

The HOTFLOW 4 Series

Reflow soldering with superior performance
and the best energy balance



Production needs us.

Cost saving through technical highlights

- Increase in productivity through double or triple conveyor
- Grip conveyor
- Optimized energy transfer, minimized delta T
- Zone separation and controlled cooling zone temperature
- Switchable internal/external cooling aggregate
- 100 % inspected process tunnel (gas tight)
- Low energy and N₂ consumption
- Highest machine availability
- Heating- and cooling modules retractable without the use of tools
- Low mass center support, return within the system tunnel
- EPC process control software



The high-end reflow soldering systems of the Ersa HOTFLOW 4 series distinguish themselves by providing excellent thermal performance and the best energy balance. With process lengths from 3.3 meters to over 7 meters, respectively 8 to 26 heating and up to 4 cooling zones, the systems of this series cover all applications calling for economical reflow soldering with the highest throughput and the lowest energy and N₂ consumption. Naturally, the traditionally high solder joint quality achieved with Ersa systems, the optimized process control and the necessary process stability are being maintained, while still offering a very high degree of system uptime.

The newly developed, smart Nitrogen control system substantially reduces the consumption of this costly consumable, offering, in conjunction with the efficient blower motors, a total reduction in energy use of more than 25 %.

In the relation footprint to productivity, the HOTFLOW 4 series redefines the industry standard. Thanks to the dual- or triple conveyor option, the throughput can be substantially increased without enlarging the footprint. And to achieve the maximum in flexibility, up to three different conveyor speeds can be programmed.

Ersa HOTFLOW 4 systems can be equipped with multiple chain conveyor systems, with pyrolysis air cleaning, and with a number of different cooling options.

To ensure the maximum availability of the system for production, only high-grade materials and components are being employed, and much attention has been paid to the requirement that all important components should be able to be replaced within a few minutes.

The Ersa HOTFLOW 4 Series

A suitable system for each application



Truly hot:

Energy efficient motors, perfect air guidance and the raised level of overall efficiency ensure the best heat transfer rate during heating



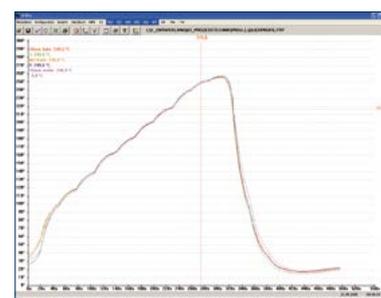
In modern reflow systems, the efficiency of the heat transfer exerts an important influence on all matters related to quality, productivity and operational cost, which, together, directly impact on the profitability of the process. It is just for this reason that in the HOTFLOW 4 model line, special attention was being paid to further optimize the heat transfer rate.

Through adapting the air routing, it was possible to notably raise the

level of overall efficiency of the system. The method of heat transfer in Erska reflow systems guarantees a minimal ΔT at the lowest power consumptions.

Since the efficiency of the heat transfer not only influences the quality of the solder joints, but impacts also on most other cost aspects of a reflow system, special attention was paid during the development stage of the model range to optimize these aspects as well.

Through a new approach in the design of the system, it was possible to reduce the contact area between the inner and the outer shell of the tunnel by 60%, again improving the energy efficiency of the system. Additionally, a heat recovery provision was integrated, whose aim it is to



ΔT across the complete working width <math>< \pm 2^\circ \text{C}</math>; Board used: FR 4 – 1,6 mm, 500 mm x 350 mm

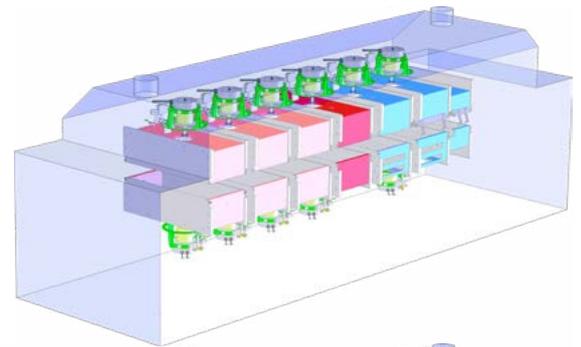
remove heat energy from specific zones and reintroduce it where heat is required. With such features, the HOTFLOW 4 reflow systems from Erska ensure not only the best energy transfer during heating, but they also allow – on account of their energy efficiency - for a quick ROI.

The HOTFLOW 4 Series

Process lengths from 3.30 m up to 7.10 m

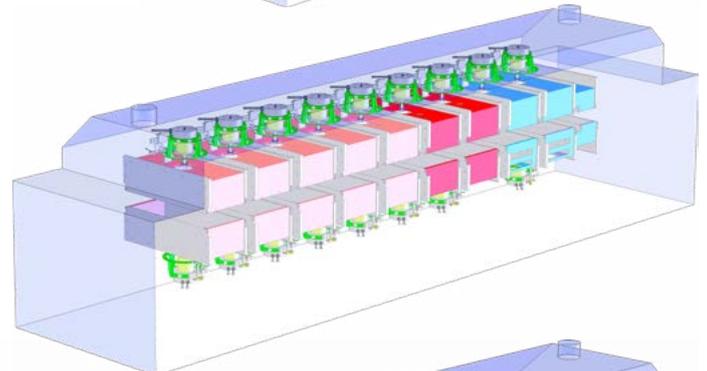
ersa **HOTFLOW® 4/8**

Process length: 3.3 m
Heated zones: 8 zones
Solder/peak zone: 1 zone
Cooling zones: 3 zones
Throughput rate*: 35.2 sec/pcb or
102 pcb's /h



