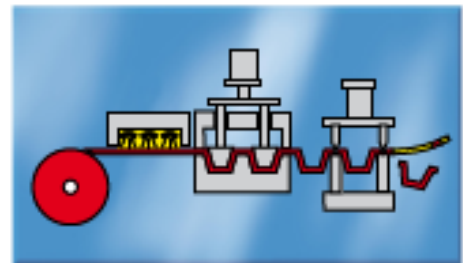


illig®



Automatic Pressure Air Forming Machine

suitable for the use of forming/punching tools with steel rule cutting lines

RDK 90

Thermoformer
of 3rd Generation

*A new concept from
inline operation up to
end packaging*



The RDK 90 is an automatic high-performance thermoformer for highest output potential at optimal customer benefit

If the question is about planning and realization of new concepts and innovative solutions, know-how and experience are in demand. As technology leader we see our challenge in the development of new and economical procedures for thermoforming.

Based on the technological features available we are able – together with our customers – to develop process-optimized and economic machines and production lines, which set standards.

The RDK 90 is the first thermoforming line, which concept was created for inline operation and the use of end packaging devices. The modular concept makes it

possible to combine and to equip lines from the basic machine up to the configured, process-optimized high-performance machine for forming/punching operation with steel rule cutting lines. Subject to customer requirements the features can vary and are finally supplied in the most different combinations. The most efficient technology can be selected out of the resulting variety of variants, the most different technical levels and stacking systems.

A high light of the equipment is the use of servo-drives. This has many advantages: The movements of the individual functions can be run at different speed profiles. Representative for their use are: Movements of the

forming table, clamping frame drive, material transport, spreading, pre-stretching drive, height adjustment for upper table of the forming station and steel rule punch press. The precise and especially fast movements have an positive effect on the product quality, since for example pre-stretching aids can be run at defined speeds and strokes. By this way certain areas can be formed more precisely which enables the use of thinner materials and which leads to higher efficiency.

The high output rates of the thermoformers of the 3rd Generation demand new drive concepts which on one hand minimize the times of the table movements, and on the other hand allow a solid construction of the stations. This features in an ergonomic working height, which – on top – has a positive effect on the parts discharge. Another

feature of the servo-drives, which should not be underrated, is the low energy consumption compared with other drives.



Automatic pressure air forming machine RDK 90

System technology RDK 90

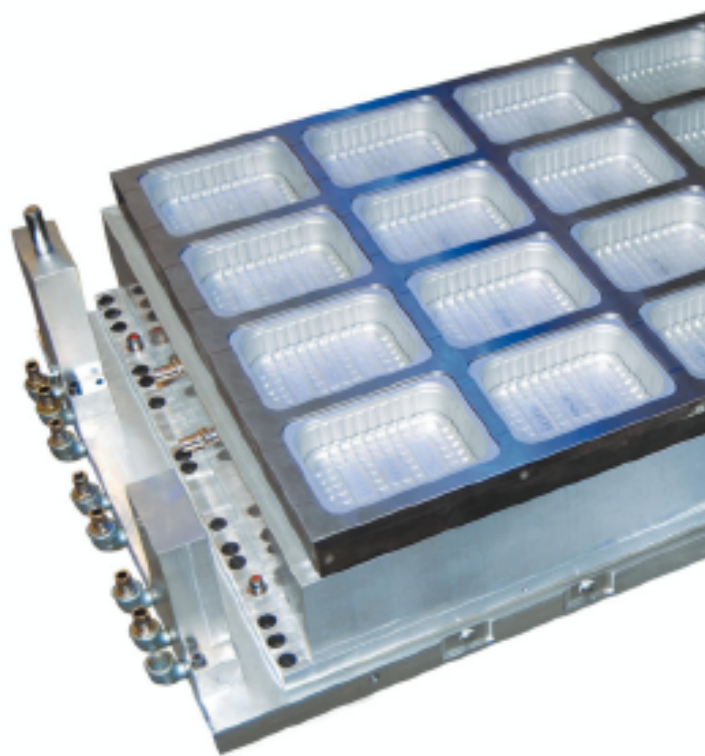
- Priorities of development
- Inline concept RDK
- Offline system/technical levels
- Stacking system variants
- Tool technology
- Machine operation

For processing of PP the heating technology is decisive for the output potential.

