

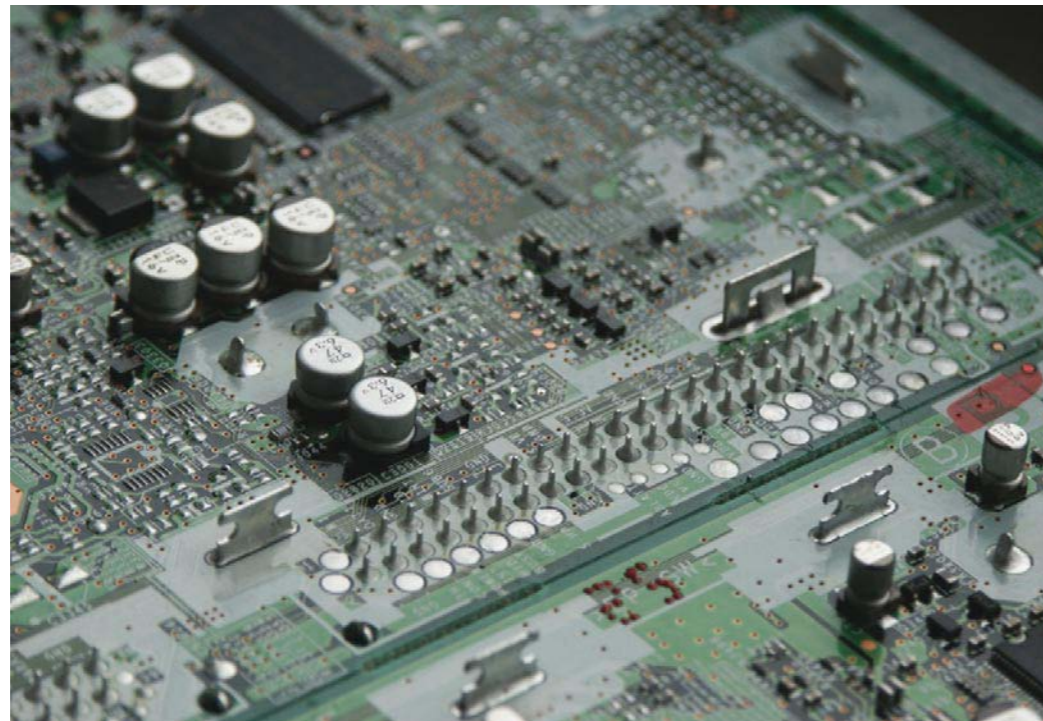


VERSAFLOW Selective Soldering - In a League of Its OWN

ERSA GmbH

Electronic Production Equipment

VERSAFLOW Selective Soldering – In a League of Its Own. Better, Faster, Cleaner and Cheaper!



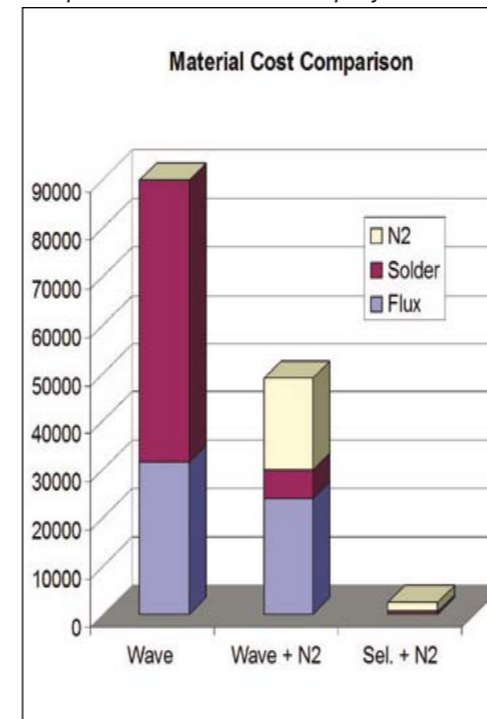
The global trend is clearly moving from a wave to a double sided reflow process. How do we then solder the few PTH components that are still required on the board? The choices are: hand soldering, wave soldering with solder mask carriers, or selective soldering. Selective soldering is defined as post reflow soldering on double sided SMT boards of PTH components, like connectors, power components, RF shieldings, etc.

More and more, the Lead Free (LF) implementation will influence PCB manufacturer's process and equipment decisions. The smaller process windows dictated by LF alloys are going to put greater demands not only on production soldering equipment, but also on process pro-

cedures and associated operational costs. All indications point to the fact that current production soldering equipment will either need to be completely replaced and/or upgraded in order to meet required DPM levels being currently achieved today with lead containing alloys and existing equipment. Maintaining a quality production process at an acceptable operational cost level will be a tricky balancing game in the upcoming years.

Where quality is paramount, manual soldering cannot guarantee the reproducible results achievable in an automated LF process! Where keeping operational costs to a minimum, LF wave soldering may no longer be a viable alternative.

Comparison of LF material costs per year

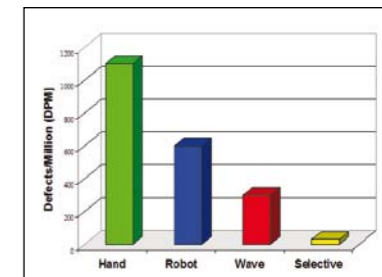


Where Lead Free quality and operational costs are the key factors, the industry should re-examine its mass production processes.

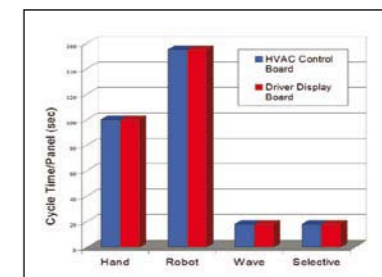
The tremendous operational costs associated with increased maintenance and bath analysis, higher dross formation, triple the costs to fill the pot; shorter bath life due to Cu accumulation, enormous N₂ costs, and higher DPM and scrap rate might cause mass production manufacturers to examine the possibility of switching to a selective soldering process! ERSa offers single pot, dual pot, multiwave, double wave and combination of each technology to meet all needs.

Selective Soldering Process Advantages: Better, Faster, Cleaner & Cheaper!