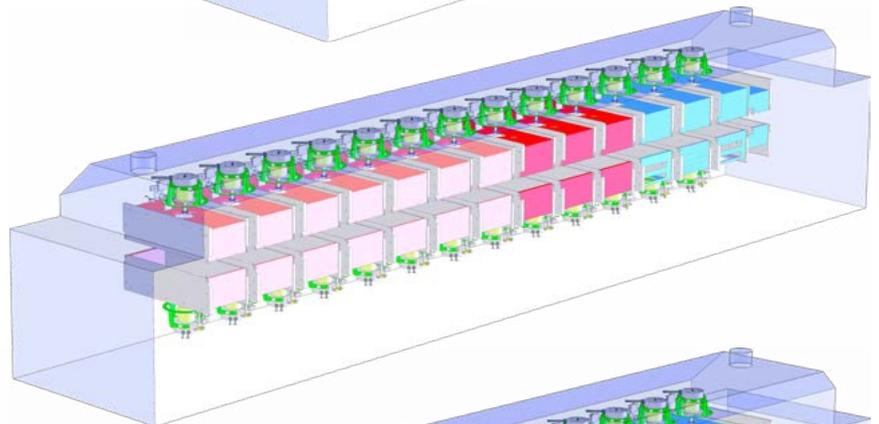
ersa **HOTFLOW® 4/14**

Process length: 4.4 m
Heated zones: 14 zones
Solder/peak zone: 2 zone
Cooling zones: 3 zones
Throughput rate*: 18.5 sec/pcb or
194 pcb's /h



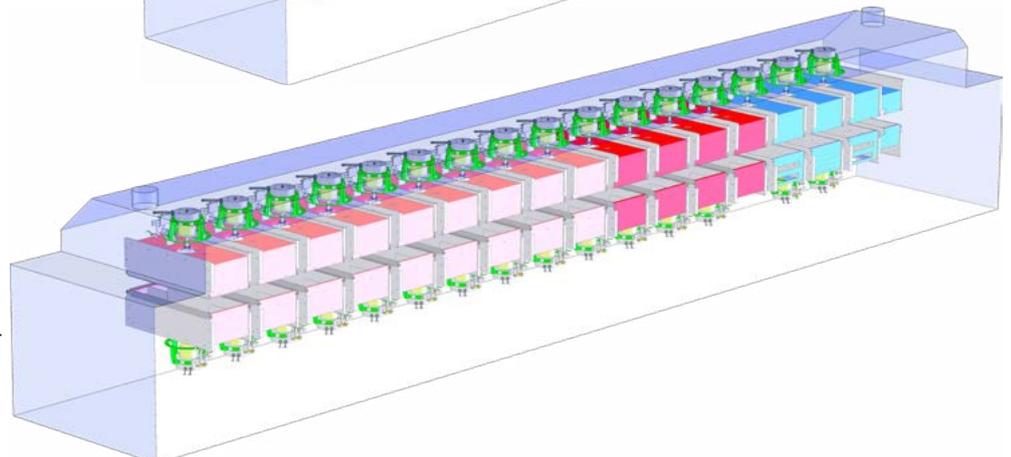
ersa **HOTFLOW® 4/20**

Process length: 5.9 m
Heated zones: 20 zones
Solder/peak zone: 3 zone
Cooling zones: 4 zones
Throughput rate*: 12.8 sec/pcb or
282 pcb's /h



ersa **HOTFLOW® 4/26**

Process length: 7.1 m
Heated zones: 26 zones
Solder / peak zone: 4 zone
Cooling zones: 4 zones
Throughput rate*: 10.2 sec/pcb or
352 pcb's /h



* based on: 1.6 mm FR4 PCB,
PCB length of 320 mm

Truly cool:

Aligning the cooling capacity to the actual process requirements allows for substantial reductions in the aggregates and in power consumption



An efficient thermal management is the determining factor for the optimal performance of a reflow soldering systems. Yet, it is not only a sophisticated and precise heating technology that is called for, but of equal importance is a precise and energy efficient cooling process. The cooling gradient is an important process parameter for the quality and structure of the solder joints, but it is equally important for subsequent production processes, for which a defined exit temperature is required to allow an error-free handling



of the assembly. The state-of-the-art HOFFLOW 4 generation of systems therefore features a multi-level, energy efficient cooling system.

Cooling stage 1 is integrated in all N_2 systems. In this stage, the hot process gas removed is cooled down by an internal system of circulating cold water. The tempered process gas is fed back into the process tunnel in the first cooling zone, cooling down the assemblies. The cooling gradient is controlled by the RPM's of the fan motors in the cooling zone. The heat that has been removed is sent via the exhaust air directly to the outside of the building, without increasing the ambient temperature of the factory area. In the exit area, the boards are additionally cooled by ambient air, an energy efficient method to achieve the optimal board temperature for the next production sequence.

