EV GROUP®

Product Range
About EVG

EV Group (EVG) is a leading supplier of high-volume production equipment and process solutions for the manufacture of semiconductors, MEMS, compound semiconductors, power devices and nanotechnology devices.

A recognized market and technology leader in wafer-level bonding and lithography for advanced packaging and nanotechnology, EVG’s key products include wafer bonding, thin-wafer processing and lithography/nanoimprint lithography (NIL) equipment, photoresist coaters, as well as cleaning and inspection/metrology systems.

With state-of-the-art application labs and cleanrooms at its headquarters in Austria, as well as in the U.S. and Japan, EVG is focused on delivering superior process expertise to its global R&D and production customer and partner base – from the initial development through to the final integration at the customer’s site.

Founded in 1980, EVG services and supports an elaborate network of global customers and partners all over the world, with more than 850 employees worldwide and fully owned subsidiaries in the U.S., Japan, South Korea, China and Taiwan.

Vision/Mission

invent – innovate – implement

Our Triple-i philosophy is reflected in the enthusiasm for technology, innovative strength and internationality of the entire company. Our vision of “being the first in exploring new techniques and serving next-generation applications of micro- and nanofabrication technologies” enables our customers to successfully commercialize their new product ideas.
Core Technologies

For nearly 40 years, EVG has provided industry-leading process technologies and solutions that have enabled innovations in advanced packaging, optics and photonics, sensors and bio-medical devices and applications.

True to our Triple-i philosophy of “Invent”, “Innovate” and “Implement”, our core lithography, wafer bonding and metrology technologies enable manufacturers to develop the latest micro- and nanotechnology device breakthroughs, and then bring them into high-volume production, cost effectively and at high process yields.

**Nanoimprint Lithography (NIL) - SmartNIL®**
A large-area soft UV-nanoimprint lithography process for high-volume manufacturing

**Wafer-Level Optics (WLO)**
Market-leading WLO manufacturing portfolio, including step-and-repeat mastering, lens molding, nanoimprint lithography and stacking

**Resist Processing**
Resist processing technology together with patterning are the most repeated steps in semiconductor manufacturing

**Temporary Bonding & Debonding**
Temporary bonding and debonding enabling backside processing for 3D integration

**Optical Lithography**
Most complete technology portfolio, supporting a maximum range of requirements in optical lithography

**MLE™ Maskless Exposure Technology**
Moving beyond traditional mask-based lithography toward digital lithography technology

**Eutectic Bonding**
Eutectic wafer bonding for reliable hermetic sealing

**Metal Diffusion Bonding**
Metal diffusion bonding for precise interfaces and alignment

**Fusion and Hybrid Bonding**
For engineered substrates and 3D device integration

**ComBond®**
High vacuum wafer bonding technology

**Metrology**
Process control and optimization for lithography and bonding
Wafer Bonding

With extensive experience in designing and manufacturing precision wafer bonding equipment, EVG is well recognized for setting industry standards in wafer bonding. EVG wafer bonding systems can be configured for R&D, pilot-line or high-volume production, and for any direct or interlayer-based bonding process, including sophisticated low-temperature covalent bonding. With this portfolio of technologies and equipment, EVG addresses markets for advanced packaging and 3D integration, MEMS, as well as advanced compound semiconductor and SOI substrates, holding the leading position and dominant market share.

Permanent Bonding Systems

The introduction of EVG’s wafer-bonding approach, which separates the bond alignment from the bonding step, immediately revolutionized the market. Utilizing high-contact forces under elevated temperatures and a controlled atmosphere, this approach is today’s process standard, with EVG holding the dominant market share for both semi- and fully automated wafer bonders and an installed base of more than 1500 chambers. EVG’s wafer bonders offer optimal total cost of ownership and bonding yield. Industry-leading alignment accuracies of less than 100 nm and a high-volume-proven modular platform enable the combination of EVG’s wafer bonding technologies for MEMS, 3D integration and advanced packaging applications.

Temporary Bonding and Debonding Systems

Temporary bonding is an essential process to offer mechanical support for thin or to-be-thinned wafers, important for 3D ICs, power devices and FoWLP wafers, as well as for handling fragile substrates like compound semiconductors. A device wafer is bonded to a carrier wafer with the help of an intermediate temporary bonding adhesive, allowing the typically fragile device wafer to be processed with additional mechanical support. After the critical processes, the wafer stack is debonded. EVG’s outstanding bonding know-how is reflected in its temporary bonding equipment, which has been provided by the company since 2001.

Bond Alignment Systems

With the invention of the world’s first double-sided alignment system in 1985, EV Group revolutionized MEMS technology and set worldwide industry standards in aligned wafer bonding by separating the alignment and bonding process. This separation results in higher flexibility and universal application of the wafer bonding equipment. EVG’s bond alignment systems offer the highest precision, flexibility and ease of use, and modular upgrade capability, and have been qualified in numerous high-throughput production environments. The precision of EVG bond aligners accommodates the most demanding alignment processes.