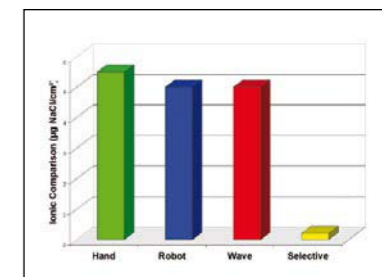
- Consistent LF solder joint quality & significant reduction of DPM
- No re-melting of top side SMD components, as with wave soldering
- PCB is not moving during the soldering process
- Faster cycle times compared to hand and multi-axis soldering
- Reduced ionic contamination and reduced flux consumption
- Heavy mass multilayer soldering without excessive thermal stress
- Reduces risks and costs of operator dependent hand soldering
- Significant reduction of materials and consumables costs (N₂, flux, solder, tips, etc.)



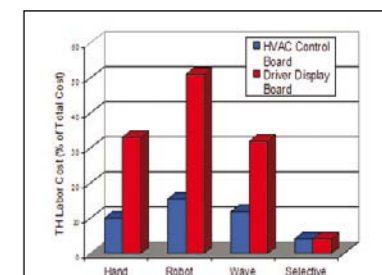
Better: Comparison of defect rates



Faster: Comparison of cycle times



Cleaner: Comparison of ionic contamination



Cheaper: Comparison of labor costs

Why Consider Selective Soldering over Wave pallet or Hand Soldering?

- Highest quality solder joints; highest reproducibility; and lowest DPM
- Efficient handling and flexibility for small lots
- Decreased consumption of solder, flux, N₂ and consumable parts equals significant per board cost reduction

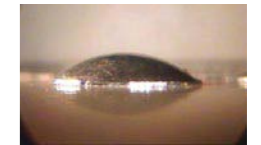
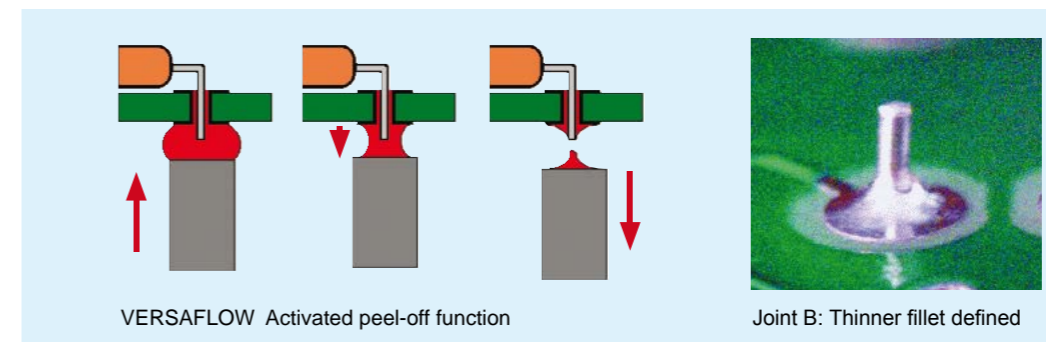
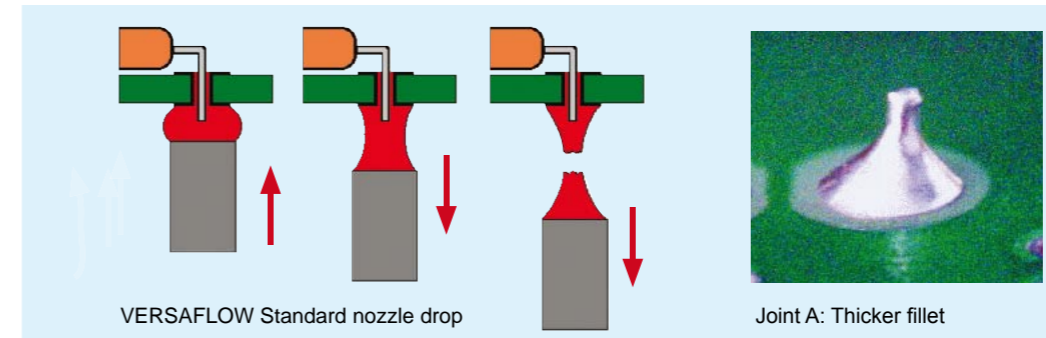
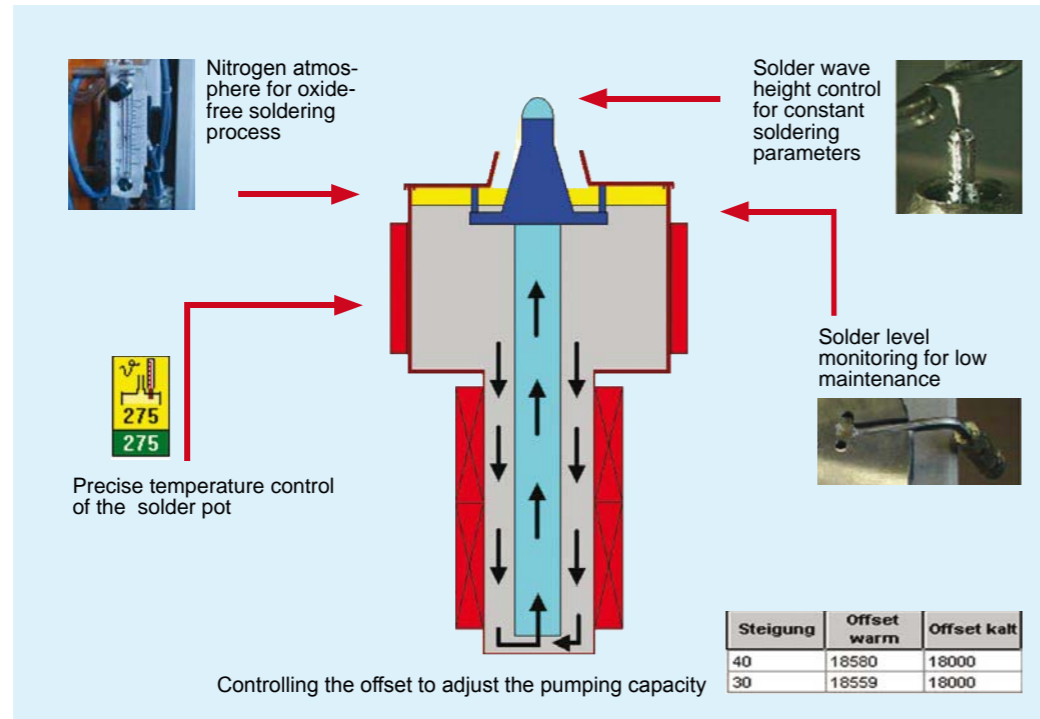
The VERSAFLOW selective soldering process advantages of **“Better, Faster, Cleaner & Cheaper”**, can translate not only into a tremendous increase in Lead Free soldering quality, but also into significant costs savings!

