LASER World of PHOTONICS

FLOIM

Flexible Optical Injection Moulding of optoelectronic devices

Flexible Optical Injection Moulding of Optoelectronic Devices

World of Photonics, April 28th 2022, Munich

About us

We are an **innovation** and **technology centre** specialized in **research** and in providing **technological services** in the field of **MATERIALS**, **ADVANCED MANUFACTURING PROCESS** and **INDUSTRY 4.0**

We are experts in

- Joining Technologies
- Laser Technologies applied to Materials Processing
- Industrial Robotics

690 R&D&i Projects
In the last 10 years

6 Active Patents
As of 31/12/2020

+500 Clients
Annual average
In the last 5 years

+250 Employees
40 PhDs
61% men
39% women

15,6 M€ Anual Income
2020

292.435 Technical Reports
As of 31/12/2020

1967 Founding of AIMEN

1995 Opening of the Armando Priegue building in O Porriño

1998 Official recognition as a Innovation and Technology Centre

2002 Creation of a Pilot Joining Technology Plant

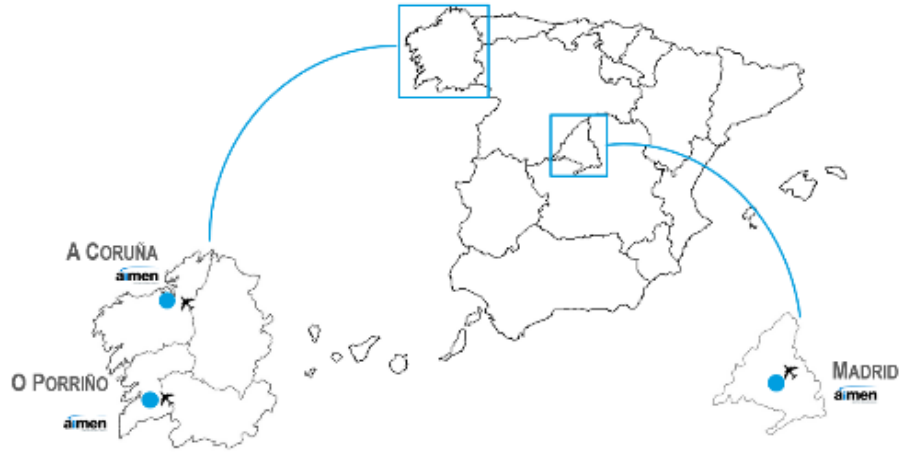
2004 Comissioning of the Laser Technologies Research Plant

2014 Opening of the Laser Applications Centre

2017 50 years associated with innovation

About us

Locations



Industry supported, private centre. Applied R&D in:

Advanced Materials

Smart Systems and Smart Manufacturing

Laser Based Manufacturing

Sustainable Manufacturing Processes

Agenda

FINAL EVENT FLOIM PROJECT

April 28th 2022 | HALL A5 - ROOM A51

LASER World of PHOTONICS

9.30 to 9.40h — FLOIM: Flexible Optical Injection Moulding of optoelectronic devices
AIMEN Technology Centre
Nerea Otero

9.40 to 9.55h — In-mould measurement for mechatronic compensation of positioning errors in injection overmoulding
RECENDT
Christian Rankl

9.55 to 10.05h — Fiber-optic based metrology for nanometric measurement of micro-mould filling by a polymer
ADAMA
Majid Fazeli Jadidi

10.05 to 10.20h — Femtosecond laser fabrication of volume and surface-relief micrometric phase gratings
CEIT
Mikel Gómez Aranzadi

10.20 to 10.35h — Challenges in the machining of micro-optical mould inserts
Fraunhofer IWU
Jan Edelmann

