Cera**THERM®** stack

Clean room-compatible thermal systems with stacking technology

CeraCon

Exceeding the standards.

EN

Thermal systems

Cera**THERM®** stack

Clean room-compatible stack systems

The vertical stack systems from CeraCon are extremely space-saving industrial ovens. Based on standardised production components, they can be configured individually for every customer, utilising the available room height and thereby generating considerable savings in terms of production space.

They are based on a vertical construction principle, with upward and downward lines, and horizontal transfer. Components are transported using special stackable product carriers (known as trays), which can be flexibly adapted to the components to be temperature-treated. In the case of very flat components, such as films or circuit boards, this enables an extremely high packing density to be achieved. Even the standard design of this stacking principle is suitable for use in production environments with clean room requirements up to ISO Class 7. Up to 12 different temperature zones can be created within the upward and downward lines.

CeraCon stack systems can be seamlessly integrated into existing production lines. This might take the form of 'by-pass' integration, for example. Multiple components can also be placed on the system's trays where possible, which further reduces the system's space requirements. Our wealth of experience in this field enables us to provide the necessary automation technology with expertise.

The gap between the trays can be freely adjusted between 25 mm and 100 mm, according to the height of your components. This makes CeraCon stack systems highly flexible and enables them to be used for a variety of heating processes for components of different heights.

Structure of the thermal system

Temperature zones (here: six)

The system can be equipped with up to twelve temperature zones in whichever combination you require.
Each zone can be heated and cooled individually. Temperature treatment is carried out using circulated air that is either heated electrically or cooled using heat exchangers.

Base module with lifting units

In addition to the electric switch cabinet, the pneumatic components and other basic elements, the base module houses the servomotor-driven lifting units of both vertical lines. Each of these high-performance drives lifts and lowers its tray stack (each of which may weigh up to 500 kg) without jerking and with extremely high positional accuracy.

Inlet and outlet of parts

Here is where your parts are transferred onto the system's special trays and are fed into it. This can be done manually or with the aid of an optional automation system.

Airbox (optional)

The airbox enables the defined removal of solvent evaporation from the processing chambers while simultaneously feeding in filtered supply air.

Lateral transport system

When the trays reach the top of the vertical upward stack line, the lateral transport system moves them sideways towards the downward stack line.

Control / visualisation

All relevant system components are monitored using sensors and are controlled by a Simatic S7-SPS. Visualisation is provided by a fixed 12" touchscreen. An additional mobile touchscreen makes it easier to carry out safe set-up operation and to perform maintenance.

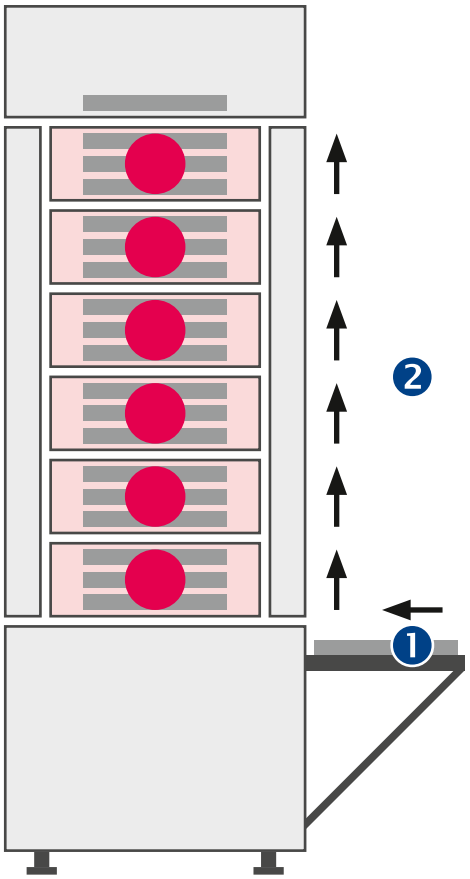
In-feed automation (optional)

The optional loading automation systems range from simple push-on systems (e.g. for circuit boards) through linear motion systems to robotic loading. The system's loading and unloading points are located directly next to one another, which makes it possible, in principle, to use automation for both purposes.

