



High-tech tailor's shop

Controls for cutting and sewing machines in textiles production

Control technology as a success factor

Meteoric development in the electronics and software trade is constantly creating new possibilities for effectively automating machines and systems. This affords great opportunities for innovative machine and system makers. Regardless of the respective trade, it is now a widely held opinion that the choice of the right control solution has become a factor for machine makers that has a crucial influence on their competitive lead.

There are several reasons for this. Firstly, precision and speed have an essential influence on the quality and performance of a machine. Secondly, it is only ergonomic operation that warrants acceptance by the user. And, last but not least, a sure feeling for trends and the flexibility of the control concept define the profitability of a corresponding investment.

It is uneconomical for most machine manufacturers and operators to set up and nurture up-to-date control technology know-how themselves. They therefore rely on specialised companies as their control and automation partners. Qualified and intensive cooperation between the machine manufacturer and control specialists is what decisively influences the quality of a machine as an end product. Only control solutions in which technically and industrially specific knowledge and experience of the operator and manufacturer have been implemented in a contemporary fashion can survive the acid test at the end customer's in the long term.

Control technology for production and processing of textiles

It goes without saying that this also applies to modern cutting and sewing machines in the production of textiles. High demands on the productivity of machines and quite special technological requirements, which depend on the materials processed and the chosen machining processes and the tools, can only be fulfilled by application-optimised controllers.

To ensure that development and production costs stay within reasonable limits, experienced control system developers take recourse to standard industrial systems that they adapt to each specific application. Such application-optimised control



systems offer tailored user interfaces in which experience specific to the machine and the industry are implemented for efficient operation and setting up. They are individually adapted to the machine signals and the interfaces to operator control units, networks, etc. Thanks to their open structure, the use of standard interfaces and the clever consideration of IT trends, such solutions remain flexibly adaptable and modifiable.

ECKELMANN AG has been developing and manufacturing such application-optimised control systems for more than 25 years and, to this end, has developed a considerable repertoire of proven hardware components and software modules that can be adapted to customers' specific needs (real-time operating systems for all hardware platforms, standard operating systems, NC and HMI function libraries, remote maintenance and diagnostic software). With consistent recourse to these module libraries, and with substantially reduced effort invested in additional special applications, numerous applications have also been realised for manufacturers of fabric cutting machines (KURIS-Wastema), foam cutting machines (Albrecht Bäumer) and industrial sewing machines (KSL Keilmann und Stutznäcker). Both the performance capabilities of the underlying standard technology and also a few examples of application-specific features will be explained below.

