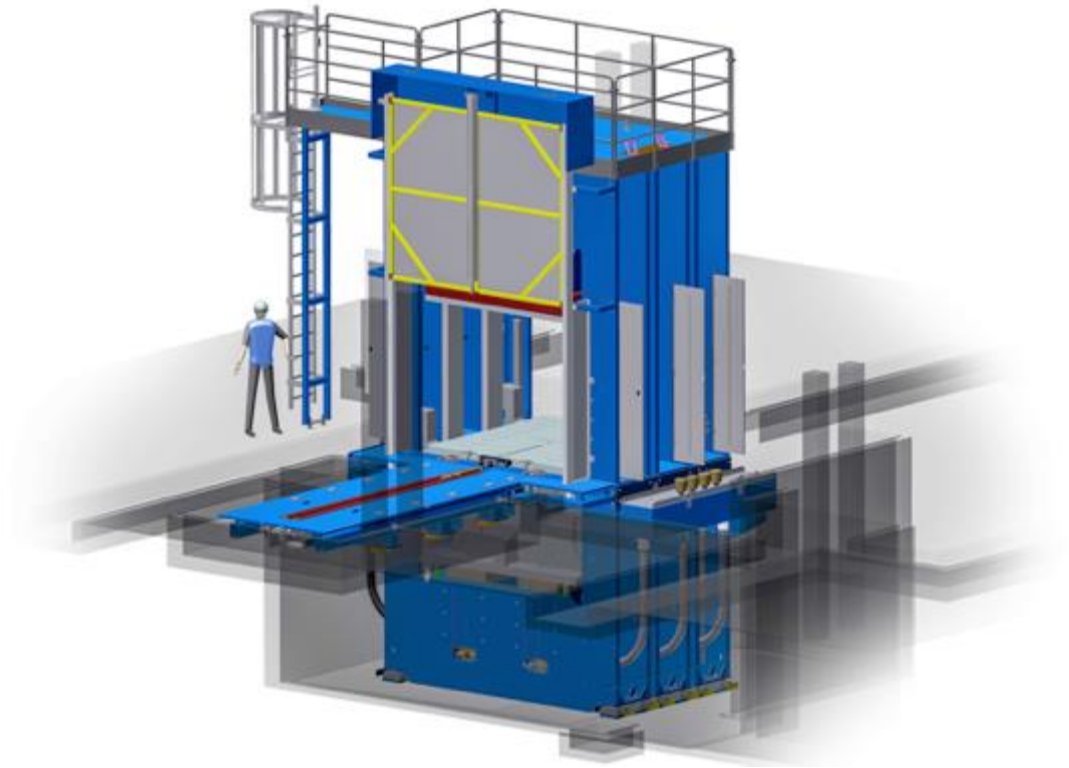
USER REPORT
Altdorf/Landshut – Germany / September 2019



Graphics: LWB-Steinl

Fig.1: 19,000 kN clamping force, a mounting surface of 2.50 x 2.50 m with 0.2 mm maximum deflection, 0.05 to 0.06 mm plate parallelism are the key data of the LWB-Steinl high-performance precision press recently delivered

With rubber processing know-how to fast XXL-sheet metal presses

The Bavarian machine manufacturer LWB-Steinl is one of the leading manufacturers of presses and injection molding machines for processing rubber and thermoplastic elastomers. The sizes range from small C-frame presses to midsize-tie-bar presses to large presses with frame clamping system, without compromising on the motion- and locking precision with increasing size. It is precisely this technical concept that is of interest to processors in other sectors, as evidenced by a recently delivered press to a metal converter employing the HSBF-process (High Speed Blow Forming) by VERBOM for their automotive body component production. In the process aluminum-alloy sheets are heated to around 450 °C and after a mechanical pre-stretching shaped by air pressure into a mold cavity. As the essential functional precondition for the air shaping process the press must ensure a circumferential tight clamping of the metal sheet. The press not only has to

be ultra-precise, but despite the size also fast-cycling, because the HSBF-process enables a production output of 25 to 30 press strokes per hour.

