



## Chapter 7: Metrology and Inspection

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6 Behrooz Parhami, *Dependable Computing: A Multilevel Approach*, part 2. University of California, Santa Barbara · 11 October 2020 · p. 8 [\[A\]](http://web.ece.ucsb.edu/~parhami/docs_folder/f33-book-dep-comp-pt2.pdf#page=8)

1 Supply Chain Explorer: Advanced Chips. Emerging Technology Observatory (ETO) · Accessed 9 September 2026 [\[A\]](https://chipexplorer.eto.tech/?parentNode=N118&selectedNode=N60)

19 Letter to Shareholders Q4 Fiscal 2026. KLA Corporation · 28 July 2026 · p. 5 [\[A\]](https://d1io3yog0oux5.cloudfront.net/_b9ee755a5f60dd0fb3f9e27967aed6af/klatencor/db/1117/10668/letter_to_shareholders/KLA+Earnings+Shareholder+Letter+-+Q4+FY26.pdf#page=5)

# Metrology and Inspection

KLA, an American firm, held 56.8 percent of the market for tools that measure and inspect wafers in 2025, by CSET's count.

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## IN PLAIN TERMS

Metrology (measurement) and inspection are a chip factory's quality control. Between the steps that build a chip, another machine looks the wafer over. It checks whether the lines are the right width, whether this layer landed squarely on the last one, and whether a speck of dirt has killed a circuit. The main chip in an AI accelerator, the one that does the calculating, is one of the largest cut from a wafer. A bigger chip is a bigger target for a speck. In a textbook example with the same density of specks, 49.2 percent of chips 1 centimeter on a side come out flawless, but only 11.3 percent of chips 2 centimeters on a side <sup>6</sup>. In 2025 one American firm, KLA, held 56.8 percent of the market for these tools, by CSET's count from TechInsights data <sup>1</sup>. So a chip factory, or fab, cut off from KLA would find fewer of the faults that make its chips fail.

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<sup>6</sup> Behrooz Parhami, Dependable Computing: A Multilevel Approach, part 2. University of California, Santa Barbara · 11 October 2020 · p. 8 [\[A\]](http://web.ece.ucsb.edu/~parhami/docs_folder/f33-book-dep-comp-pt2.pdf#page=8)

<sup>1</sup> Supply Chain Explorer: Advanced Chips. Emerging Technology Observatory (ETO) · Accessed 9 September 2026 [\[A\]](http://chipexplorer.eto.tech/?parentNode=N118&selectedNode=N60)

**IN SHORT**

By the count of CSET, a Georgetown University research center working from TechInsights data, defect inspection was the largest kind of measuring and inspection tool in 2025, a \$6.7 billion market <sup>1</sup>. KLA held 85.9 percent of it <sup>1</sup>. Chinese makers held 0.7 percent of the whole market that year by the same count <sup>1</sup>. Yet China took 26 percent of KLA's revenue in the June 2026 quarter <sup>19</sup>.

Since October 2022 the US has required a license for any tool subject to US export rules bound for Chinese fabs that make advanced logic or memory chips <sup>29</sup>. A December 2024 rule added specific tools to the export control list, among them inspection tools that can find defects of 21 nm or smaller <sup>35</sup>.

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<sup>1</sup> Supply Chain Explorer: Advanced Chips. Emerging Technology Observatory (ETO) · Accessed 9 September 2026 [\[A\]](https://chipexplorer.eto.tech/?parentNode=N118&selectedNode=N60)  
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<sup>19</sup> Letter to Shareholders Q4 Fiscal 2026. KLA Corporation · 28 July 2026 · p. 5 [\[A\]](https://d1io3yog0oux5.cloudfront.net/_b9ee755a5f60dd0fb3f9e27967aed6af/klatencor/db/1117/10668/letter_to_shareholders/KLA+Earnings+Shareholder+Letter+-+Q4+FY26.pdf#page=5)  
[d1io3yog0oux5.cloudfront.net/\\_b9ee755a5f60dd0fb3f9e27967aed6af/klatencor/db/1117/10668/letter\\_to\\_shareholders/KLA+Earnings+Shareholder+Letter+-+Q4+FY26.pdf#page=5](https://d1io3yog0oux5.cloudfront.net/_b9ee755a5f60dd0fb3f9e27967aed6af/klatencor/db/1117/10668/letter_to_shareholders/KLA+Earnings+Shareholder+Letter+-+Q4+FY26.pdf#page=5)

<sup>29</sup> Implementation of Additional Export Controls: Certain Advanced Computing and Semiconductor Manufacturing Items; Supercomputer and Semiconductor End Use; Entity List Modification. U.S. Government Publishing Office (Federal Register) · 13 October 2022 · p. 5 [\[A\]](https://www.govinfo.gov/content/pkg/FR-2022-10-13/pdf/2022-21658.pdf#page=5)  
[www.govinfo.gov/content/pkg/FR-2022-10-13/pdf/2022-21658.pdf#page=5](https://www.govinfo.gov/content/pkg/FR-2022-10-13/pdf/2022-21658.pdf#page=5)