The VERSAFLOW Selective Solderpot Nozzle: Ultimate Control of Solder Joint Quality!



VERSAFLOW Advantages

- Electromagnetic solder pump
- Maintenance-free
- No moving parts
- Very constant flow rate
- Wave height accurate & fine adjustable



High voltage solder joint with exact definition, according to ESA-Specs

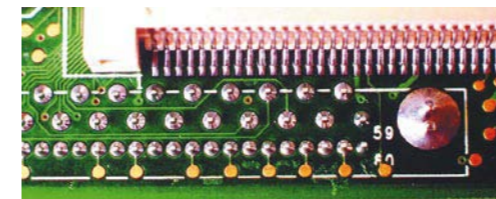
Excepted as the inventor of modern inline selective soldering for mass production, the ERSA **VERSAFLOW** has unique and fundamental technological advantages over other types of selective robotic systems. Unlike robotic cell machines, which move the PCB at an angle during the process, the **VERSAFLOW** mirrors the inline process of keeping the PCB on a horizontal transport throughout the soldering process. This can only be achieved via the x-y-z-servo-driven, multi-directional, wetttable nozzle solder pot design that puts the **VERSAFLOW** in a league of its own!

The revolutionary design of the ERSA **VERSAFLOW** selective solder nozzle and pot offer a level of solder joint process control never before dreamed of in a production soldering process.

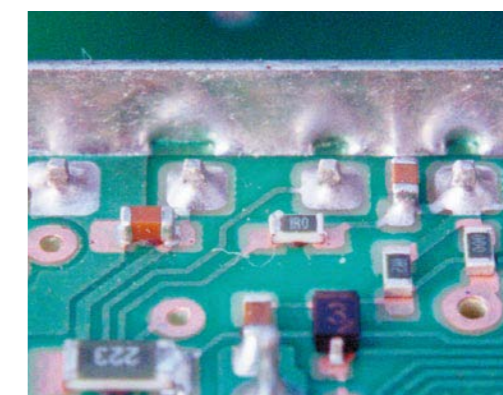
All dynamic and static functions such as solder level, wave height, temperature, N₂ blanket, and pump offset are not only programmable, but also continually monitored. The nearly maintenance-free, electromagnetically driven solder pump ensures a very constant flow rate with no moving parts. Exact wave height is precisely adjustable.

VERSAFLOW guarantees perfect solder joint definition and reproducibility, as well as complete documentation of individual solder parameters.

All of these unique features combine with the improved solder wave peel-off function to offer individually programmable process parameters per solder joint!



Fine Pitch soldering without bridging.

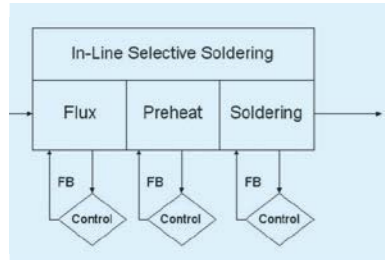


RF shielding & SMD soldering without bridging.



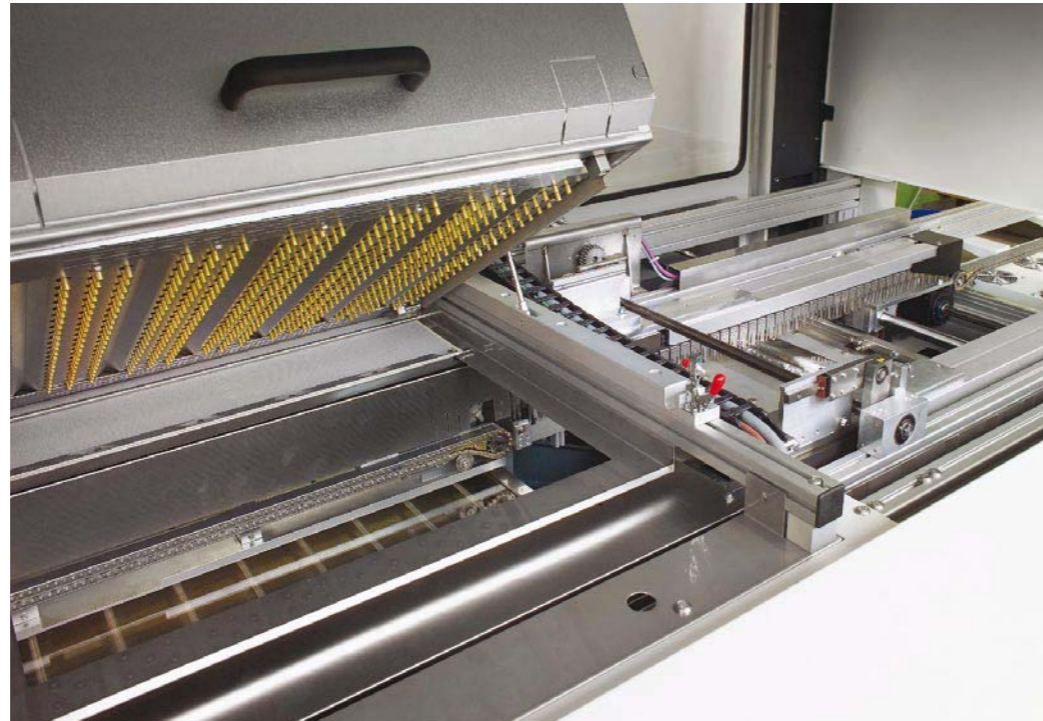
The **VERSAFLOW** selective soldering nozzles are low-maintenance and can be changed rapidly.

VERSAFLOW Selective Soldering Systems – Engineered for Lead-Free Success under the Toughest Heavy Mass Soldering Conditions.

