Be the first point of contact for worldwide customers searching for solutions.

“Create unique solutions. Create new value.”
Corporate philosophy of Lasertec

Lasertec has been creating a number of unique inspection and measurement systems that feature leading-edge technologies for many years. We capture market needs at an early stage and bring high-value solutions quickly to help customers’ efforts at their R&D and production sites based on our proprietary technologies in applied optics. Thanks to our unique technologies, high quality, and good customer support, we have earned a good reputation and customer trust in such fields as semiconductor, energy and environment, laser microscope, and flat panel display.

Lasertec will keep creating new value and contribute to the progress of society.

The core expertise of Lasertec that enables the successive launches of epoch-making products is its technologies in applied optics.

Lasertec has accumulated its technologies through the pursuit of ultimate possibility in the use of light. The pursuit began when we started using laser as a light source to give high resolution to microscopes. Since then, we have mastered a “confocal optics” technology that enables the construction of a three-dimensional image that is in focus at all points. We have also succeeded in developing a “DUV/EUV optics” technology that is applicable to semiconductor lithography applications. The application of our expertise to ultrahigh resolution lithography has led to an “interferometry” technology that accurately measures the phase of light.

Lasertec uses the three core technologies and other neighboring technologies in various combinations to develop products that address customer needs ahead of anyone else.
Lasertec uses its proprietary optical technologies to help customers overcome new challenges.

“Let’s launch a product that is totally new to the world every year.” Spirit of the founders

In October 1976, we successfully developed the world’s first automated LSI photomask inspection system. The system contributed to quality improvement and cost reduction in the semiconductor industry, achieving a higher defect detection rate (from 60% to near 100%) and a significantly reduced inspection time (to 1/10 of what it used to be). It gave us a foundation for growth. Drawing on this success, we have launched more innovative products featuring unique optical technologies. “A product that is totally new to the world” - by upholding the spirit of the founders and redefining it, we will keep enhancing our product development capability and strive for higher growth.

Rapid product development and good customer support

Advanced and unique products are developed in the shortest time possible

At Lasertec, engineers are responsible not only for product development but also for all stages of product life cycle, i.e., planning, technology research, designing, prototyping, fabrication, delivery, installation and after-sale support. Armed with diverse experiences from these activities and highly motivated by the professional spirit, our engineers take on tough challenges. This leads to the accumulation of unique knowhow and drives our rapid product development.

Technical support infrastructure for leading-edge customers worldwide

Our customers’ leading-edge production facilities require uninterrupted full capacity operations. Lasertec’s standard is to keep a 99% or higher uptime for all of its systems in use. We put in place a technical support infrastructure to provide full on-site support and prompt backup in case of emergency. Our global operations are assisting our customers’ production and R&D efforts.
Lasertec provides highly accurate inspection and measurement systems essential for semiconductor manufacturing process.

Our inspection and measurement systems play a crucial role in the semiconductor manufacturing process, which is becoming more complex and sophisticated by the introduction of new materials and new architectures as well as by the continuing miniaturization of IC designs. Our mask blank inspection systems have a track record of being regarded as the de facto standard tools of mask blank inspection. We are also launching various other inspection systems to address new challenges in IC device production. We are offering products that fit customer needs and strategies.

### Lasertec systems in the semiconductor manufacturing process

**Front end process**
- Mask Blank Inspection System
  - M8650/M8651
- Phase Shift/Transmittance Measurement System
  - MPM193EX
- Mask Inspection System
  - MATRICS X810EX Series
- Pellicle/Photomask
  - PEGGIS P100

**Wafer Inspection/Review System**
- MAGICS Series M5640
- MR300
- LX330/LX530
- EZ300
- BGM300
- BIM300
- EZ300
- LX330/LX530

**Phase Shift/Transmittance Measurement System**
- MPM193EX
- LX330/LX530
- EZ300
- BGM300

**Evolution of IC design rules and timely product launches by Lasertec**

<table>
<thead>
<tr>
<th>Year</th>
<th>Design Rule</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>60nm</td>
<td>M1350</td>
</tr>
<tr>
<td>2003</td>
<td>60nm</td>
<td>M2350</td>
</tr>
<tr>
<td>2007</td>
<td>45nn</td>
<td>M5640</td>
</tr>
<tr>
<td>2012</td>
<td>30nm</td>
<td>M6640S/M6641S</td>
</tr>
<tr>
<td>2014</td>
<td>30nm</td>
<td>M8650/M8651</td>
</tr>
</tbody>
</table>

M8650/M8651 is a new MAGICS series mask blank inspection system that meets 7 nm requirements.

A sample review image from M8650/M8651
Lasertec is also providing systems that contribute to higher energy efficiency and better environment.

