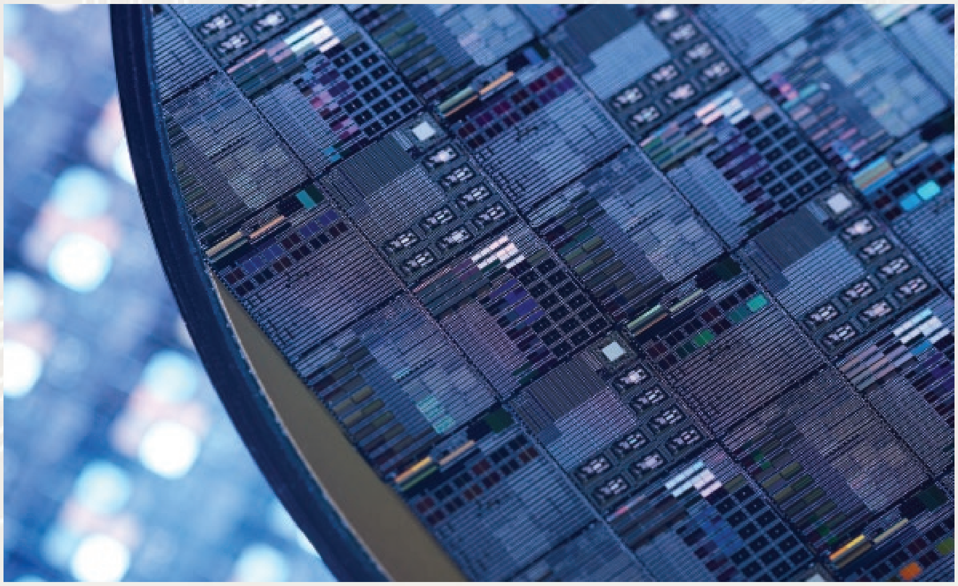
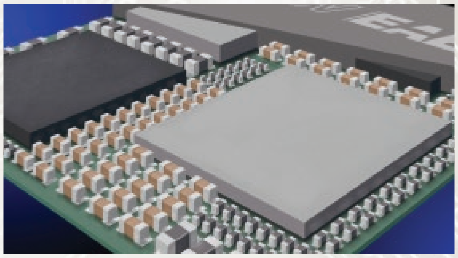
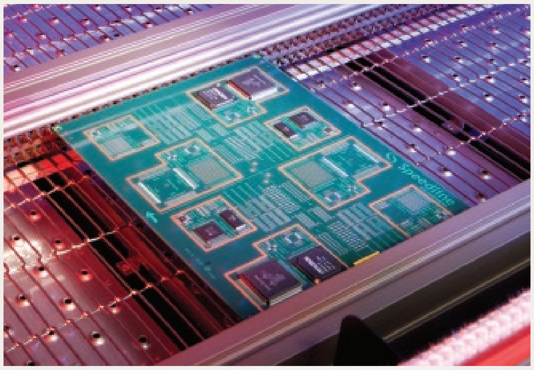
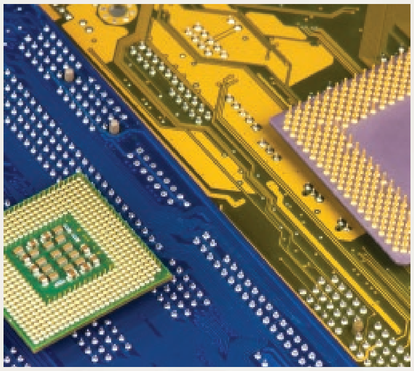
MPM | Camalot | Electrovert
Vitronics Soltec | Despatch

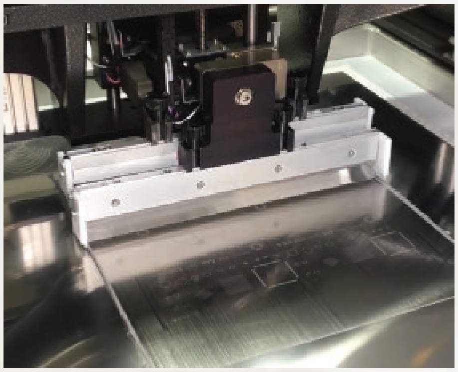
Printing, Dispensing, Reflow, Cleaning and Thermal Processing Equipment











Designed for Semiconductor Yield Improvement

Electronic Assembly Equipment

ITW EAE

A division of Illinois Tools Works

Together in process perfection

ITW EAE brings together the world-leading brands of electronics assembly equipment. Brands with reputations for advancing process perfection. The combined knowledge and experience of the ITW EAE group is driving further innovation and speeding the development of next generation technology. New technology that can dramatically improve productivity and yields while reducing maintenance and cost of ownership.

