

## The HOTFLOW 3 Series

Reflow soldering on the highest quality level at the lowest operating cost



# Production needs us.

## Cost savings through technical highlights:

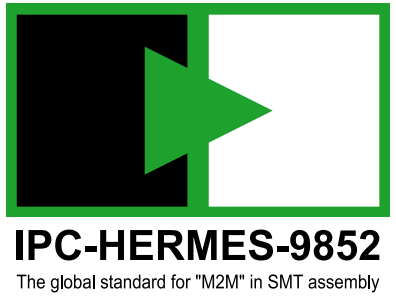
- Best heat transfer
- Highest throughput
- Smallest cross-sectional  $\Delta T$  over the entire process width
- Maximum machine availability
- Best energy balance
- Lowest energy consumption
- Best oven stability
- Excellence serviceability
- Ready for Traceability

## Soldering systems with innovative reflow technology for maximum quality at lowest operating costs

Global shifts in labor costs, rising energy costs and exchange rate risks are increasingly weighing on profitability. Maintaining the competitive edge will go to those strategic manufacturers who maximize production output per m<sup>2</sup> of floor space, who minimize the defect rate and minimize the total cost of production per PCB: better said, who maximize the total profit per PCB.

Ersa is one of the world's leading suppliers of quality machines and equipment for the highly competitive PCB manufacturing industry. We have made one of our customers' main production challenges our own: guaranteeing the highest productivity with the lowest running cost.

With the HOTFLOW 3 series, Ersa has been successful in optimizing the systems in such a manner that, for all aspects important in the reflow process, their systems provide superior results. Only highest quality materials are used and care is taken to ensure that all important parts can be replaced within only a few minutes.



# The Erska HOTFLOW 3 series

A suitable system for each application



# Multijet Heating Cassette Technology

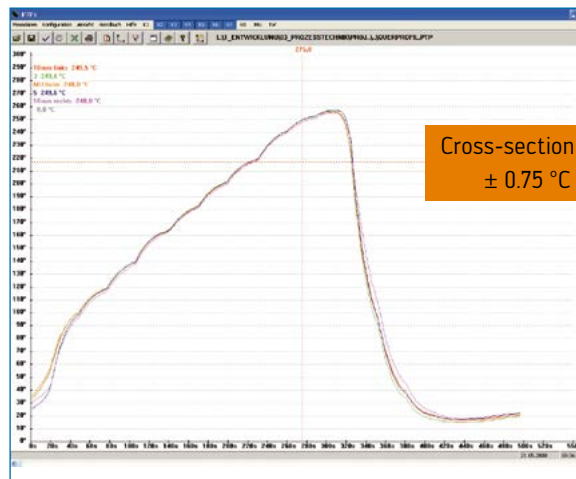
## Best coefficient of heat transfer with smallest $\Delta T$ on the market



*The specially designed Ersu nozzle system - improved heat transfer with high density multijets*

In a reflow oven, the efficiency of the heat transfer has a primary effect on all aspects of quality, productivity and running costs which directly influence profitability. Our heat transfer guarantees a minimum  $\Delta T$  which translates into maximum profile flexibility.

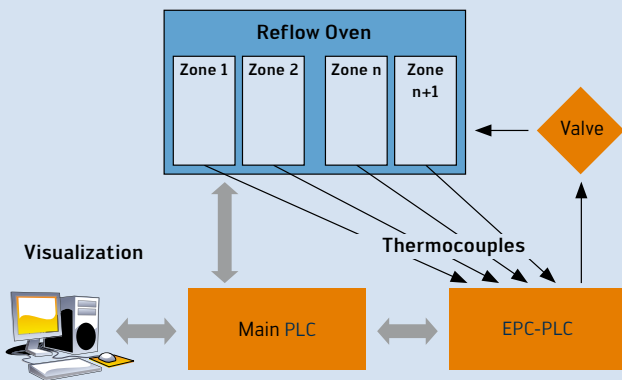
The proven Ersu Multijet heating technology has been re-designed and improved to achieve a completely new level of reflow performance. A value added and measurable result of this innovative heating technology is one of the smallest machine cross-sectional  $\Delta T$  of any reflow oven in the world while consuming less energy as is required by some competitive heating technologies.