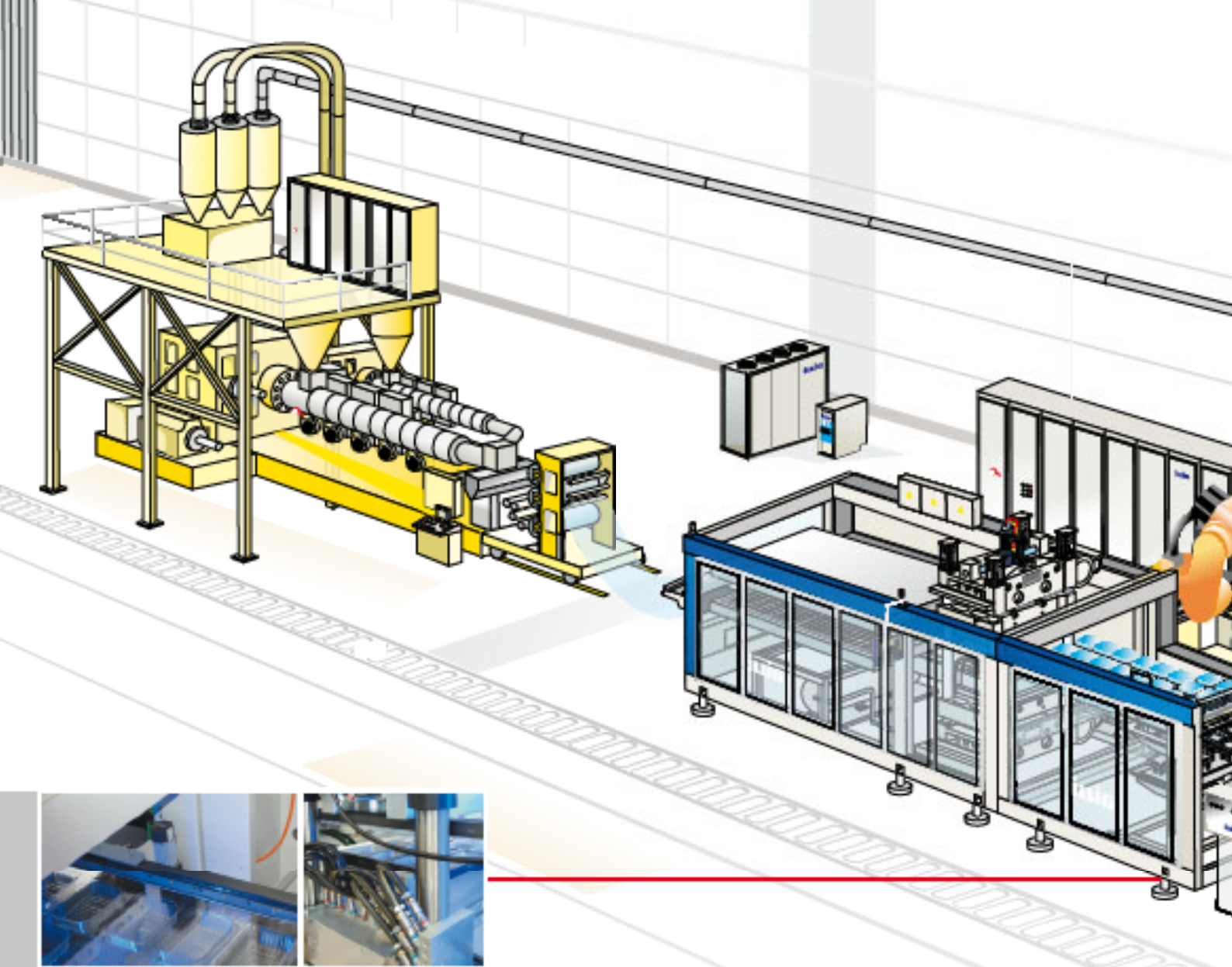
With the machines – and tools – of the 3rd Generation, especially for PP processing, cycle speeds are achieved, which could only be reached with Polystyrene processing.

The narrow processing window for PP requires for all roll-fed machines a special technology for heating the material. Heater rolls, which are installed in a closed housing, heat up uniformly the material to a temperature of approx. 120 °C. By this way the material, which lays on the heater rolls, can expand unhindered. This reduces the material sag during heating of the material in the machine to forming temperature. Important for PP processing is the fact that the machine is equipped additionally with a

servo-driven spreading device for the material transport. On top of that, there is a spreading device in front of the forming station. These units compensate the material sag and avoid webbing during the forming process. Herewith the 3rd Generation of thermoformers stand also for significant cycle speed increases, which offer big benefits especially as far as PP processing is concerned.