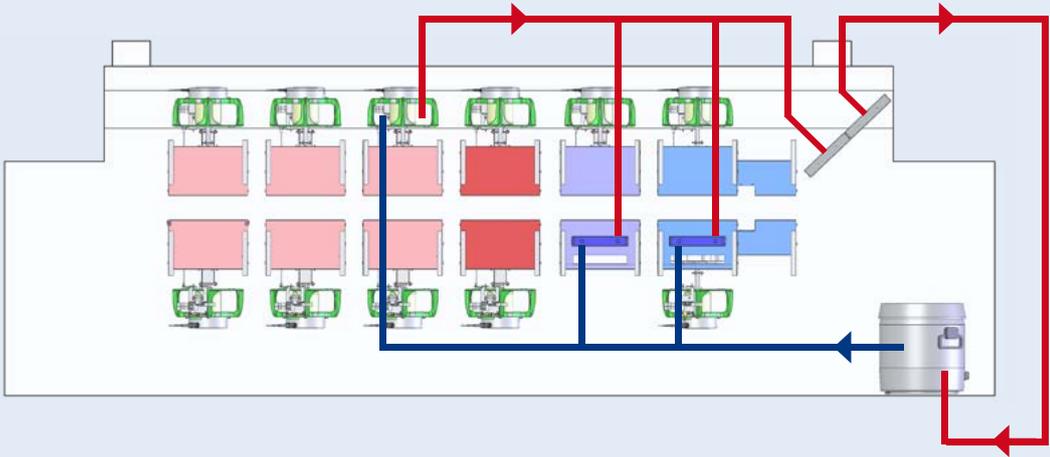
Cooling stage 2 features an additional external cooling aggregate, which raises the cooling capacity for demanding applications. This is called for if, without further additional steps, an AOI system, which requires a low board temperature in order to perform without errors, is integrated into the production line. Pseudo-errors are drastically reduced, and the cost for downstream cooling systems can be eliminated.

The temperature controlled cooling features of the HOFFLOW 4 systems offer Ersas customers the maximum in flexibility when selecting a cooling gradient for their process. With it, board assemblies can be safely cooled down, and the highest quality standards are being assured without having to accept compromises in the question of energy efficiency.

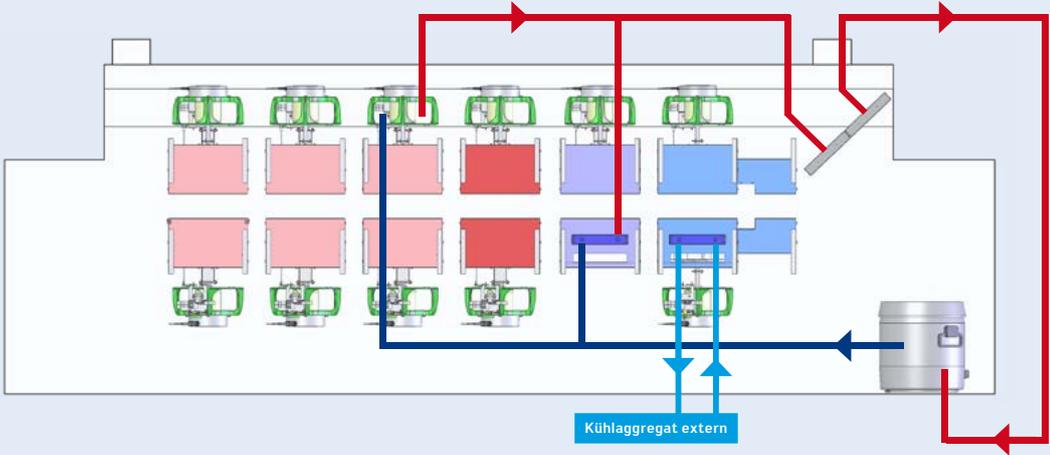
The HOTFLOW 4 Series

Cooling in matching steps

Basic Cooling:
Air cooling



Cooling Step 1:
Internal cold water circulation



Cooling Step 2:
Internal cold water circulation
with external cooling aggregate

Truly clean: The Ersa No-Clean Management for cleanliness in the process zone



Cleanliness of the process zone is of supreme importance in the reflow process, since it determines the uptime of the system and ensures a stable and reproducible process. Contaminations in the process gas atmosphere stem from various sources. The two most important are the solder pastes and the base material of the printed circuit board.

It is the most basic task of the no-clean-management system to remove these contaminants from the process gas atmosphere, so that neither the board assemblies nor the process gas tunnel are soiled by them. To cover and effectively remove as broad a spectrum of contaminants as possible, the no-clean-management consists of two resp. optionally three levels. The primary goal of each of the levels is, aside

from a high cleansing efficiency, the targeted deposition of the residues outside of the process zone.

Stage 1 encompasses the preheat area of the process zone. At the beginning and at the end of the preheat zone, a portion of the process medium is being removed from the tunnel, cleansed, and returned to the process. Heat losses to the outside are reduced by an innovative way of routing the air flow. The heat exchangers of this stage are easily accessible from the outside, have quick connects and can be removed for cleaning quickly and without the need for tools.