MPM | Camalot | Electrovert | Vitronics Soltec | Despatch

In-lined manufacturing for faster delivery

ITW, and all of its divisions, are afforded the opportunity to leverage highly refined manufacturing practices that have improved our factory and supply chain operations. This has significantly increased our shipment velocities, allowing us to deliver industry leading lead-times and responsiveness.

Process optimization, training and 24/7 support

We are committed to high-quality products backed by application and process expertise. After installation we will help optimize your equipment for maximum performance over its lifetime. We offer operator training, equipment protection and preventative maintenance programs to ensure 24/7 machine availability. We provide on-site technical support, remote diagnostics, telephone support and quick access to spare parts.

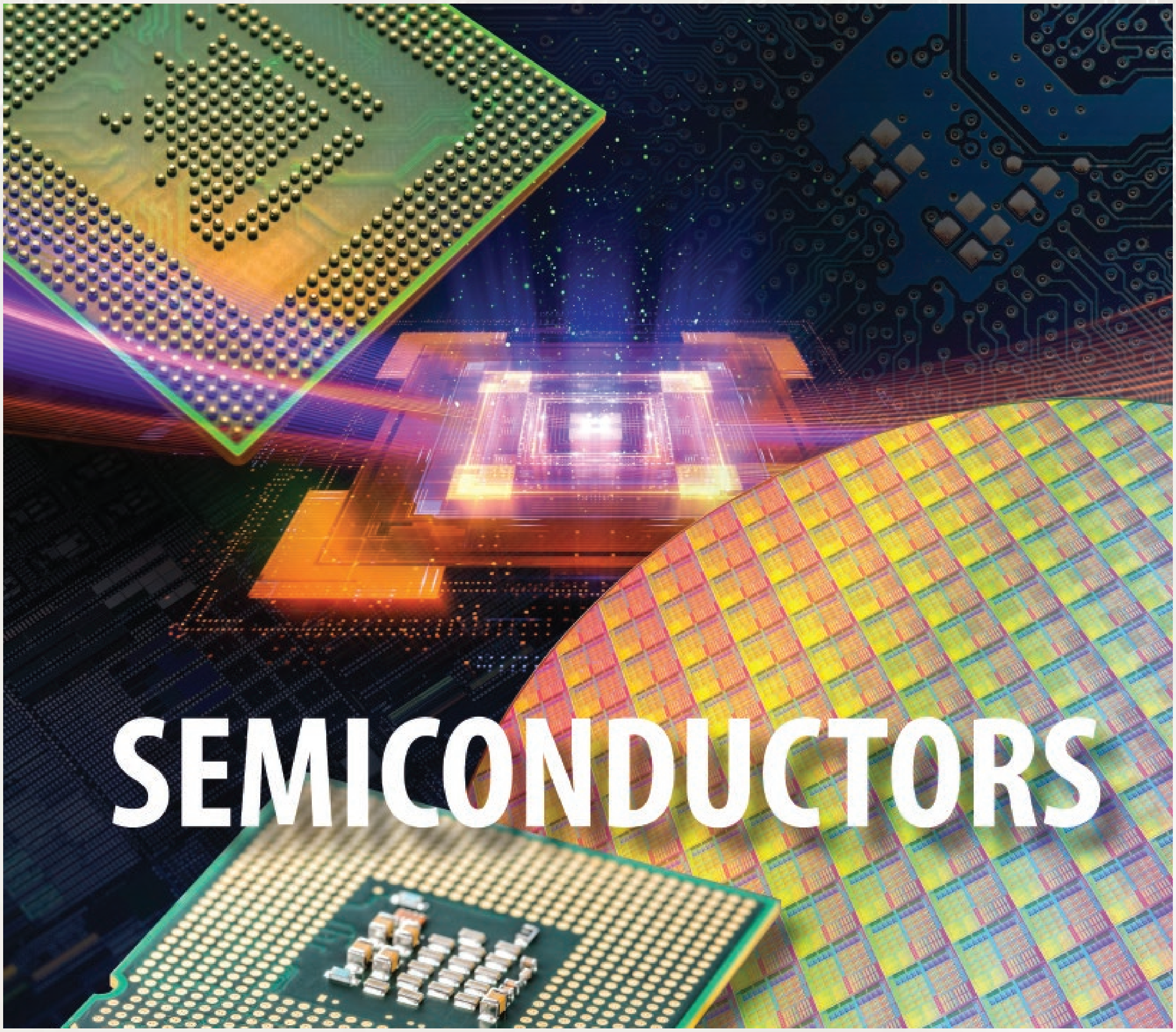
SECS/GEM and OpenApps™ for Industry 4.0 interfaces

A ready made SECS/GEM communication interface is available for most ITW EAE equipment. OpenApps features an open architecture source code which enables development of custom interfaces in support of Industry 4.0 initiatives and communication with Manufacturing Execution Systems (MES).

