FLOIM, a European project shaping the future of optoelectronics manufacturing

As FLOIM project reaches its end, the Consortium must look beyond the technical challenges already overcome, and focus on the societal barriers for the implementation of the developed manufacturing chain.

The production chain for optoelectronic device manufacturing is inherited from microelectronics, which is not suitable for novel, low cost, high efficiency photonic devices. Improving the cost efficiency, flexibility and environmental footprint of the complete integrated optoelectronics workflow, can provide European industry with a key tool for excelling in advanced applications and differentiating their products, while keeping production, innovation capacity and key IP in Europe.

In this context, FLOIM has developed an automated process for optical assembly of optoelectronic devices, based on optical quality injection overmoulding. Freeform and microstructured optical surfaces are generated directly on the components through thermoplastic microreplication, using microstructured inserts. The injection overmoulding technology is inherently a fast process that allows easy mass production, while at the same time permits the substitution of thermosetting plastics by thermoplastic polymers, which are fully recyclable thus, reducing the environmental impact of the optoelectronics devices.

However, injection overmoulding had to go a long way to be a viable alternative to the current manufacturing technologies. The strict requirements regarding alignment and positioning accuracy of the overmoulded part, the sub-micron resolution required for the moulding inserts to apply additional optical functionalities to the injected optics, and the sensitivity of the electronic component to the high temperature and pressure inherent to the injection overmoulding process, posed the main challenges that were overcome in this project.

Contribution to European photonics industry

The manufacturing solution developed in FLOIM demonstrated a reduction of production time of up to 80%, while guaranteeing a high repeatability rate and allowing an easy customization thanks to the possibility of quickly changing inserts within the mould cavity of the injection machine.

Such advantages will contribute to improve not only competitiveness of European photonics industry at large, generating growth and jobs, but also making new custom products available to small consumers, previously too costly to be affordable.

FLOIM demonstrated its success with a Pilot Line that proved the productivity increase and high quality yield of the developed processes. It is expected that this Pilot Line will serve as a benchmark for the future lines to be installed in optoelectronics manufacturing companies in Europe. However, even though the project is a technical success, there have been challenges that await the Consortium in the future, such as the need of well trained personnel at all levels of photonic-based production and an increase in awareness amongst the potential technology adopters.
FLOIM has participated in different events, such as the Laser World of Photonics, the World's Leading Trade Fair with Congress for photonics components, systems and applications, and clustering with

other Research Projects. In addition, the Consortium prepared training material and workshops and made it available to the public at http://www.floimproject.eu/ website, in order to ease up the adoption of the new technologies by other companies in the optoelectronics sector.

FLOIM has the potential for a relevant impact in photonics and optoelectronics industry and its applications at large. Estimations based on current markets status leads to a potential impact of FLOIM, when adopted by manufacturing industry, generating up to 5,200 jobs and an additional market share of €1,195M for EU companies in the sectors tackled by the project.

Details

Title: Flexible Optical Injection Moulding of optoelectronic devices
Partners: 12
Countries: 6
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Project Consortium:

For additional information please contact:
Project Coordinator: AIMEN Technology Centre
Contact: Nerea Otero
E-mail: notero@aimen.es

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