Stage 2 of the system is integrated after the peak zone. The hot process gas of the peak zone is extracted towards the top and the bottom,

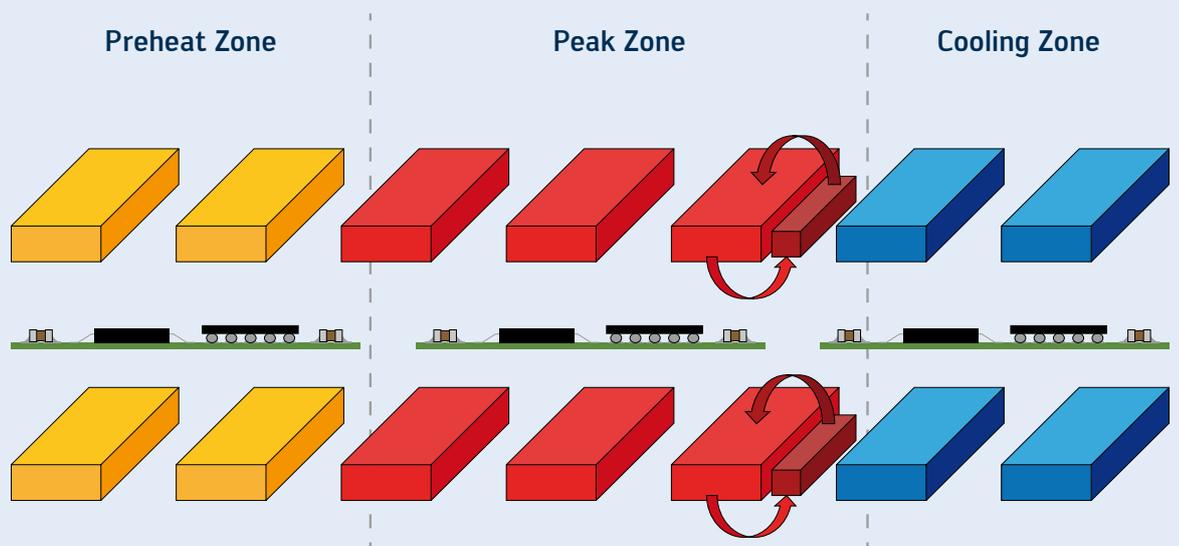
moved across a heat exchanger and subsequently fed back into cooling zone 1.

Cooling stage 2 and 3 also function with heat exchangers. A special feature of this stage is the automatic signal advising that maintenance is required. The operator enters into the software a value for the degree of contamination of the heat exchanger, and when this value has been reached the signal calling for maintenance is being triggered. Maintenance intervals are no longer a matter of fixed cycles, but are dependent on the throughput of the system.

The cleaning of the heat exchangers can be achieved with exchange units, and the process tunnel need not be opened for this.

The HOTFLOW 4 Series

Residue terminator – the maintenance free thermal process gas cleaning



Aside from low condensing compounds, long-chain molecules which deposit on the hot inner surfaces of the process chamber are present in the process atmosphere, contaminating the tunnel.

To effectively remove these types of contaminants, the long-chain molecules must be broken up through their exposure to high temperatures. Thereby, harmless compounds are being formed which will not condense in the process zone.

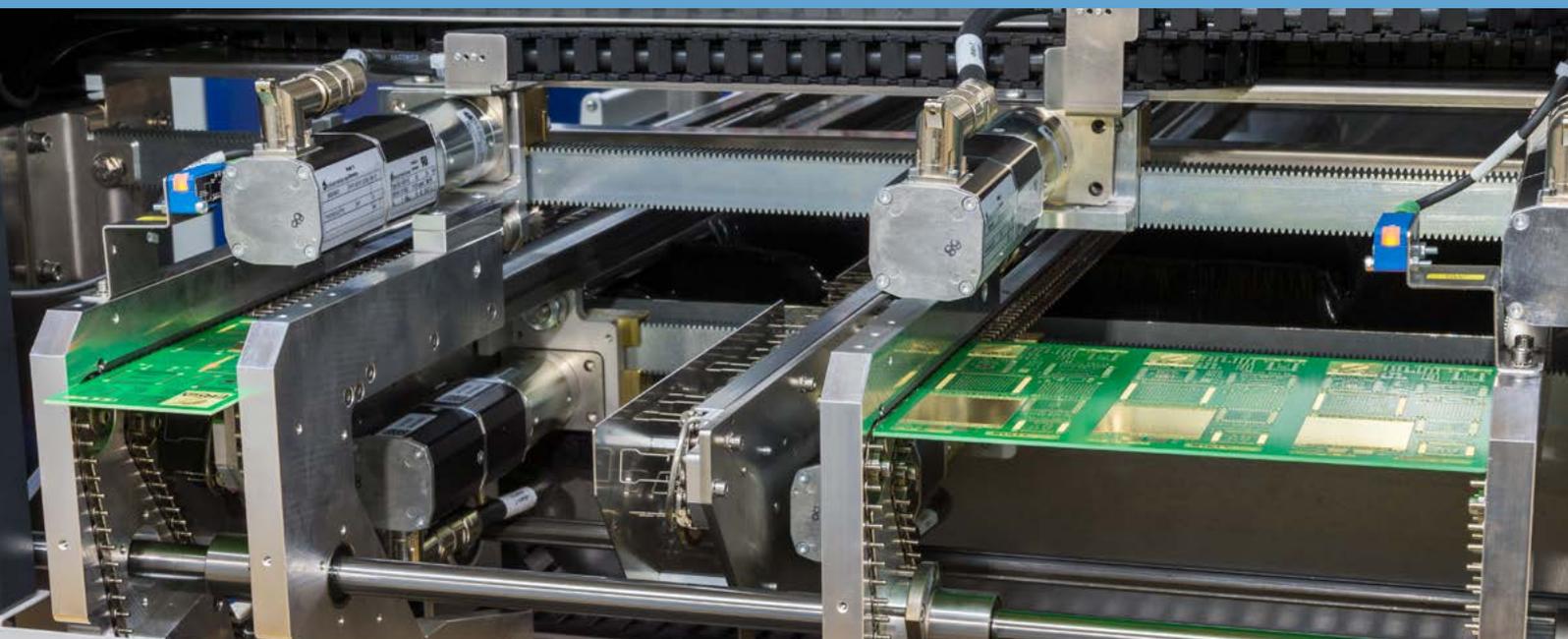
This optionally available cleaning stage is designed such that the hot process gas is extracted right at the upper and the lower peak zone. Immediately after their extraction, the gas is heated up to the temperature required to commence its cleaning. The cleaned gas is, following the direct route, reentered into the peak zone.