PP tool for the production of meat trays



A new concept from inline operation up to end packaging

When ILLIG launched forming/punching operation the inline-technology was developed, which fulfills the high degree of requirements on the overall process. In particular, these refer to the development of system components with maximal availability, the interlinkage of the individual system components among each other as well as the start-up technology for the overall process.

Our system technology includes both the process engineering as well as the machine and tool program for forming / punching operation right up to stacking and finishing of formed parts.

The RDK 90 is the first thermoforming production line, which has been designed for inline operation and the use of end packaging devices. At ILLIG the synergies between the customer benefit and the development of thermoforming machines lead to clearly improved formed parts with the help of the tools of the 3rd Generation and, at the same time, establish the preconditions for the inline process.

An important step is the newly developed start-up technology for the RDK 90 with the extruder interlinkage kit of ILLIG, which is well-proved since decades. The web coming from the extruder can be fed into the granulator during the start-up procedure and/or optimization until optimal operation conditions and stackable formed parts are produced.

To ensure the demanded availability it is necessary to make all process-relevant parameters repeatable. In combination with new stacking systems, which are adapted to the accelerated forming/punching process, the new generation of the skeletal granulators allow an optimally designed inline process.



extruder



forming area 640 x 670 mm



*RDK 90 inline production line for forming/punching operation
stacking with counting and transfer device*

Cooling and temperature control

In the basic machine two different temperature levels are available for tool cooling. These can be used for control of the individual tool elements. This means the upper and lower tool work with another temperature than for example the downholder and the counter punching plate. If required, an additional tool temperature control with the ILLIG temperature control device ITG is possible.

The RDK 90 also stands for an increased degree of automation for simple operation and more comfortable, faster tool change. On account of reduced distances the forming air has to cover, the full forming pressure is available in shortest time.

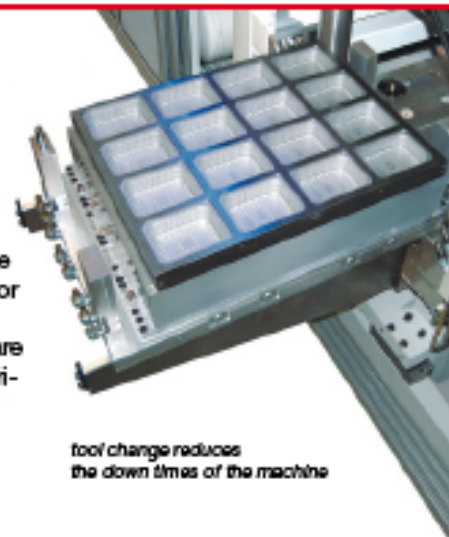
Increase of availability by optimized tool technology

By means of a newly developed cooling technology the inlet as well as the outlet temperature are controlled and maintained. This results in nearly constant tool temperature in all operation modes. With the control circuits the requirements of complex formed parts can easily be taken into consideration.

