

With the modula wave® Siemens has invested in a reduced error rate

With its workforce of around 230 staff, the electronics production line in Volketswil supplies more than 2,792 million assembled and tested circuit boards per year. Since the beginning of 2009, the Volketswil plant has been collaborating with Kirsten Soldering AG in the field of THT.



Siemens AG is a leading global electronics and electro-technology concern. 430,000 employees develop and manufacture products and design and produce systems and equipment for tailor-made solutions.

The Volketswil plant, which is part of the Fire and Safety & Security Products (FS) business unit's Building Technologies division, produces innovative fire protection components.

the modula wave® in the electronic manufacturing of Siemens at Volketswil

With its new **the modula wave®** wave soldering system, Kirsten Soldering AG has produced a major prerequisite for a high-quality, energy-saving soldering system. This soldering system sets itself apart from other systems in all its major components.

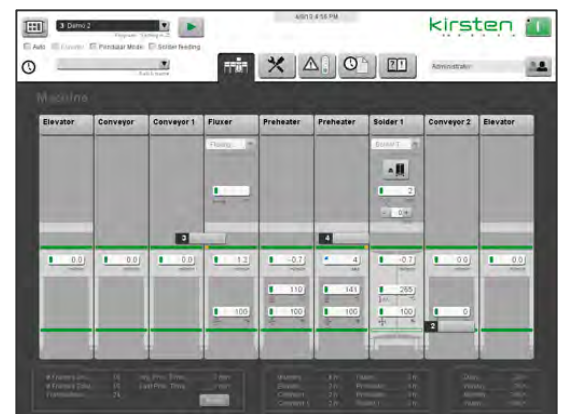
The compact design means that we were able to set up **the modula wave®** on our production line in a very cost-effective and space-saving manner. The modular design played an important part in this regard. No specialised means of transport and no alterations to the building were necessary to transport and install the system in our production facilities. Each module (WxLxH max. 750x1500x1500mm) was transported individually and could therefore be conveyed to upper storeys in a normal lift or through smaller gates without problems. This meant considerable cost savings compared to conventional systems.

The system was configured precisely to our requirements. New components such as additional pre-heating modules can be integrated into the existing system very quickly and simply should these requirements change in the future. This is also possible at any time even after the system has been operated for a certain period of time. This meant that the initial investment could be kept low, and the system can be expanded by adding additional modules at any time if production requirements and additional products demand it. The modules are always constructed according to the same principle and are then simply placed next to each other, aligned and bolted together on the production line. The system is also deliberately designed with a limited range of parts and components. This, of course, simplifies preventive maintenance for staff and keeps the cost of storing replacement parts low.

Attention has also been paid to energy-efficient design. This makes the compact solder pot possible because the soldering pump works according to the stator/rotor principle and thus does without a single moving part. The only thing that moves is the solder. All wearing parts which can cause problems in conventional soldering pumps are therefore immediately dispensed with. For this reason, the Kirsten **jet wave** also needs a significantly smaller solder bath than conventional soldering pumps (just 60kg). This means substantially lower energy consumption and a shorter heating-up time of just one hour.



Mr. Thomas Frey, Development / Construction, Kirsten Soldering AG explains the simple usage of the visko user interface to Mr. Reto Rentsch, Solder process owner, Siemens Schweiz AG.



The low content of the solder pot means that the cost of the capital tied up in solder is also significantly lower. One complete filling of solder for the solder pot costs a fraction of what it does for competitors' products. In our case at current solder prices, CHF 7,170.00 against CHF 65,500.00 for a different manufacturer. The formation of waste metal is minimised by the compact solder pot and the resulting small, unprotected solder surface which also means that solder consumption is kept low. A very high solder turnover ratio is achieved with a capacity of just 60kg of solder, which also reduces contamination of the solder bath to an absolute minimum. If the contents of the solder pot still have to be changed, the costs for refilling it with new solder are minimal.