*Cross-sectional  $\Delta T$  below  $< \pm 2$  °C  
FR4 Test board: 1.6 mm thick; 500 x 350 mm*

# Unrivaled Process Control

EPC – reproducible results through a redundant measuring system in the HOTFLOW 3



Working with the correct parameters, a soldering system will deliver optimal soldering results. Yet, it needs to be assured that these results can be produced with sustained repeatability. Therefore, the relevant processes need to be closely monitored.

This can be achieved in either of two ways: The first would be to intermittently record profiles of individual boards, and compare these for consistency with previously recorded profiles, while the second method is to continuously monitor the main process parameters such as the conveyor

speed, the zone temperatures and the convection in each zone. It is these three parameters which mainly determine the temperature profile of a board in a reflow system, and the more constant these are, the easier it is to reproduce the process.

While other measuring systems on the market consider only conveyor speed and zone temperature, leaving aside the performance of the convection in the individual zone, it should be clear that for the effective transmission of the thermal energy, the total amount of convection is important. It is therefore possible in the Ersä HOTFLOW 3 reflow soldering systems to exactly determine, with the optional EPC (Ersä Process Control), the amount

of convection in each zone. With this unique method, specifically developed for this purpose and patented by Ersä, the convection in each zone is continuously measured.

This assures having reliable process data at all times. Deviations lying outside the tolerance window are recognized and reported immediately. Potentially expensive defects because of an unstable process are effectively eliminated. EPC makes a valuable contribution to quality assurance.

*EPC - redundant measuring system to monitor the most important parameters in the reflow process*

# Optimized Reflow Process Tunnel

## Process stability under all load conditions



*Improved reflow process tunnel - process tunnel, tested for tightness, guarantees long-term stability*

The highly efficient reflow heating system allows for a maximum reproducibility for any loading conditions. Regardless of type, size and mass, the improved Multijet heating technology requires almost no distance between PCBs.

The ovens of the HOTFLOW series guarantee absolute process stability even when running at "Board on Board" maximum capacity. Furthermore, intermittent and/or continual loading does not affect the long-term process stability of the machine even in a "24/7" 3 shift production environment.

Finally, Erska offers "Copy Exact" machines meaning that all machines have similar process and temperature stability. It is normally not necessary to re-profile an Erska oven when a product is moved from one machine to another.

### **Energy balance – energy and nitrogen consumption**

The high-efficiency heat transfer system requires only little energy to run heating elements and blower motors. The Multijet technology in combination with "intelligently" regulated,

low-energy blower motors, allows for the minimum energy consumption requirement while guaranteeing the maximum process stability.

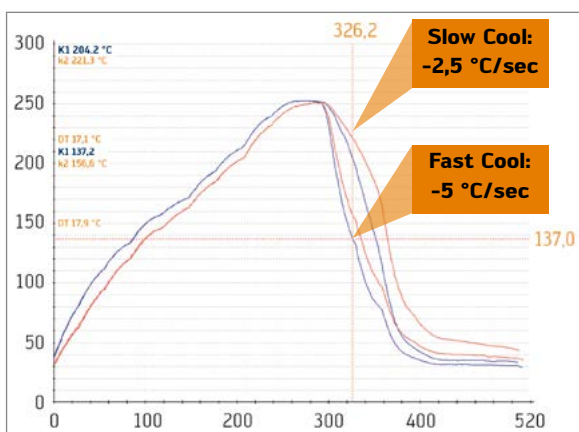
High-quality insulation materials keep the heat energy in the process tunnel and avoid heat radiation into the environment of the machine.

# Active Cooling Technology

## Power cooling – PCB exits “Cool to Touch”!



*Advanced active cooling - top- & bottom-side cooling available on demand*



*Maximum flexibility by cooling - cooling gradient can be set at fast or slow*

### “Power Cool” advanced active cooling technology

The demands on an efficient cooling system in a reflow oven are higher than ever. First and foremost, the cooling gradient plays an important role in the homogeneity of soldered joints.

For lead-free applications, JEDEC recommends a cooling gradient between 2 to 6 °C/sec in order to achieve an optimal solder joint microstructure and in order to prevent component damage.

In addition to joint integrity, one major demand on cooling has to do with the exit temperature of the PCB for further handling.

Post reflow AOI systems require the PCB to be near room temperature. Unwanted fluctuations in the exit temperature of the PCB surface can result in unwanted false calls.

### Active cooling and zone separation

The newly designed system offers additional cooling capabilities. If desired, it is even possible to achieve a cooling gradient as high as 10 °C/sec! PCB exit temperatures **below** 40 °C are now possible for high-volume applications. This translates into Direct Savings: no space and invest requirements for additional cooling and a significant decrease in the AOI false calls.