The power used to heat the stream of process gas in the cleaning stage leads to a significant reduction of power used by the heaters in the peak zone. Thus, the energy balance of the total system is neutral, that is, the thermal process gas cleaning consumes no additional power.

This technology is maintenance free and fully integrated into the tunnel. A further advantage of the extremely short distances found in the system and in its compact design, is the gas tightness that is achieved when soldering in a protective atmosphere of N₂.

In conclusion, the thermal process gas cleaning feature significantly contributes to a reduction of maintenance required, substantially raising the system uptime.

Truly variable: Innovative Ersa Grip conveyor technology for printed circuit boards as well as flex boards in mixed production



The trend in reflow soldering technology is clear – users demand equipment providing them with high uptimes, which performs consistently and reliably to a high quality level, and which demonstrate excellent economic efficiency that will allow for an ROI in no time. It is clear, that these demands can only be met by systems offering multi-track operation, which in turn has a direct impact on the design and structure of new SMT production lines.

State-of-the-art production lines simultaneously feed one reflow system from a number of conveyors with different board assemblies. This calls for a high degree of flexibility of the reflow system, but it also means that the materials and components used are subject to increased wear and tear.

Highest throughput at a small footprint – Multi-track conveyor system

The heating technology employed in the Ersa reflow systems has been able to prove itself for many years, especially so in multi-track applications and in high-volume productions. Its excellent heat transfer and its high thermal stability permit the integration of multiple tracks into one reflow systems. Not only is it possible to solder the same board assemblies on multiple tracks, but also, on account of the independently controllable conveyor speeds of the tracks, different assemblies can be simultaneously processed.

Productivity increases of up to 300% can be achieved when compared to other equipment currently on the market, without impacting on the thermal stability of the processes.

Precise, power saving and reliable – Low- mass center support

The HOTFLOW Series allows simultaneously producing different products requiring different conveyor width and differing conveyor speeds. The center support, with its extremely small mass, features continuous board support throughout the process tunnel. Particularly when processing thin boards this is necessary to prevent sagging or warping under the influence of the heat, and to ensure their planarity over the full length of the reflow system.

The specially developed supports of the Ersa center support automatically fold under for the return, so that the lower convection modules can be placed as close as possible to the board assembly. In multi-track systems, the center supports for the individual tracks can

be placed independently of each other, so that at all times the maximum of support is ensured. In order to achieve the greatest latitude for components mounted on the underside of the assembly, it is also possible to completely move the center support from the working area of the track. It is equally possible to use two or three center supports on a single track. Its mechanical stability, low heat capacity, lack of a shadowing effect, as well as its minimal space requirement are additional advantages of this proven technology.

Temperature neutral, flexible and precise – Ersa conveyor system

It is only possible to achieve process stability in reflow systems when the conveyors as well as the center supports are meeting the highest technical demands. In order not to have an influence on the heating process, both need to be as temperature neutral as possible. By the use of the most up-to-date materials, the low-mass conveyor of the HOTFLOW ensures absolutely stable board conveyance.

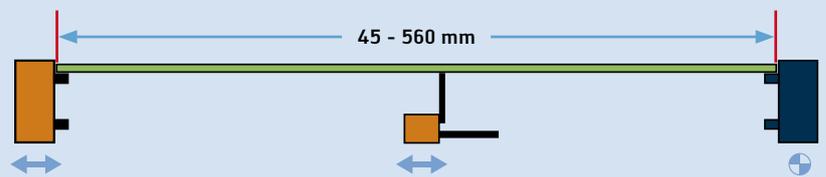
The conveyor chain of the HOTFLOW is manufactured from high-grade, low wearing material and operates 100 % vibration free. The small radius of the chain at the infeed section of the system ensures the safe transfer of even short assemblies. The automatic chain lubricator is programmable and ensures the long life of the conveyor chain.

The new GRIP-conveyor chain was developed specifically for very thin printed circuit or flex boards, which, aside from the center support, require an additional hold, since they tend to sag or warp already under small thermal loads as well as on their own weight. The sensitive grippers optimally ensure, over the full process length, the safe conveyance of the board assemblies.

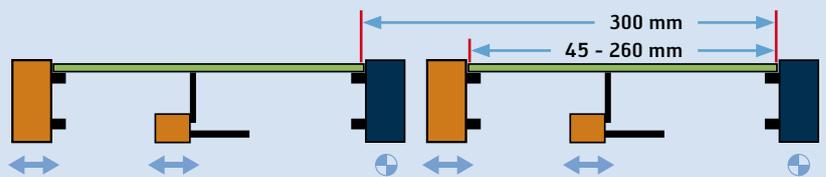
The precise HOTFLOW conveyor system ensures the user of the ability to reliably process both standard as well as highly complex printed circuit board assemblies to the highest quality criteria.