Founded in 1962 as Landshut toolmaker Alfred Steinl (LWB-Steinl), the company has been producing presses for rubber processing since around 1971. But before they were contract manufacturer for such large companies as the aviation group Messerschmitt-Boelkow-Blohm, the Thyssen-Krupp Transrapid GmbH or the Metzeler Gummiwerke. For all these companies LWB built not only small devices, but also quite large components for rocket and aircraft production or the first maglev train, but also machines for tire production or the preparation of rubber compounds. Since then, the Steinl team is used to dealing with large components and to manufacture them in the required precision. So far the pre-history.

In 1988, Alfred Steinl received the patent for a method for increasing the rubber compound temperature during the injection process by the adjustable generation of shear heat in the injection channel. This was followed by a series of further procedural innovations and created the basis for the increasing specialization on mechanical engineering for the processing of rubber, in particular the construction of rubber presses. Their systems (tie-bar as well a C-frame and portal frame clamping units) and sizes have grown steadily with customer requirements over the years (Fig. 2). Since it has been the Steinl self-conception since the beginning to let grow the production capacity and the precision level with the larger machine dimensions and to be open for new things, they could be open also to inquiries from sectors apart from rubber processing.

What's right for the rubber industry is also helpful for other businesses

The question on potential reasons for the inquiries for LWB-presses from branches outside the rubber sector is commented by LWB-CEO Peter Steinl as follows: "To press is one of the oldest forming processes. Today presses are available in a wide price/size- and quality-range on all continents. The offer, however, is narrowed with rising demands on the machine performance regarding a precise plate parallelism and the movement speed. In this respect rubber presses are good options, as the rubber processing sets exactly these requirements for the machine technology. In addition, at rubber presses the clamping precision is mastered even at the elevated temperatures of heated platens. One more reason seems decisive to me. It is the increasing demand for project partnerships for adjusting a press to a specific production environment."

Press precision increased despite XXL-dimensions

This was exemplified over the years by some sheet metal manufacturers who were looking for cooperation partners to adapt the press technology to the increased precision requirements of new sheet metal forming processes. Especially when it comes to apply new highly-stretchable aluminum sheets, e.g. for light-weight car bodies or body components and seat troughs subway wagons. In this context, it was important to offer a press concept that can be scaled modular with different clamping sizes and forces.

The challenge accepted

The result of such a project collaboration is a press with the LWB type designation VR 19,000. It surpasses every press been built before. Other than a rubber press, it has no heating plates and no injection unit. It consists of three juxtaposed frame racks, each with two hydraulic lifting / pressure units. Across the three locking modules extend two 2.5 x 2.5 m platen. By juxtaposing the three closing modules, the lower (i.e., the movable) platen is moved by a total of six hydraulic units. To meet the precision requirements of the specific sheet metal forming process, the platens were designed for a maximum deflection of 0.2 mm over the entire surface (Fig.3a b). The complete press weighs 161 tons, is 4 meters wide and 7.5 meters high. The closing force is 19,000 kN, the closing stroke rates 930 mm. The press-molds weigh around 40 tons and are tempered during operation to approx. 500 °C. The mechanical guiding is specially designed to insure a maximum platen parallelism securing a circumferential tight clamping of the inserted aluminum sheets.

Very special is the hydraulic control. The clamping and opening movements of the traveling platen are actuated by 6 combined and synchronized lifting / pressure units. The parallelism of 0.05 to 0.06 mm is being controlled by 4 independent distance measuring systems for the purpose of a circumferential sheet metal clamping (Figs.4a + b). As an additional feature, the closing force can be variably increased or decreased during the production cycle, i.e. the closing pressure follows exactly a defined set curve. This is of major importance for the process and the protection of the expensive mold tools.

Precision through in-house production of all key components

As mentioned at the beginning, LWB-Steinl has a long tradition in machining large workpieces. Accordingly, all precision-defining machine components could be processed and assembled in the own premises (Fig.5).

Large press concept with future potential

Summarizing, LWB-CEO Peter Steinl anticipates application and automation techniques as the driving factors for the future of the presses business, whether it involves new tasks in rubber processing or in other industries. And, thanks to modularity, universality, precision and speed, one of the oldest processing principles of metal forming technology will be up-to-date also in the 21st century (Fig.6)

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Figures:

Photo: LWB-Steinl

Fig. 2: Over several decades, LWB-Steinl has continuously expanded its press program, so that advancing into the XXL range was only the next consequential step.

