

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 ΔT
- Maximum Machine Availability
- Best Energy Balance
- Lowest Energy Consumption
- Best Oven Stability
- Excellence Serviceability
- Ready for Traceability



Ersa HOTFLOW 3

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



With the lead-free implementation now behind most of us, today's concerns in the PCB manufacturing industry are moving in a very exciting direction. Market demands are forcing the OEM and EMS global players to look beyond the soldering process alone in order to optimize the manufacturing process from a total economic efficiency standpoint.



Maintaining the competitive edge will go to those strategic manufacturers who maximize production output per m² 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.

It was precisely for this reason that Ersa invested in the reflow machine concept which places the reflow process safety, throughput and running costs at the forefront of the R&D. The days of investing in just any reflow oven that has the number of heating zones required are over.

Today, the economical aspects and true performance of the oven must play a major role in the decision making process. Only via a Total Cost of Ownership analysis is it possible to determine the economic efficiency of a machine with respect to profitability.

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.



Multijet Heating Cassette Technology

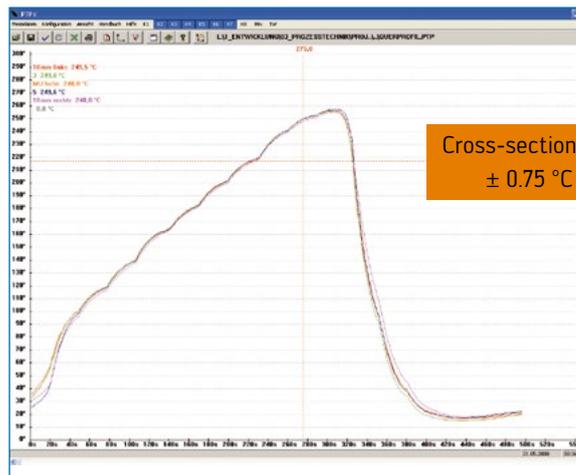
Best coefficient of heat transfer with smallest ΔT on the market



The specially designed nozzle system Improved heat transfer with high density multi-jets

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 ΔT which translates into maximum profile flexibility.

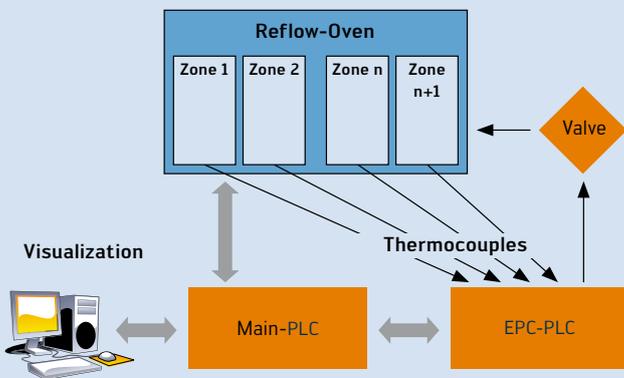
The proven Ersma Multijet heating technology has been re-designed and improved to achieve a completely new level of reflow performance. A value added and measurable result of this innovative heating technology is one of the smallest machine cross-sectional ΔT of any reflow oven in the world while consuming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



*Cross-sectional ΔT 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 Ersas HOTFLOW 3 reflow soldering systems to exactly determine, with the optional EPC (Ersa Process Control), the amount

of convection in each zone. With this unique method, specifically developed for this purpose and patented by Ersas, 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 is a potentially powerful tool for 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 most efficient reflow heating system allows for the most flexibility in the loading conditions. The improved Multijet heating technology requires almost no distance between PCBs regardless of type, size and mass.

The HOTFLOW series oven guarantees absolute process stability when running at "Board on Board" maximum capacity. 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 most efficient heat transfer system requires the least amount of energy for running the 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.

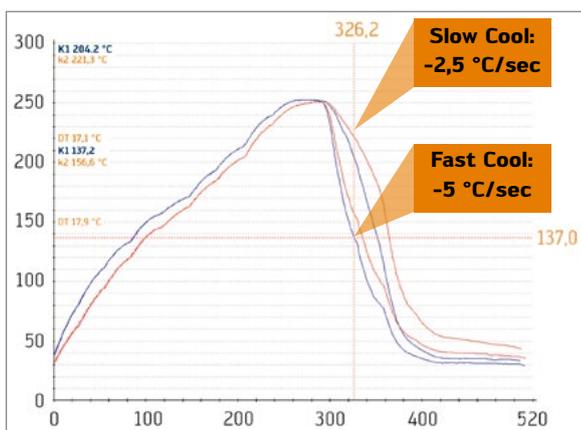
Highest quality insulation materials keep the heat energy in the process tunnel and avoid heat radiation into the environment around the machine.