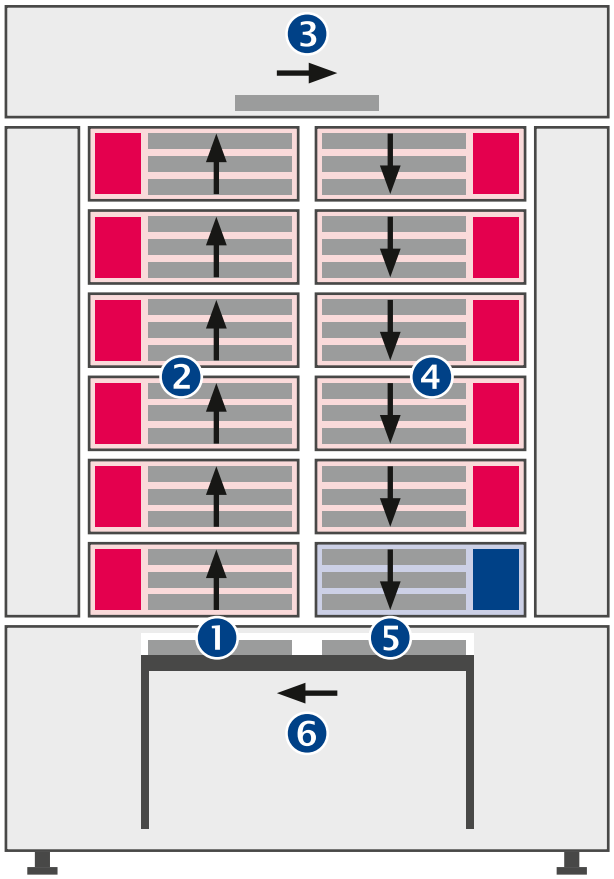
Functional principle of the Cera**THERM**® stack

(here with 12 zones in total)

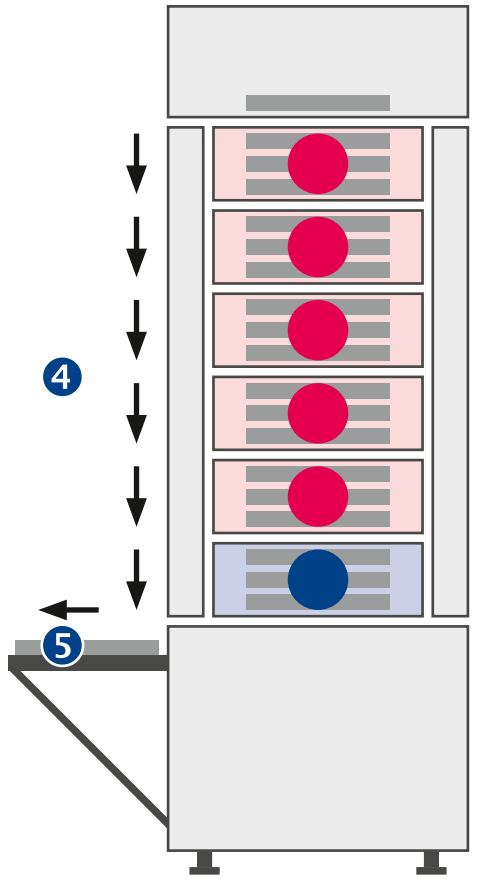
Side view



Front view



Side view



❶ / ❺ Loading and unloading

The trays are loaded with the components to be temperature-treated at the loading station (❶). This may be done manually, but is generally carried out using automation. We can fulfil your needs in this regard, ranging from push-on/push-off mechanisms through linear motion systems to robots, and we adapt our systems to the requirements of your production line.

A conveyor system feeds in the loaded trays at regular intervals towards the vertical upward stack line, and then out again onto the adjacent unloading station (❺) once the components have passed through the entire process. The proximity of the loading and unloading station makes it possible, in principle, to use a single robot for both purposes.

❷ / ❹ Stacking principle

Before a new tray is taken into the system, the entire tray stack on the upward stack line is first lifted and fixed in place. The new tray is then positioned underneath the stack and lifted up together with it as a new element at the very bottom of the stack. The top-most tray of this stack is now transferred horizontally to the downward stack line (❸) and the principle continues in reverse in a downwards motion.

This enables all trays to pass smoothly through the processing chamber. The two high-performance lifting units with servomotor drives in the thermal system's base module are what creates this process.

❸ Lateral transport system

When the trays reach the top of the vertical upward stack line, the crossways transport unit (❸) moves them sideways towards the downward stack line.