We offer a highly sensitive inspection system for SiC devices, which are expected to become power semiconductors of the next generation. For photovoltaic (PV) cells, which are widely used as a renewable energy source, we have a high-speed visualization system that measures conversion efficiency distribution, a key performance indicator. For lithium ion batteries, which are being developed as an automotive power source, we provide a unique measurement system that can reveal coating thickness non-uniformities as well as one that helps analyze the characteristics of component materials.

### High sensitivity detection of defects on SiC and GaN wafers

**SiC wafer inspection and review system**
- SICA88
  - High sensitivity detection of surface defects and crystallographic defects under epitaxial film, both at the same time
  - Highly accurate and detailed automatic defect classification (ADC)

**Transparent object inspection system**
- TROIS32/33
  - High sensitivity detection of defects on wide-bandgap semiconductors and various transparent wafers made of sapphire, quartz and others
  - Effective tool of epitaxial growth process control

Defects captured by SICA88
- Defect map and histogram

### MAP Series – Contributing to PV cell conversion efficiency improvement

**PV cell conversion efficiency distribution measurement system**
- MP15/50
  - Computed tomography (CT)-based high-speed mapping of electric current density distribution under user-specified bias voltage
  - Visualization of I-V characteristics for entire surface or for user-specified area or point
  - Various mapping options including Pmax, Voc, FF, Rs and Rsh
  - Non-destructive, non-contact inspection and measurement for R&D or production
  - Visualization of non-uniform efficiency distribution and detection of shunt, BSFE, and other defects

**PV cell spectral response distribution measurement system**
- SR15
  - Measurement of spectral response and QE characteristics for entire surface or for user-specified area or point
  - Featuring a line illumination for achieving a high S/N ratio and a minimum resolution of 100μm for enabling measurement in narrow areas
  - Analysis of the distribution of diffusion and front/back surface passivation effect on crystalline PV cells
  - Evaluation of spectral characteristics of photovoltaic materials (based on the distribution of doping materials such as EVA and wavelength shifters)

### For electrode coating process control and for analyzing charge/discharge characteristics of lithium ion batteries

**Electrochemical reaction visualizing confocal system**
- ECCS B310
  - In-situ observation of electrochemical reactions inside a charging/discharging battery
  - Visualization of lithium ion intercalation
  - Quantification of the expansion and contraction of active materials
  - Analysis of dendrite formation mechanism

**Coating thickness scanning system**
- TSS20
  - For higher performance of lithium ion batteries
  - Management of slurry condition and viscosity uniformity
  - Fine tuning of die coater (gap width, pump pressures, etc.)
  - Management of press roll accuracy

Example of distribution of slurry coating
- Distribution measured with capacitance sensor
  - Horizontal lines - coating errors
  - Black spots - peeled coating
  - White spots - coating clusters
HYBRID is a multifunctional high-performance confocal microscope that features 2 different light sources - white light and laser light - in one body to provide both wide field-of-view and high resolution.

Microscopes are expected to be more multifunctional and better performing because of their widening applications and nanometer-scale measurement needs. Lasertec’s confocal microscope, HYBRID, features 2 different optics in one body to provide high accuracy in wide field-of-view (at low magnification) while offering high resolution at high magnification. Using a white light, HYBRID can perform interferometry measurement and spectroscopic reflectometry measurement. HYBRID also uses a laser light to provide high resolution images in non-contact observation of extremely small structures at high magnification. HYBRID is widely used for R&D and quality control in various industrial fields, including semiconductors, metals, resins, new materials and high performance films.

Integrating 6 functions in one body and covering a full range of observation and measurement needs

For a wider range of observation and measurement needs

<table>
<thead>
<tr>
<th>Observation</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scanning laser microscope</td>
<td>Industry-leading accuracy and repeatability</td>
</tr>
<tr>
<td>High magnification and high resolution observation</td>
<td>Height measurement based on confocal technology</td>
</tr>
<tr>
<td>White Light Confocal</td>
<td>3D image</td>
</tr>
<tr>
<td>Wavelength selection to meet a wide range of applications</td>
<td>Sample: Accelerometer</td>
</tr>
<tr>
<td>Sample: Si wafer backside (FOV 75μm)</td>
<td>Width: 6.4μm Height: 8.2μm</td>
</tr>
<tr>
<td>Concept of multilayer observation based on wavelength selection</td>
<td></td>
</tr>
<tr>
<td>Sample: Scales of butterfly</td>
<td></td>
</tr>
</tbody>
</table>

Wider, higher and easier

<table>
<thead>
<tr>
<th>Wide measurement range and high accuracy</th>
<th>Automated measurement of bumps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seamless measurement from the millimeter scale to the nanometer scale</td>
<td>HYBRID performs automated measurement using its auto-measurement software and motorized stage. Once you set a recipe, the system automatically measures width, height and roughness of patterns on such samples as semiconductors and crystal substrates.</td>
</tr>
</tbody>
</table>
Lasertec provides state-of-the-art inspection systems to support innovations in FPD technology.