Fusion and Hybrid Bonding Systems

Fusion or direct wafer bonding enables permanent connection via dielectric layers on each wafer surface used for engineered substrates or layer transfer applications such as backside illuminated CMOS image sensors. Hybrid bonding extends fusion bonding with embedded metal pads in the bond interface, allowing face-to-face connection of wafers. The main application for hybrid bonding is advanced 3D device stacking.

Metrology

Metrology is essential to control, optimize and ensure the highest yield in semiconductor manufacturing processes. By implementing feedback loops, both process control and process parameter correction are enabled, which allow compliance to tighter process requirements.

EVG’s metrology solutions are optimized for lithography and all types of bonding applications, and use non-destructive measurement methods. Customers can choose between integration of the metrology technology within fully automated process equipment, or stand-alone metrology systems serving multiple process steps.
**Lithography**

EVG’s key competencies in lithographic technology lie in the high-throughput contact and proximity exposure capabilities of its mask aligners and the in-house process knowledge of its resist processing systems. All of EVG’s lithography equipment platforms are 300-mm ready, can be fully integrated into its HERCULES® lithography track systems, and are complemented by its metrology tools for top-to-bottom side alignment verification. EVG constantly looks ahead to future market trends and thus provides application-specific solutions, particularly in the optical 3D sensing and photonics market where EVG’s process and materials expertise is unsurpassed.

**Mask Alignment Systems**

EVG’s inventions, such as the world’s first bottom-side alignment system in 1985, have pioneered and set the industry standards in both top and double-sided lithography, aligned wafer bonding and nanoimprint lithography. EVG contributes in these areas through continuous development of mask aligner product generations to augment this core lithography technology.

**Resist Processing Systems**

The EVG100 series resist processing systems establish new standards in quality and flexibility for photoresist coating and developing. Designed to provide the widest range of process variations, the EVG100 series’ modularity offers spin and spray coating, developing, bake and chill modules to suit individual production requirements. These systems accommodate the processing of an extensive range of materials such as positive and negative resists, polyimides, double-sided coating of thin resist layers, high viscosity resists, and edge protection coatings.

**Integrated Lithography Track Systems**

Lithography track systems complete the EVG lithography product family with a fully integrated production system and high grade of automation combining mask alignment and exposure with integrated pre- and post-processing. Based on a modular platform, the HERCULES lithography track system merges EVG’s established optical mask alignment technology with integrated cleaning, resist coating, baking and resist development modules.

**Nanoimprint Lithography (NIL)**

EVG is the market-leading supplier of nanoimprint lithography (NIL) equipment and integration processes. EVG pioneered and mastered NIL from a research approach more than 15 years ago, to implementation in volume production on various substrate sizes from two-inch compound semiconductor wafers to 300-mm wafers and even on large-area panels. NIL is the most promising and cost-effective process for generating nanometer-scale-resolution patterns for a variety of commercial applications in bioMEMS, microfluidics, electronics and, most recently, various diffractive optical elements.

**UV-NIL / SmartNIL® Systems**

EV Group provides a complete product line for UV-based nanoimprint lithography (UV-NIL), including different single-step imprinting systems, large-area imprinters as well as step-and-repeat systems for efficient master fabrication. Besides soft UV-NIL, EVG offers its proprietary SmartNIL technology with multiple-use polymer stamp technology. The efficient and robust SmartNIL process provides high pattern fidelity, highly uniform patterned layers and minimum residual layers, combined with easy scalability in wafer size and production volume.

**Hot Embossing Systems**

EV Group’s series of high-precision hot embossing systems are based on the company’s market-leading wafer bonding technology. Excellent pressure and temperature control as well as uniformity over large areas allow for high accuracy imprints. Hot embossing is a cost-effective and flexible fabrication technology with very high replication accuracy for feature sizes down to 50 nm.
LITHOGRAPHY

Mask Alignment Systems

EVG®101 Advanced Resist Processing System up to 300 mm

EVG®105 Bake Module up to 300 mm

Resist Processing Systems

EVG®101 Advanced Resist Processing System up to 300 mm

EVG®105 Bake Module up to 300 mm

UV Nanoimprint Lithography / SmartNIL® Systems

EVG®610 UV-NIL System up to 150 mm

HERCULES® NIL Fully Integrated SmartNIL® UV-NIL System up to 200 mm

UV Nanoimprint Lithography / SmartNIL® Systems

EVG®620 NT Mask Alignment System (semi-automated / automated) up to 150 mm

HERCULES® NIL Fully Integrated SmartNIL® UV-NIL System up to 300 mm

EVG®620 NT Mask Alignment System (semi-automated / automated) up to 150 mm

HERCULES® NIL Fully Modular and Integrated SmartNIL® UV-NIL System up to 300 mm
**EVG®6200 NT Mask Alignment System**
(semi-automated / automated)
up to 200 mm