<sup>35</sup> Foreign-Produced Direct Product Rule Additions, and Refinements to Controls for Advanced Computing and Semiconductor Manufacturing Items. U.S. Government Publishing Office (Federal Register) · 5 December 2024 · p. 18 [\[A\]](https://www.govinfo.gov/content/pkg/FR-2024-12-05/pdf/2024-28270.pdf#page=18)  
[www.govinfo.gov/content/pkg/FR-2024-12-05/pdf/2024-28270.pdf#page=18](https://www.govinfo.gov/content/pkg/FR-2024-12-05/pdf/2024-28270.pdf#page=18)

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|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CHOKEPOINT CARD              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | HIGH CONCENTRATION                                                                                                                                                                                                  |
|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | MODERATELY HARD TO SUBSTITUTE                                                                                                                                                                                       |
| CONCENTRATION                | SUBSTITUTABILITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                     |
| High                         | Moderate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                     |
|                              | Every kind of measuring and inspecting tool had a second maker in 2025 <sup>1</sup> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                     |
|                              | PRICE OR MARKET SIZE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                     |
|                              | \$15.7B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                     |
|                              | process control tool market in 2025 <sup>1</sup> . KLA puts the 2025 wafer equipment market at about \$120B <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                     |
| WHO LEADS                    | <div><div>US</div><div>KLA 56.8% of process control tools in 2025 by CSET's count<sup>1</sup></div></div> <div><div>US</div><div>Applied Materials 11.2% of process control tools in 2025<sup>1</sup></div></div> <div><div>JP</div><div>Lasertec 6.4% of process control tools in 2025<sup>1</sup></div></div> <div><div>JP</div><div>Hitachi High-Tech 6.2% of process control tools in 2025<sup>1</sup></div></div> <div><div>NL</div><div>ASML 5.9% of process control tools in 2025<sup>1</sup></div></div> <div><div>IL</div><div>Nova 4.3% of process control tools in 2025<sup>1</sup></div></div> <div><div>US</div><div>Onto Innovation 2.6% of process control tools in 2025<sup>1</sup></div></div> |                                                                                                                                                                                                                     |
| WHERE IT IS MADE             | <div><div>US</div><div>United States KLA (Milpitas), Onto Innovation (Wilmington, MA), Applied Materials</div></div> <div><div>NL</div><div>Netherlands ASML YieldStar and HMI e-beam, Veldhoven and San Jose</div></div> <div><div>JP</div><div>Japan Hitachi High-Tech (CD-SEM), Lasertec (mask inspection), Rigaku (X-ray)</div></div> <div><div>IL</div><div>Israel Nova (Rehovot) and Camtek (Migdal Haemek)</div></div> <div><div>CN</div><div>China Skyverse (Shenzhen), RSIC and other domestic makers, with 0.7% of the market in 2025 by CSET's count</div></div>                                                                                                                                     |                                                                                                                                                                                                                     |
| WHY SUBSTITUTION IS POSSIBLE | Eight firms besides KLA each held more than 1 percent of the market in 2025 <sup>1</sup> . But KLA alone held 85.9 percent of defect inspection, the largest kind, that year <sup>1</sup> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                     |
| WHERE CHINA STANDS           | Chinese firms held 0.7 percent of the world market for these tools in 2025, by CSET's count <sup>1</sup> . Skyverse, a Shenzhen maker of inspection and metrology tools, reported 2,053,298,171.74 yuan of revenue in 2025, up 48.75 percent on 2024 <sup>3</sup> .                                                                                                                                                                                                                                                                                                                                                                                                                                             | WHERE THE US STANDS                                                                                                                                                                                                 |
|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | In 2025 the American firm KLA was the world's largest maker of metrology and inspection tools <sup>1</sup> . Citing Gartner, KLA puts its 2024 share at 56.5 percent, or 6.5 times its nearest rival <sup>4</sup> . |

<sup>1</sup> Supply Chain Explorer: Advanced Chips. Emerging Technology Observatory (ETO) · Accessed 9 September 2026 [A](#)  
chipexplorer.eto.tech/?parentNode=N118&selectedNode=N60

<sup>2</sup> Letter to Shareholders Q4 Fiscal 2026. KLA Corporation · 28 July 2026 · p. 7 [A](#)  
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Process control tools, the machines that measure and inspect wafers and masks, were a \$15.7 billion market in 2025, by CSET's count from TechInsights data <sup>1</sup>. KLA puts the whole wafer equipment market, including advanced packaging, at about \$120 billion that year <sup>2</sup>.

CSET's count for 2025, built on TechInsights data, puts KLA at 56.8 percent and Applied Materials, the next largest, at 11.2 percent <sup>1</sup>. At its March 2026 investor day KLA cited Gartner's figures for 2024, which put its share at 56.5 percent, 6.5 times its nearest competitor <sup>4</sup>. In April 2026 KLA said its 2025 share was about 7 times the nearest competitor's <sup>5</sup>.

