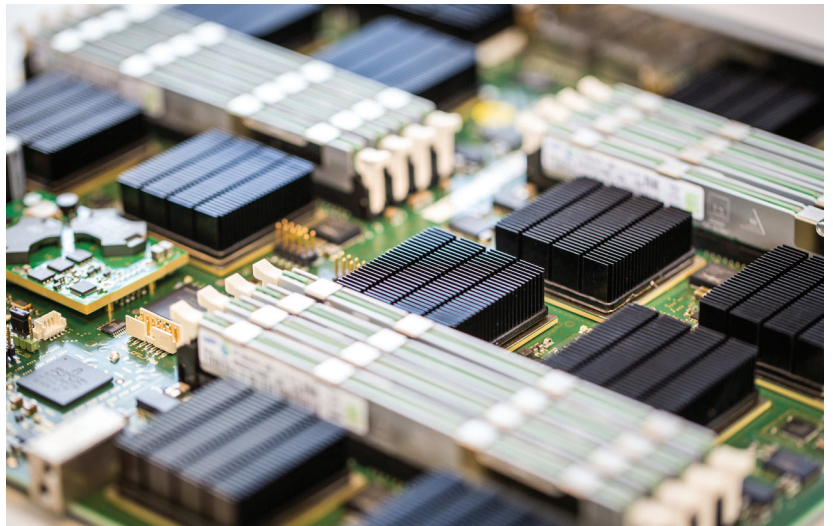


Technolution and the MEKOPP project: enabling a virtuous cycle

Technolution Advance is a market leader in the field of high-tech applications for the semiconductor industry and for leading scientific institutions. Thanks to their deep experience with the design and development of advanced instruments, they have acquired a great deal of in-house knowledge and strong connections to start-ups, scale-ups, larger enterprises and scientific organisations that specialise in fields such as semiconductor equipment, optics, imaging, med tech and life sciences. This gives them the well-rounded profile needed to play a key part in the MEKOPP project.



A major ambition

Metrology, the science of measurement, plays a crucial role in advanced semiconductor manufacturing equipment. More accurate, reliable and (above all) faster measurements are essential to innovation and economic growth. Reliable and traceable measurements help to develop better instruments for the high-precision manufacturing of photonic integrated circuits (PICs), for instance. And the state-of-the-art PIC metrology machines that were developed in MEKOPP are the building blocks for smart industry, using artificial intelligence, machine learning and big data techniques to optimally perform and improve. These machines will be connected to other machines across the supply chain to adjust production processes to one another.

A challenge in this field is that the data streams from metrology systems are growing in size enormously. This is due, for example, to subsequent data storage and the need to make data available and suitable for post-processing. Metrology systems are also typically equipped to measure a few aspects of an object at most. To gain insight into multiple aspects of an object, such as a PIC wafer, multiple metrology systems are typically applied in a chain, after which the data from the metrology systems must be brought together for interpretation. For new applications, this workflow is typically manual and time-consuming. A major ambition for organisations in this field is therefore to automate this process.

MEKOPP

Metrology Equipment for critical scale up of PIC Production

Photonic integrated circuits (PICs), combining photonics with chips, are a technology for which the Netherlands enjoys a leading position. With chips that use light instead of electricity, many new and improved applications can be realised in healthcare, energy, automotive, agrifood and IT. PICs also drive the global internet infrastructure and are highly suitable for the large amounts of data collected and combined in the Internet of Things. The MEKOPP project will therefore facilitate sustainable economic growth by preparing metrology equipment for the efficient production of PICs and reduction of production defects.

In doing so, MEKOPP brings together ten expert partners and focuses on two machines: a Photonics Test Prober and a Photonics Visual Inspection Tool. These will enhance PIC production sustainability, potentially reducing material, energy and water usage by 50%. Indirectly, the project will contribute to PIC market adoption and scaling, which are vital for digital communication infrastructure efficiency. And with an expected 21-31% year-on-year market growth for PICs, the consortium expects to achieve an annual revenue of over €100 million by 2030 and create ~400 jobs in the eastern Netherlands.



EUROPEAN UNION

European Regional Development Fund.
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European Regional Development Fund

Smoothing out and expediting

To help rise to this challenge, Technolution's focus in the MEKOPP project was on supporting the machine architecture definition and the development of the machine control software for the Photonics Test Prober and the Photonics Visual Inspection Tool. In general, this meant supervising the systems engineering and providing the architectural design for high-speed data acquisition. The development of such complex electronic systems is almost always a multidisciplinary process and Technolution was able to support MEKOPP through their understanding of the various domains in the data processing chain, including analogue electronics, digital electronics, onboard processing and external processing. Through carefully considered systems engineering and system integration, they helped to realise the best solutions to the project's technological challenges.



Introducing new electronics to the market is another highly complex process that is sometimes underestimated. Fortunately, Technolution also has a great deal of experience regarding new product introductions and can offer support and advice to smooth out and expedite the process from prototype to new product. As a result, they will continue to support the MEKOPP project after its completion by preparing the lifecycle management and supply chain management of the PIC metrology machines at the beginning of the development process.

The co-creation effect

A significant element of MEKOPP was collaboration with a consortium spread across the Netherlands – something that Technolution has long excelled in due to its preferred working method of co-creation. Innovation arises when talented people from different disciplines and/or different expertise meet. Such exchanges of technical and domain knowledge between equal partners foster mutual inspiration, resulting in innovative solutions with significant – and often surprising – added value.

For Technolution Advance, the development of new electronics does not end with the start of production and the market launch. Advanced structuring of their tools and operating processes enables them to guarantee a long lifecycle of up to dozens of years. This offers a major boost to an emerging field like integrated photonics, in which the Netherlands wishes to secure its leading position on the global stage. In turn, the high market growth for PICs will sustain and advance the national and international position of consortium partners like Technolution, creating a virtuous cycle for many years to come.

MEKOPP project partners

IMS

Development of equipment for high-precision positioning of Photonic Integrated Circuits (PICs), enabling the optimisation of back-end processes and cost reduction.

LioniX International

Develops and commercialises silicon-nitride (SiN)-based waveguide technology (TriPlex) for a variety of applications and is a leader in the photonic sector.

Nobleo Technology

Realisation of software for the automatic inspection of photonic chips (PICs).

Photonic Integration Technology Center (PITC)

Shortening the path to the commercial application of integrated photonics through application-driven technology programs and by offering access to shared infrastructure.

Salland Engineering

World-leading in test technology and engineering, specialised in solutions and services to improve efficiency and quality testing at semiconductor manufacturers.

Settels Savenije

Total solution supplier for high-tech equipment, systems, modules and critical components, including engineering and prototyping.

Technolution

Advanced electronics and embedded systems for complex instruments: specialist in the (combined) development of software, programmable logic and electronics for embedded and technical information systems.

TNO

One of the focus areas in the TNO expertise centre for semicon and quantum is optical metrology. TNO's goal is to bridge low TRL developments and businesses.

Workfloor

Development of software modules that interact with manufacturing execution systems.

High Tech NL Semiconductors

Fully focused on the vast and strong semicon industry and operates as a 'single point of contact' in all steps of the value chain. Drives and stimulates (international) cooperation and initiates and facilitates (international) innovation and crossover projects.

Berenschot

A consultancy company that supports High Tech NL with grant proposal writing and project management and facilitates cooperation between companies and the growth of ecosystems.