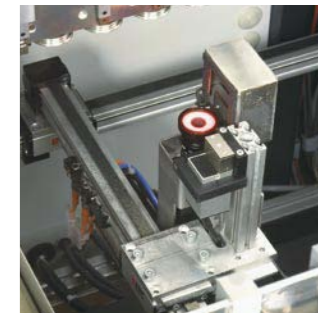
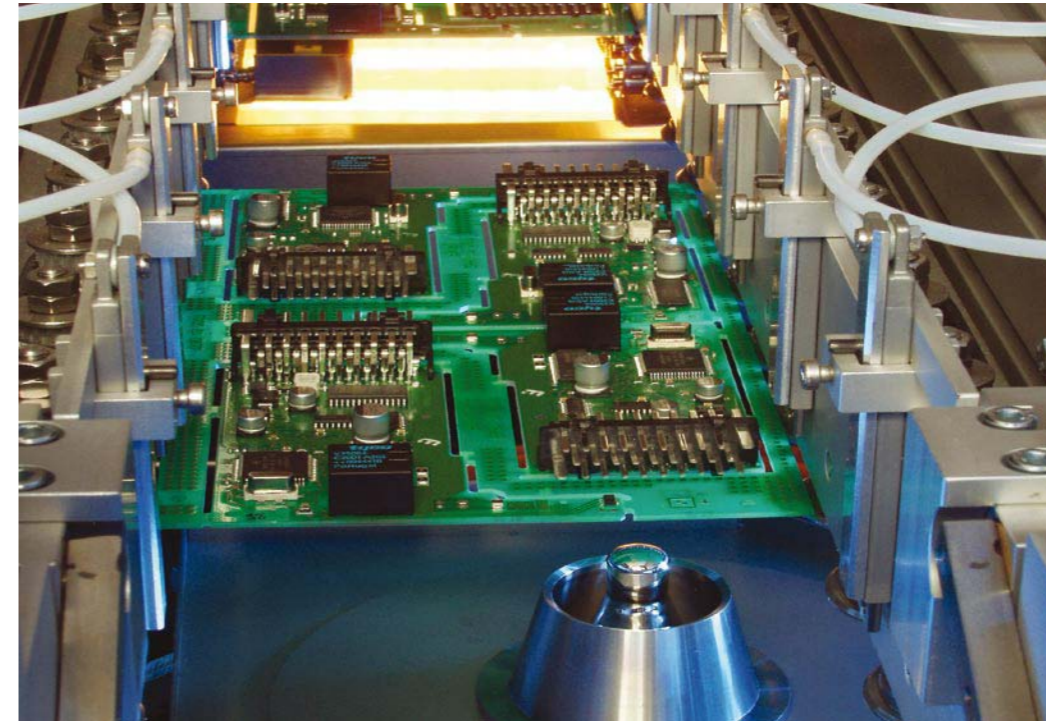


In-line process control

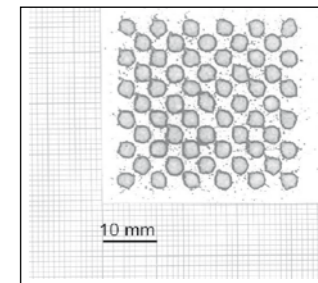
Top side convection module



Bottom side short-wave IR module



Precision Multidrop Fluxers



Multidrop fluxer spray pattern



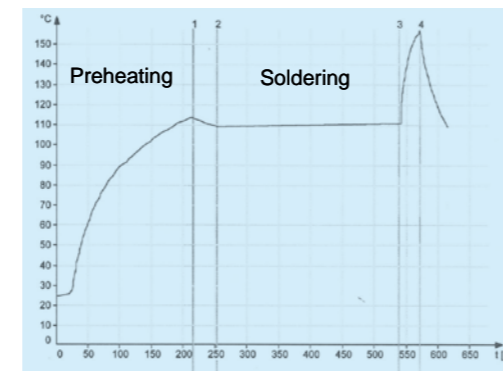
Flux module

An increased thermal performance will be required both for lead free, heavy-mass, and multi-layer applications.

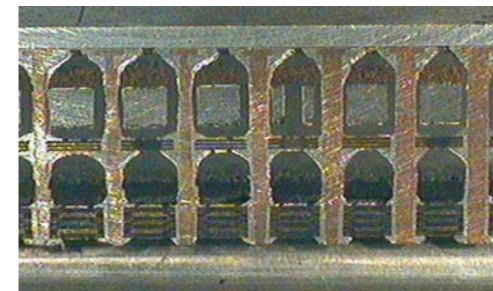
Correct activation and wetting is essential to assure good capillary action for high thermal mass through-hole components mounted in densely populated multi-layer circuit boards. By means of closed-loop process control, and feedback from each step in the process, the VERSAFLOW assures the user unparalleled vertical fill by different PCB's.

The **VERSAFLOW** system is the only selective system in the world that utilizes top side multi-jet convection preheating modules running in

parallel to the bottom side selective solder pots. PCB and solder joint temperatures are kept constant during the entire process thereby guaranteeing reproducible quality! Robotic cell systems do not allow for this critical option.



Top side preheat profile



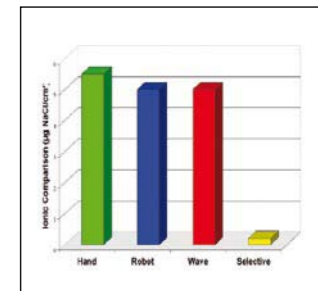
Complete filling, 24 layers



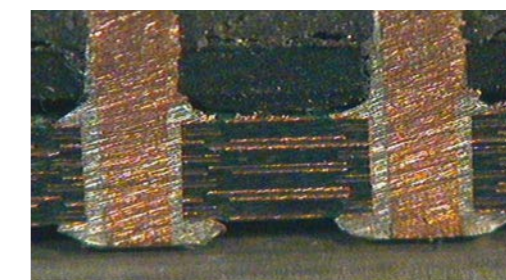
Complete filling, 16 layers

VERSAFLOW Selective Soldering steps include controlled application of flux, an asymptotic heating method with optional top-side convection preheat and closed-loop controlled application of liqueous solder.

The **VERSAFLOW** Precision Multidrop Fluxer guarantees minimum ionic contamination while optimizing solder joint quality!

