and rafters, arcade rooflight bases and profiles or special profiles. “Essentially, all our edge profiles are special solutions,” states Jürgen Stötzel, manager of the SCHRAG Kantprofile subsidiary in Heilbronn. “Halls come in numerous shapes and sizes,” he adds. “There is no such thing as ‘standard’, which is why we manufacture tailor-made components from batch size 1 to n that can be assembled quickly and easily later on with the appropriate labeling, as if from a kit.”

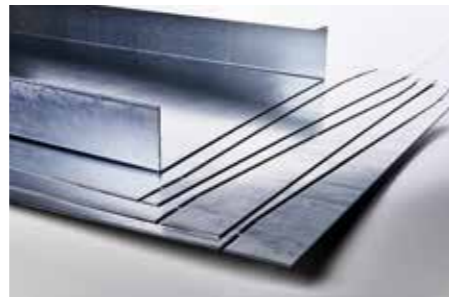
The modern machines and units are used mostly to process galvanized sheet steel in thicknesses from 0.75 to 4.00 mm, aluzinc from 0.75 to 2.00 mm, aluminum from 1.00 to 3.00 mm, and strip coated aluminum from 1.00 to 1.50 mm in lengths of up to 11 m.

“As a result of constantly changing construction component dimensions and batch sizes down to quantities of ‘one’, we decided to invest in a new, considerably more flexible, and easier to use unit from KOHLER,” says SCHRAG subsidiary manager Stötzel. This new strip feeding line replaces the unit from another manufacturer, which no longer met the requirements in terms of flexibility, speed, and accuracy.

Other manufacturing methods such as roll forming were dismissed from the outset, precisely because of the frequently small quantities required. The changing of profile rolls was therefore out of the question from a hardware point of view. “If, for example, a similar profile with a different limb length is needed, production preparation changes the machine parameters and transfers these directly to the unit,” explains Tobias Frank, a KOHLER project manager, who is familiar with the unit down to the tiniest detail and knows exactly how to use it. The unit operators do not need to intervene in any way to achieve this.

An important feature of the unit is the integrated hole punch, which is equipped with 12 tools and can therefore perforate 12 different hole diameters simultaneously. It also allows different contours to be cut. This is made possible by a turning tool that can be rotated through 180°. The hole punch is implemented on both sides of the strip edge like pliers (C frame) and is able to work with tools with diameters from 3.3 to 88 mm, one of the tool mounts being rotatable through 360°. The double-sided or mirrored arrangement of the punching units allows more or less any conceivable hole pattern to be created in seconds.

The material flow starts with a hydraulic and movable coil loading car with integrated weight measurement. The coil weights processed are logged for later evaluations. A new coil is loaded onto the coiler mandrel. A double-sided decoiler is used in order to minimize non-productive times, allowing a coil already on the coiler to be



— The edge-finished blanks produced on the KOHLER machine, which are fully perforated, cut to length and either a) painted or b) galvanized, are given their profile contour in a subsequent bending process, which is dependent on the application.



— Experts together: (from left) Tobias Frank, project manager at KOHLER, and Jürgen Stötzel, subsidiary manager at SCHRAG Kantprofile GmbH in Heilbronn. They have worked together in close co-operation to develop and implement the strip feeding line project.

“Our KOHLER machine allows us to easily level and punch parts of differing dimensions and variable batch sizes.”

Jürgen Stötzel, subsidiary manager at SCHRAG Kantprofile GmbH

unwound as the loading process takes place. “The various edge profile dimensions barely allow a coil to pass through from start to end. This is why we have selected an automatic rewinding system that winds the strip that is not needed back onto the coil,” explains Jürgen Stötzel. The entire loading and unloading process takes place automatically, without any human intervention. SCHRAG selected a coiler with a maximum coil weight of 12 t and strip widths of 200 to 1250 mm from the selection offered by KOHLER. “As far as the user is concerned, avoiding unproductive time due to changing coils is crucial. This allowed us to reduce the strip-to-strip changing times by up to 60 %,” explains Tobias Frank.

With a leading-in device comprising a table below and a holding-down device above, the start of the coil is inserted in the KOHLER 9-roller levelling machine via the strip feed. This is a strip feeding line with an advanced quick-change device. The device allows the levelling rollers and supporting rollers to be cleaned quickly and thoroughly. When doing this, the upper and lower cassettes can be moved separately out of the levelling machine. Users prefer this extremely economical option to solutions in other systems available on the market. The levelling parameters in the KOHLER control system are used for product changes involving recurring materials. For new materials, the Expert Calculation System is used to determine the default values for the roller frame position after entering the sheet thickness and width,

yield point, and type of material, and these can be adapted by the machine operator as necessary. The strip finally reaches the punching units, with the tools that move transversely to the strip running direction, via the loop pit located behind the levelling machine, which is responsible for corresponding compensation when different throughput speeds are used. The preferred hole patterns or contours are made available by work preparation and are called up by the unit according to the production sequence. A roller feeder ensures precise feeding of the strips into the punching unit so that the tools are positioned with up to 0.05mm accuracy.

The strips are cut lengthwise using the following hydraulic cut-to-length shear. The integrated residual strip driver separates strip residues cleanly from the usable parts, shreds these and moves them into a scrap container.

The blanks ready to be edged are pushed onto a downstream side table. Before this, each

sheet metal part is provided automatically with order-specific information. This allows the fitter to identify the parts on the installation site at a later date and establish the corresponding assembly sequence.

The overall system measures about 20 m and is coordinated precisely with the linked production stations. All control and automation programs, including the CAD-based functions in work preparation, were developed and installed by KOHLER. All system-specific parameters interact optimally and make the strip feeding line “round”. This means that not only does the KOHLER strip feeding line represent outstanding flexibility and safety at SCHRAG, it is also the perfect example of what is understood by digitized production and Industry 4.0. As the subsidiary manager for production at SCHRAG Kantprofile, Jürgen Stötzel considers the company is now well-equipped to meet the needs of the future.



— An overview of the entire production line (from left), with coil preparation, coil loading car, double-sided decoiler, levelling machine, loop pit, hole punch, and cut-to-length line.



— The cut-to-length shear cuts the strip to the precise length of the later edge profile.