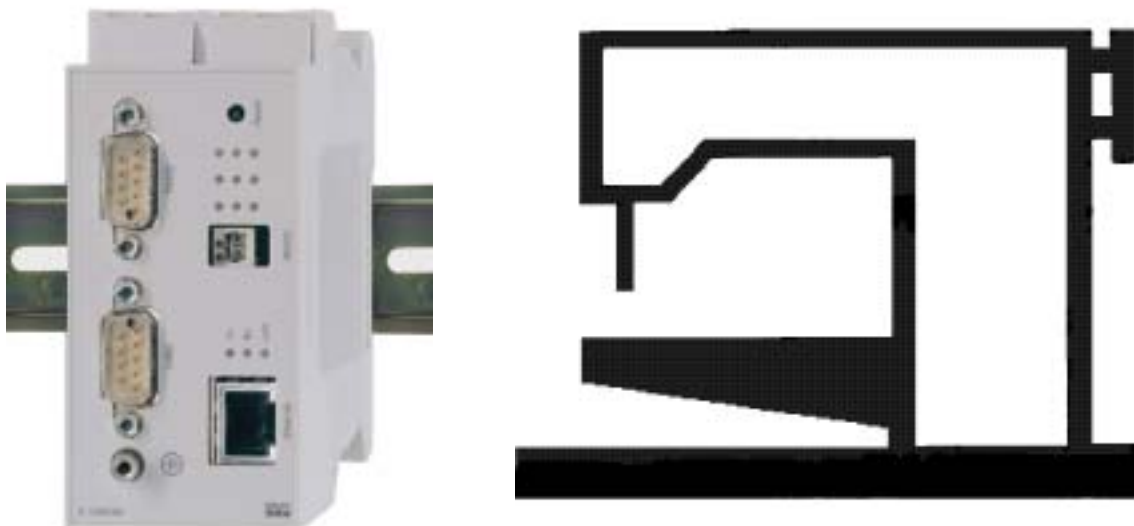


Fig.: ECKELMANN "top-hat rail controller" for cutting systems and industrial sewing machines



KURIS-WASTEMA cutting machines

KURIS-WASTEMA offers one of the broadest product ranges of laying and cutting technology for end customers in the clothing industry, the automobile and aerospace industries, the engineering textiles industry and the furniture industry. Eckelmann developed the controller of the multiple-layer cutting machines belonging to the Tex Cut series for cutting textile fabrics, knitwear, engineering textiles and special materials. In different performance classes, the Tex Cut machines are suitable for small and large series or mass production of thick or voluminous materials that are processed in a continuous material flow, with transverse travel capabilities for accommodating packages of layers on parallel table systems.



Fig.: Cutting machine from the KURIS-WASTEMA Tex Cut series

With the E-CNC55 controller used, the Tex Cut systems achieve an extremely high positioning and cutting speed, thus enabling above-average productive working even in the event of single layers. The scope also includes simple, technically matured operator prompting, extensive production data acquisition for individual evaluation by the customer, software maintenance and remote diagnostics, which it was possible to implement with modules from a standard in-house library.



Special functions, which were realised within the scope of cooperation between KURIS-Wastema and the control system developer, include automatic compensation of cutter bending, excellent cutting quality even when cutting in, in the case of difficult contours and hard materials, for example. Further functionality typical of the application is parallelism checking to dispense with later manual alignment of the fabric layers.

Contour cutting machine from Albrecht Bäumer

The machine construction partners of ECKELMANN AG also include the special machine factory Albrecht Bäumer GmbH & Co. KG in Freudenberg, where more than 350 employees are concerned with the development, design and production of a broad range of products for soft and hard foam processing. Besides contour, milling, profiling and form cutting machines for PE, PE and PVC foam, control cabinets and complete cutting lines, high-grade cutting tools supplement the production range. They cut shoulder pads to shape, they split hard foam blocks into slices as thin as a millimetre, they shape upholstered furniture elements and automobile accessories or they lend shaped packaging parts their three-dimensional contour.

In combination with the CNC controller used, special cutting methods patented by Albrecht Bäumer GmbH & Co. KG fulfil the fundamental requirement of also producing complicated geometric parts in unchanging quality. This is also the case with the vertical contour cutting machine OFS - VT CNC, which is equipped with a slot CNC, i.e. a CNC controller consisting of a PC plug-in card. It achieves a cutting speed of up to 80 m/min and at the same time very high dynamics during acceleration and deceleration.



Fig.: Contour cutting machine of Albrecht Bäumer GmbH & Co. KG

Here also, the ergonomic nature of operation makes an essential contribution towards machining quality, safety and acceptance of the machine. The cutting programs can be created easily and effectively at a programming station with the CAP software. Via a colour TFT display, the cutter's position in the contour is monitored continuously by means of a cursor. There is an alternative possibility of a total block display.

KSL Keilmann-Sondermaschinenbau

Keilmann Sondermaschinenbau GmbH realises tailored CNC sewing systems with a fixed or moving sewing head. It therefore delivers to customers from the automobile industry, their suppliers, the aerospace industry, the engineering textiles industry, the leather industry, the upholstery industry and the environmental and packaging industries.