Additionally, the possibility to control the temperature of the cooling medium provides the maximum flexibility in the drive to achieve a desired cooling gradient in the profile.

# Maintenance-On-the-Fly

## Highest machine uptime due to maintenance-friendly machine design



**Maintenance "On the Fly"**  
- the system continues to operate in production while the condensation management system is being cleaned



**Quick and easy servicing**  
Through excellent accessibility and connections through quick couplings

Maintenance and service friendliness and the required time play a very important role in the consideration of the performance of a modern reflow system. Ultimately, maintenance means usually nothing else as machine downtime and thus production downtime.

With the "Maintenance-On-the-Fly" option, the condensate management system can also be cleaned while the system is in operation. This means: no machine downtime and no production downtime due to machine maintenance.

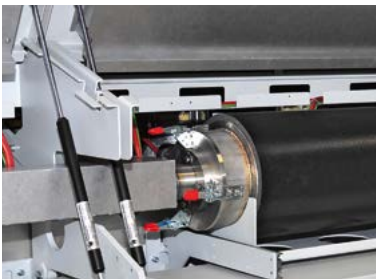
The "maintenance on the fly" concept of the HOTFLOW series reduces machine downtimes to an absolute minimum.

The HOTFLOW 3 series is designed to be easy to service. This means that all important parts can be replaced for service or maintenance in less than 15 minutes. The heating and cooling cassettes can be replaced manually within a few seconds - "quick-change principle". Special tools are not necessary.

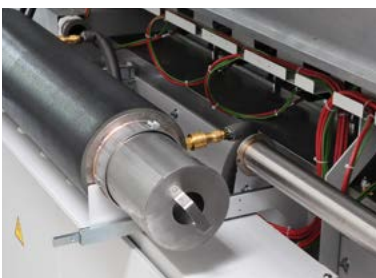


# Condensation Management

## Efficient process gas cleaning system



*Condensation management with cleaning granulate*



Keeping the oven clean from residues, remains to be a major concern during a reflow process. Ersa's proven multi-stage management system has been completely re-designed to offer new DUAL capability.

The HOTFLOW 3 can now be fitted with a substantially improved process gas cleaning unit. Up to now, the process gas was extracted from the tunnel between the reflow and the cooling zone, subsequently cooled down respectively cleaned and fed back to the system in the cooling zone. The condensate, accrued during the cooling process, was collected in the condensate trap, which had to be cleaned in regular intervals.

This system has now been extended through the supplementation of a further cleaning stage in the heated section. Thereby the process gas is removed through a conduit, at the end of the preheat area and from the peak zone, fed to the cleaning unit and subsequently, after having been cleaned, it is fed back into the tunnel at the beginning of the preheat zone.