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 often expected. In the first instance, the cooling gradient plays an important role in determining solder joint stability.

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.

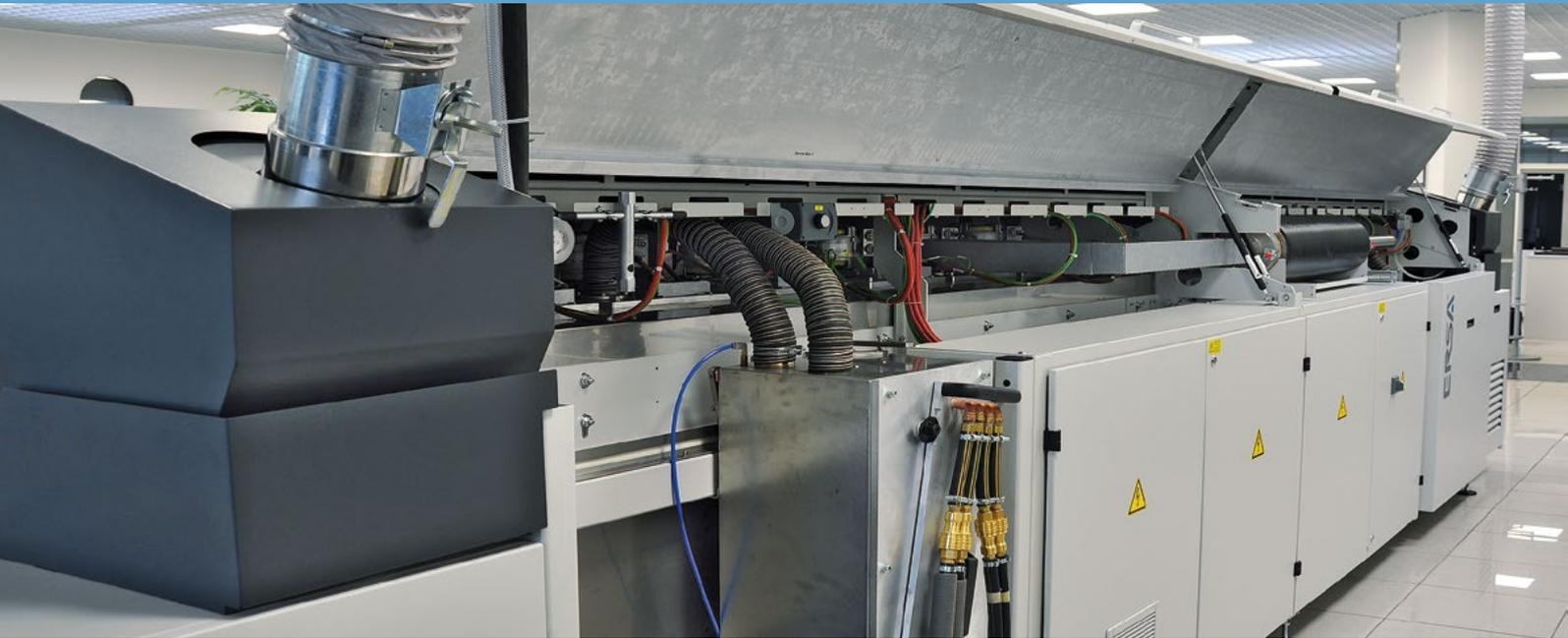
Active cooling and zone separation

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

More and more, the ROI (Return of Invest) and TCO (Total Cost of Ownership) analysis are playing an important role in the decision making process for the purchase of manufacturing equipment. While the ROI and TCO aspects must be considered, they do not cover one potentially significant factor - Lost Profitability.

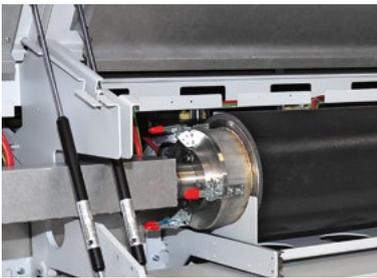
Downtime for maintenance, servicing and cleaning of the machine results in a production stop. When a machine is not running than it cannot be making money.

The HOTFLOW series is designed for maximum machine availability and thus minimize lost profits.