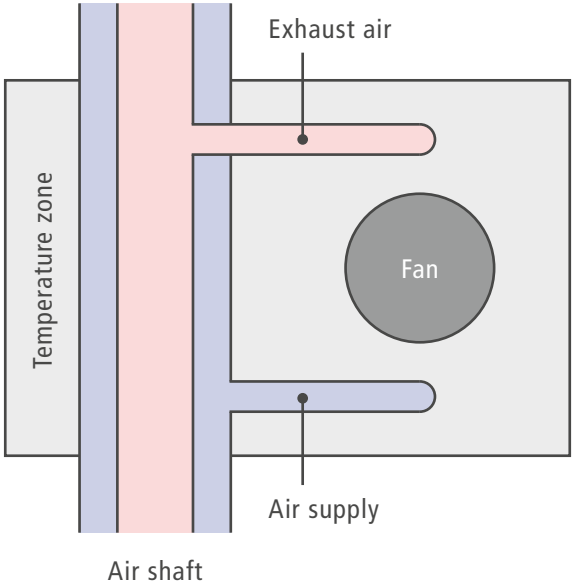
❻ Tray return

Once a tray has been unloaded, the same tray is returned to the loading station.

Cera**THERM®** stack is energy-efficient!

Heat recovery

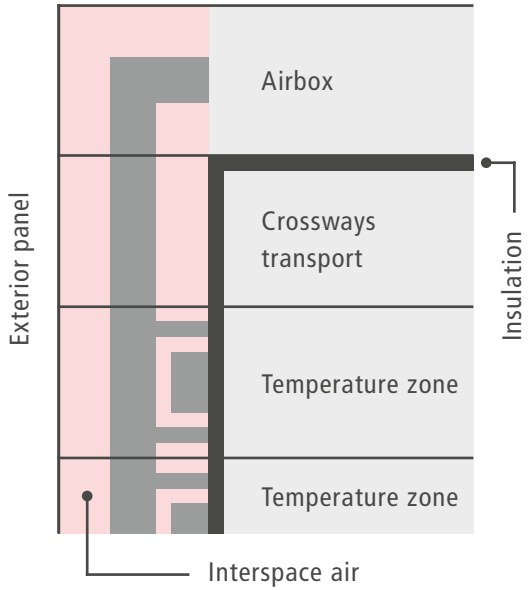
A system-internal temperature balance of the inlet air and exhaust air provided by the customer is supported in



conjunction with the optional airbox. The warm exhaust air is fed from the heating chambers into an air shaft that leads to the airbox, where a cooler fresh air supply, separated by a barrier, flows into the heating chamber at the same time. Even while still in the shaft, the two air temperatures assimilate: the warm exhaust air is reduced in temperature while the non-heated supply air is simultaneously heated. Both relieve the load on the air supply provided by the customer.

Interspace air extraction

The effect described under "Heat recovery" is not the only thing that contributes towards energy-efficient supply of processing air. The interspace air between the multi-layered insulation and the exterior panel, which is already warm, is extracted using the optional airbox before being fed back



directly into the temperature zones to supply heat. At the same time, this minimises the amount of heat absorbed by the exterior panel, which significantly supports the temperature stability of your production environment. Both measures reduce the energy requirements and save costs.

CeraTHERM® stack is space-saving!

Extremely compact construction

The floor area required to assemble a CeraTHERM® stack is approximately 3.0 m². The total usable areas of all trays combined that can be temperature-treated simultaneously in the system is approximately 19.6 m² (tray catch: 25 mm, 12 temperature zones). This means that the thermal system can treat 6.5 times its required floor space in components.

Processing chambers without drives

Almost all of the available space within the temperature zones can be used by your components, because the drive technology in the form of vertical lifting units is housed centrally in the base module. This allows for an even more compact design.

Space-saving insulation

The insulation of the CeraTHERM® stack is fitted in multiple layers. The combination of these different insulation materials that are custom-produced to the required size results in a smaller volume of insulation overall than is the case when fitting all insulation using just one material.

Gap between trays close to component height

In thermal systems with alternative conveyance systems (e.g. chain links with recesses and drivers), the vertical spacing between the product carriers often has to be set wider than the component height by itself would require. Conversely, the gap between the trays in the extremely space-saving CeraTHERM® stack is almost only based on the height of your components.

CeraTHERM® stack offers a high level of availability!

The simple conveyance principle of "vertical lift" with very few moving parts gives the CeraTHERM® stack a high level of reliability and long service intervals. The consistently modular system structure also proves its worth when maintenance is required. It enables standard elements to be changed quickly when necessary.

Cera**THERM**® stack manages temperature accurately!