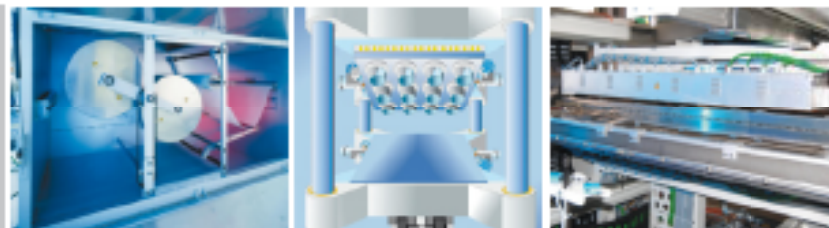
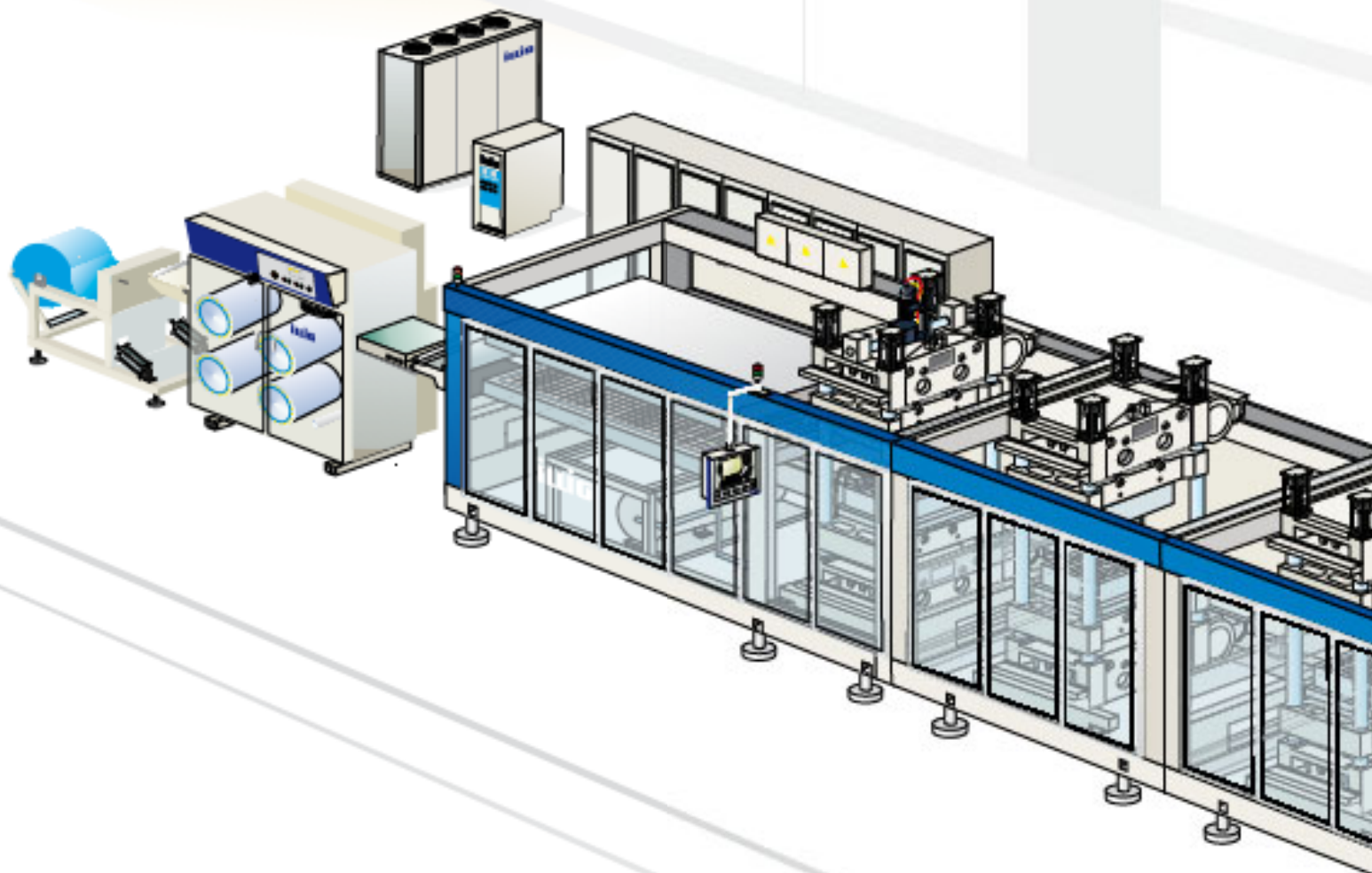
Tool change and maintenance

The RDK 90 stands out especially by the high degree of efficiency and maintenance comfort. Apart from that the machine concept considers the specific requirements on a fast tool change, which is supported by the basic setting program and corresponding auxiliary devices.

On account of useful construction of the individual functional units the machine is easily accessible at the important positions for service and maintenance. Important greasing points are provided by the central lubrication system.



*tool change reduces
the down times of the machine*



Offline system, technical level

The equipment features of the RDK 90 can vary subject to customer requirements and can be supplied in the most different combinations.

The most efficient technology for the most different applications can be selected from the resulting variety of variants, the different drive concepts and the process control. The basic component of the RDK 90 consists of heating and forming/punching station.

In addition, a steel rule punch, a hole punch and different stacking system variants are available. With these units the machines can be equipped such that the required degree of automation and output potential can be covered.

Subject to requirement suitable machine concepts are available which are realized at leading packing manufacturers.