## How it works

An inspection tool sweeps a beam of light across the wafer, photographs it, and compares the image of each chip with the image of its neighbors. The chips on a wafer are meant to be identical, so the tool flags anything that shows in one and not the others as a possible defect. It records where each one is. For faults too small for light to show, a second tool scans a beam of electrons across a small

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1 Supply Chain Explorer: Advanced Chips. Emerging Technology Observatory (ETO) · Accessed 9 September 2026 [\[A\]](#)

[chipexplorer.eto.tech/?parentNode=N118&selectedNode=N60](https://chipexplorer.eto.tech/?parentNode=N118&selectedNode=N60)

3 深圳中科飞测科技股份有限公司2025年年度报告摘要. CNINFO · 24 April 2026 · p. 12 [\[A\]](#) [static.cninfo.com.cn/finalpage/2026-04-25/1225182755.PDF#page=12](https://static.cninfo.com.cn/finalpage/2026-04-25/1225182755.PDF#page=12)

4 Compounding Sustainable Outperformance. KLA Corporation · 12 March 2026 · p. 35 [\[A\]](#)

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2 Letter to Shareholders Q4 Fiscal 2026. KLA Corporation · 28 July 2026 · p. 7 [\[A\]](#)

[d1io3yog0oux5.cloudfront.net/\\_b9ee755a5f60dd0fb3f9e27967aed6af/klatencor/db/1117/10668/letter\\_to\\_shareholders/KLA+Earnings+Shareholder+Letter+-+Q4+FY26.pdf#page=7](https://d1io3yog0oux5.cloudfront.net/_b9ee755a5f60dd0fb3f9e27967aed6af/klatencor/db/1117/10668/letter_to_shareholders/KLA+Earnings+Shareholder+Letter+-+Q4+FY26.pdf#page=7)

5 Letter to Shareholders Q3 Fiscal 2026. KLA Corporation · 29 April 2026 · p. 3 [\[A\]](#)

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patch and builds a picture from the electrons the beam knocks loose from the surface.

A metrology tool measures known shapes. It shines light on a test pattern printed beside the circuits and works out from the reflected light how wide the lines are and how thick the film is. It also reads marks printed in this layer and the last to measure how far the two are out of line, which chipmakers call overlay.

The fab pays for all this to protect yield, the share of chips on a wafer that work. A wafer loses value two ways: whole regions ruined by mishandling, misalignment or over-etching, and single circuits killed by stray material or an airborne particle <sup>7</sup>.

A bigger chip is a bigger target for the second kind, so the cost of each good chip grows faster than its area <sup>6</sup>. Chipmakers call each chip on a wafer a die. In the standard formula, die yield is  $(1 + D0A/a)^{-a}$  to the power minus a. Here D0 is defects per square centimeter, A is die area, and a is a clustering constant of 3 to 4 that says how much defects bunch together. At a defect density of 0.8 per square centimeter, with a set to 3, a 1 square centimeter die yields 49.2 percent and a 2 by 2 centimeter die 11.3 percent <sup>6</sup>. Because the bigger die yields less and fits fewer times on a wafer, it costs 20.1 times as much as the small one <sup>6</sup>.

In another textbook example, a fab makes 5,000 wafers a week, each holding 200 dies, and earns \$15 from each good die <sup>8</sup>. Each percentage point of yield is then worth \$7.8 million a year <sup>8</sup>. Engineers raise yield by finding the process step that is losing dies and fixing it, work called yield learning.

The formula's percentages are the share of dies with no killer defect. A chip built from many identical blocks can carry spares and switch off a faulty block <sup>9</sup>. Nvidia's full H100 design has 144 of its main computing blocks, called streaming multiprocessors, and the SXM5 version it ships has 132 turned on <sup>10</sup>. So the share of dies that can be sold is higher than the formula gives. But the formula shows how fast flawless dies get scarce as chips grow.

## Variants and trade-offs

The tools trade sensitivity against speed. All the market sizes and shares below are CSET's, for 2025, from TechInsights data <sup>1</sup>.

7 Behrooz Parhami, Dependable Computing: A Multilevel Approach, part 2. University of California, Santa Barbara · 11 October 2020 · p. 10 [A] [web.ece.ucsb.edu/~parhami/docs\\_folder/f33-book-dep-comp-pt2.pdf#page=10](http://web.ece.ucsb.edu/~parhami/docs_folder/f33-book-dep-comp-pt2.pdf#page=10)

6 Behrooz Parhami, Dependable Computing: A Multilevel Approach, part 2. University of California, Santa Barbara · 11 October 2020 · p. 8 [A] [web.ece.ucsb.edu/~parhami/docs\\_folder/f33-book-dep-comp-pt2.pdf#page=8](http://web.ece.ucsb.edu/~parhami/docs_folder/f33-book-dep-comp-pt2.pdf#page=8)