Multiple temperature zones

Up to six temperature zones can be created within a vertical line (and therefore up to twelve within the whole system). Each of these zones can be controlled independently, can create a separate temperature, and heat up or cool down in order to reach these temperatures. It is also possible to create more complex temperature profiles within a single system.

Laminar flow

Ultimately, the laminar air flow created by the thermal system in particular is what ensures the even heat treatment of all components. This takes place irrespective of the number of components on the trays.

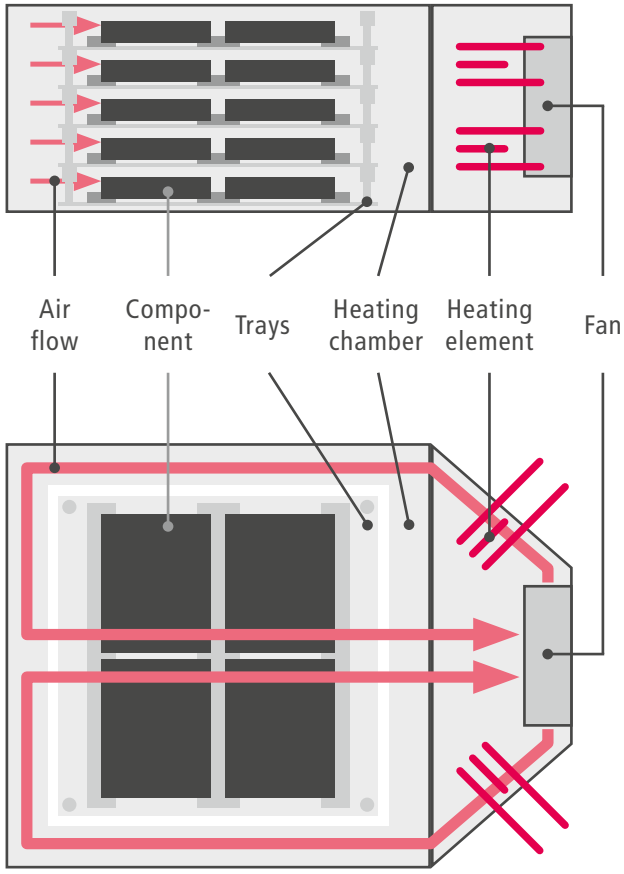
Optimum control

The compact sizes of the individual zones make it possible to manage temperatures with a high level of accuracy. The efficient fans circulate the air volumes up to 40 times a minute.

Precise separation

The individual heating zones are separated effectively from one another to prevent temperature exchange. This is ensured by the trays with their integrated bases, the small gap size between the trays and the shaft enclosure at transfer points. What is more, a special thermal separator is fitted at the transition between a hot and cold zone, which is particularly effectively in preventing temperature exchange at this position.

Longitudinal section through a temperature zone



Cross section through a temperature zone

Cera**THERM®** stack is clean room-compatible!

(in accordance with ISO Class 7)

High-quality materials

The internal panelling of the chambers is made of special, high-quality stainless steel. Its "2R" surface properties (smooth, bright, reflective) make all surfaces easy to clean. It also makes it less susceptible to adhesion.

External drive elements

All drive elements of the conveyance system are located outside of the "component conveyance" areas, such as the temperature zones or the lateral transport system. This provides your components with effective protection against possible contamination from these drive elements (e.g. by lubricant, wear debris, etc.).

Controlled air systems

In production environments with clean room requirements, the customer often makes available controlled supplies of inlet air and exhaust air. The thermal system is able to utilise these supplies using the optional airbox, and therefore contributes towards keeping the production environment clean and maintaining its temperature stability (see also "Energy efficiency").