The CNC sewing system KL 100, which is used in all areas of textile production, was developed in close cooperation with the controller partner. This freely programmable CNC sewing system featuring a modular machine structure (sewing field size 600 x 600 mm to 4000 x 4000 mm) offers numerous application-specific functions which were made possible by customer-oriented integration of control engineering competence and special machine know-how. As a standard feature, it possesses a sewing head, which can be lifted out, for direct path programming and a generously dimensioned sewed material holder structure for complex tasks. It enables 100% reproducibility of seams and offers automatic sewed material holder recognition. Additional functions comprise the freely programmable pneumatic or electric motor-driven adjustable presser foot height, linking with previous and subsequent production systems, the integration of quality control systems relevant to safety, e.g. material layer and insertion checking, automatic sewed material holder recognition in the insertion zone and the triggering of additional functions, automatic sewed material holder transport and parts removal systems.

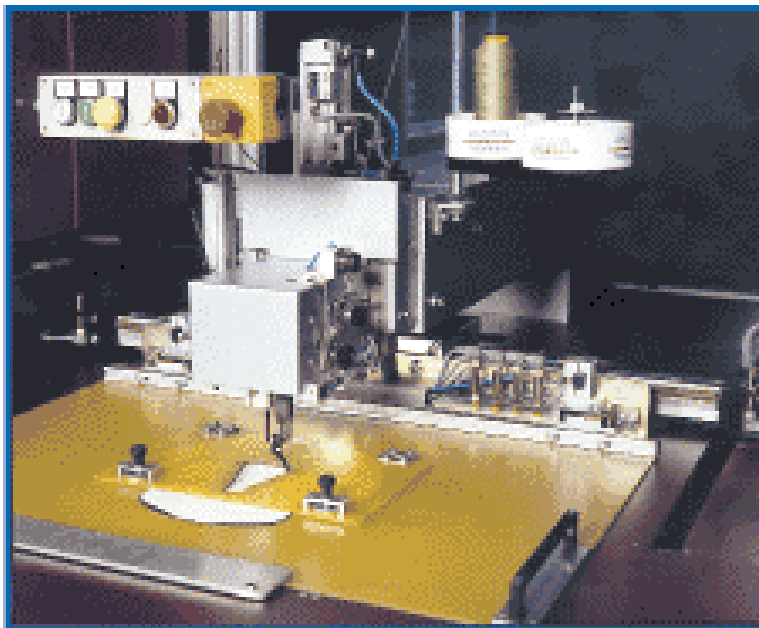


Fig.: KSL CNC sewing system



Nähmaschinen-Fabrik Emil Stutznäcker GmbH + Co. KG

For more than one hundred years, the Stutznäcker company (brand name MAMMUT) has specialised in the production of high-quality sewing machines for industrial backstitching. These backstitching machines process 'everything to do with the bed', where filling materials and large dimensions call for a special sewing technique and machine concept. The focus is on mattress slabs and edges as well as quilts, bedspreads, quilted cushions and sleeping bags. Parts for upholstered furniture can also be processed, however.

Every Stutznäcker backstitching machine is backed by the aim of achieving a maximum yield at a maximum possible sewing speed. And all this ought to be achieved for sewed materials of quite different characteristics and filling weight. The ECKELMANN CNC controller supports this aim by enabling the operator to choose and backstitch, quickly and conveniently, the required pattern out of any size of pattern pool. Backstitching patterns are programmed optionally with an external standard PC or directly on the backstitching machine. A digitiser can also be used.

The software is user-friendly and the programs can be created swiftly and easily by the user, and also edited at any time. To this end, the "my Mammut programming software" offers numerous functions such as dragging and dropping coordinates, enlarging and reducing, mirroring, rotating at a click of the mouse, contour programming on the basis of graphics files, importing of DXF data and an on-screen preview of diverse needle positions.