Optional equipment:

Steel rule punch press

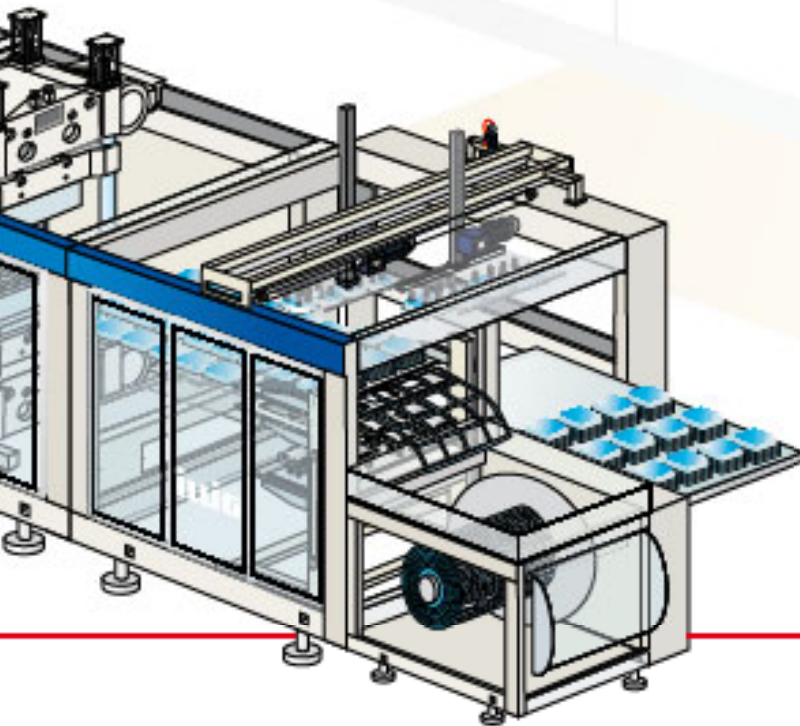
A steel rule punch press equipped with movable upper and lower table is offered for separation of the formed parts. On the steel rule punch press punching force and cutting length form an ideal ratio. This means that the same layout of the forming area can be used as on the forming/punching station.

The complete station can be displaced in operating direction by servo-drive. The correct position is given by the computer-aided basic setting and stored. Precise correction is possible during operation. The steel rule die is positioned by motor-driven adjustment units, which enable free adjustment on the punching table. The positions

selected can be modified during operation and can be stored when optimized. A steel rule die heater to reduce cutting forces can be supplied as option.

Hole punch press for base punching

The hole punch press is available for the production of formed parts with base punching. With movable upper and lower table base punching can be carried out within the forming area on all formed parts. The computer-aided basic setting ensures adjustable positioning of the hole punch.



*RDK 90 Offline production line for forming/
punching operation with steel rule punch
press for separate forming and punching,
hole punch press for base punching and
stacking with counting and transfer device*

In order to insert inlays for decoration of the package or for printing of bar codes, the customer might attach his own machine elements. For this purpose an intermediate stand is used, which takes up these elements.

Cooling systems

A large quantity of energy has to be fed for the forming process, which has to be dissipated after the forming process by the cooling systems in a useful way and in very short time. The coordination of the individual cooling systems such like tool cooling as well as cooling of the individual machine elements have the most efficient effect, which then can directly be converted into performance.

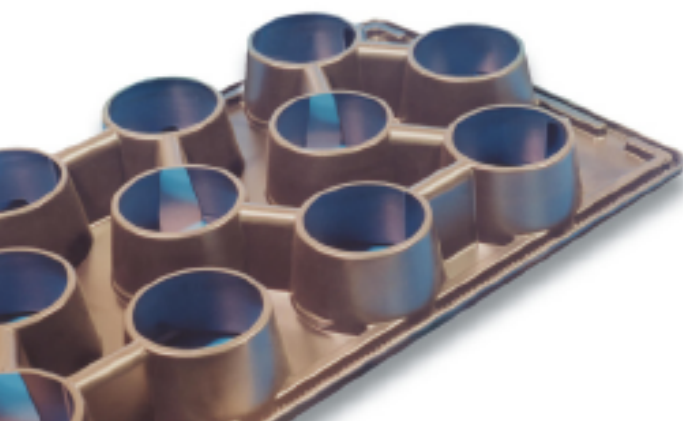
Temperature control by ILLIG Temperature control device ITG

The temperature control device ITG enables well experienced temperature control of the forming tool and the material transport. Profibus connection to the control unit allow control via the screen.



*servo-driven height adjustment of
upper table*

*Formed part produced by separate
forming and punching with base
punching*





Stacking system variants

New stacking system variants, adapted to the high performance of the automatic thermoforming machine, were developed which for example permit transfer of the products to a sleeve packer for finishing. With the help of new type of interlinkage concepts both individual machines and complete production islands can be connected among each other or for example connected with an end packaging line.