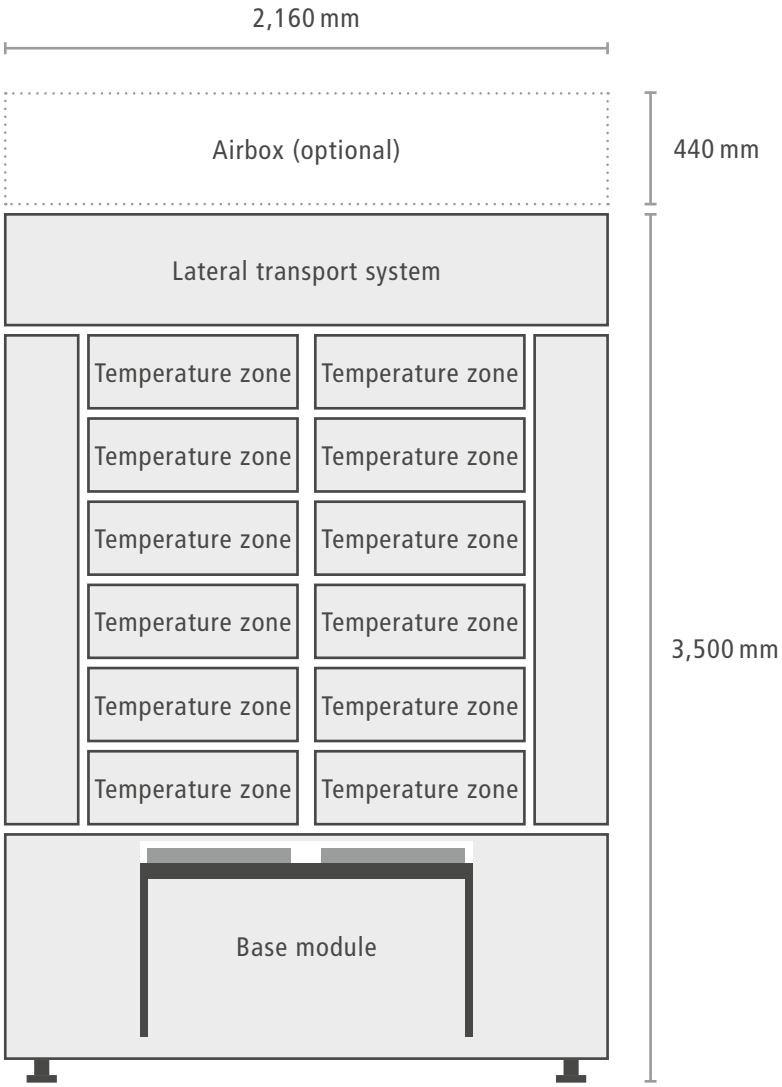
Filter mechanisms within the airbox also provide additional cleaning of the supply air.

Increased clean room-compatibility

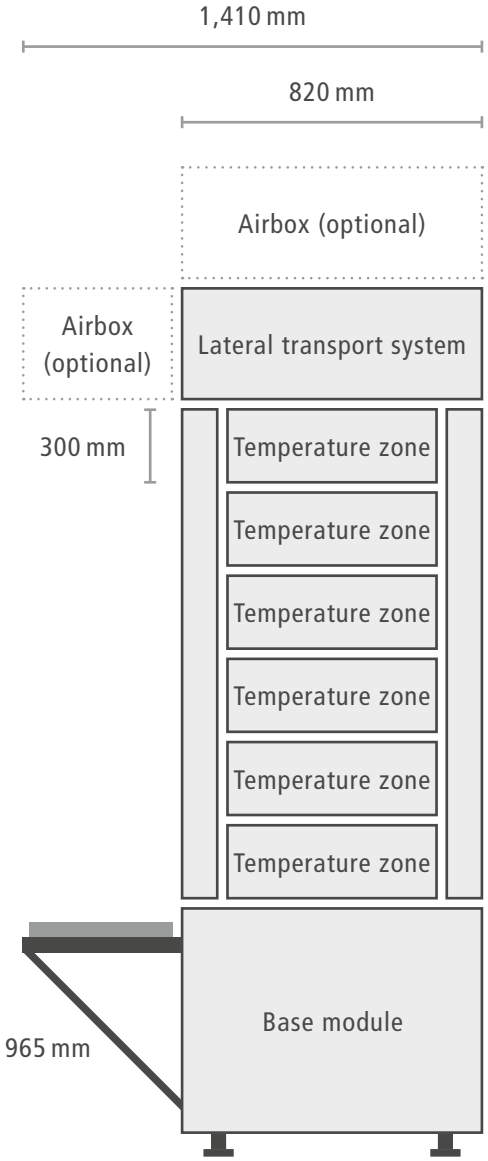
The horizontal conveyance of trays into and out of the system is provided as standard by conveyor belts.

In order to meet even more stringent clean room requirements approaching ISO Class 6, we offer the option of replacing these with a linear motion system.