8 Behrooz Parhami, Dependable Computing: A Multilevel Approach, part 2. University of California, Santa Barbara · 11 October 2020 · p. 7 [A] [web.ece.ucsb.edu/~parhami/docs\\_folder/f33-book-dep-comp-pt2.pdf#page=7](http://web.ece.ucsb.edu/~parhami/docs_folder/f33-book-dep-comp-pt2.pdf#page=7)

9 Behrooz Parhami, Dependable Computing: A Multilevel Approach, part 2. University of California, Santa Barbara · 11 October 2020 · p. 23 [A] [web.ece.ucsb.edu/~parhami/docs\\_folder/f33-book-dep-comp-pt2.pdf#page=23](http://web.ece.ucsb.edu/~parhami/docs_folder/f33-book-dep-comp-pt2.pdf#page=23)

10 NVIDIA Hopper Architecture In-Depth. Nvidia · 22 March 2022 [A] [developer.nvidia.com/blog/nvidia-hopper-architecture-in-depth/](https://developer.nvidia.com/blog/nvidia-hopper-architecture-in-depth/)

1 Supply Chain Explorer: Advanced Chips. Emerging Technology Observatory (ETO) · Accessed 9 September 2026 [A] [chipexplorer.eto.tech/?parentNode=N118&selectedNode=N60](http://chipexplorer.eto.tech/?parentNode=N118&selectedNode=N60)

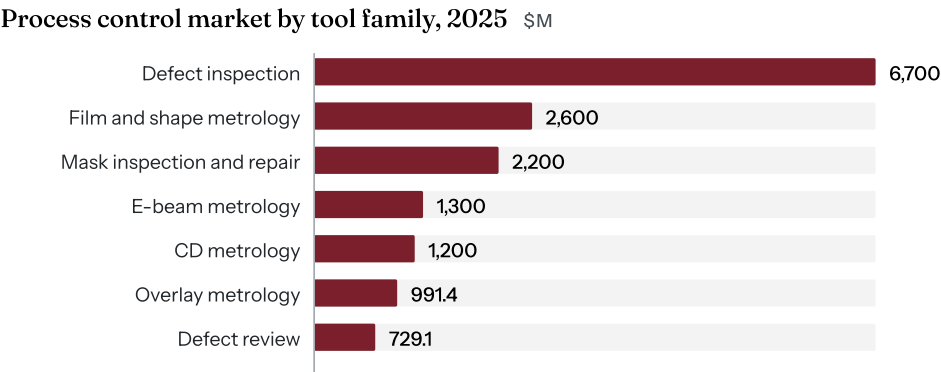
- **Defect inspection** scans a whole wafer with light, or small areas of it with electrons, and compares each die against its neighbors. It is by far the largest family, at \$6.7 billion, and KLA held 85.9 percent of it. ASML's HMI eScan 1100 runs 25 electron beams at once, up to 15 times the throughput of single-beam inspection tools, and finds patterning defects down to 7 nm <sup>11</sup>.
- **Film and shape metrology** measures how thick each film is and how flat the wafer is, without cutting it open. In this \$2.6 billion family KLA held 45.6 percent, Nova 24.6 and Onto Innovation 10.9. Onto paid about \$720 million in August 2026 for 27 percent of the Japanese X-ray tool maker Rigaku <sup>12</sup>.
- **Mask inspection and repair** has its own tools, because a defect on a mask, the stencil the circuit pattern is printed from, repeats on every die. This \$2.2 billion family is one of two where KLA has a close rival. KLA held 45.9 percent, Lasertec 42 and Zeiss 10.1. Lasertec also makes actinic inspection tools, which check EUV masks with the same 13.5 nm light that prints them <sup>13</sup>. Lasertec calls its ACTIS A150 the world's first EUV patterned mask inspection system <sup>13</sup>. KLA's own actinic mask inspection tool was still at an early demo stage at its March 2026 investor day <sup>14</sup>.
- **Overlay metrology** measures how well this layer lines up with the one below. Its \$991.4 million market was split almost evenly between KLA at 51.5 percent and ASML at 47.9.
- **Critical dimension metrology**, also called line-width measurement, measures how wide a printed feature came out. It is the one family Japan leads. Hitachi held 71.9 percent of this \$1.2 billion market and Applied Materials 27.5.
- **Electron-beam metrology** resolves detail too fine for light. Applied Materials led this \$1.3 billion family at 45.1 percent, with ASML at 35.6 and KLA at 18.8.