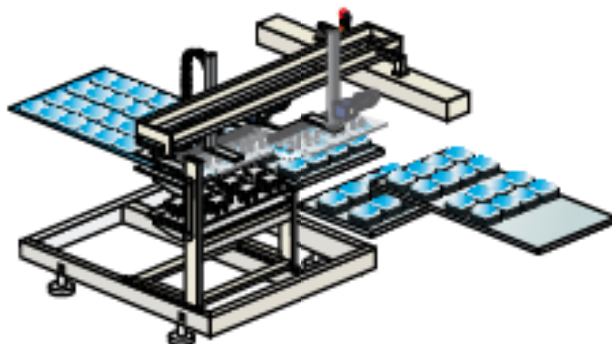
Stacking mask and stacking chute are simultaneously moved together by a servo-drive and fix the web during the breaking-out function so safely that even complicated products like hinged packages or sandwich packages can be broken out easily and stacked.

Stacking device with counting and push-out device

A break-out device depending on format breaks the formed parts out of the skeletal and puts them into the stacking chute. When the requested quantity of formed parts has been reached in the stacking cage the formed stacks are pushed onto a servo-driven conveyor.



stacking device with counting and push-out device and stacking chute divided in two parts



stacking device with 2 axis handling system

Stacking with counting and push-out device and stacking chute divided in two parts

When high cycle speeds are run the push-out time for the formed parts has to be prolonged. In addition, a stationary stacking chute is used together with the movable one. In combination with the servo-driven clamping mask a buffer can be created in the movable stacking chute where the formed parts can be pushed out independently from the machine cycle.

Servo-driven alternating stacking combined with stacking in stacking chute

When the formed parts are stacked into the stacking chute, the movement of the alternating/stacking parts is controlled by servo-motors.



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Stacking device with counting and transfer device with external buffer chute

Stacking by 2 axis double head handling system

For the stacking process the formed parts are separated by the break-out plug from the skeletal and transferred to the suction plate of the handling system. This system works with two linear units and puts the formed parts down onto the conveyors, which are moved by the paternoster principle. This means, when one conveyor is emptied, the second one is in stacking position. When the requested stacking height has been reached the formed parts are pushed onto a discharge conveyor. An alternating stacking device with rotation axis in combination with handling system is offered as option. Apart from that a sample shot for examination of the formed part can be taken out.

Stacking device with counting and transfer device with external buffer chute for optimal connection to end packaging systems

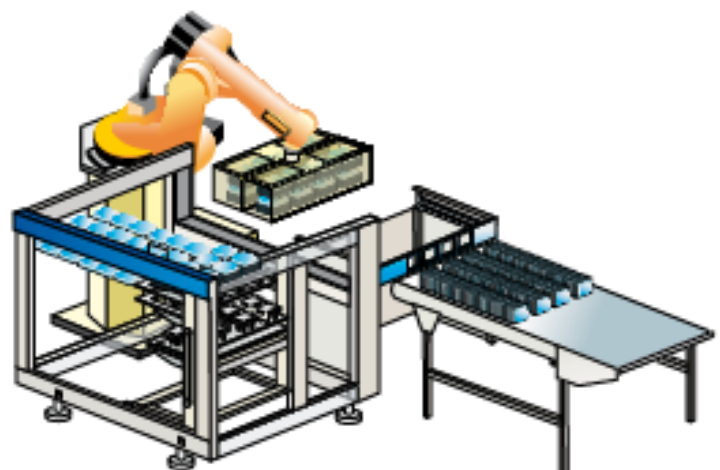
To ensure an ordered transfer of the formed products to an industrial robot a new stacking system was developed.

The products are stacked in a buffer chutes, which combines the thermoformer with the end packer.

In the emptying station the stacking cage is now emptied layer by layer.