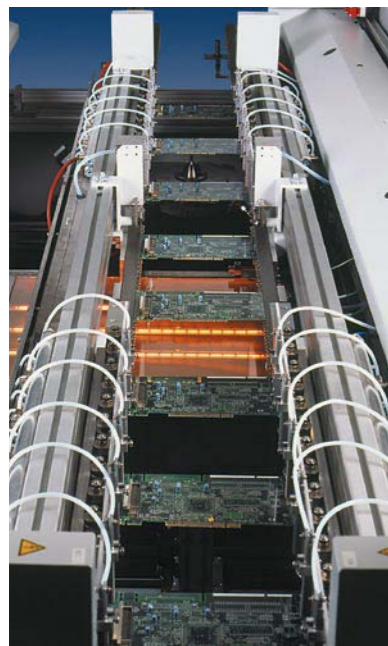


Minimum ionic contamination

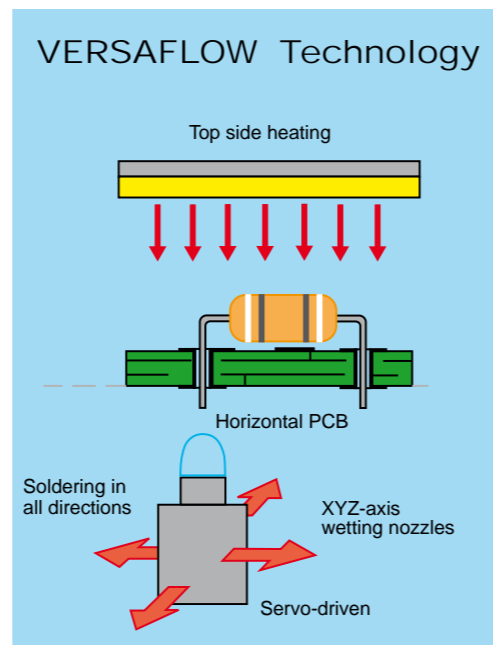
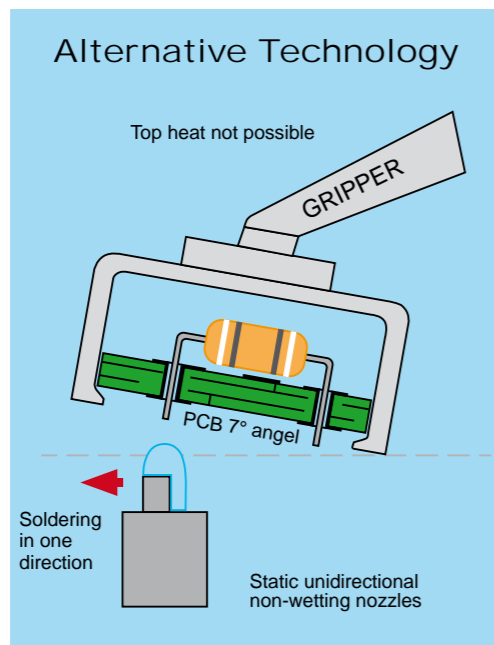


Complete filling, 14 layers

Why ERSA is Worldwide Leader in Selective Soldering Technology?

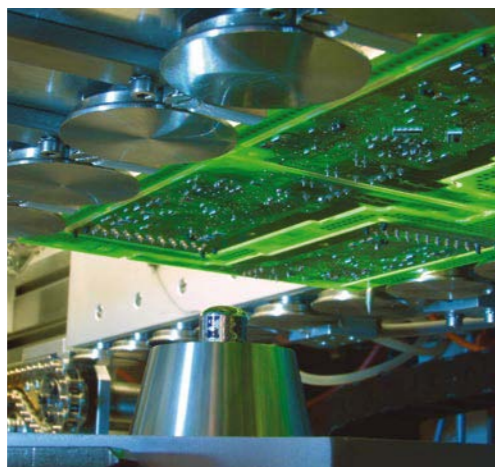


Multiple PCB simultaneous in-line processing



When evaluating different selective soldering systems, please consider the following factors that make **VERSAFLOW** Selective Soldering truly in a *League of Its Own*:

- **VERSAFLOW** moves the flux and solder aggregates **and not the PCB**, thus no gripper system is required.
- **VERSAFLOW** has **no risk of vibration during cooling!**
- **VERSAFLOW does not require component fixing!**
- **VERSAFLOW** top side preheating keeps **PCB temperature constant during soldering!**
- **VERSAFLOW** can handle **up to 7 PCBs at the same time!**
- **VERSAFLOW** peel-off function allows for **bridge free Fine-Pitch soldering!**
- **VERSAFLOW** can **solder in all directions!**
- **VERSAFLOW** can individually program **exact solder joint definition!**
- **VERSAFLOW** programming is **fast and easy!**



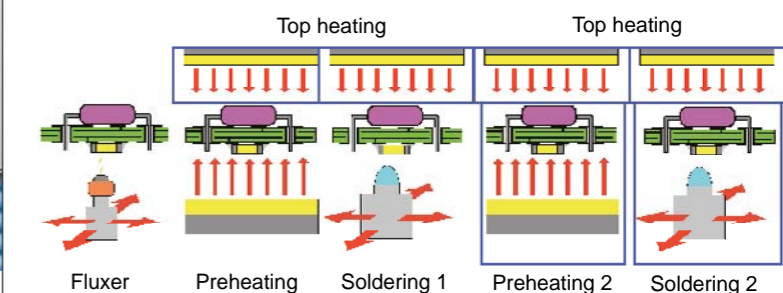
VERSAFLOW is the undisputed technology leader with the largest installed base worldwide!

VERSAFLOW – Designed to Meet All Lead free Production Needs!



**VERSAFLOW 40/50
VERSAFLOW 50/60**

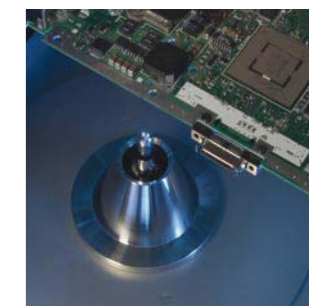
Processing of 4 - 5 different PCB's simultaneously !



The **VERSAFLOW** offers a maximum of flexibility and doubles the throughput when equipped with a second single wave module.

The in-line concept, combined with the three basic modules for flux, preheat and solder, work simultaneously and independently of each other, ensuring maximum throughput. The in-line conveyor system transports the PCBs from module to module, and ensures that they are precisely fixed in position for processing. The separately programmable movement sequences of the precision fluxer and of the solder aggregate enable parameters to be set individually for every single solder joint. The wettable solder nozzle surface guarantees a very high standard of solder

joint quality. Solder nozzles can be quickly exchanged. Flexibility and throughput can even be further increased by using a second optional solder aggregate. An additional advantage of the **VERSAFLOW** is the free space above the PCBs that is not limited by grippers or handling systems. This free space can be used for optional top side heaters in the preheating area and/or soldering area. With the topside convection heaters, even the most thermally demanding PCBs can be safely processed. The solder aggregate has a service-free electromagnetic solder pump with no mechanically moved parts. Simple programming of the system via CAD data, and reduced service and cleaning, contribute to an increase in productivity and profitability.