Technical details

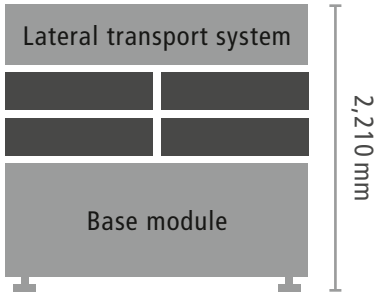


Technical details
4 to 12 temperature zones
Electrically heated circulated air system (convection)
Heating temperature range between 50 °C and 180 °C (higher temperatures optional)
Temperature accuracy of ± 5K (greater accuracy optional)
Cooling system with water to air heat exchanger
Cooling temperature range between 20 °C and 50 °C
40x air circulation per chamber per minute (5 m^3 / min.)
Floor area of 2,160 x 1,410 mm
Clean room ISO Class 7
ESD-compatible
Optional MES connection
Switch cabinet colour RAL 5005
System colour RAL 7035

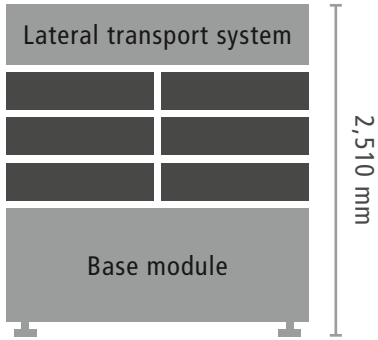


Variants of temperature zone quantities

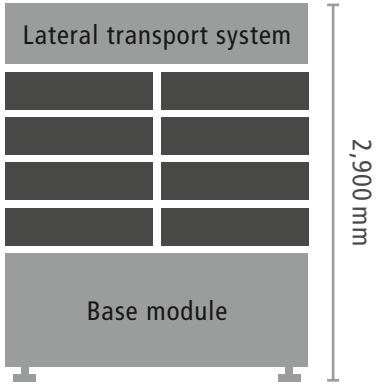
4 temperature zones



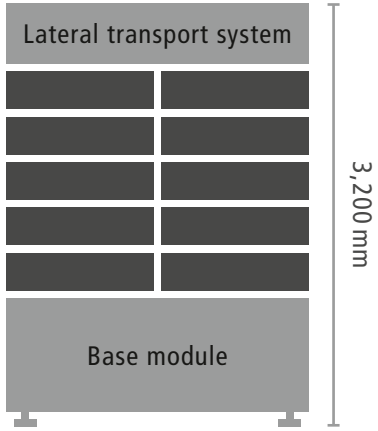
6 temperature zones



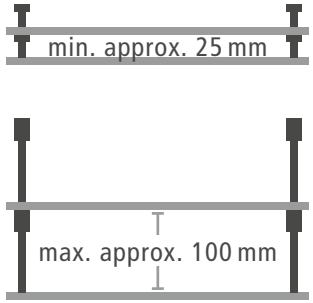
8 temperature zones



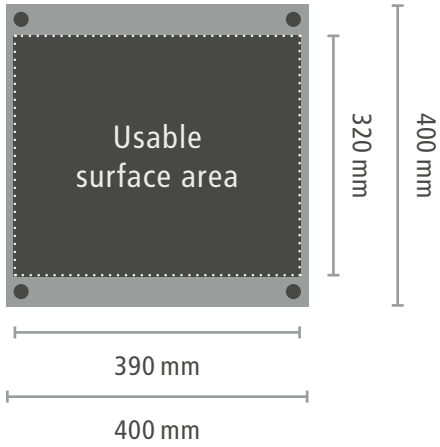
10 temperature zones



Trays



Catch: 5 mm



The thermal system can be equipped with four, six, eight, ten or twelve temperature zones. Heating and cooling zones may be combined with one another as desired. To ensure smooth subsequent processing, it may be helpful to use a cooled zone as the last one before components are ejected from the system.

The gap height between trays may be freely selected between 25 mm and 100 mm in increments of 5 mm. If the smallest gap is used with twelve temperature zones, the system can manage a maximum of 157 trays (including crossways transport and transfer points at the entrance and exit).

CeraCon

Exceeding the standards.

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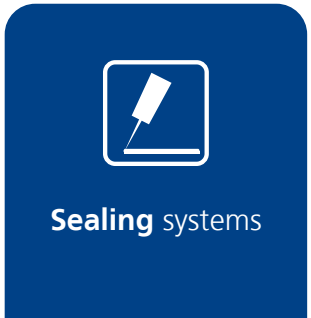

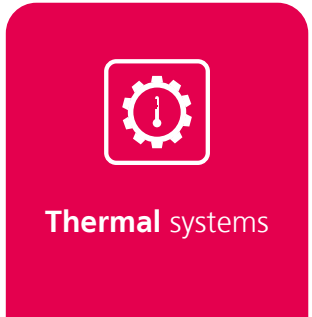

Image sources: CeraCon GmbH, Kratschmann Concept.