The HOTFLOW 4 Series

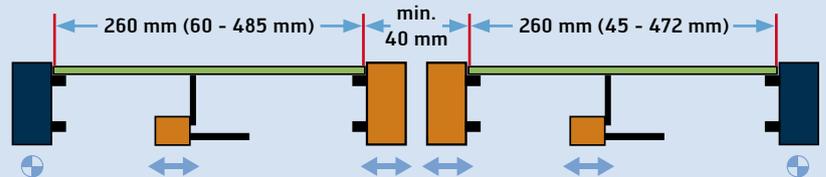
Conveyor systems from single to triple-track operation and up to three different conveyor speeds



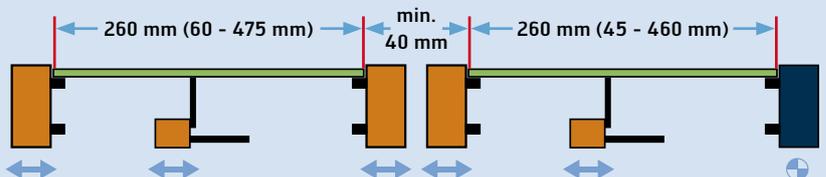
Single track: 1 center support and 1 rail variable



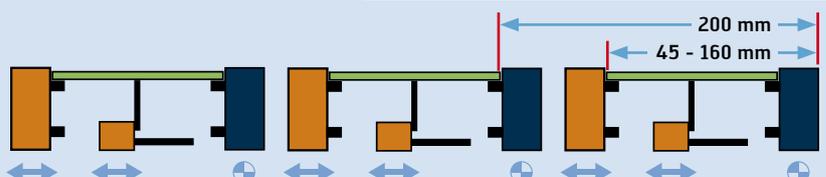
Dual track: 2 center supports and 2 rails variable



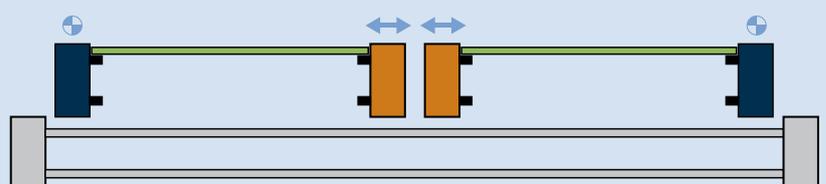
Dual track: 2 center supports and 2 rails variable



Dual track: 2 center supports and 3 rails variable



Triple track: 3 center supports and 3 rails variable



As an alternative to the center supports, the conveyors could also be equipped with a low mass tubular support safety conveyor running below the conveyor rails (example shows safety conveyor below dual track conveyor).



Truly comfortable: ERSASOFT – complete control and visualization of all processes

*ERSASOFT
provides complete
control and
visualization
of the process*



Software Highlights

- System control and monitoring
- Editing and administering solder programs
- Trace data acquisition as per ZVEI-standard (included)
- Solder protocols, process writer
- Alarm messages management
- Automatic time control
- Clearly arranged and intuitive to operate
- Comfortable touch operation
- Backward compatibility
- Linking to Manufacturing Execution System (MES) possible

All Ersas reflow systems are operated under PC control with ERSASOFT. This machine visualization software offers numerous functions which assist the system user to operate the system error free.

For comfortable touch operation, special attention was paid during the design of the user interface to display all control elements in sufficiently large icons. Colored and uniformly structured dialogues allow for quick orientation. The clear separation of input masks and dialogues offers an excellent overview. The structured build of the software supports the intuitive and therefore easy to learn operation of the system. Furthermore, through the competency-based allocation of user rights, an incorrect operation of the system is prevented.

While all Ersas reflow soldering systems uniformly operate with the standard version of ERSASOFT, but only such data is displayed that corresponds to the actual configuration of the system. For those who have previously worked on an Ersas selective soldering- or wave soldering system, the analog structure of the software is quickly recognized. Training of the operators of the reflow system can therefore be held to a minimum.

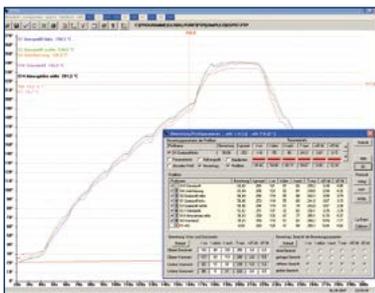
The process writer, which continuously records the nominal values of all aggregates relevant to the soldering process, and the solder protocol, which stores the process data with all information necessary for traceability, is included in delivery.

All messages occurring are stored with time stamp and user recognition. The data is available in the XML format, making it easy to process it on higher level systems.

It is worth to note that ERSASOFT is completely downwards compatible within a system generation. That means that customers can be certain that innovative software functions, becoming available after he has purchased his equipment, will be available for his system as well.

Ersa Sensor Shuttle PTP®

Professional temperature measuring system



Auto. profile evaluation with 6 parameters; Display of the continuous gradients; and up to 17 profiles

The Ersa Sensor Shuttle PTP® is an ideal and flexible instrument for evaluating and monitoring processes. When it comes to measuring temperature, speed and evaluating solder wetting profiles, this system can be used in any mass soldering process including reflow, wave and selective soldering. The system lets the user monitor the processes online and evaluate the reported parameters in real-time.