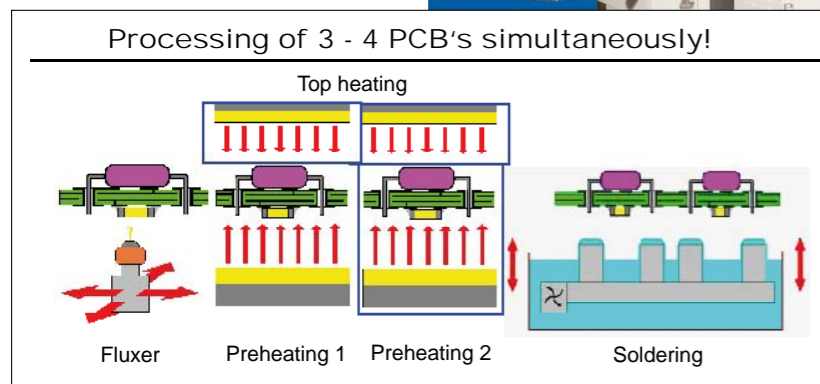
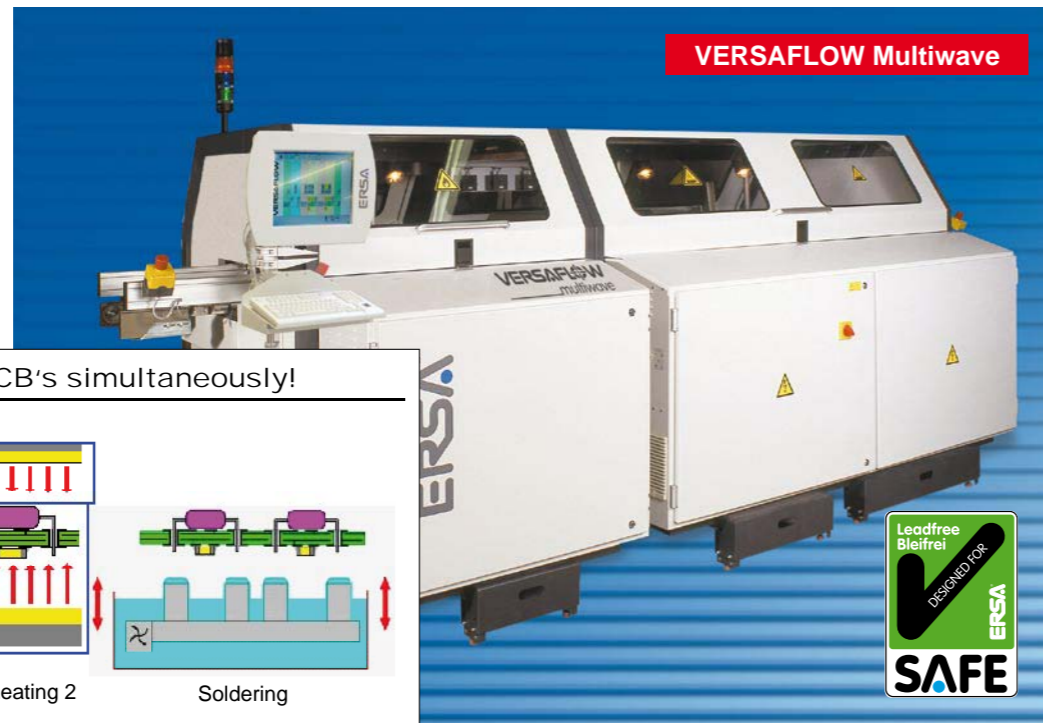


Single wave module

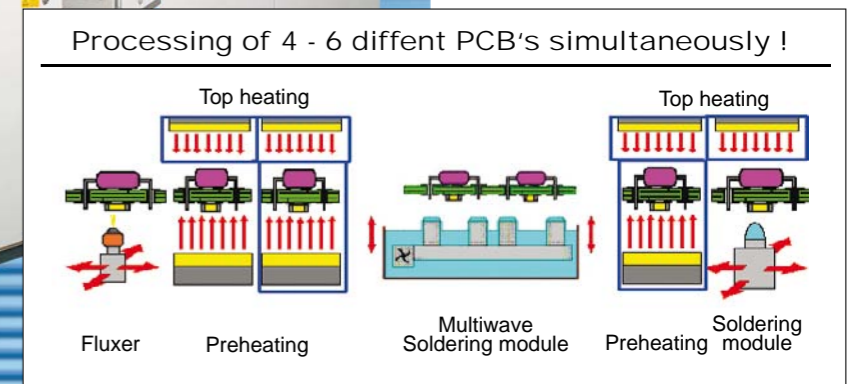
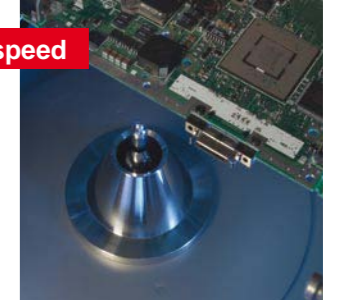
VERSAFLOW Multiwave & VERSAFLOW Highspeed – A Truly Viable Alternative to Mass Production Wave Soldering!



Multiwave module



Single wave module



The **VERSAFLOW Multiwave** is a selective soldering system for maximum throughput in short cycle times, as achieved in the classical wave soldering process.

The modules for fluxing, preheating and soldering are arranged below the conveyor and work simultaneously. To achieve shorter cycle times, the machine is equipped with a multiwave solder aggregate which allows all solder joints to be formed in the solder pot at the same time. A product-specific solder nozzle plate is produced for each PCB. There are individual solder nozzles of different sizes on the nozzle plate, corresponding to the solder joints of the PCB. In the solder pot, the nozzle plate is precisely fixed on a pump system and is permanently flooded with solder. Continuous solder flow through each individual nozzle ensures a constant transfer of energy into the solder joint.

The total solder aggregate is encapsulated by a hood and is flooded with nitrogen. This effectively reduces oxidation of the solder and increases solder quality.

Due to the short cycle times of the solder aggregate, the other modules of the system must orient themselves to this time. If the entire cycle time of the system must also be low, then the preheat process in particular must be considered. In order to effectively preheat the PCBs, even for short cycle times, a second optional preheater module is available to extend the preheater section.

The user friendly concept of the **VERSAFLOW Multiwave** allows for rapid re-tooling to a different product. The solder nozzle plate exchange is simple and quickly executed.