Photos: Author

Fig.3a + b: The 7.5 m high and 4 m wide clamping unit consists of the juxtaposition of individual clamping modules.


Photos: Author

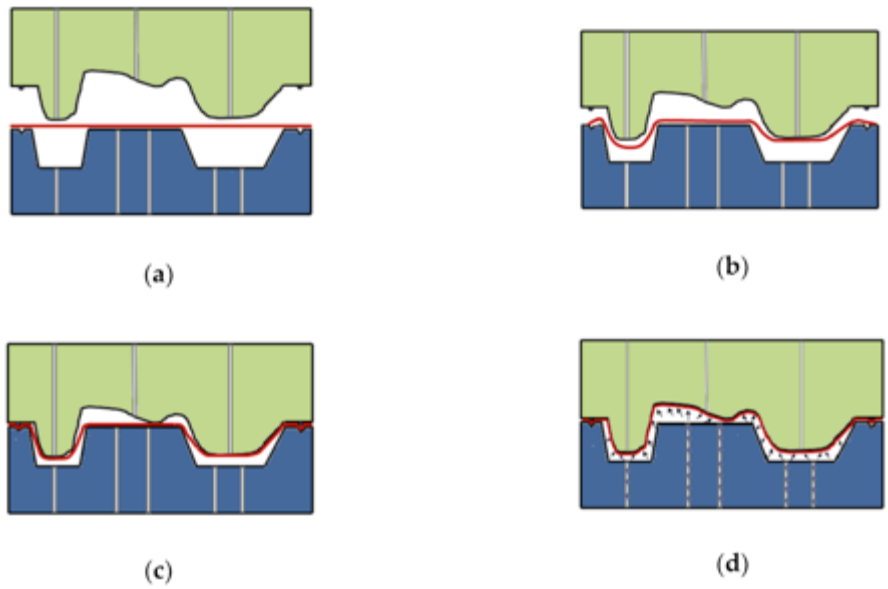
Fig.4a + b: The modular clamping-module-concept allows a uniform distribution and transmission of the clamping force on the mold mounting plates.


Photos: LWB-Steinl

Fig.5a + b: All precision-defining machine components could be processed in the LWB-Steinl-workshops, despite their size and weight.

Factbox: **HSBF – High Speed Blow-Formung**

The process steps of HSBF (High Speed Blow Forming)-process:



The process steps:

a) Inserting the metal sheet, which was heated outside the press to around 450 °C.
b) Press stroke with partial mechanical pre-stretching. As a result, the sensitive visible side (Class A surface) of the aluminum sheet has no contact with the metal of the mold and is thus not damaged.
c) Closing of press until circumferentially uniform clamping of the metal sheet edge.
d) Subsequent precision molding by air pressure

Photo: Verbom

Application example for the HSBF-process for the production of complex parts made of a high-strength aluminum alloy.

about LWB-Steinl

Founded in 1962 by Alfred Steinl, the company is now run by the Steinl family for the second generation and is one of the world's leading manufacturers of rubber presses and rubber injection molding machines. The product portfolio covers the complete range from vertical C-frame machines to vertical 4-tiebar or portal-frame machines, to horizontal tie-bar and C-frame machines.

LWB-Steinl currently employs around 250 people and manufactures around 500 machines per year.

Altogether, the Steinl Group currently consists of eight companies, which are divided into four divisions. The largest division is mechanical engineering, consisting of the LWB elastomer injection molding machine, the conveyor belt vulcanizing machine manufacturer Vulctech, the LWB automation, the rubber batch-confection equipment manufacturer Prodicon Ind. Srl and the injection molding machine manufacturer URP (United Rubber & Plastic Machinery Ltd in Langfang / China.

In the stamping technology division the STG-Carrier GmbH manufactures metal scaffolding strips for automotive weatherstripping profiles. In the third division the Dreibond GmbH offers sealing and bonding technology and the adherent application technology. The fourth division is biomaterial production with the company Biofibre, in Altdorf and its sister company Naftex GmbH in Wiesmoor / Lower Saxony.

More under: www.lwb-steinl.de

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