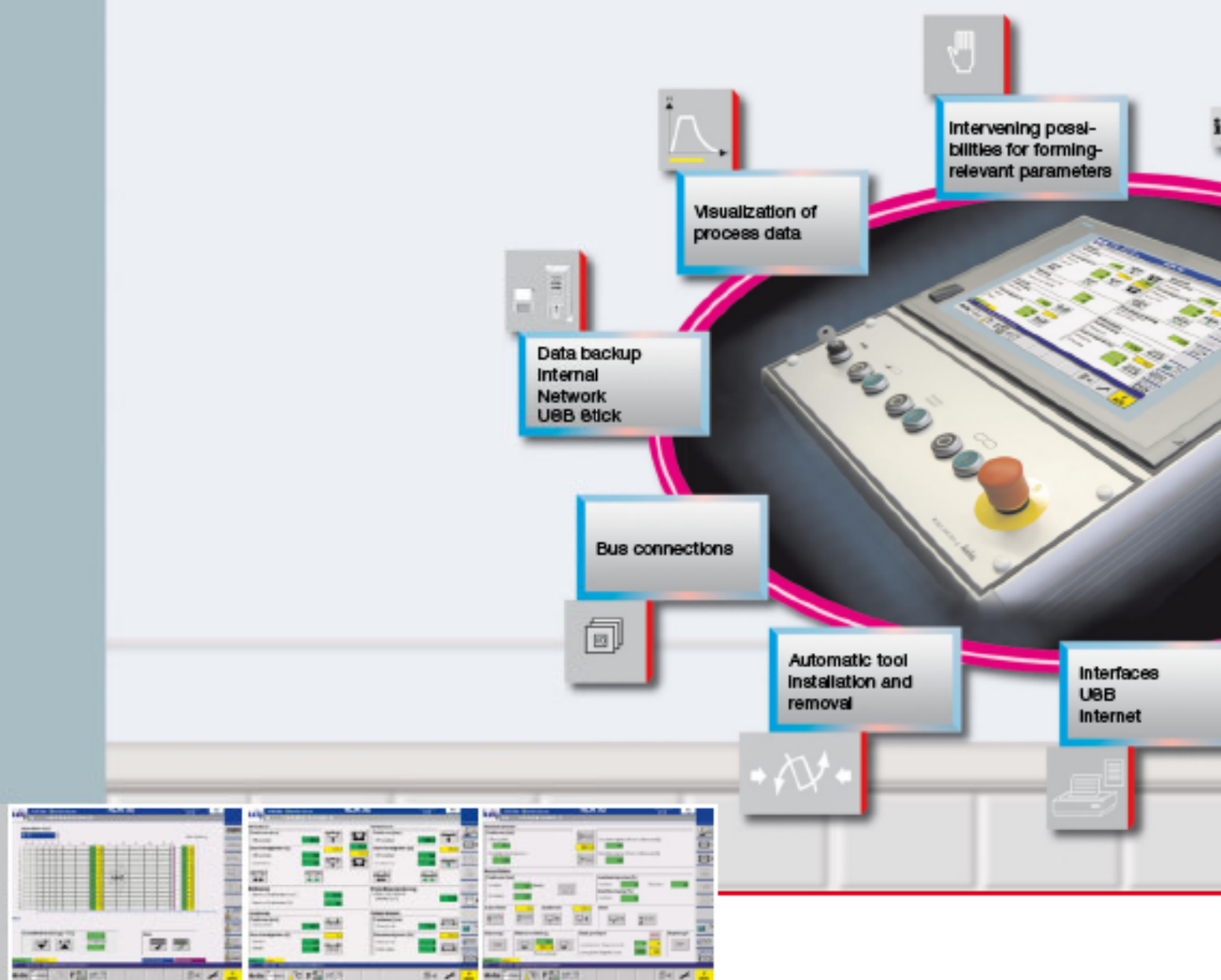
Due to the flexibility of the robot the formed parts can be pushed out horizontally or vertically. This ensures easy finishing for example in a sleeve packer. On account of this working method the machine can be used as individual machine or several

machines can be combined to one end packaging line. A pre-condition for the application of such lines is the process optimization of the 3rd Generation with the new drive technology.



stacking by 2 axis handling system





Easy machine operation

The complexity of the thermoforming/punching process and respective stacking process is subject to a new control technology where several individual drives are controlled and optimized.

The effects of the changed setting are displayed on a newly developed user surface.