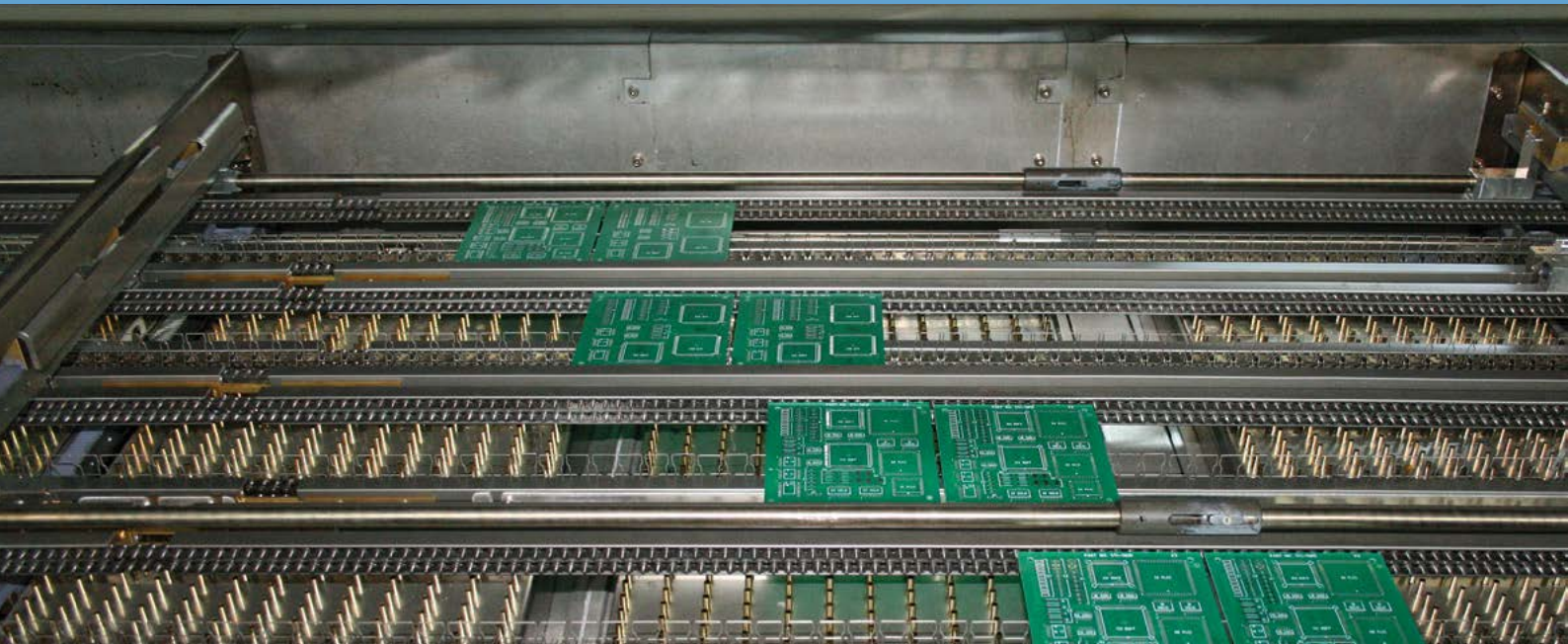
This cleaning unit is of two-tiered design. The first tier consists of an easy to replace cartridge, which is filled with a fine-grained granulate cleaning material. When the process gas passes through the granulate material, the

impurities (solvents released from the components, the boards, the solder pastes, etc.) are partially broken down, whereby their physiochemical properties are altered in such a way, that a condensation inside the tunnel is prevented. In the second tier the gas is routed through a specially developed heat exchanger. Here the remaining impurities condense out and are removed, and the clean gas is returned to the process. As was the cartridge, the heat exchanger as well can easily be removed and cleaned. With this new cleaning stage, a considerable extension of the time between cleaning cycles has been achieved.

Note: This feature can be retrofitted in all models of the HOTFLOW 3/14, 3/20, 2/14 and 2/20!

# Multiple Track Capacity

## Productivity with highest throughput



*Multitrack ovens for multiple placer lines. Dual, triple and quad transport machines available.*

### Highest throughput using multiple track

The running demands on a reflow oven and the calculated ROI depend on the expected utilization requirements. Strictly from a profit per PCB standpoint, it is the highest volume "24/7" applications which put the highest demands on a reflow system and which push the ROI calculation to the limit.

As a German manufacturer, it remains our primary focus to offer top quality and highly innovative machine technology which adds measurable value to our customers' PCB manufacturing process. For this reason, the R&D behind the HOTFLOW 3 series was designed to offer the fastest ROI under the most demanding production conditions.

### Best machine output/m<sup>2</sup> of floor space

Defining our primary customer target group as having the most challenging demands, Erska engineers realized that multiple track capability represents the future for high-volume reflow. Multitrack reflow also opens the door to new SMT line planning as multiple SMT placer lines can be funnelled into one reflow oven. It must be said here, however, that only a highly efficient and utterly stable heating technology is a necessity when considering dual or multiple track transport.

Erska heating technology has proven itself for several years in double track reflow applications in large series production. The result was optimized heat transfer and even higher thermal

stability. This allowed further transport tracks to be integrated into the process tunnel without any negative impact on the thermal properties of the systems.

As a result, productivity increases of up to 400% compared to conventional machines are possible.

Different products can be run at different board widths and at different speeds offering not only the highest reflow output/m<sup>2</sup> of floor space but also offering the greatest flexibility.

## Extremely low-mass center support

Precise, reliable and energy-saving

The extremely low-mass center support (German utility patent granted) offers continuous support especially for very thin PCB substrates and guarantees linear precision over the entire length of the oven. The specially designed supports automatically fold down flat to allow for bottom-side Multijets to remain as close as possible to PCB. Mechanical stability, no heat absorption or shadow effects as well as minimal space requirement are the essential advantages.