Equipment designed for advanced semiconductor packaging

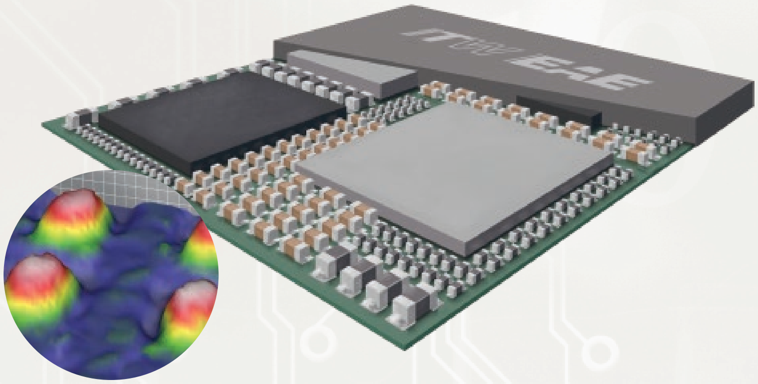
Advanced packaging and component miniaturization are putting increasingly complex demands on semiconductor manufacturing that pushes the limits of electronic assembly equipment. Developments in flip chip packaging, advanced fan-out packages (FOWLP), System in Package technologies and 3D stacking are being developed to meet next generation market requirements.

ITW EAE plays a major role in semiconductor packaging, including stencil printing solder bumps, dispensing underfills and encapsulant liquids, thermal processing die attach adhesives, cleaning before and after wire bonding, solder ball reflow and more. ITW EAE works with the world's leading semiconductor manufacturers in developing equipment that addresses evolving technical challenges while also meeting the need for higher throughput, yield and performance.



MPM Printers

The most accurate printers in the market, with advanced technology needed for ultra fine pad and pitch printing applications



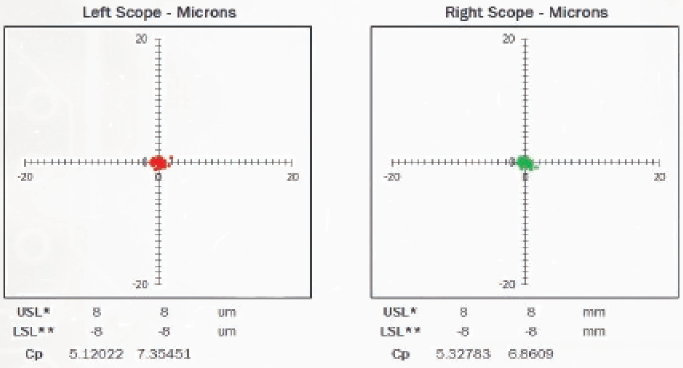
SEMI back-end packaging industry requires more functionality and capabilities in a smaller package and requires optimized electrical and thermal performance. OSATs and IDMs are increasingly demanding high yield, consistent quality, and printing process integrity control.

MPM has industry tailored solution's for the major trends and paint points, such as increasing miniaturization, double-sided substrate, 3D cavity printing and more.

Leading Machine Performance

Industry Leading Accuracy

Edison II ±8 micron and the Momentum II ±11 micron machine alignment at ≥2 Cpk @ 6 sigma.



Edison alignment accuracy shown

Optimized Coplanarity

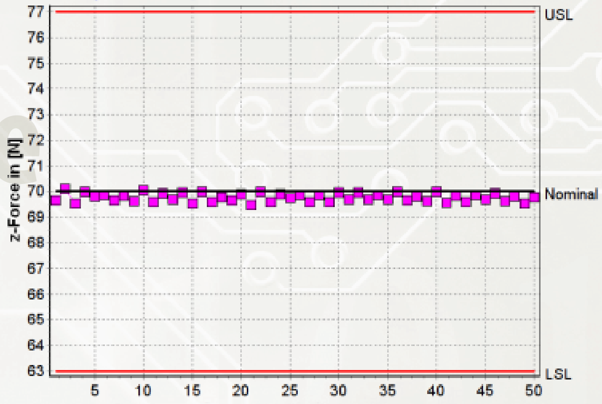
Innovative machine design achieves ultra-tight coplanarity between stencil and substrate enabling yield improvement for ultra-thin stencil printing.

High Resolution Camera (Edison II)

Designed to enable precise board alignment and board stretch compensation.

Best Performance Closed-loop Squeegee

High precision load-cell with motor driven closed-loop control ensures print force accuracy and consistence across the complete print stroke.



Highly Effective Wipe System

A patented wipe system design ensures enhanced wipe effectiveness for super fine aperture applications. Industry largest paper roll on Edison lasts more than one shift without the need of paper replenishment.

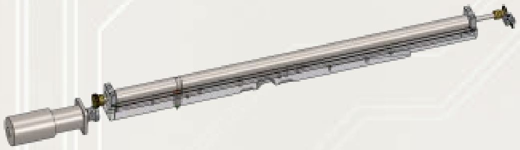
Designed for Semiconductor Yield Improvement

Process Integrity Control Solutions

Paste Management Control

Paste Temperature Monitoring – Error proof solution to ensure printing process is conducted within the required paste temperature range.