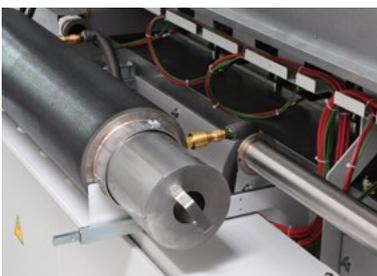
The HOTFLOW 3 has been engineered to offer Advanced Serviceability. This means that all main parts can be changed and/or removed for maintenance purposes in less than 15 minutes. “Quick Change” heating and cooling cassettes can be removed by hand in seconds without any additional tools required.

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. Ersas proven multistage 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 is easily removed for cleaning. 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 series!

Multiple Track Capacity

Productivity with highest throughput



Multiple track 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 most 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 new HOTFLOW series was designed to offer the fastest ROI under the most demanding production conditions.

Best machine output/m² of floor space

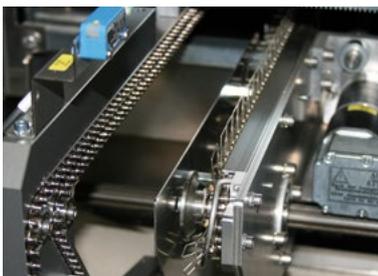
Defining our primary customer target group as having the most challenging demands, Erska engineers realized that multiple track capability represents the future for high-volume reflow. Multitrack reflow also opens the door to new SMT line planning as multiple SMT placer lines can be funnelled into one 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.

The Erska heating technology has been successfully running high-volume, dual track reflow applications for several years. This allows us to put even more multiple tracks into the process tunnel

without decreasing the efficiency and stability of the heat transfer – even at "board on board" fully loaded capacity.

A true pioneer in dual track reflow, Erska is now proud to announce the new HOTFLOW's expanded multiple track, capabilities which can increase productivity by as much as 400 %.

Different products can be run at different board widths and at different speeds offering not only the highest reflow output/m² of floor space but also offering the greatest flexibility.



*Extreme low mass center support
Precision support even for flex prints*

Extreme Low Mass PCB Center Support

Maintains linear stability

The HOTFLOW uses a new technology which offers many advantages – mechanical stability, low mass for reduced shadow effect and minimum space requirement.

The extreme 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.

Highest Quality Transport Conveyor

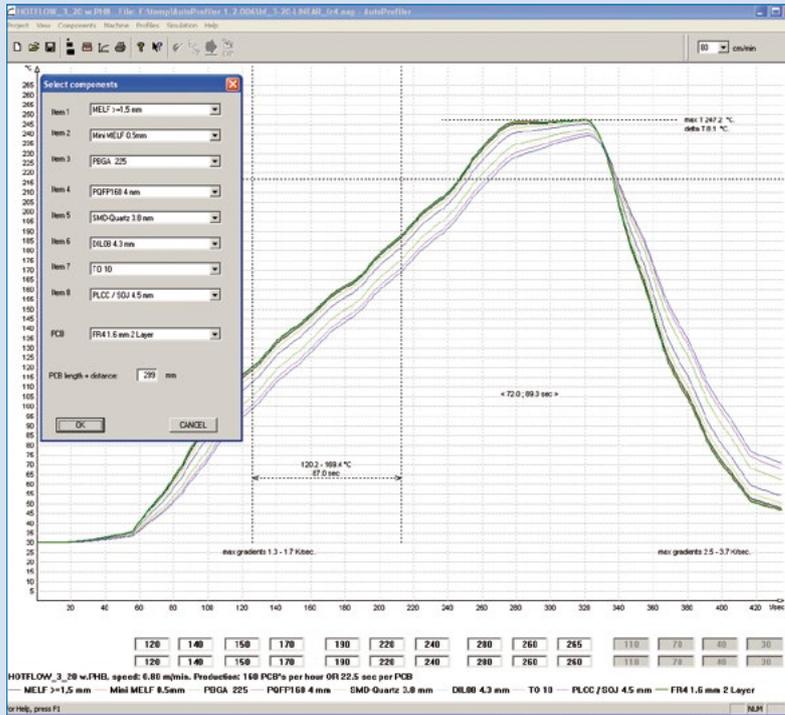
Long-term process stability

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 profile assembly in the HOTFLOW is of highly stable construction. The special material was chosen for its precise CTE (Coefficient of Thermal Expansion) and long life and thus guarantees a highly stable working condition.

The HOTFLOW conveyor chain is of the highest quality and is 100 % vibration free. A small radius at the chain in-feed section ensures safe handling of even short PCB's. The automatic chain lubrication option is programmable and guarantees smooth running and longest life. Lower condensation, lower energy costs, higher stability and longer conveyor lifetime are the measurable customer benefits of this added value technology.