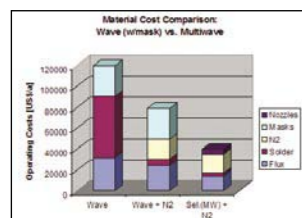
VERSAFLOW Highspeed combines the two different selective solder processes, flexible single wave and multiwave, in one machine, and opens up new possibilities to the user for manufacturing electronic PCBs.

A wide product mix is possible; products in large quantities and products in small series can be manufactured on this system in mixed operation. Thus, the system satisfies the requirements for high throughput, higher flexibility, and short cycle times.

Due to PCB layout constraints, it is possible to have a "logical defect" in the form of a solder bridge after the multiwave soldering module. This type of defect can be "automatically corrected" via programming of the flexible single wave nozzle. The result is a First Pass Yield with Zero-Defects! Thus, additional handling of the PCB is not required.

The design structure of the system is identical to that of the corresponding single systems. The preheater for the multiwave solder process is after the flux system. This preheater section can optionally be doubled to achieve the necessary preheating time even with short cycle times.

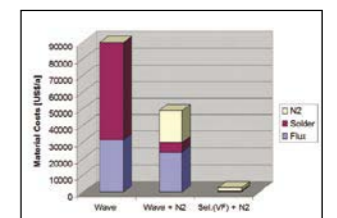
The flexible single wave solder module comes after the multiwave solder aggregate. A preheater can be integrated as an option in the conveyor section between the two solder modules. Using these options, six PCB's can be processed in the system simultaneously. If thermally demanding PCB's will be manufactured, then top side convection heaters can be optionally installed in the free space above the preheater modules, as well as above the flexible solder aggregate.



Multiwave can save costs for a LF mass soldering process



Multiwave module



VERSAFLOW Highspeed can save costs for a LF soldering process

VERSAFLOW Ultimate – Combining All Advantages of High Speed Selective and Mass Soldering in one Machine!



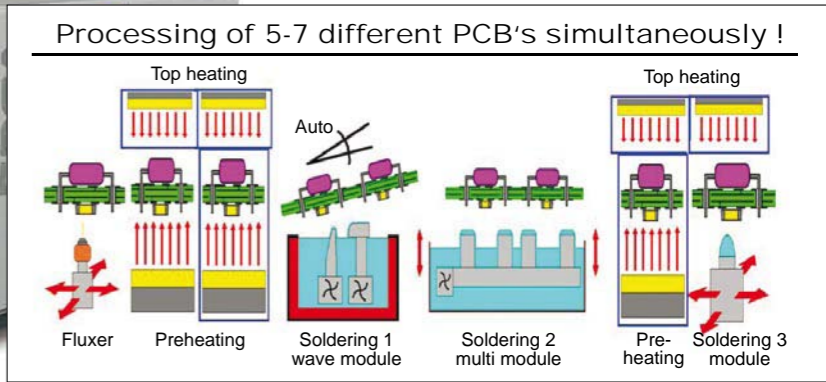
The ultimate solution for leadfree soldering



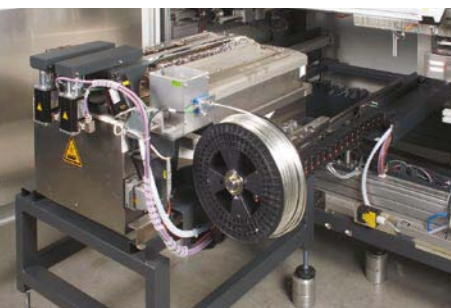
Single wave module



VERSAFLOW Ultimate



Auto angle adjustment of in-line conveyor



Double wave module in service position

The **VERSAFLOW Ultimate** is a truly high-end, high-tech machine which offers the complete range of in-line selective and mass wave soldering processes in one platform.

Where at all possible, moving away from a wave soldering process to an in-line selective process can increase joint quality, decrease DPM rate and decrease operating costs. Recognizing, however, that wave soldering cannot be completely eliminated in today's electronic manufacturing process, ERSAs engineers, in combination

with leading OEMs in the automotive and telecommunication industries, developed our newest high-speed production "flagship" machine, the **VERSAFLOW Ultimate**.

Since its inception in 1997, the ERSAs **VERSAFLOW** has been the technology leader for in-line selective soldering. The continual development and improvement on this core technology has always been based upon the need to balance throughput and flexibility requirements. The **VERSAFLOW Multiwave** was introduced in

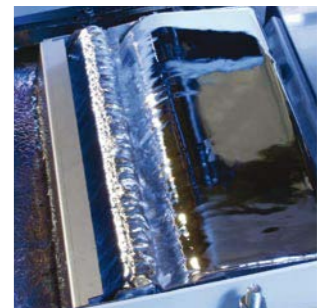
2000 to specifically address the highest throughput needs of our customers. The ever changing market demands continued to drive our R&D team. The **VERSAFLOW Highspeed** was introduced in 2002 to combine the flexibility of the **VERSAFLOW** with the throughput of the **Multiwave**. This machine opened a completely new perspective to streamlining the manufacturing process. Today, standing at the doorstep of lead free implementation, world-class manufacturers must take a strategic approach to optimizing their new production process under the aspects of increasing quality, increasing productivity and decreasing costs. Due to the fact that the reflow process is becoming more and more dominant, the problem is to find the proper machine balance between the increas-

ing need for an in-line selective process, and the decreasing, but ever present demand for classical wave soldering. The ultimate solution was to design the ultimate machine – the **VERSAFLOW Ultimate**.

The **VERSAFLOW Ultimate** is equipped with an initial fluxing and preheating module, which precedes either the double wave or the multiwave mass soldering modules. The PCB then continues on the in-line conveyor to a secondary preheating module and on to the flexible, single wave soldering module. As many as 5 to 7 different PCBs can be processed simultaneously! **Even imagine, that it is now possible to do the required touch up (e. g. solder bridge removal) after the wave process, in the same machine, fully automated, and with zero-defect! The VERSAFLOW Ultimate truly expands the horizons of a production soldering process by offering the ultimate in machine capabilities.**



Multiwave module



Double wave module

The ECOSELECT Line of Semi-Automatic Selective Systems - The Most Economical Step into Selective Soldering!