<sup>11</sup> The HMI eScan 1100. ASML · Accessed 9 September 2026 [\[A\]](https://www.asml.com/en/products/metrology-and-inspection-systems/hmi-escan-1100) [www.asml.com/en/products/metrology-and-inspection-systems/hmi-escan-1100](https://www.asml.com/en/products/metrology-and-inspection-systems/hmi-escan-1100)

<sup>12</sup> Onto Innovation Completes Strategic Investment in Rigaku Holdings Corporation. Onto Innovation · 10 August 2026 [\[A\]](https://investors.ontoinnovation.com/news/news-details/2026/Onto-Innovation-Completes-Strategic-Investment-in-Rigaku-Holdings-Corporation/default.aspx) [investors.ontoinnovation.com/news/news-details/2026/Onto-Innovation-Completes-Strategic-Investment-in-Rigaku-Holdings-Corporation/default.aspx](https://investors.ontoinnovation.com/news/news-details/2026/Onto-Innovation-Completes-Strategic-Investment-in-Rigaku-Holdings-Corporation/default.aspx)

<sup>13</sup> ACTIS A150. Lasertec · 12 September 2019 [\[A\]](https://www.lasertec.co.jp/en/products/semiconductor/actis_a150.html) [www.lasertec.co.jp/en/products/semiconductor/actis\\_a150.html](https://www.lasertec.co.jp/en/products/semiconductor/actis_a150.html)

<sup>14</sup> Compounding Sustainable Outperformance. KLA Corporation · 12 March 2026 · p. 91 [\[A\]](https://d1io3yog0oux5.cloudfront.net/_7791115a123b86b3f10b1a5eb5210224/klatencor/db/1166/10653/file/2026+Investor+Day+Master+Final_IR+copy.pdf#page=9) [d1io3yog0oux5.cloudfront.net/\\_7791115a123b86b3f10b1a5eb5210224/klatencor/db/1166/10653/file/2026+Investor+Day+Master+Final\\_IR+copy.pdf#page=9](https://d1io3yog0oux5.cloudfront.net/_7791115a123b86b3f10b1a5eb5210224/klatencor/db/1166/10653/file/2026+Investor+Day+Master+Final_IR+copy.pdf#page=9)



Source: ETO Supply Chain Explorer, CSET

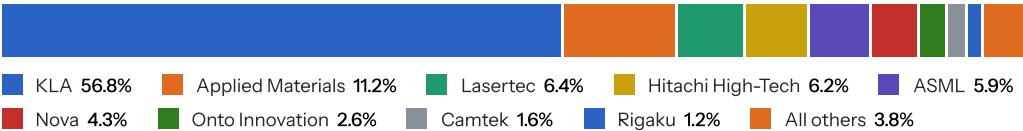
Who makes it

KLA says its share grew 3.6 percentage points from 2021 to 2025 <sup>5</sup>. It says it gained share again in 2025 across mask, optical wafer and e-beam inspection <sup>5</sup>. Its revenue for fiscal 2026, the year to June 2026, was \$13.579 billion, up from \$12.156 billion in fiscal 2025 <sup>15</sup>.

5 Letter to Shareholders Q3 Fiscal 2026. KLA Corporation · 29 April 2026 · p. 3 [A](#)  
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15 Revenue from Contract with Customer, Excluding Assessed Tax (us-gaap:RevenueFromContractWithCustomerExcludingAssessedTax) reported by KLA CORP, XBRL company concept data. U.S. Securities and Exchange Commission (XBRL data for KLA CORP) · Accessed 9 September 2026 [A](#)  
data.sec.gov/api/xbrl/companyconcept/CIK0000319201/us-gaap/RevenueFromContractWithCustomerExcludingAssessedTax.json

Process control tool revenue share, 2025 %



Source: ETO Supply Chain Explorer, CSET

The rest are specialists, and none holds more than 11.2 percent, by CSET's count from TechInsights data for 2025 <sup>1</sup>. Eight of them each held more than 1 percent of the market that year <sup>1</sup>.

- **Applied Materials** is the largest of them. It sells e-beam defect review tools, CD-SEMs (electron microscopes that measure line width) and e-beam metrology tools next to the deposition and etch tools whose work they check.
- **Lasertec** holds 6.4 percent, almost all of it mask inspection <sup>1</sup>. **Hitachi High-Tech** holds 6.2 percent, most of it from CD-SEMs <sup>1</sup>. **ASML** holds 5.9 percent through YieldStar overlay and HMI e-beam metrology <sup>1</sup>.

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<sup>1</sup> Supply Chain Explorer: Advanced Chips. Emerging Technology Observatory (ETO) · Accessed 9 September 2026 [A](https://chipexplorer.eto.tech/?parentNode=N118&selectedNode=N60)  
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- **Nova** holds 4.3 percent, through film metrology <sup>1</sup>. It took \$880.6 million of revenue in 2025 <sup>16</sup>.
- **Onto Innovation** holds 2.6 percent <sup>1</sup>. It took \$1,005.3 million of revenue in 2025 <sup>17</sup>.
- **Camtek** holds 1.6 percent <sup>1</sup>. It took \$496.1 million of revenue in 2025 <sup>18</sup>.

KLA's patterning line, which includes several metrology products and mask inspection, grew 61 percent year on year in the June 2026 quarter <sup>19</sup>. In that quarter Taiwan took 31 percent of KLA's revenue and China 26 percent <sup>19</sup>.