**IQ Aligner® Automated Resist Processing System**
up to 200 mm

**IQ Aligner® NT Automated Mask Alignment System**
up to 300 mm

**Lithography Track Systems**

**EVG®120 Automated Resist Processing System**
up to 200 mm

**EVG®150 Automated Resist Processing System**
up to 300 mm

**HERCULES® Lithography Track System**
up to 300 mm

**EVG®6200 NT SmartNIL® UV-NIL System**
up to 200 mm

**EVG®720 Automated SmartNIL® UV-NIL System**
up to 150 mm

**EVG®7200 Automated SmartNIL® UV-NIL System**
up to 200 mm

**EVG®7200 LA Large-Area SmartNIL® UV-NIL System**
up to 550 mm x 650 mm (Gen 3)

**IQ Aligner® Automated Mask Alignment System**
up to 200 mm

**IQ Aligner® UV-NIL System**
up to 300 mm

**IQ Aligner® Hot Embossing System**
up to 200 mm

**Hot Embossing Systems**

**EVG®770 Step-and-Repeat NIL System**
up to 300 mm

**IQ Aligner® Automated UV-NIL System**
up to 300 mm

**EVG®S10 HE Hot Embossing System**
up to 200 mm

**EVG®S20 HE Hot Embossing System**
up to 200 mm
Permanent Bonding Systems

**EVG®501 / EVG®510**
Wafer Bonding System
up to 200 mm

**EVG®520 IS**
Wafer Bonding System
up to 200 mm

**EVG®540 Automated**
Wafer Bonding System
up to 300 mm

**EVG®560 Automated**
Wafer Bonding System
up to 300 mm

Temporary Bonding and Debonding Systems

**EVG®805**
Debonding System
up to 300 mm

**EVG®820**
Lamination System
up to 300 mm

**EVG®850 TB Automated**
Temporary Bonding System
up to 300 mm

**EVG®850 DB Automated**
Debonding System
up to 300 mm

Bond Alignment Systems

**EVG®6200∞ BA Automated**
Bond Alignment System
up to 200 mm

**SmartView® NT Automated Bond Alignment System for Universal Alignment**
up to 300 mm

**EVG®301**
Single Wafer Cleaning System
up to 300 mm

**EVG®320 Automated**
Single Wafer Cleaning System
up to 300 mm

Fusion and Hybrid Bonding Systems

**EVG®850 Automated**
Production Bonding System for SOI
up to 300 mm

**GEMINI® FB Automated**
Production Wafer Bonding System
up to 300 mm

**BONDSCALE™ Automated**
Production Fusion Bonding System
up to 300 mm

**EVG®20**
IR Inspection Station
up to 200 mm
Bond Alignment Systems

- **ComBond®** Automated High-Vacuum Wafer Bonding System up to 200 mm
- **GEMINI®** Automated Production Wafer Bonding System up to 300 mm

- **EVG®610 BA** Bond Alignment System up to 200 mm
- **EVG®620 BA** Automated Bond Alignment System up to 150 mm

- **EVG®810 LT** LowTemp™ Plasma Activation System up to 300 mm
- **EVG®850 LT** Automated Production Bonding System for SOI and Direct Wafer Bonding up to 300 mm

- **EVG®40 NT** Automated Measurement System up to 300 mm
- **EVG®50** Automated Metrology System up to 300 mm

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Process Technology

With state-of-the-art application labs and cleanrooms at its headquarters in Austria, as well as in the U.S. and Japan, EVG is focused on delivering superior process expertise to our global R&D and production customer and partner base. Our process development teams work hand-in-hand with customers, from the initial process development through to the final integration at their production sites. Services range from equipment demonstrations and feasibility studies to small-to-medium-scale pilot-line production to shorten time to market.

Last but not least, EVG’s process technology business unit performs independent research work to explore and develop baseline processes that will open up new market opportunities for us and our customers. This includes working with partners such as materials suppliers to develop and optimize new processes and capabilities.
Customer satisfaction is critically important for EVG. Our worldwide customer support centers and spare parts supply network deliver on our commitment to provide on-demand, quality service that our local customers and partners have come to expect from EVG. With outstanding experience and knowledge, our team is ready to provide you with immediate assistance through remote diagnostics and on-site service with extremely short response times around the globe.

EVG Training Center

In-depth knowledge allows you to unlock the full potential of your EVG equipment. Our state-of-the-art training center is equipped with fully operational production machines, component test rigs and dedicated classrooms. Depending on the type of training, our experienced and qualified training staff will focus on tool operation, handling and adjustments as well as preventive and corrective maintenance. Full documentation will ensure long-term ROI of your training sessions.