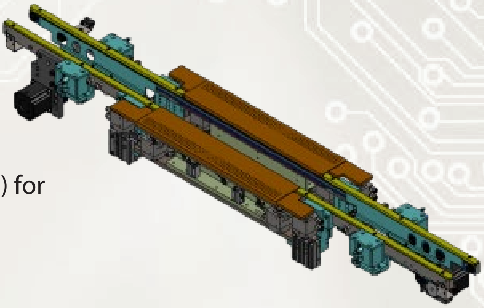
Paste Height Monitoring – with the program upper and lower limit, the paste roll is maintained in optimized range.



Solvent Condition Monitoring

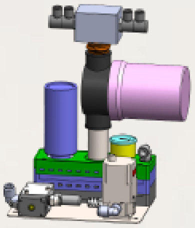
Multiple sensors in solvent management system ensures secured solvent application to paper for consistent stencil cleaning effectiveness.

Solutions for Increasing Miniaturization



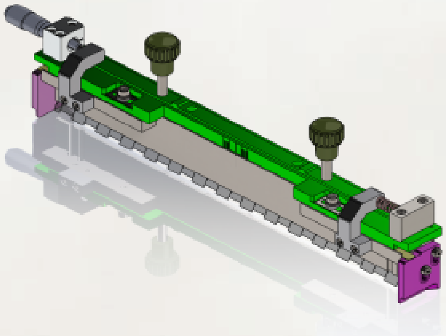
Stencil Vacuum Hold-Down & Optimized Board Separation

This patent pending option is designed for ultra fine pad and spacing (<0201M pads) for optimized printing process stability and paste deposit release performance.



High Flow Closed-loop Venturi

High flow venturi with programmable closed-loop control is designed to enhance robust substrate support and warpage correction.



Revolutionizing 3D Printing (Momentum II)

Patent pending 3D printing squeegees and coordinated motion control enables complex 3D cavity printing with high yield.

4.0 INDUSTRY

Industry 4.0 Connectivity

OpenApps Interface

SECS/GEM as a SEMI industry standard is available on both Edison and Momentum. MPM unique OpenApp programming tool allows users to develop their own programs for other applications.

Camalot Prodigy™ Dispensers

Camalot offers high-speed, extremely accurate dispensing of underfill and encapsulation molding, epoxy adhesives, polymers, photoresist, and flux. Speed, stability, and precision are hallmarks of Camalot® Prodigy™ automated dispensing systems. Bedrock stability and advanced 'jetting' techniques enable the highest level of precision for semiconductor packaging applications. The platform design is Semi S2/S8 compliant and can also meet Class 1000 cleanroom requirements by request.

Innovation, performance and flexibility designed to meet the needs of semiconductor manufacturers.

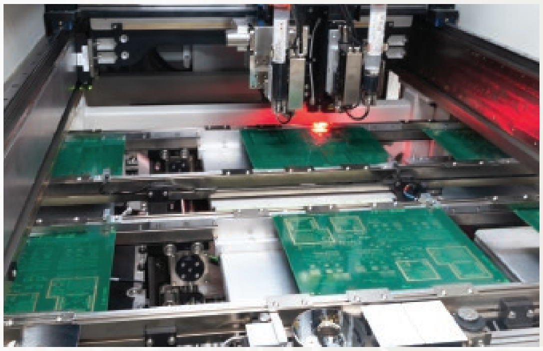
Smarter, Faster

High-Speed and Extremely Accurate Dispensing

The Camalot® Prodigy™ dispenser is designed and built to deliver high-speed, extremely accurate dispensing. Advanced linear-drive architecture, combined with exceptional frame stability enables greater precision at higher speeds, resulting in consistently higher yields.

Prodigy Dual Lane

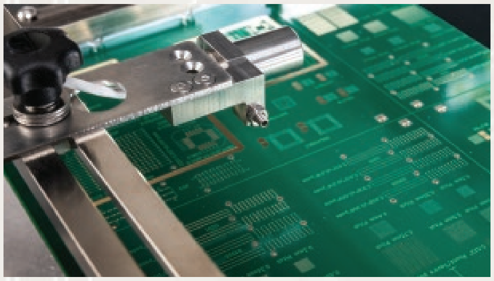
For increased productivity, a dual lane platform is available in a compact 830mm wide 4-zone system or the larger 1270mm 6-zone system. Independent lane width adjustment provides the ability to process a wide range of product sizes up to 400mm x 254mm.



Designed for Semiconductor Yield Improvement

IR Temperature Sensors

A constant product temperature through the dispense process is critical to ensure process stability and repeatability for underfilling of high I/O count devices such as BGA's, Flip Chips. The new patent-pending IR (Infrared) Temperature Sensors measure in "real time" the top-side board temperature which allows the system to provide closed-loop control to maintain the product within the specified temperature range. Temperature is monitored through pre-heat, dispense heat and post-heat zones.