<sup>1</sup> Supply Chain Explorer: Advanced Chips. Emerging Technology Observatory (ETO) · Accessed 9 September 2026 [\[A\]](#)

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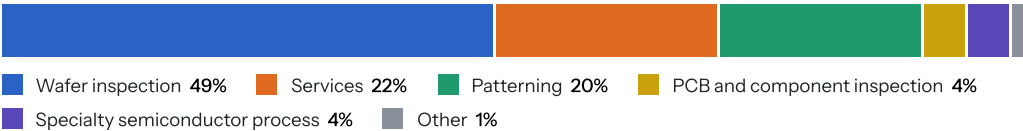
<sup>16</sup> Revenues (us-gaap:Revenues) reported by NOVA LTD., XBRL company concept data. U.S. Securities and Exchange Commission (XBRL data for NOVA LTD.) · Accessed 9 September 2026 [\[A\]](#) [data.sec.gov/api/xbrl/companyconcept/CIK0001109345/us-gaap/Revenues.json](https://data.sec.gov/api/xbrl/companyconcept/CIK0001109345/us-gaap/Revenues.json)

<sup>17</sup> Onto Innovation Reports 2025 Fourth Quarter and Full Year Results. Onto Innovation · 19 February 2026 [\[A\]](#) [investors.ontoinnovation.com/news/news-details/2026/Onto-Innovation-Reports-2025-Fourth-Quarter-and-Full-Year-Results/default.aspx](https://investors.ontoinnovation.com/news/news-details/2026/Onto-Innovation-Reports-2025-Fourth-Quarter-and-Full-Year-Results/default.aspx)

<sup>18</sup> CAMTEK LTD, Form 6-K report of foreign private issuer for the period ended 2026-02-18 (6-K). U.S. Securities and Exchange Commission (filing by CAMTEK LTD) · 18 February 2026 [\[A\]](#) [www.sec.gov/Archives/edgar/data/1109138/000117891326000549/zk2634405.htm](https://www.sec.gov/Archives/edgar/data/1109138/000117891326000549/zk2634405.htm)

<sup>19</sup> Letter to Shareholders Q4 Fiscal 2026. KLA Corporation · 28 July 2026 · p. 5 [\[A\]](#) [d1io3yog0oux5.cloudfront.net/\\_b9ee755a5f60dd0fb3f9e27967aed6af/klatencor/db/1117/10668/letter\\_to\\_shareholders/KLA+Earnings+Shareholder+Letter+-+Q4+FY26.pdf#page=5](https://d1io3yog0oux5.cloudfront.net/_b9ee755a5f60dd0fb3f9e27967aed6af/klatencor/db/1117/10668/letter_to_shareholders/KLA+Earnings+Shareholder+Letter+-+Q4+FY26.pdf#page=5)

KLA revenue by product line, June 2026 quarter %



Source: KLA letter to shareholders, Q4 FY2026

KLA says process control's share of spending on chipmaking equipment is still rising <sup>20</sup>. In memory chips, KLA credits the rise to higher performance specifications, less redundancy (fewer spare circuits) and more logic content in devices built for high-performance computing <sup>21</sup>.

KLA's systems analyze data with AI and also filter out noise <sup>21</sup>. In April 2026 KLA said it had added AI to every product line over the previous five years <sup>21</sup>.

20 Letter to Shareholders Q3 Fiscal 2026. KLA Corporation · 29 April 2026 · p. 12 [A](#)  
d1io3yog0oux5.cloudfront.net/\_a357bfc9113388e37f3bfc2ea2f0b64/klatencor/db/1117/10655/letter\_to\_shareholders/KLA+Shareholder+Letter+-+Q3+FY26.pdf#page=12

21 Letter to Shareholders Q3 Fiscal 2026. KLA Corporation · 29 April 2026 · p. 4 [A](#)  
d1io3yog0oux5.cloudfront.net/\_a357bfc9113388e37f3bfc2ea2f0b64/klatencor/db/1117/10655/letter\_to\_shareholders/KLA+Shareholder+Letter+-+Q3+FY26.pdf#page=4

## Packaging, AI and China

KLA says the AI build-out is making advanced packaging, and the process control it needs, more important <sup>22</sup>. KLA became the largest supplier of process control tools for advanced wafer-level packaging in 2025, adding 14 percentage points of share <sup>5</sup>. It expects about \$1.1 billion of packaging process control revenue in 2026, up more than 70 percent <sup>22</sup>. In February 2026 Onto said it had signed a volume purchase agreement estimated at over \$240 million with a high-bandwidth memory (HBM) maker for 2D inspection and 3D bump metrology through 2027 <sup>17</sup>.

