NXT GEN hightech

NOBLEO TECHNOLOGY

Semicon 08:

Metrology Equipment for critical scaling of PIC Production

Within this project, two machines are being developed to test integrated photonic chips with the aim of becoming a global leader in visual and prober test equipment for integrated photonics as part of the consortium. Three generations of machines are being developed in which fundamental research is transformed into working machines.

Nobleo: Pioneering Advanced Inspection Solutions in the Semicon 08 Project

Nobleo is a leading contributor to the Semicon 08 project. As an innovator in high-speed scanning and inspection technology, Nobleo specializes in machine learning-driven applications and vision-based solutions. In collaboration with IMS and Settels Savenije, Nobleo is instrumental in developing inspection systems tailored for photonic integrated circuits (PICs), an area of growing significance within the high-tech sector.

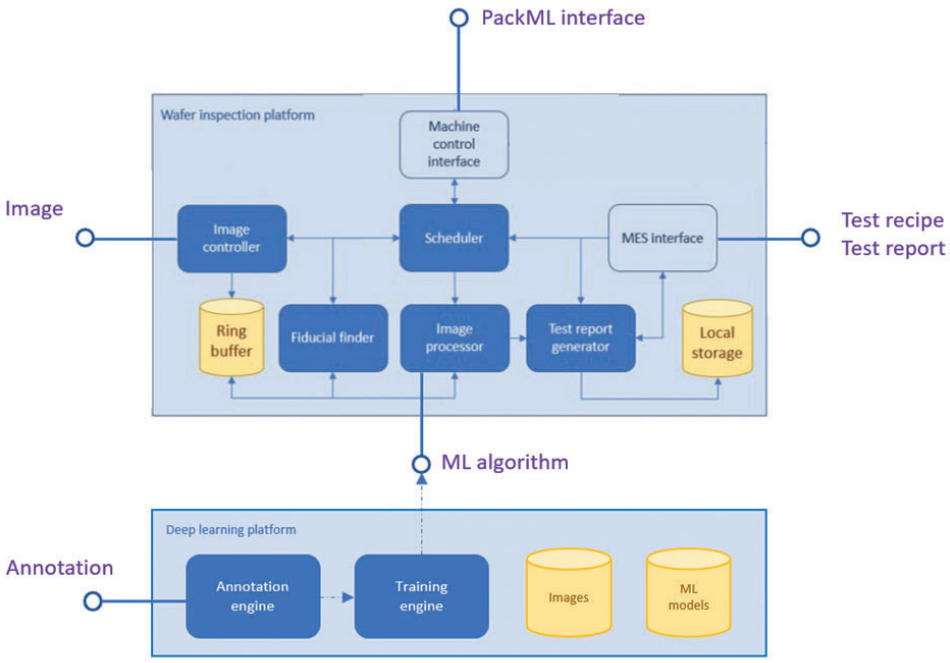
Pivotal Role in the Semicon 08 Project
In the Semicon 08 project, Nobleo is responsible for the surface inspection algorithms, wafer alignment, and scanning functionalities within the photonic wafer inspection system. Leveraging its expertise in machine learning, Nobleo has developed a suite of tools for annotating and defining wafer defects in collaboration with Lionix. This annotated data enables the training of machine learning networks, which are crucial for achieving the precise defect detection needed in PIC production.

Nobleo's contributions also include the development of two core solutions: a hardware platform dedicated to defect inspection of photonic wafers and a software solution capable of processing wafer images using standard equipment. The synergy between Nobleo's hardware and software offerings enables high-speed scanning and accurate defect detection, enhancing the overall quality assurance process for photonic wafers.

Expectations and Vision for the Future
Looking ahead, Nobleo aims to expand the application of its surface inspection algorithms across various high-tech industries. With support from the NXTGEN Hightech initiative, Nobleo envisions establishing its inspection platform within TU Twente's ecosystem, known as "New Origin." This setup would provide smaller companies with access to advanced scanning capabilities for diverse, low-volume product lines. NXTGEN Hightech resources and network could be instrumental in enabling Nobleo to broaden its technology's reach within the high-tech community.

Added Value and Industry Integration
Nobleo's primary contribution to the Semicon 08 project lies in its expertise in machine learning for defect detection, combined with high-speed scanning capabilities and precise alignment algorithms. This comprehensive skill set allows Nobleo to oversee key functions of the scanning microscope, ensuring alignment, defect detection, and wafer scanning are achieved with accuracy and effi ciency. Nobleo's in-depth knowledge of machine learning, autofocus control, and scheduling algorithms equips the Semicon 08 project with robust tools for managing the demands of large-scale PIC production.

Ongoing Contributions and Future Plans
The development of Nobleo's hardware platform enables the detection of wafer defects as small as 0.1 µm, with the potential for immediate analysis through IMS facilities. Nobleo has also created a software solution to automate the processing of wafer images, producing wafer maps that pinpoint defect locations alongside wafer design files. Moving forward, Nobleo plans to work closely with lead customers to extensively test and refine its inspection system, improving both the robustness of the hardware and the precision of its defect detection algorithms.



By 2030, Nobleo anticipates that the accumulated data and refinements from extensive field testing will yield an industry-standard inspection solution, meeting the stringent demands of PIC production.

Conclusion
Nobleo's role in the Semicon 08 project underscores its strength in cutting-edge machine learning, optics, and control systems, making it an ideal partner for advancing PIC production technology. With its high-speed scanning capabilities and advanced inspection algorithms, Nobleo is helping to shape the future of photonic wafer inspection and solidify the foundations for a scalable, automated solution in the photonics industry. Through the NXTGEN Hightech initiative, Nobleo's solutions are poised to make a lasting impact, fostering greater effi ciency and innovation in high-tech manufacturing.

About **NXTGEN Hightech**

The NXTGEN Hightech program has been awarded a grant from the Dutch National Growth Fund to stimulate structural and sustainable economic growth in the Netherlands. Learn more:

www.nxtgenhightech.nl

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