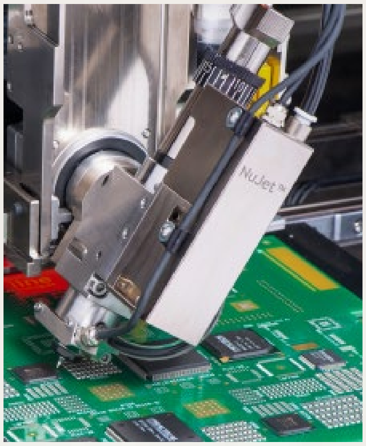
Automatic Digital Vision Alignment

Powerful optics and processing algorithms allow for sub-pixel definition maximizing the capability for locating fiducials, and components/pad edges. Fiducial images are taught and saved to an onboard library; in addition, it works as an image recognition system so that any unique feature can be used for alignment. Camalot's edge detection vision alignment is the fastest and most accurate positioning method available. A one-snap operation finds all four edges of a die up to 25mm square, and automatically adjusts needle path for variations in X,Y, and theta placement, die width, and edge parallelism.

Advanced pump technology designed by Camalot®

Dynamic Dual Head (DDH)

The first and only dual head system that automatically corrects for part to part inconsistencies. The DDH option uses a unique and patented mini XY drive system on a second Z-Axis to correct in "real-time" and allow synchronous dispensing of both pumps regardless of part to part rotation. This patented technology dramatically increases productivity with no sacrifice to yield and is compatible with jetting and needle-based pump technologies.



Advanced Tilt and Rotate

This patented option provides reduced wet-out areas and improved capillary flow for underfill by accurately dispensing on side walls of packages. State-of-the-art rotary actuators provide a fast, high precision, zero backlash mechanism that allows articulation of the dispense pump in sub-degree increments in both axes as many times as you need for total flexibility.

NuJet™

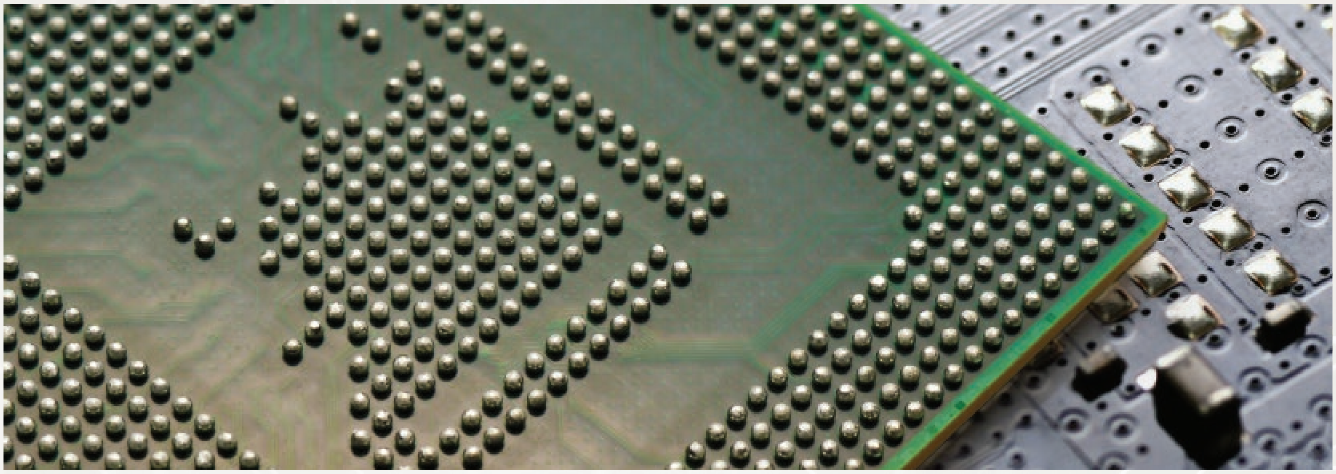
"Compact, Fast and Flexible", NuJet eliminates the use of a needle and incorporates a state-of-the-art pneumatic actuator that generates an operating frequency of up to 300Hz. Controlling the piston with a pneumatic actuator and closed-loop software achieves a high degree of accuracy and repeatability for consistent process results. With a slim-line design and low mass the pumps can be pitched down to 28mm apart for optimal dual-head dispensing.

NanoShot™

NanoShot™ offers high speed - up to 600 Hz, and ultra-fine resolution, with dot sizes < 300 microns, this patent pending pump features state-of-the-art motion control technology, simple maintenance and quick changeover.