## Accurate and high-quality transport conveyors

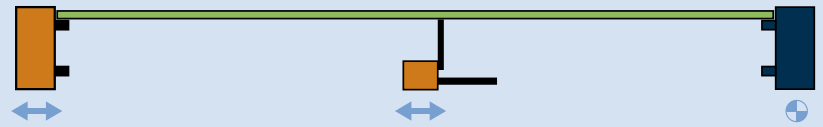
Long-term process stability

Long-term process stability puts high demands on a reflow machine's transport and center support systems. Although a transport system is required to move the PCB through the process tunnel, in theory the transport should be "thermally invisible" so that it does not adversely affect the PCB heating process. The low-mass transport module of the HOTFLOW is characterized by its high stability, since only special materials are used. This ensures absolutely stable transport conditions.

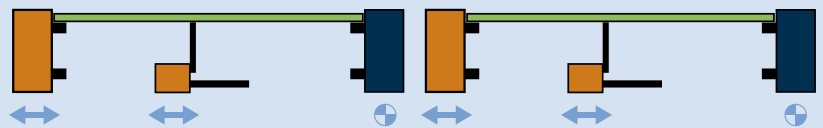
The HOTFLOW conveyor chain is of high-quality, wear-resistant materials, and it runs 100 % vibration-free. A small radius at the chain infed section ensures safe handling even of short PCBs. The programmable automatic chain lubrication guarantees a long service life of the chain.

# The HOTFLOW 3 Series

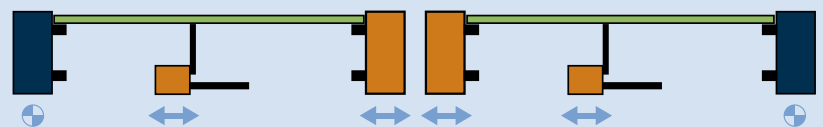
## Conveyor systems from single to quad track operation and up to four different conveyor speeds



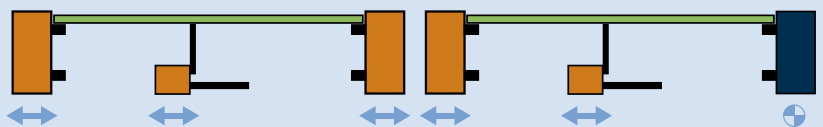
Single track: 1 center support and 1 rail variable



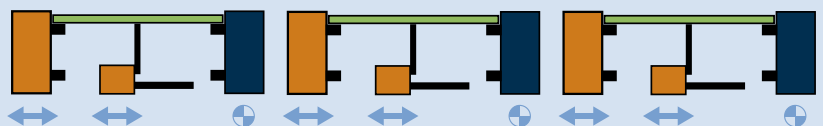
Dual track: 2 center supports and 2 rails variable



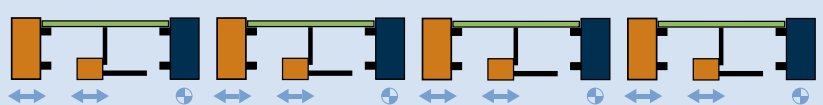
Dual track: 2 center supports and 2 rails variable



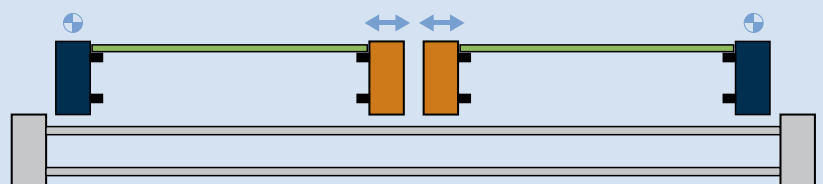
Dual track: 2 center supports and 3 rails variable