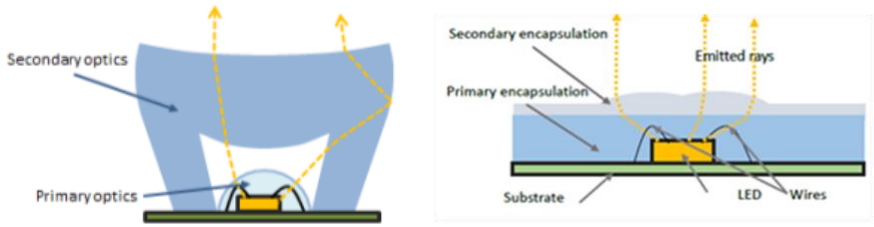
10.35 to 10.45h — High-performance DLC-based mould patterning technology with high control over micro and nano features
ADAMA
Zahra Gholamvand

10.45 to 11.00h — European Pilot Line and one-stop-shop for free-form micro-optics
PHABULOuS Pilot Line Association
Jessica van Heck

11.00 to 11.30h — Networking coffee – Clustering with PULSATE Project

Goal and Technology advantages

Single step optoelectronics encapsulation with optical functionalities.



Advantages

- Improved optical path and efficiency.
- Avoids optomechanics, increasing robustness.
- No need for microoptics manipulation.
- Allows for more compact devices.
- Reduces manufacturing steps and costs.

Challenges

- Need for high accuracy positioning during injection.
- Faulty parts incur in higher costs.
- Need for high resolution manufacturing processes.
- Functionalities must be transferred to injected parts.

Manufacturing steps

Inserts manufacturing with optical properties

- Direct laser writing
- Ion Implant Lithography
- Micro Machining
- MultiPhoton Polymerization

Single-step encapsulation with optical functionalities

- Injection overmoulding
- In-mould active positioning system
- OCT quality control
- Real-time mould filling measurement

Technology demonstrators

- Compact Fibre Optic Transceiver
- Scanning Head for Optical Encoder
- BackLight Unit for vehicles A pillar

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Demonstrators

1: Compact Fiber optic transceiver

- Higher data density transmission and fiber optics communication speeds.
- High productivity and in-mould alignment requirements.

2: Scanning Head for Optical Encoder

- More compact design, increased efficiency of illumination and improved signal to noise ratio.
- Will allow for higher positioning accuracy, meaning a breakthrough in the manufacturing industry.

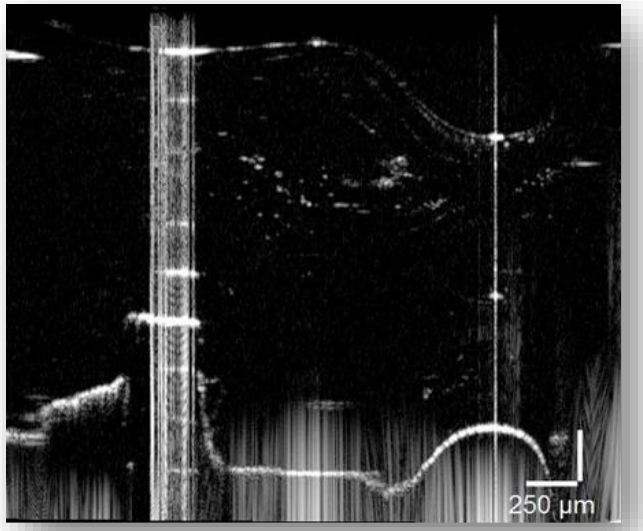
3: Backlight unit for Flexible screen in vehicles A pillar for increased visibility

- Higher road safety, specially for pedestrians and bikers.
- High directionality and homogeneity required