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22 Letter to Shareholders Q4 Fiscal 2026. KLA Corporation · 28 July 2026 · p. 2 [A](#)

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5 Letter to Shareholders Q3 Fiscal 2026. KLA Corporation · 29 April 2026 · p. 3 [A](#)

d1io3yog0oux5.cloudfront.net/\_a357bfc9113388e37f3bfc2ea2f0b64/klatencor/db/1117/10655/letter\_to\_shareholders/KLA+Shareholder+Letter+-+Q3+FY26.pdf#page=3

17 Onto Innovation Reports 2025 Fourth Quarter and Full Year Results. Onto Innovation · 19 February 2026 [A](#)

investors.ontoinnovation.com/news/news-details/2026/Onto-Innovation-Reports-2025-Fourth-Quarter-and-Full-Year-Results/default.aspx

Chinese makers are still small in process control, but one of them is growing fast. CSET's count, built on TechInsights data, puts all Chinese firms at 0.7 percent of the market in 2025 <sup>1</sup>. Skyverse (Shenzhen Zhongke Feice), a maker of wafer inspection and metrology tools, reported 2,053,298,171.74 yuan of revenue in 2025 <sup>3</sup>. That was up 48.75 percent on 2024 <sup>3</sup>. In its 2025 annual report Skyverse says Chinese makers still hold a low share of China's market for these tools and that KLA holds the largest share of it <sup>23</sup>.

By CSET's 2025 count from TechInsights data, Chinese firms held 0.6 percent of defect inspection tools <sup>24</sup>. They held 0.4 percent of line-width measurement tools in 2025 <sup>25</sup>. In film and shape metrology they held 2 percent in 2025, all of it from Raintree Scientific Instruments, or RSIC <sup>26</sup>. They held no share of mask inspection and repair tools in 2025 <sup>27</sup>. Nor did they hold any share that year of the tools that inspect wafers during advanced packaging <sup>28</sup>.

In October 2022 the US began requiring a license for any item subject to US export rules, process control tools included, bound for certain Chinese fabs <sup>29</sup>. The rule covered fabs that made logic chips at 16/14 nm or below, NAND memory with 128 or more layers, or DRAM at 18 nm half-pitch or below <sup>30</sup>.

A December 2024 rule added specific process control tools to the export control list. It controls tools for defect inspection and measurement of patterned 300 mm

1 Supply Chain Explorer: Advanced Chips. Emerging Technology Observatory (ETO) · Accessed 9 September 2026 [\[A\]](https://chipexplorer.eto.tech/?parentNode=N118&selectedNode=N60)  
chipexplorer.eto.tech/?parentNode=N118&selectedNode=N60

3 深圳中科飞测科技股份有限公司2025年年度报告摘要. CNINFO · 24 April 2026 · p. 12 [\[A\]](https://static.cninfo.com.cn/finalpage/2026-04-25/1225182755.PDF#page=12) static.cninfo.com.cn/finalpage/2026-04-25/1225182755.PDF#page=12

23 深圳中科飞测科技股份有限公司2025年年度报告摘要. CNINFO · 24 April 2026 · p. 11 [\[A\]](https://static.cninfo.com.cn/finalpage/2026-04-25/1225182755.PDF#page=11) static.cninfo.com.cn/finalpage/2026-04-25/1225182755.PDF#page=11

24 Supply Chain Explorer: Advanced Chips. Emerging Technology Observatory (ETO) · Accessed 9 September 2026 [\[A\]](https://chipexplorer.eto.tech/?parentNode=N118&selectedNode=N67)  
chipexplorer.eto.tech/?parentNode=N118&selectedNode=N67

25 Supply Chain Explorer: Advanced Chips. Emerging Technology Observatory (ETO) · Accessed 9 September 2026 [\[A\]](https://chipexplorer.eto.tech/?parentNode=N118&selectedNode=N66)  
chipexplorer.eto.tech/?parentNode=N118&selectedNode=N66

26 Supply Chain Explorer: Advanced Chips. Emerging Technology Observatory (ETO) · Accessed 9 September 2026 [\[A\]](https://chipexplorer.eto.tech/?parentNode=N118&selectedNode=N65)  
chipexplorer.eto.tech/?parentNode=N118&selectedNode=N65

27 Supply Chain Explorer: Advanced Chips. Emerging Technology Observatory (ETO) · Accessed 9 September 2026 [\[A\]](https://chipexplorer.eto.tech/?parentNode=N118&selectedNode=N62)  
chipexplorer.eto.tech/?parentNode=N118&selectedNode=N62

28 Supply Chain Explorer: Advanced Chips. Emerging Technology Observatory (ETO) · Accessed 9 September 2026 [\[A\]](https://chipexplorer.eto.tech/?parentNode=N69&selectedNode=N63)  
chipexplorer.eto.tech/?parentNode=N69&selectedNode=N63

29 Implementation of Additional Export Controls: Certain Advanced Computing and Semiconductor Manufacturing Items; Supercomputer and Semiconductor End Use; Entity List Modification. U.S. Government Publishing Office (Federal Register) · 13 October 2022 · p. 5 [\[A\]](https://www.govinfo.gov/content/pkg/FR-2022-10-13/pdf/2022-21658.pdf#page=5) www.govinfo.gov/content/pkg/FR-2022-10-13/pdf/2022-21658.pdf#page=5