Triple track: 3 center supports and 3 rails variable

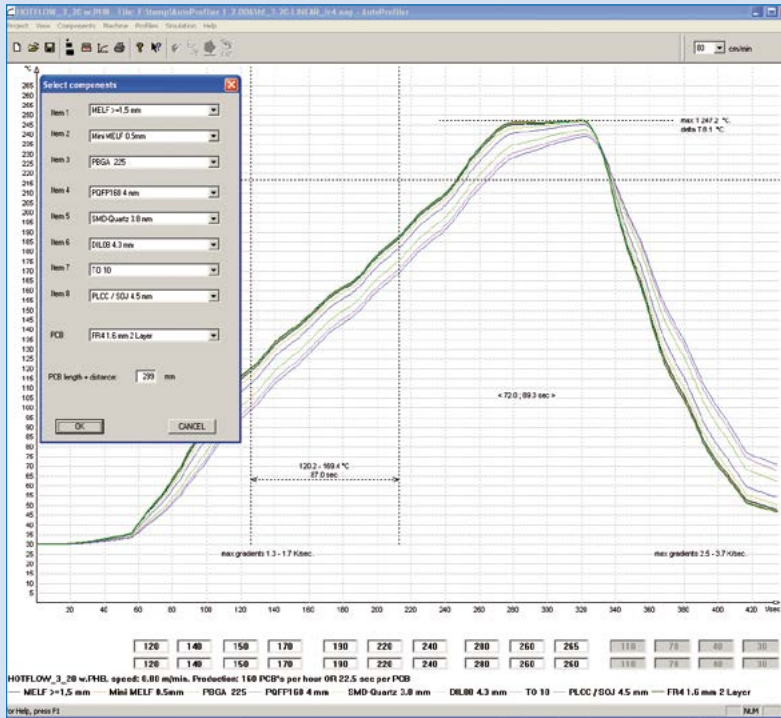


Quad track: 4 center supports and 4 rails variable



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).





*The AutoProfiler with library  
Off-line profiling saves time and money:  
A "virtual PCB" is created and sent through the "virtual oven" – first run success >90%*

## Machine Software

### Process visualization and data management

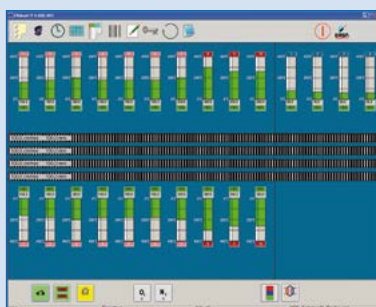
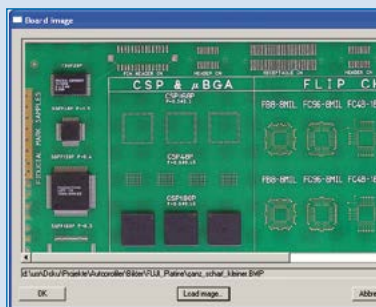
The user-friendly machine software platform includes a new Process Control Software, a Process Data Recorder and the Ersa AutoProfiler for rapid off-line profiling. The design goals behind this advanced machine software package include the simplest possible

operation of the machine, process monitoring and visualization, reduction in the time required for configuring parameters and searching for profiles, process and data management as well as documentation and archiving of all process and machine relevant information for traceability.

### AutoProfiler

#### Offline profiling increases productivity

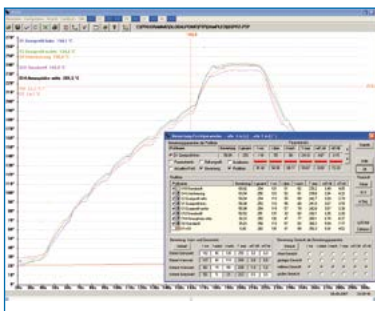
The AutoProfiler is an Ersa specific software tool that tremendously reduces the time required to find the right profile. A comprehensive library has been created which documents the precise thermal behaviour of how typical components heat in an Ersa HOTFLOW oven. In this manner, it is possible to create a "virtual PCB" and send it through a "virtual oven" - all offline. The success rate for the first trial run on the actual machine is over 90 %, thereby substantially reducing the downtime of the machine for profiling.



*ERSASOFT allows for total process monitoring and visualization*

# Sensor Shuttle PTP®

## Professional temperature measuring system



*Automatic process evaluation with 6 parameters - continuous display of the gradients with 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 recorded parameters in real-time.

The wireless data transmission uses Bluetooth technology which makes the Ersa Sensor Shuttle PTP® especially easy and convenient to use. A wired connection between Shuttle and PC is no longer required. 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 PTP® Sensor Shuttle software uses a graphical display to aid in optimally evaluating, documenting and archiving

the measurement data. PTP® runs on Windows Vista/7 or later, 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-Series

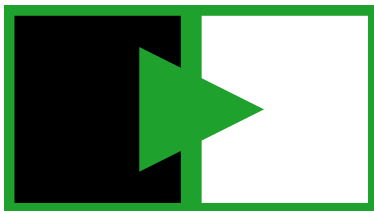
## The right system for each application



**HOTFLOW 3/20**  
*High-end model with excellent performance  
 and superior machine availability*



**HOTFLOW 3/14e**  
*Latest model of the HOTFLOW 3 series with outstanding price-performance-ratio*



**IPC-HERMES-9852**

The global standard for "M2M" in SMT assembly

The Ersa HOTFLOW 3 series of reflow ovens is comprised of two machine lines. First the HOTFLOW 3/14 and 3/20 machine types which are available from their basic configurations up to the high-quality, high-end system.