Hardened transport profile Maintains linear stability over its entire length



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

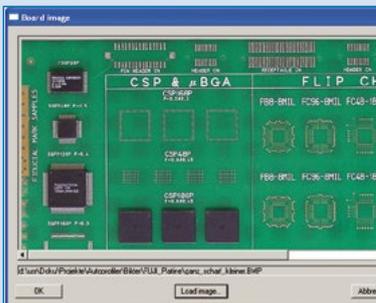
The user-friendly machine software platform includes a new Process Control Software, a Process Data Recorder and the Ersa AutoProfiler for rapid off-line profiling. The design goals behind this advanced machine software package include the simplest possible

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

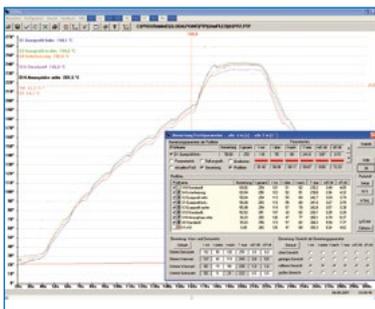
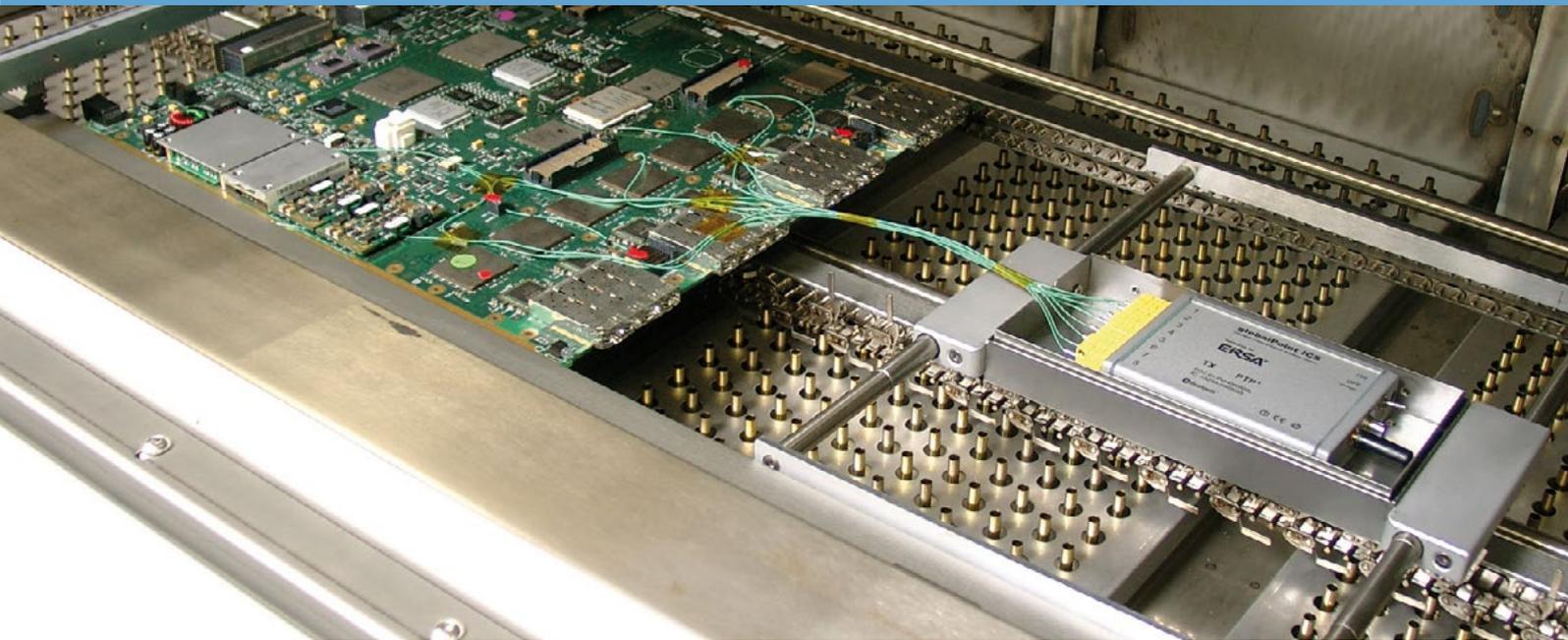
The AutoProfiler is an Ersa specific software tool that tremendously reduces the time required to find the right profile. A comprehensive library has been created which documents the precise thermal behaviour of how typical components heat in an Ersa HOTFLOW oven. In this manner, it is possible to create 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



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.