Lasertec’s inspection systems support innovations in liquid crystal and other flat panel display (FPD) technologies and facilitate the adoption of higher resolution FPDs. Our FPD photomask inspection systems have a track record of being regarded as de facto standard tools. We also offer a full lineup of solutions to cover inspection needs of the processes before and after photomask inspection. We upgrade the defect detection performance of our inspection systems in response to the introduction of finer patterns. We pride ourselves on making significant contributions to the quality improvement of FPD photomasks.

### Lasertec systems used in FPD manufacturing process

- **FPD Photomask Inspection System**
  - for G10 LI series LI712
- **FPD Mask Blanks Inspection System**
  - LBIS Series L852/L1052
- **Pellicle Inspection and Mounting System**
  - for LI712 71PA/71PP

### Evolution of Lasertec systems in response to higher-resolution and larger-sized panels

#### Photomask inspection systems

<table>
<thead>
<tr>
<th>Year (year)</th>
<th>Photomask size (mm)</th>
<th>Sensitivity (μm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>34MD</td>
<td>0.35</td>
</tr>
<tr>
<td>1999</td>
<td>44MD</td>
<td>0.50</td>
</tr>
<tr>
<td>2000</td>
<td>51MD</td>
<td>0.75</td>
</tr>
<tr>
<td>2003</td>
<td>71MD</td>
<td>1.00</td>
</tr>
<tr>
<td>2008</td>
<td>LI712</td>
<td>1.50</td>
</tr>
<tr>
<td>2012</td>
<td>CLIOS</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>1500×1300</td>
<td></td>
</tr>
</tbody>
</table>

#### Generation

<table>
<thead>
<tr>
<th>Photomask size (mm)</th>
<th>Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>300×300</td>
<td>G1</td>
</tr>
<tr>
<td>360×465</td>
<td>G2</td>
</tr>
<tr>
<td>560×650</td>
<td>G3</td>
</tr>
<tr>
<td>690×880</td>
<td>G4</td>
</tr>
<tr>
<td>1090×1200</td>
<td>G5</td>
</tr>
<tr>
<td>1500×1800</td>
<td>G6</td>
</tr>
<tr>
<td>1870×2200</td>
<td>G7</td>
</tr>
<tr>
<td>2160×2460</td>
<td>G8</td>
</tr>
<tr>
<td>2850×3050</td>
<td>G10</td>
</tr>
</tbody>
</table>

- **Defect on photomask (0.3μm)**
- **Optics – the centerpiece of inspection system**
### Company Outline

Name: Lasertec Corporation  
Corporate office: 2-10-1 Shin-yokohama, Kohoku-ku, Yokohama, 222-8552, Japan  
Capital: 931 million yen  
Founded: July 1960  
Business: Development, manufacturing, sale and service of the following products  
1. Semiconductor-related systems  
2. Energy and Environment-related products  
3. Laser Microscopes  
4. FPD-related systems  
Main Banks: The Bank of Tokyo-Mitsubishi UFJ  
The Sumitomo Mitsui Banking Corp.

### Contact Information

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Phone: +82-31-8015-0540, Fax: +82-31-8015-0541  
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Phone: +886-3-657-9120, Fax: +886-3-657-9122  
Inquiry by e-mail: sales@lasertec.co.jp

### Milestones

1960: Yasushi Uchiyama founds Tokyo ITV Laboratory, a firm engaged in X-ray television in X-ray television development.  
1962: NJS Corporation is established and starts exploring a wide range of technology development besides X-ray television.  
1985: The world's first LSI photomask inspection system is developed and launched.  
1986: NJS Corporation is renamed as Lasertec Corporation. Lasertec U.S.A., Inc. is established in San Jose, CA.  
1987: Large FPD photomask defect inspection system, 20MD Series, is developed and launched.  
1990: Lasertec is listed on the OTC stock market (code 6920).  
1993: Automated LCD color filter inspection system and automated repair system are developed and launched. The world’s first phase shift measurement system is developed and launched.  
2000: Photomask defect inspection system, MATRICS Series, is developed and launched.  
2001: Lasertec Korea Corporation is established in Seoul, Korea.  
2004: Lasertec is listed on JASDAQ.  
2006: Photomask defect inspection system, MAP Series, is developed and launched.  
2009: PV cell conversion efficiency distribution measurement system, MAP Series, is developed and launched.  
2010: Lasertec Taiwan, Inc. is established in Hsinchu, Taiwan.  
2012: Lithography process inspection system, LX330, is developed and launched.  
2013: Lasertec is listed on the second section of the Tokyo Stock Exchange.  