Vitronics Soltec Reflow

The Centurion™ is a forced-convection reflow system with tight, closed-loop process control. The patented CATHOX™ (Catalytic Thermal Oxidizer) dramatically reduces maintenance requirements while keeping a clean process environment that is critical for Semiconductor processing. It is very effective in removing volatile compounds from the process tunnel during reflow. In thermal oxidation, organic vapors are converted to hydrocarbons, which are captured by a filter. With the best heat transfer in the industry, the Centurion is able to run any profile at the lowest set point possible, which minimizes the thermal differences over the product and uses less energy.



Best-in-class thermal performance and improved sustainability, meeting the most critical and demanding semiconductor reflow requirements.

CENTURION

Reduced Cost of Ownership

With an efficient heat transfer design, Centurion has a low energy consumption rate. Its reliable and robust design, backed by over 20 years of experience and capability, ensures high uptime even with the toughest reflow requirements. Our patented CATHOX™ (Catalytic Thermal Oxidizer) further reduces cost of ownership by reducing the maintenance needs through cutting-edge flux treatment technology. The new 'idle mode' option will further reduce cost of operation.

Industry-leading Thermal Performance

With Centurion's new design backed by our experiences with its prior generations, we achieved better thermal transfer even with a wider process chamber. Our knowledge and experience in process control ensures the repeatability across the oven required by the most demanding customers and the most challenging process requirements in the world.

Industry's best heat transfer

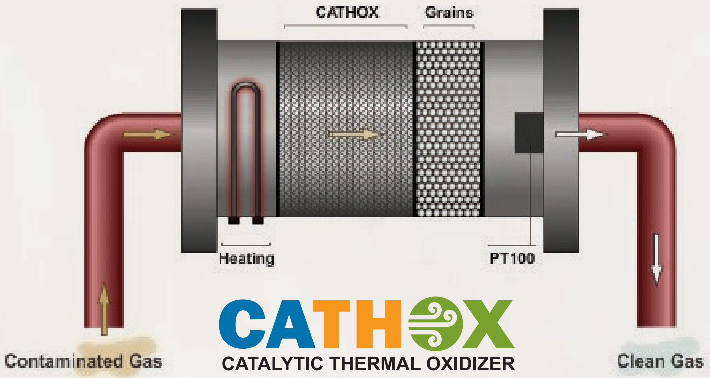
Designed for Semiconductor Yield Improvement

CLOSED-LOOP TEMPERATURE-CONTROLLED WATER COOLING

The Centurion features tight, closed-loop process control including closed-loop temperature controlled water cooling. This enables semiconductor customers to control cooling zones just like heating zones and meets the special cooling rate requirements for the industry.

MAINTENANCE AND ACCESSIBILITY

The patented CATHOX™ (Catalytic Thermal Oxidizer) dramatically reduces maintenance requirements while keeping a clean process environment. It is very effective in removing volatile compounds from the process tunnel during reflow. In thermal oxidation, organic vapors are converted to hydrocarbons, which are captured by a filter. Centurion’s design also ensures that when maintenance is required, you have easy access and can do the maintenance job with few tools required.

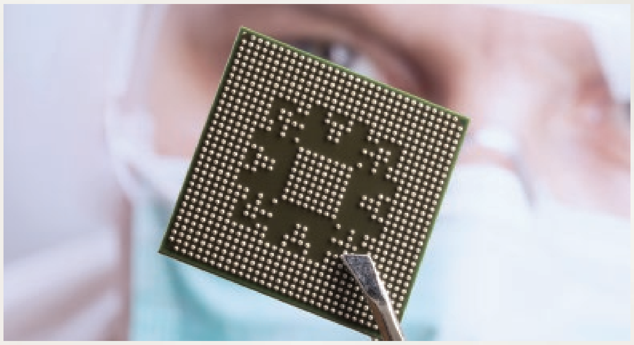


NITROGEN CONTROL

Nitrogen atmosphere is used to reduce oxidation of surfaces and minimize voids in the interfaces. Centurion’s design of chamber in Nitrogen system prevents air from getting into the process. It also comes standard with a quick purge system. Optional closed-loop PPM control automatically regulates oxygen levels. Nitrogen recirculation in the Flux Management System significantly reduces nitrogen consumption.

FAST COOL DOWN

Fast changeover time is a key factor for high-mix low volume manufacturers. Fast Cool Down (FCD) is a key option when there are multiple recipe changes in a day, especially when changing profiles from high to low temperature. Through computer program, FCD automatically controls individual zones to reach its specific temperature setpoint.