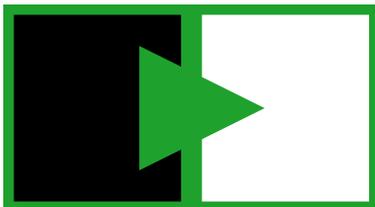
Integrated Bluetooth wireless module; Data transmission and display in real-time

The HOTFLOW-Series

The right system for each application



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



The Hermes Standard
for "M-to-M" in SMT Assembly

The Ersa HOTFLOW 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 536 mm



- New Multijet heating cassettes in all heating zones
- Adjustable RPM blower motors in reflow zones



- 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
- Dual flux management
- Maintenance "On the Fly"
- Extreme low-mass PCB center support

- Multiple track transport systems
- Ersa process control software module
- Sensor Shuttle temperature measuring system
- Possibility to connect to all common MES (Manufacturing Executive Systems)

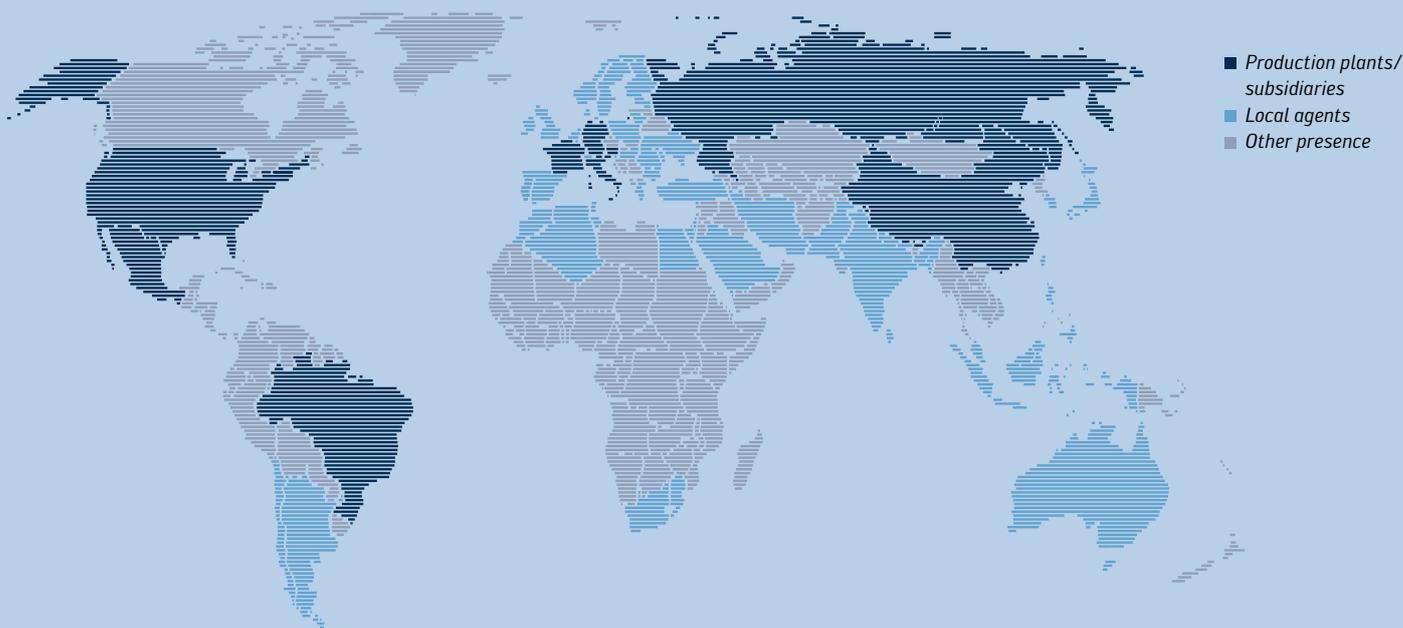


*HOTFLOW 3/14 e
The newest model of the HOTFLOW 3-series with an excellent price/performance ratio*

Overview Ersa HOTFLOW-Serie

Machine type	Heating zones			Cooling zones		Length process zone
	top	bottom	bottom opt.	top	bottom opt.	
HOTFLOW 3/20	10	3	7	4	4	5.2 m
HOTFLOW 3/20 e	10	10	-	3	-	4.2 m
HOTFLOW 3/14	7	2	5	3	3	3.8 m
HOTFLOW 3/14 e	7	7	-	2	-	3.6 m

Electronics Production Equipment Worldwide Presence



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