30 Implementation of Additional Export Controls: Certain Advanced Computing and Semiconductor Manufacturing Items; Supercomputer and Semiconductor End Use; Entity List Modification. U.S. Government Publishing Office (Federal Register) · 13 October 2022 · p. 16 [\[A\]](https://www.govinfo.gov/content/pkg/FR-2022-10-13/pdf/2022-21658.pdf#page=16) www.govinfo.gov/content/pkg/FR-2022-10-13/pdf/2022-21658.pdf#page=16

wafers if they can find defects of 21 nm or smaller <sup>31</sup>. They must do this using light with a wavelength below 400 nm, an electron beam with a resolution of 1.65 nm or better, a cold field emission source, or two or more electron-beam sources <sup>31</sup>. The same rule controls overlay metrology accurate to 0.5 nm or better if the tool is built into the track (the machine that coats and develops the light-sensitive resist) or can switch wavelengths quickly <sup>31</sup>. It also controls stand-alone wafer shape metrology that feeds corrections to immersion or EUV scanners <sup>31</sup>. A separate new entry, 3B994, covers optical film and line-width metrology for 300 mm wafers with software for measuring non-planar transistors <sup>32</sup>.

BIS, the US Commerce Department bureau that wrote the rule, placed these tools in new entries for items it says also have legitimate uses in older chipmaking <sup>33</sup>. So they carry narrower license requirements than tools built only for advanced chips <sup>33</sup>. A new foreign direct product rule extends US jurisdiction to specified foreign-made chipmaking tools bound for Macau or for a Country Group D:5 destination such as China <sup>34</sup>.

## The chokepoint

One firm, KLA, held more than half the process control market in 2025. Every kind of process control tool also had a second maker that year, by CSET's count from TechInsights data <sup>1</sup>. Several firms can build a good film metrology tool, but KLA led four of the eight kinds of process control tool in 2025, by CSET's count <sup>1</sup>. KLA says its share of the whole market grew from 2021 to 2025 <sup>5</sup>. A fab that can buy scanners and etchers but not sensitive inspection tools finds fewer of the defects that lower its yield, so its yield rises more slowly.

31 Foreign-Produced Direct Product Rule Additions, and Refinements to Controls for Advanced Computing and Semiconductor Manufacturing Items. U.S. Government Publishing Office (Federal Register) · 5 December 2024 · p. 37 [A](https://www.govinfo.gov/content/pkg/FR-2024-12-05/pdf/2024-28270.pdf#page=37)

32 Foreign-Produced Direct Product Rule Additions, and Refinements to Controls for Advanced Computing and Semiconductor Manufacturing Items. U.S. Government Publishing Office (Federal Register) · 5 December 2024 · p. 38 [A](https://www.govinfo.gov/content/pkg/FR-2024-12-05/pdf/2024-28270.pdf#page=38)

33 Foreign-Produced Direct Product Rule Additions, and Refinements to Controls for Advanced Computing and Semiconductor Manufacturing Items. U.S. Government Publishing Office (Federal Register) · 5 December 2024 · p. 17 [A](https://www.govinfo.gov/content/pkg/FR-2024-12-05/pdf/2024-28270.pdf#page=17)

34 Commerce Strengthens Export Controls to Restrict China's Capability to Produce Advanced Semiconductors for Military Applications. U.S. Bureau of Industry and Security · 2 December 2024 [A](https://www.bis.gov/press-release/commerce-strengthens-export-controls-restrict-chinas-capability-produce-advanced-semiconductors-military)

1 Supply Chain Explorer: Advanced Chips. Emerging Technology Observatory (ETO) · Accessed 9 September 2026 [A](https://chipexplorer.eto.tech/?parentNode=N118&selectedNode=N60)

5 Letter to Shareholders Q3 Fiscal 2026. KLA Corporation · 29 April 2026 · p. 3 [A](https://d1io3yog0oux5.cloudfront.net/_a357bfc9113388e37f3bfc2ea2f0b64/klatencor/db/1117/10655/letter_to_shareholders/KLA+Shareholder+Letter+-+Q3+FY26.pdf#page=3)

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**FOUR THINGS TO REMEMBER**

- Metrology and inspection tools check each wafer between steps and help a fab find out why its chips fail.
  - AI chips are among the largest made, so finding defects matters most for them.
  - CSET's count puts KLA of the United States at 56.8 percent of this tool market in 2025, and Applied Materials, the next largest, at 11.2 percent.
  - Chinese makers held 0.7 percent of this tool market in 2025 on CSET's count, though one Chinese maker, Skyverse, grew its revenue 48.75 percent that year.
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Made by **Yashvardhan Sharma** with Claude. Corrections and questions: [contact@chipsupplychain.org](mailto:contact@chipsupplychain.org).

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**A** company filings, governments, standards bodies, universities and research institutions; **B** SemiAnalysis, Reuters, the Financial Times and Nikkei Asia.

**HOW TO CITE THIS CHAPTER**

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