The wireless data transmission uses Bluetooth technology which makes the Ersa Sensor Shuttle PTP® especially easy and convenient to use. The system is equipped with 8 measurement channels that can be connected to commercially available Ni/CrNi thermocouples.

The appropriate measurement boards fulfilling the various requirements are available for all soldering processes. If measurements are performed on actual PCBs in a reflow system, a flexible transport carrier is provided for conveying the Shuttle system. This carrier is easily adapted to the transport width required by the reflow oven.

The Ersa Sensor Shuttle Software PTP® uses a graphical display to aid in optimally evaluating, documenting and archiving the measurement data.

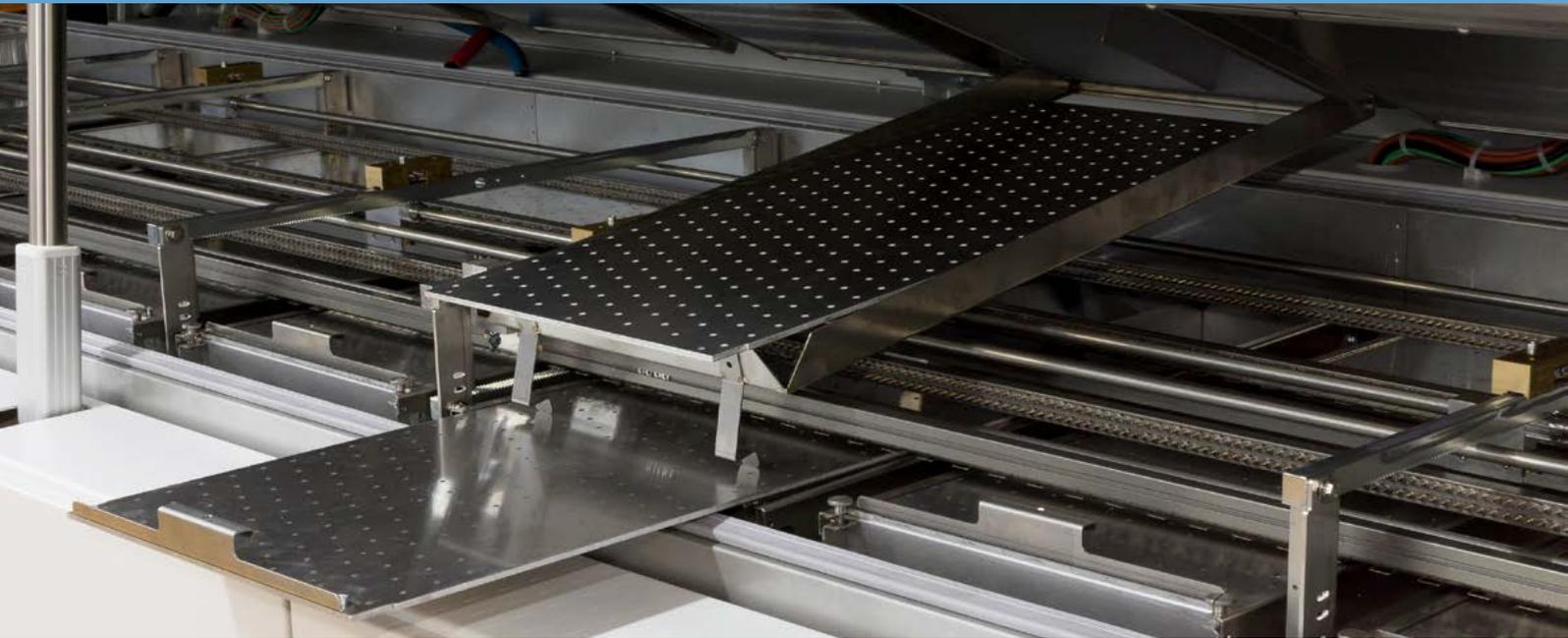
PTP® runs on Windows XP/7 thereby providing a simple and user-friendly menu control and offering all the advantages of Windows technology.

Advanced profile evaluation offers the following capabilities: temperature evaluation at any given moment, maximum temperatures, temperature gradients, differential temperatures, min./max. solder wetting times, conveyor speeds and envelope curves with automatic report generation. An overlay function allows current profiles to be compared with saved reference profiles.

Integrated Bluetooth wireless module; Data transmission and display in real-time

The HOTFLOW 4 Series

Highest uptime through maximum ease of service



Ease of maintenance and serviceability, as well as the total time required to perform the necessary maintenance, play a major role when looking at the performance capability of a modern reflow soldering system. But, for a user, performing maintenance means that during this time the system is not in productive operation.

To keep this downtime to a minimum, great importance was placed on this issue during the design of the HOTFLOW 4. Aside from the ability to widely open the hood, which makes it possible to easily access the interior parts of the system. Modules that need to be regularly maintained are placed in service friendly positions. All are immediately accessible, without having to remove any other components. In addition, all system parts that need to be maintained

are designed such that their removal does not require any extra tools. The heat exchangers, for example, are pluggable and can quickly and easily be removed and cleaned. These provisions are all in addition to our using only wear-reduced or wear-free components. By implementing these measures, Erska has managed to reduce the time required for maintenance and the associated costs to a minimum, and to maximize the uptime of the system and the availability for production.