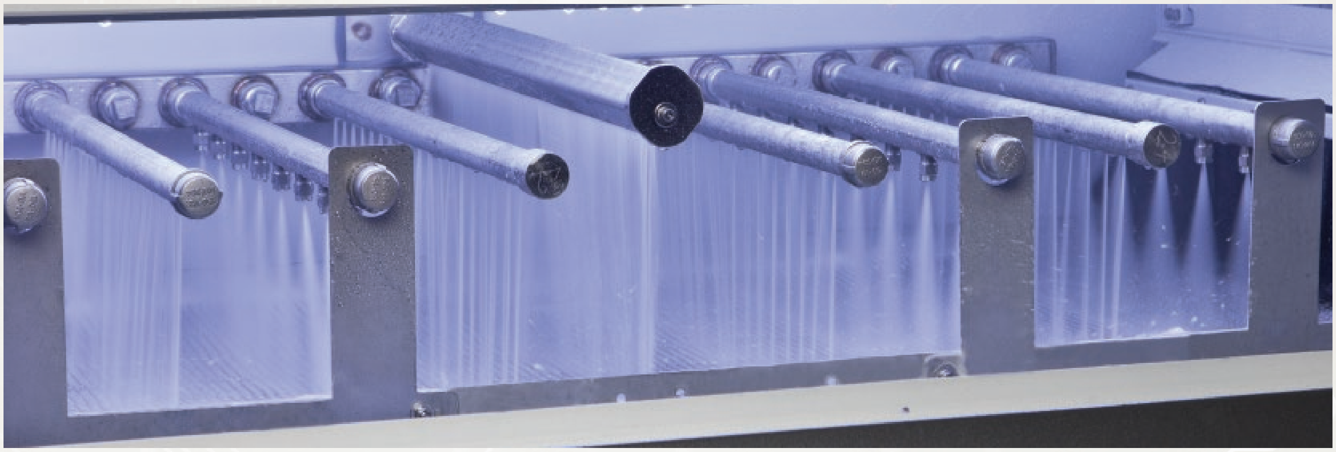


TRACEABILITY, PERFORMANCE VERIFICATION AND EFFICIENCY

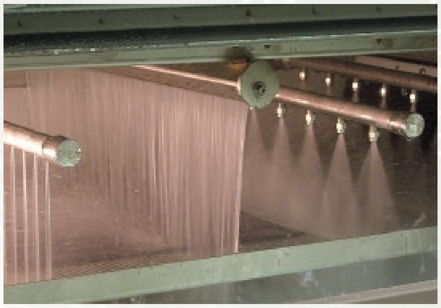
The Centurion offers smart software solutions that provide traceability, performance verification and enhanced efficiency. The Management Information System provides a log with all settings and actual values for traceability. Barcode software has ability to connect to an individual product and can be used for automatic program selection. The System Performance Verification System checks heating elements and fan motors in real-time and generates an alarm if there is a failure. The new "idle mode" reduces power and nitrogen consumption when the machine is idle reducing power consumption by up to 35% and nitrogen by up to 40%.

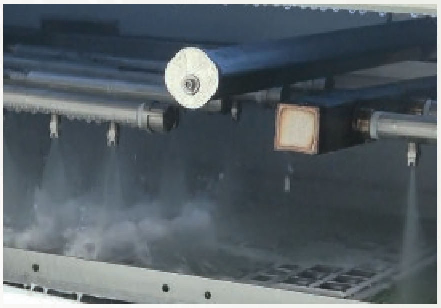
Electrovert Cleaning Solutions

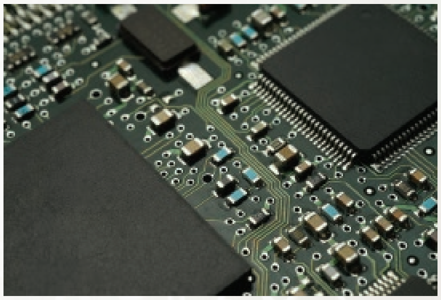
Electrovert cleaning equipment plays a critical role in semiconductor fabrication and are utilized in multiple steps, including degreasing, cleaning prior to electroplating and underfill, cleaning after bumping and wire bonding, and carrier debonding of fan-out packages. Cleaning helps to remove flux residue, excess adhesive, grease and oils to ensure proper bonding and material distribution and avoid defects and increase yields. Electrovert cleaners are designed to deal with small, lightweight semiconductor products such as lead frames, BGAs, wafers and 3D stacked packages.



Designed to provide complete cleaning process flexibility, superior cleaning and drying performance, process monitoring, and reliability.







MIXED SPRAY TECHNOLOGY

The clear advantage of the Aquastorm cleaners is the ability to deliver a dynamic combination of chemistry, thermal, and mechanical forms of energy at the surface to effectively clean under low stand-off and difficult to clean components. Aquastorm utilizes mixed spray technologies including high-impact force for tight spaces, oscillating action for low pressure applications and complete flooding action for high pressure applications. Jet Impact Cleaning with omni-directional spray patterns greatly improves cleaning under low-standoff components, and eliminates shadowing effects. Chemical Isolation provides optimal process separation and minimizes chemistry consumption.

TORRID ZONE DRYING TECHNOLOGY

Integrated into the machine cabinet, the Torrid Zone delivers a controlled dynamic process that effectively removes moisture. Typical performance includes drying complex assemblies to within 0.1 gram of prewashed dry weight. The technology reduces exhaust requirements by 44% and uses 15% less power than conventional drying systems.