The HOTFLOW 3/14 e and HOTFLOW 3/20 e stand out by their efficiency. The machines of this product line include the high-quality components of the standard ovens, however, in a limited variety in the final configuration stage. In return, they offer a particularly attractive pricing.



### Most important standard features:

- Pin-and-chain conveyor with 3 mm pin length
- Working width from 60 mm up to 580 mm
- New Multijet heating cassettes in all heating zones
- ERSASOFT machine software; PC with 17" TFT monitor
- Prepared for traceability as per ZVEI standards

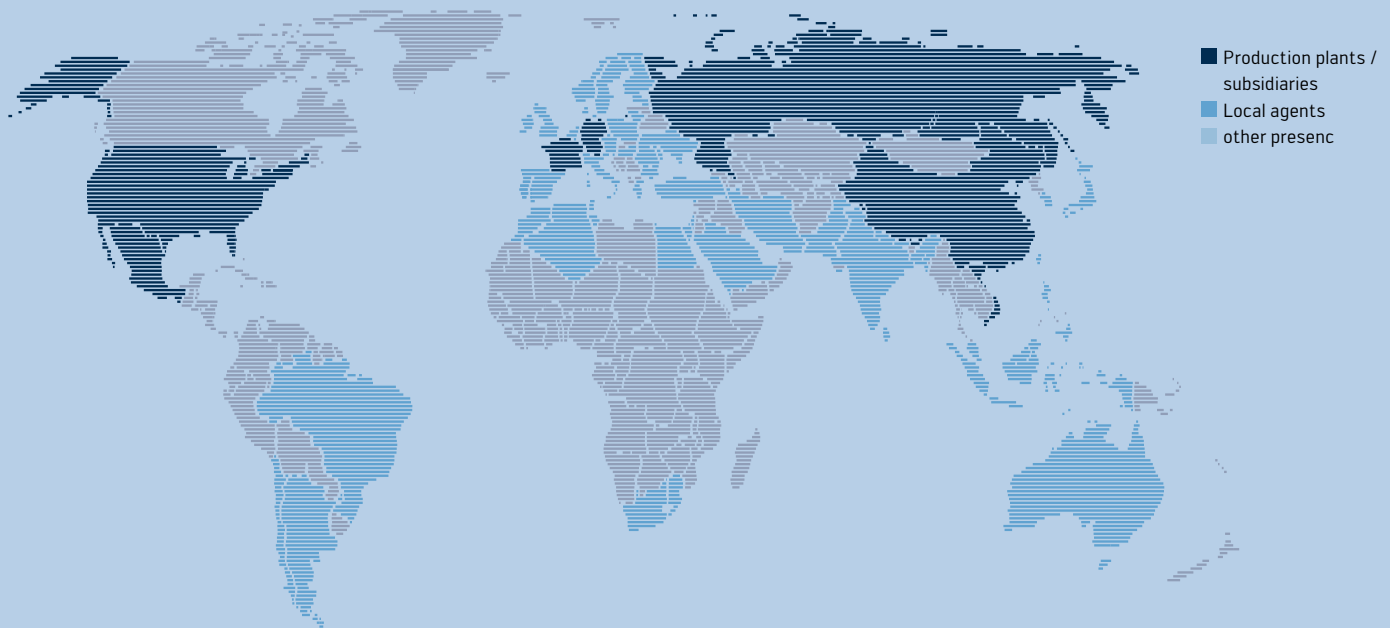


### Most important machine options:

- Nitrogen supply and control system with analyser
- Bottom-side active cooling
- Active cooling from top with water cooling
- Multi-stage condensation management
- Maintenance "On the Fly"
- Extremely low-mass PCB center support
- Multiple track conveyor systems
- Ersa Process Control (EPC) software module
- Sensor Shuttle temperature measuring system
- Possibility to connect to all common MES (Manufacturing Execution System)