In-mould measuring and control

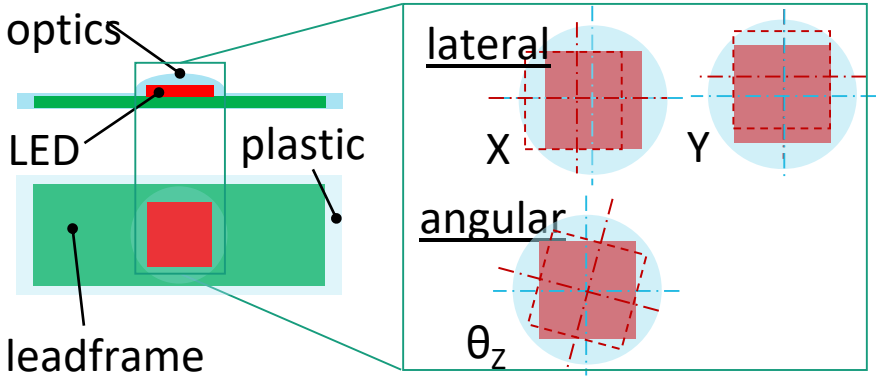
- Optical Coherence Tomography provides information about heterogeneities, cracks and other defects within the injected material.
- A 3 degrees of freedom positioning system allows for compensation of alignment errors in the injection moulding cavity.
- Proper mould filling must be ensured to guarantee the desired optical functionalities of the product.