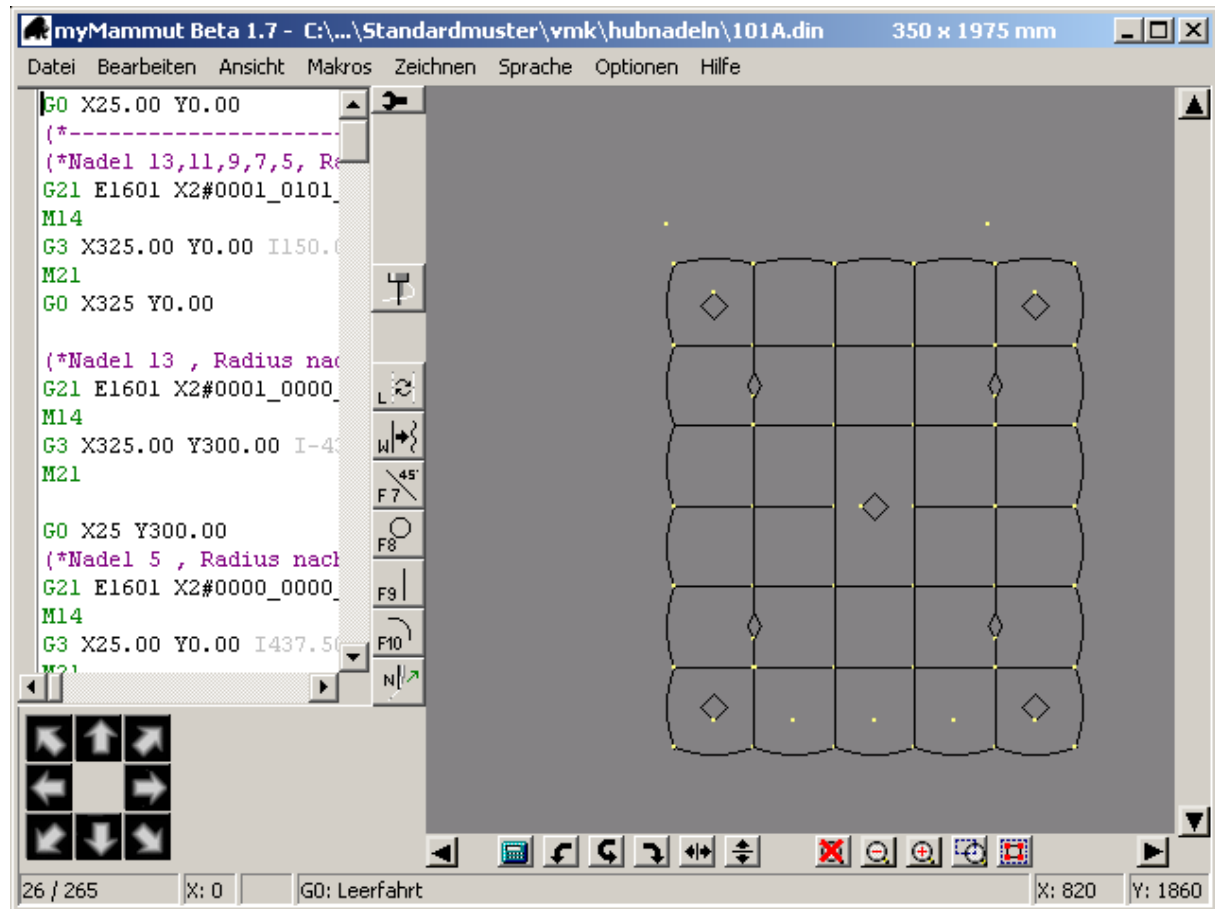


Fig.: Pattern programming for a backstitching machine

Technological partnership to the benefit of the end customer

Regardless of the individual demands of single applications, solutions that warrant maximum acceptance by the end customer are possible in all areas of textile production thanks to integration of control engineering competence and industry-specific machine construction know-how. Cooperation between the CNC developer and the machine manufacturer in an atmosphere of partnership can translate progress in hardware and software development into tangible advantages for machine operators and users, thus realising strategic competitive advantages for the machine manufacturer.