	HOTFLOW 3/14 e	HOTFLOW 3/20 e	HOTFLOW 3/14	HOTFLOW 3/20	HOTFLOW 3/20 XL
<b>Total length</b>	4,770 mm	6,265 mm	5,190 mm	6,590 mm	6,590 mm
<b>Total width</b>	1,319 mm	1,319 mm	1,523 mm	1,523 mm	1,673 mm
<b>Total height</b>	1,375 – 1,535 mm	1,375 – 1,535 mm	1,450 – 1,580 mm	1,450 – 1,580 mm	1,450 – 1,580 mm
<b>Top-side heating zones</b>	7	10	7	10	10
<b>Bottom-side heating zones</b>	7	10	2 (option: plus 5)	3 (option: plus 7)	3 (option: plus 7)
<b>Top-side cooling zones</b>	2	3	3	4	4
<b>Bottom-side cooling zones</b>			3 (option)	4 (option)	4 (option)
<b>Process length</b>	3.35 m	4.84 m	3.8 m	5.2 m	5.2 m
<b>Max. working width (single track)</b>	516 mm	516 mm	580 mm	580 mm	720 mm
<b>Dual track (FLFL)</b>	2 x 230 mm, distance fixed rail/fixed rail 286 mm	2 x 230 mm, distance fixed rail/fixed rail 286 mm	2 x 270 mm, distance fixed rail/fixed rail 310 mm	2 x 270 mm, distance fixed rail/fixed rail 310 mm	XL: 2 x 340 mm distance fixed rail/fixed rail 380 mm
<b>Dual track (FLLL)</b>	Not available	Not available	Not available	2 x 270 mm, working width of one conveyor 60 – 480 mm	2 x 340 mm, working width of one conveyor 60 – 620 mm
<b>Dual track (FLLF)</b>	Not available	Not available	Not available	2 x 270 mm, working width of one conveyor 60 – 480 mm	Not available
<b>Triple track (FLFLFL)</b>	Not available	Not available	3 x 160 mm, distance between the fixed rails 200 mm	3 x 160 mm, distance between the fixed rails 200 mm	3 x 210 mm, distance between the fixed rails 250 mm
<b>Quad track (FLFLFLFL)</b>	Not available	Not available	4 x 115 mm, distance between the fixed rails 155 mm	4 x 115 mm, distance between the fixed rails 155 mm	4 x 150 mm, distance between the fixed rails 190 mm

# Electronics Production Equipment Worldwide Presence



## America

Kurtz Ersa, Inc.  
1779 Pilgrim Road  
Plymouth, WI 53073  
USA  
Phone +1 920 893 3772  
from US: 1 800 363 3772  
Fax +1 920 893 3322  
usa@kurtzrsa.com  
www.ersa.com

## Mexico

Kurtz Ersa México, S.A. de C.V.  
Av. Lopez Mateos Sur Núm. 1450 Int. 7  
Col. Las Amapas (Plaza las Villas)  
Tlajomulco de Zúñiga, Jalisco  
C.P. 45643  
México  
Phone +52 33 15 93 18 63  
info-kmx@kurtzrsa.com  
www.ersa.com

## Asia

Kurtz Ersa Asia Ltd.  
Unit 03-05, 8th Floor  
One Island South  
No. 2 Heung Yip Road  
Wong Chuk Hang  
Hongkong  
China  
Phone +852 2331 2232  
Fax: +852 2758 7749  
asia@kurtzrsa.com  
www.ersa.com

## China

Ersa Shanghai  
Room 720, Tian Xiang Building  
No. 1068 Mao Tai Rd.,  
Shanghai 200336  
China  
Phone +86 213126 0818  
Fax +86 215239 2001  
info-esh@kurtzrsa.com  
www.ersa.com

## Vietnam

Kurtz Ersa Vietnam Company Limited  
B916 Road 3, Kizuna 2 Factory Area, Lot B4-3-7-8,  
Tan Kim IP, Can Giuoc Dist. Long An Province,  
Vietnam  
Phone +84 2723 733 682  
info-kev@kurtzrsa.com  
www.ersa.com

## France

Ersa France, Division de Kurtz France S.A.R.L  
15 rue de la Sucharde  
21800 Chevigny Saint Sauveur  
France  
Phone +33 3 80 56 66 10  
info-efr@kurtzrsa.com  
www.kurtzrsa.com

Ersa GmbH (Headquarters)  
Leonhard-Karl-Str. 24  
97877 Wertheim/Germany

Phone +49 9342 800-0  
Fax +49 9342 800-127  
info@ersa.de  
www.ersa.com