The system is operated with partial gas treatment with nitrogen in the critical range. The solder pot is covered as far as possible with a nitrogen hood. Nitrogen is blown in through sintered pipes at critical points (directly at the wave outlet, below the hollow shaft at the solder discharge and above the solder bath) by means of the wave, and a residual oxygen quantity of 20 to 150 ppm is achieved during the soldering process. Which forms a high-quality solder joint. Consistent wave geometry is also guaranteed and waste metal is prevented from forming to a large extent. Consumption is relatively low at approx. 15m³/h, meaning a good cost-benefit ratio.

The soldering wave is formed through channels and the neck of the jet via a 1.3mm wide jet in a soft and smooth counter-direction jet hollow wave. This principle allows waves of different heights to be created just millimetres apart up to a height of approx. 35mm. This always permits optimum adjustment of the wave height for a wide variety of applications. In this way, the wave also reaches problem areas such as soldering pads in deep pockets when covering SMD or plastic components with the assistance of a mask. In this process, the soldering pads are washed with solder from a relatively large distance and not dragged through a slowly flowing wave (delta

wave) as with most soldering systems. For this reason, it is also not necessary to convey the components through the wave by means of an angled transport system. Another reason for the compact design of **the modula wave**[®] is the horizontal transport through the entire system; that means there is a uniform transport height and no upward or downward sloping ramps to reach an initial level again.



the modula wave[®] offers the user true modularity so that the exact configuration required by production needs can always be met.

With the high flow rate of 0.8m/s the hollow wave achieves optimum circulation for soldering glued SMD components on the underside, thus preventing solder bridges from forming. The drag resulting from the Bernoulli Effect makes mechanical pressing on of the circuit boards over and above their own weight unnecessary. A point which is just as decisive for quality is the gentle treatment of the circuit boards. Thanks to the adjustable contact time, they are only subjected to a very low thermal load. This means little stress for circuit boards and components.

A further plus with **the modula wave**[®] is the quickly replaceable, wheel-mounted moveable solder cart. A second solder cart with a different solder alloy, such as leaded solder, is preheated to a certain temperature below the melting point in a separate docking station and the system can then, for example, be converted from lead-free to leaded soldering material (or vice versa). Long waiting times for cooling down and reheating and expensive standstill times are convincingly reduced in this way. Moreover, servicing and adjustments can be carried out on the second soldering module in the docking station without interrupting production.

The simple design of the individual modules permits good access to individual components. These are the right prerequisites for preventive maintenance. Worn or faulty parts can thus be replaced with little time and effort. The fluxer unit, which must be regularly preventively cleaned to ensure uninterrupted and safe flux application, also leaves nothing to be desired.

The complete unit can be removed from the fluxer model in just a few seconds by means of quick-release closures for the controller, flux supply, and pressurised air and a simple drawer construction. All important locations can then be easily cleaned and serviced on a table, and the system is ready for operation again in a very short period of time. If the standstill time needs to be minimised even further, it is possible to work with a second fluxer drawer unit. This is then exchanged within one minute and the contaminated unit can then be cleaned unhurriedly and prepared for the next deployment during production.



Bar-Code and/or RFID transponder reader. allows the programmes to be loaded and changed fully automatically. It resides in front of the fluxer module and loads each module with its specific programme.

The control unit for the entire system via the operation panel by means of **visko** user interface leaves nothing to be desired. Operating the system is very simple for the operating staff. The individual programmes are automatically initialised with all critical parameters by an RFID system. The operator is constantly informed of the desired parameters in real time via the **visko** control system. Deviations are reported immediately both optically and acoustically. All values for the process steps run through are saved in log files and can be accessed at any time for quality management-relevant information.

A logical, graphical menu is available to Mr. Reto Rentsch, solder process owner, Siemens Schweiz AG, via a touch screen. All the information regarding the current status in the individual modules is displayed in real time and can be called up from a log file at any time.



„The error rate of the processed circuit boards has improved markedly since the deployment of the Kirsten system.”

Special mention should also be made of the excellent customer service which Kirsten Soldering guarantees. Amongst other things, company-specific requirements and additional software wishes, including on the part of the operators, were positively received and realised. Reaction times are short and always combined with efficient and very customer-friendly solutions.

The following factors were of special significance for the choice of this wave soldering system for the Volketswil location: investment level, operating costs, low maintenance, low energy requirements and high variant flexibility

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