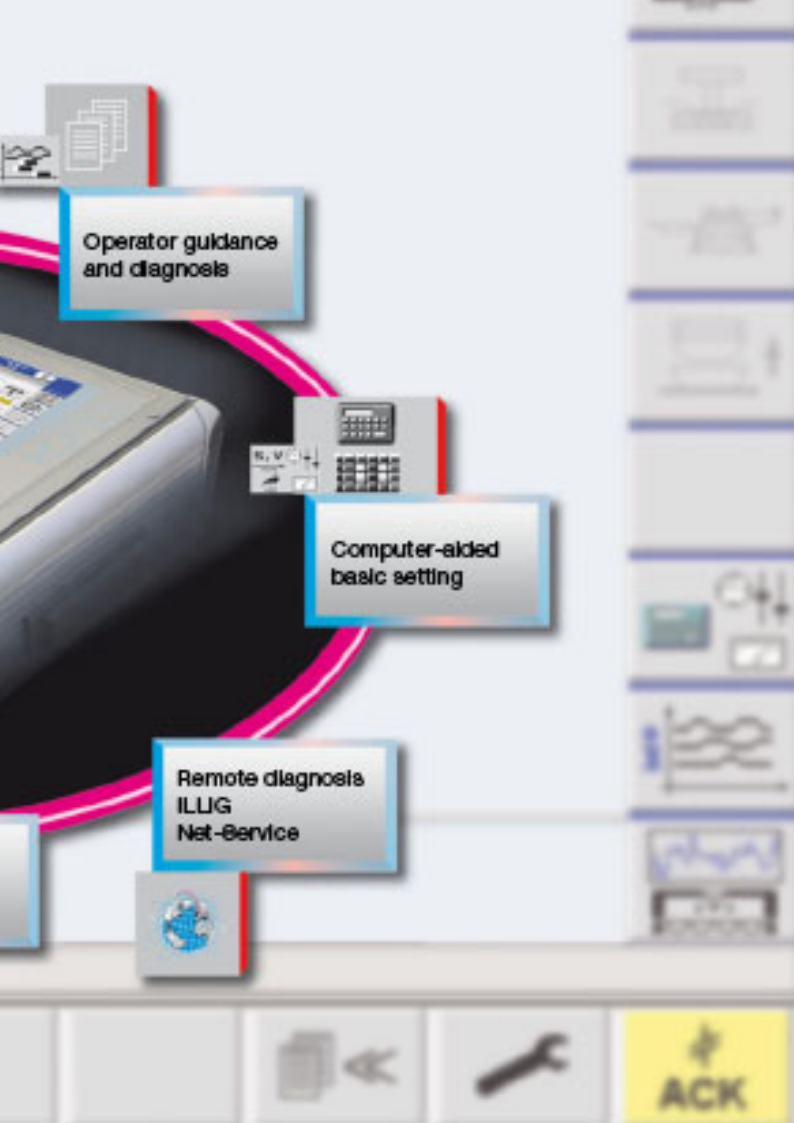
The user surface is easy to understand. It avoids operation errors by clear and simple menu structure. Navigation is effected comfortably by the individual menu pages and can be selected on the operating panel.

The dialogue system is also provided with an electronic aid, which is included in the operation system.

Digitized function sequencing means practicable operation philosophy

Advantages of industrial PC: (SIEMENS Panel PC)

- Newly developed machine control with Soft-PLC based on Windows operation system.
- Screen operating panel with high-contrast, brighter Touch-TFT display for simplified operation and better legibility.
- Computer-aided basic setting of machine setting data with expanded optimization of machine sequencing. All setting data for the data set can be stored at any place (network, USB)
- Diagnostic aid
- Visual presentation of forming sequence
- Printer connection. Setting data and production protocol can be printed out
- Improved operator guidance during automatic tool installation and removal



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Conversion of free moving sequence potential to specific increase of cycle speed

On account of the new, functional program structure the thermoformers of the 3rd Generation allow an optimization strategy with which performance, product quality and production safety can be improved specifically at the customer.

Setting data and process times established by the computer-aided basic setting can be optimized to such an extent that controlled overlapping of machine sequencing sections is possible.

Without changing the thermoforming process, the resulting intersections have an optimal effect on cycle time, however, without adversely affecting the product quality.



Diagnostic aid and/or monitoring of limit values ensure help and support for machine and process adjustment as well as monitoring and quality assurance.

Substantially faster cycle speeds are achieved with 3rd Generation thermoformers. Product quality is clearly improved due to an optimized and considerably accelerated forming process. This way new application ranges can be opened up.

Digitized functions enable computer-aided basic setting of machine data. Process optimization increases output potential.

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SYSTEMS
for Thermoforming and Packaging Technology

Sheet processing machines
Automatic roll-fed thermoformers for forming/punching tools
Automatic roll-fed thermoformers, separate forming and punching
Skin and blister packaging machines
Form, fill and seal lines
Produced Tooling