Operator interface ECOSELECT 350



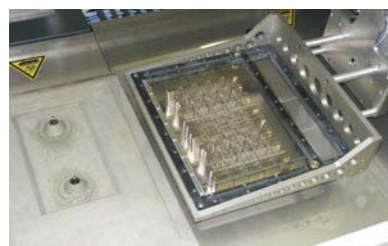
ECOSELECT 350 - Manual load & unload



IR preheating module



Single wave module, 2nd nozzle optional



Multiwave module and two single wave modules



The ECOSELECT 350 is a cost effective step into selective soldering designed for low and medium throughput. It can be universally and flexibly used providing both spot soldering by means of the proven single spot precision soldering nozzle, and simultaneous soldering by means of the ERSA multi-fountain technique.

The basic machine is equipped with one soldering module and the extended version can be equipped with two soldering modules to increase throughput!

An integrated handling system provides program-controlled PCB transport ensuring individual component processing. Various options to adapt the system to the customer's

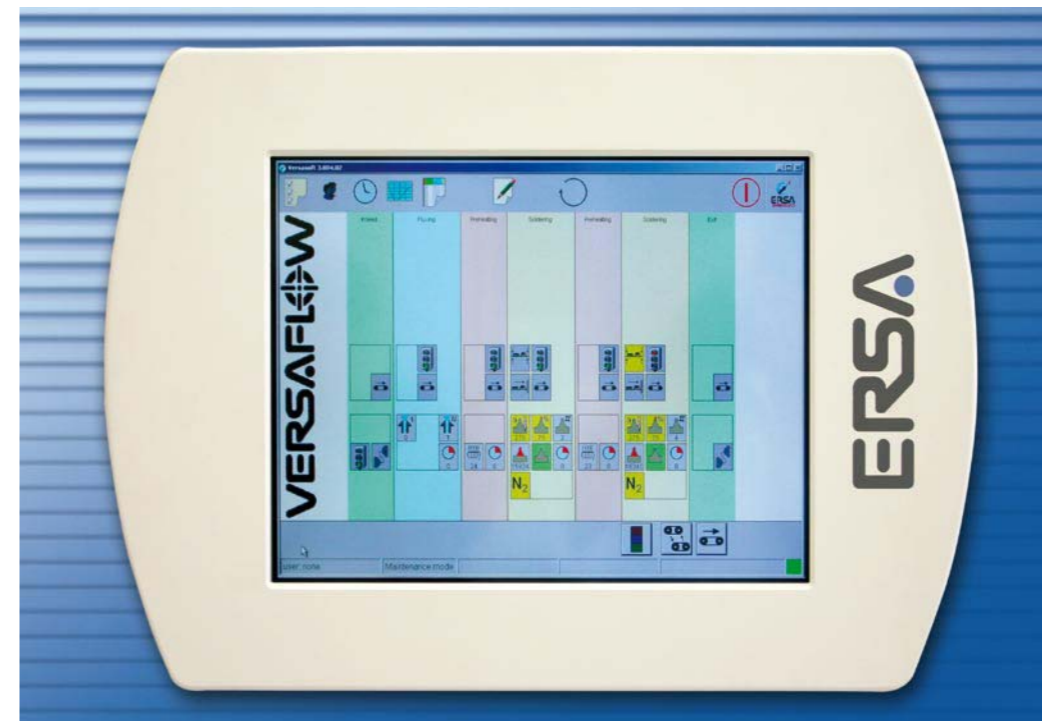
requirements are also available. The easy operation, programming and accessibility for maintenance round off the system's key features.

The ECOSELECT 350 can be operated as a stand-alone system or "soldering cell" providing near "zero-defect" soldering results. The automatic feeding of the selective soldering system from a transport or storage system is currently prepared. Its comfortable WINDOWS™-based 32-bit operating software controls and monitors the machine functions and can comfortably and easily be handled via touch-screen. Furthermore, the software records all relevant process parameters and messages.

Fast and Easy Machine-Setup with Touch Screen Control Panel, and VERSAsoft with CAD Assistant.



Touch-screen control panel; User-friendly machine set-up ensures valuable time



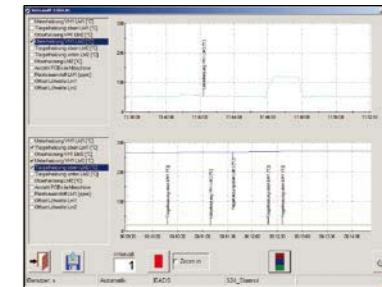
Due to the complexity of the in-line selective soldering process, machine programming is a major concern. The operator interface of all ERSA selective machines has taken into account the two most critical aspects of ease of use and machine availability.

The VERSAsoft software, used on all ERSA selective machines, offers not only a user friendly touch-screen interface, but also controls and monitors all relevant machine functions and process parameters. Programming the total selective process can be either accomplished on the machine or off-line by using the optional ERSA CAD Assistant.

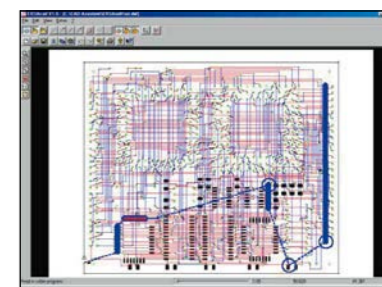
Unlike camera based "teach-in" systems, which can only be done on the machine,

thereby reducing valuable machine availability, the ERSA CAD Assistant is fully off line. This unique software package allows the user to download available CAD data for easy programming on a graphic interface displaying the CAD data of the PCB.

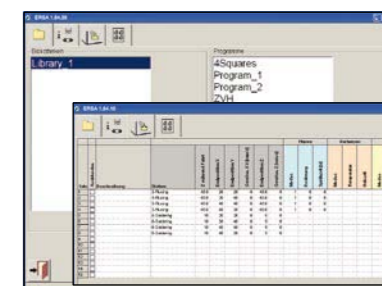
The positions for fluxing and soldering are drawn in the graphic on different layers. The process parameters are assigned to the appropriate points and sections, which then can easily be copied to other positions of the PCB. Programs can either be created on the machine computer, or this can be created off-line on a desktop or laptop. For off-line programming the data are transferred into the machine via network or data storage media.



VERSAsoft allows for visualization, recording and documentation of all process parameters



CAD data programming interface



Off-line editor

The Complete ERSA Line. Professional Solutions for State-of-the-Art Electronics Production



Selective soldering



Visual inspection



www.ersa.com



Over 70 ERSA agencies are located in more than 65 countries.

Wave soldering



SMT/BGA Rework



Reflow soldering



Process software



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Lead-free soldering, inspection or rework: ERSA solutions for a safe process.

Ask for the latest issue of the ERSA multimedia Demo DVD!

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