SOLUTIONS4YOU

Ersa product portfolio



■ Screen & Stencil Printer

VERSAPRINT screen printing systems with fully integrated in-line post print inspection offer unique cost and technology benefits. The revolutionary LIST camera offers an inspection beyond compare: detection of paste on pad, print offset, bridges and stencil blockages in in-line speed.



■ Rework

For more than a decade more than 5000 users all around the world benefit from the patented Ersa IR rework technology. Besides their excellent cost-benefit-relation Ersa systems have conquered their leading market position for their outstanding results even in demanding rework tasks.



■ Reflow Soldering

Ersa reflow soldering systems convince by their extraordinary thermal performance, highest machine availability and low operating costs. The Ersa HOTFLOW 4 series has mastered to significantly reduce the energy and N2 consumption on a comparable performance level



■ Inspection SMT/BGA

No matter if a reworked BGA needs to be inspected or the parameters of a production line need to be verified – ERSASCOPE inspection systems for the damage free inspection of covered solder joints have become the standard in electronic productions.



■ Selective Soldering

As technology leader Ersa delivers perfect solutions for all selective soldering tasks: the scope of configurations ranges from start-up to high-end, from inline to cell production, from single to multi wave soldering and from highest flexibility to highest throughput and make the VERSAFLOW, ECOCELL and ECOSELECT systems the ideal match for the demands of the users.



■ Soldering and Desoldering

Ersa soldering and desoldering stations impress by their compact size, high performance, energy efficiency and low operating costs, since inexpensive exchange soldering tips are used. Being the i-CON family's flagship it offers the user 4 tools to master demanding soldering applications.



■ Wave Soldering

The cost-benefit ratio of wave soldering is still outstanding. But the demands of the users differ widely. Therefore Ersa offers an extensive range of individually configurable systems, from basic to high-end.



■ Solder Fume Extraction

Ersa solder fume extractions are the efficient and economic way to ensure clean PCBs and healthy breathing air. The big nozzles, which are available in different shapes, efficiently extract the solder fumes of an entire workspace.



■ Automation

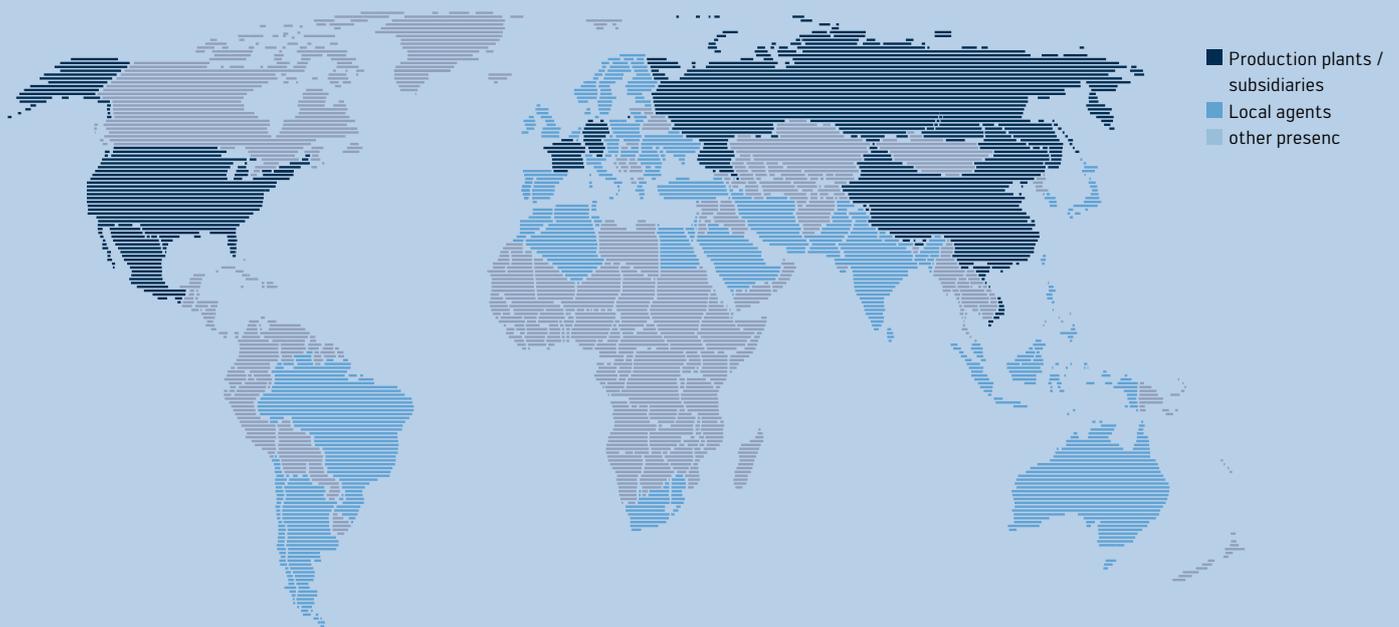
Ersa presents the collaborative ROBOPLACE, an innovative automation solution based on a flexible 2-arm technology, which lifts the inline production of PCBs for industry and automotive to the next level.



■ Services/Employer Trainings

Beside the broad product range Ersa offers comprehensive services like employer training and qualification, machine and production process audits, maintenance contracts, ramp-up support, machine capability studies or online spare part catalogues. Tell us your needs - we find the solution!

Electronics Production Equipment Worldwide Presence



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