RECENDT
RESEARCH CENTER NON DESTRUCTIVE TESTING



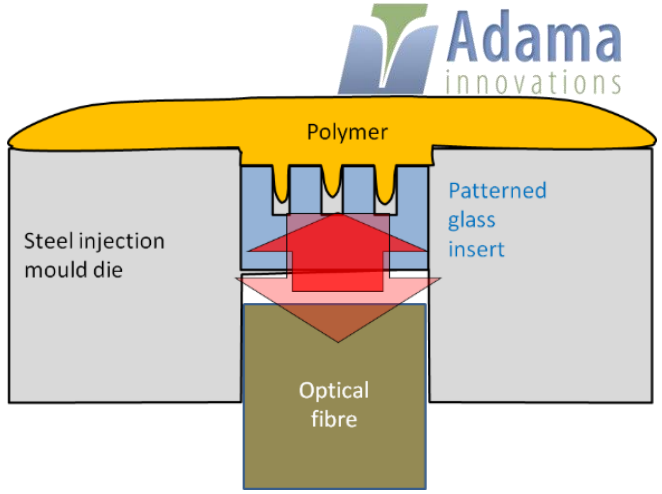
OCT measurement of injected optic

Fraunhofer IWU



Alignment compensation schematic

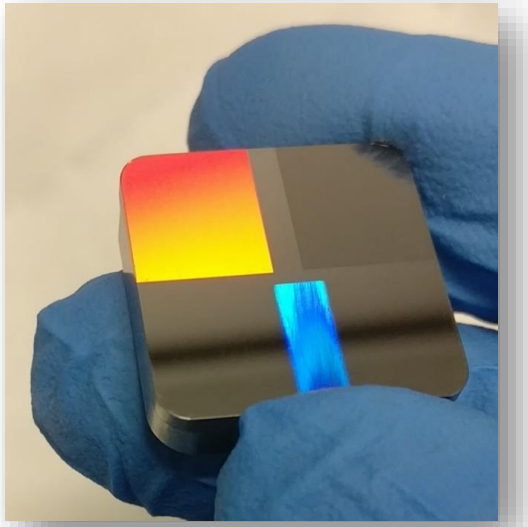
Adama innovations



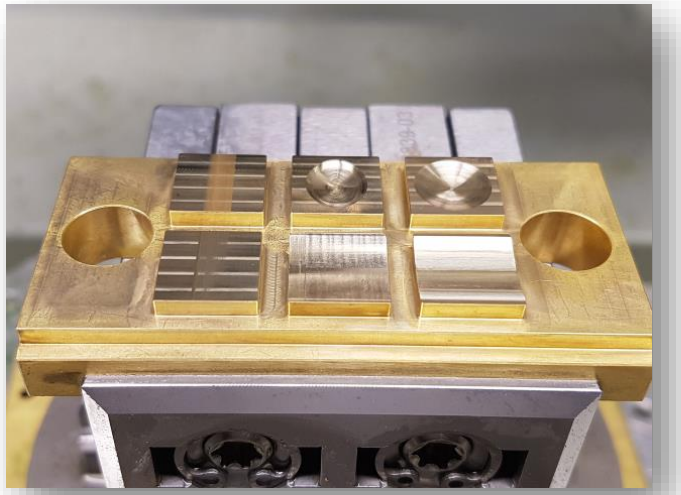
Measuring system schematic

Manufacturing Technologies

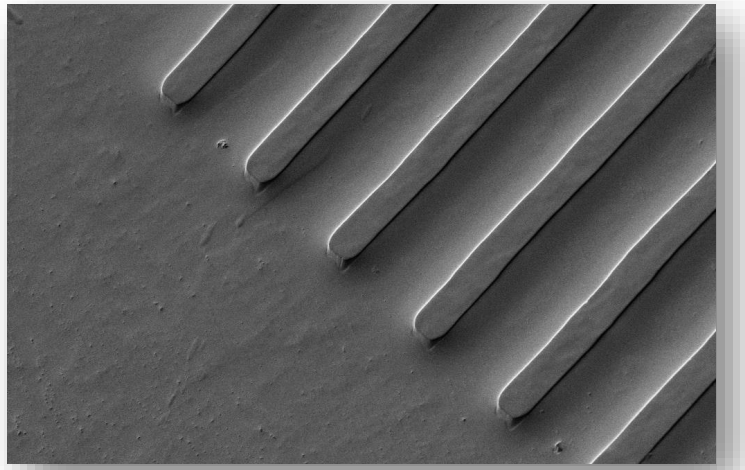
- Laser direct writing is a fast and repeatable manufacturing process.
- Micro machining can generate surfaces with optical quality roughness.
- Ion Implant Lithography provides excellent resolution and accuracy.



Laser micro/nanostructured mould insert



Optical quality set of micro machined lenses on mould inserts.



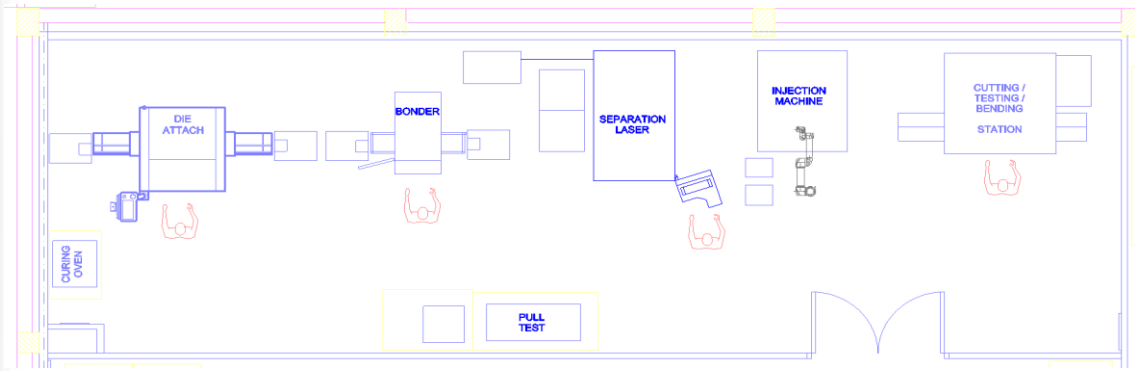
10 µm-period structures manufactured by Ion Implant Lithography.

Technologies integration

- A fully functional Pilot Line will be assembled at HYBTRONICS facilities, to manufacture the FOT demonstrator.
- The pilot line includes all the necessary steps to produce functional FOTs, not only the injection moulding process.
- HYBTRONICS handles the Front-End part of the line (steps previous to Injection Moulding), UPC is in charge of the Injection Moulding process and the optical validation, while MASSO leads the Back-End part of the line.

BabyPlast 6/10 VP injection machine used at UPC

Back end robot cell developed by MASSO & HYBTRONICS



Pilot Line Lay-out at HYBTRONICS facilities

Thanks for your attention

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Consortium:

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