Designed for Semiconductor Yield Improvement

Proven Cleaning Performance

Electrovert® AQUASTORM® SERIES

Electrovert Aquastorm is a versatile, high-performance cleaning system designed to optimize the your cleaning process while minimizing overall cost. Precise spray pressure control for sensitive components and semiconductor applications. Both the Aquastorm 100 and 200 are ideally suited to RMA and no-clean de-flux applications that require chemistry, as well as removal of water-soluble organic acid flux. It is also available in stainless steel model.

Versatility

Electrovert® AQUASTORM® FSM (FREE STANDING MODULE)

Aquastorm FSM is a free standing additional wash section that can be added to any existing in-line cleaning process. It is available for a 'straight DI' or 'chemical wash with chemical isolation' processes.

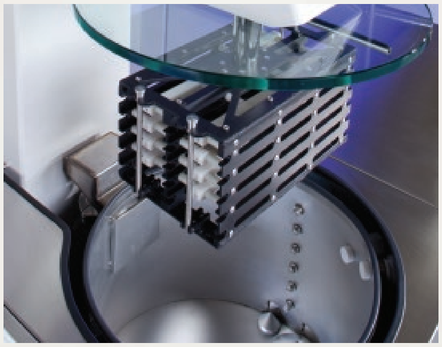
Lead-Free Process Ready

Electrovert® AQUASTORM® 60

Aquastorm 60 in-line cleaning system is ideal for semiconductor cleaning applications in which the manufacturing volume has outgrown the capability of a batch type cleaner and/or lack the floor space requirements of a typical in-line cleaner. For straight DI aqueous cleaning applications the total length is 6'9" (2103 mm) and for chemistry based applications the total length is 9'3" (2844 mm).

Electrovert® AQUASTORM® 50

Aquastorm 50 batch cleaner utilizes the same advanced cleaning technologies found in the Aquastorm in-line cleaners in a batch footprint.



MICROCEL™ CENTRIFUGAL CLEANING SYSTEM

The MicroCel cleaner uses centrifugal energy for unparalleled penetration, solubilization and containment removal for advanced packages including flip chips, MCMs, SIPs, BGAs, CSPs, and hybrid electronics.

Despatch Thermal Processing

Despatch ovens provide clean process, low oxygen, fast cycle curing of adhesives and polymers used in high-volume semiconductor packaging and assembly. Despatch ovens have superior temperature uniformity of ± 0.5% of setpoint and offer SEMI S2/S8, CE, and SECS/GEM communication. Low particulate environmental controls protect from contamination and low oxygen levels prevent oxidation. Despatch ovens are used for adhesive bonding and curing, encapsulant curing, underfill curing of CMOS optical sensors, die attach and BGA, B-stage adhesive curing, polyimide curing, metallic thin film annealing, and photoresist curing.

Clean process ovens designed for polyimide baking and curing applications

The Despatch PCO2-14™ electrically heated oven was designed to meet the specific process requirements for hard baking polyimide coatings in an inert atmosphere. This high-performance, clean process oven (ISO Class 5/Class 100 recirculated airflow) offers many unique components, including a pressure relief system, an oxygen control system and a process monitoring system which allows the oven to achieve the strict oxygen level and atmospheric requirements involved in polyimide curing.

Pressure Relief System: In the “hard bake” polyimide cure process, residual solvent is removed and desired surface properties are finalized. The process of removing solvents requires that the oven contain equipment to help prevent and collect solvent condensation. Despatch designed the PCO2-14™ with a pressure relief system that includes a removable “cold trap”, an easy-to-clean condensate trap that helps to prevent polyimide buildup in the oven’s exhaust.

Oxygen Monitor and Control System:

The PCO2-14™ is an inert atmosphere oven which allows the oxygen level to be maintained at 20ppm or less to help prevent oxidation of the polyimides being cured. The oven contains an O2 monitor which is wired to the purge valve and turns the nitrogen purge on whenever the oxygen level is above the O2 monitor set point. Once the nitrogen purge is complete, the O2 level is maintained at a set point by a controller that operates a modulating valve during the curing process. This process minimizes the nitrogen usage and allows for consistent and repeatable product curing.

Process Monitoring System:

The oven features Protocol 3™ software to allow for communication between the PC and the oven, an Ethernet connection and a 15” (38.1cm) flat panel display screen. The software communicates directly with the oven’s Protocol 3™ controller, O2 controller, O2 monitor and integrated PC to observe and data log entire cycles and provide the user with real-time information on set points, actual chamber temperatures and O2 levels throughout the entire process.

ITW EAE is a division of Illinois Tool Works, Inc. It is a consolidation of all of its Electronic Assembly Equipment and Thermal Processing Technology. The group includes world-class products from MPM, Camalot, Electrovert, Vitronics Soltec and Despatch.

EAE Overview 07-24

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ITW EAE
Electronic Assembly Equipment