FLOIM

Flexible Optical Injection Moulding of optoelectronic devices

FLOIM concerns a new, automatized manufacturing technology for the production of optoelectronic components and the assembly of the corresponding optical system, based on the use of thermoplastic materials and the embedding of all the components into a compact and robust unique device. This technology permits to overcome current manufacturing limitations and magnifies the design possibilities.

The production chain for optoelectronic device manufacturing is inherited from microelectronics, which is not appropriate for novel, low cost, high efficiency photonic devices.

Project Duration:
42 months
Starting project date:
1st of September, 2018
http://www.floimproject.eu

Partners

AIMEN Technology Centre

www.aimen.es

Universitat Politècnica de Catalunya

www.upc.edu

PROMOLDING

www.promolding.nl

HYBTRONICS MICROSYSTEMS

www.hybtronics.com

MONDRAGON ASSEMBLY

www.mondragon-assembly.com

FAGOR AUTOMATION

www.fagorautomation.com

ADAMA INNOVATIONS

www.adama.tips

FLEXENABLE

www.flexenable.com

RECENDT

www.recendt.at/en

FRAUNHOFER IWU

www.iwu.fraunhofer.de

Ceit-IK4

www.ceit.es

SNELLOPTICS

www.snelloptics.com

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 820661.

FLOIM is an initiative of the Factories of the Future Public Private Partnership

Second year of FLOIM

FLOIM project started two years ago and has come a long way since its beginning. In the last 12 months, the consortium has validated the initial proposed manufacturing technologies, and further developed the systems of in-mould and inline quality control.

Key manufacturing technologies

AIMEN focused on laser Two-Photon polymerization, to structure a hard resin on top of steel inserts, suitable to be used in injection moulding. Resolution achieved with this technique is within the hundreds of nanometers range, and it has been successfully replicated by injection moulding.

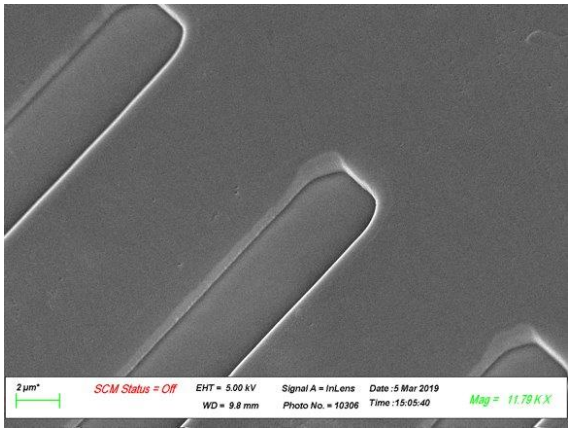
"AIMEN logo replicated by injection moulding from a photopolymerized hard resin insert".

The replicated inserts proved to be resistant to the injection process, being able to withstand tens of replications without showing signs of weathering.

SnellOptics designed a light-directional lens system for overmoulding a curved BLU LED matrix from FlexEnable. This design allows a curved display to direct the light to the user, at 30°. PROMOLDING has tested different materials for its overmoulding, coming up with flexible and rigid curved alternatives.

"FlexEnable LED matrixes, overmoulded by PROMOLDING with a light-directional lens system designed by SnellOptics".

ADAMA innovations has been coating steel inserts with DLC and structuring them by Ion Implant Lithography (IIL), which provides a resolution in the range of tens of nanometers. This will allow manufacturing a very accurate diffraction grating, needed for FAGOR demonstrator, a miniaturized scanning head for optical encoders. The manufactured inserts have been successfully replicated by PROMOLDING with their injection moulding machines.



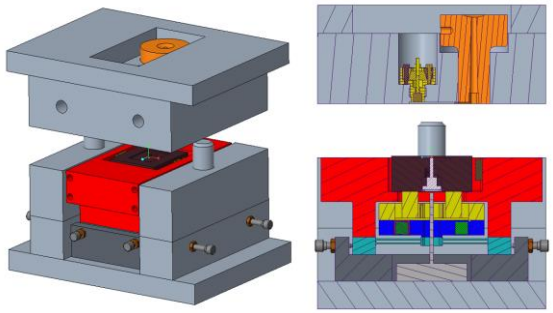
"ADAMA innovations IIL structured grating, replicated by PROMOLDING with their injection moulding machines".

Control systems

FLOIM aims to develop a very thorough and all-around control system, that includes an off-line quality control and in-line, in-mould control system for the manufacturing pilot line that will be assembled to demonstrate the technologies developed during the project.

For the in-mould control, Recendt, Fraunhofer-IWU and ADAMA innovations have been closely working together, to design a system that will include:

- An OCT system developed by Recendt, that will measure any insertion errors and geometric tolerances of the components to be overmoulded.
- A 3-axis mechatronic device designed and manufactured by Fraunhofer-IWU, that will compensate the measured errors with micrometric accuracy.
- A filling sensor developed by ADAMA innovations, based on fibre-optics interferometry, which provides a resolution of tens of nanometers.



"Final concept of the mechatronic device for in-mould alignment and compensation of geometric tolerances".