Advancing Consumer Optics with Ultra-Precision Machining and Replication

Micro-Optics Summit
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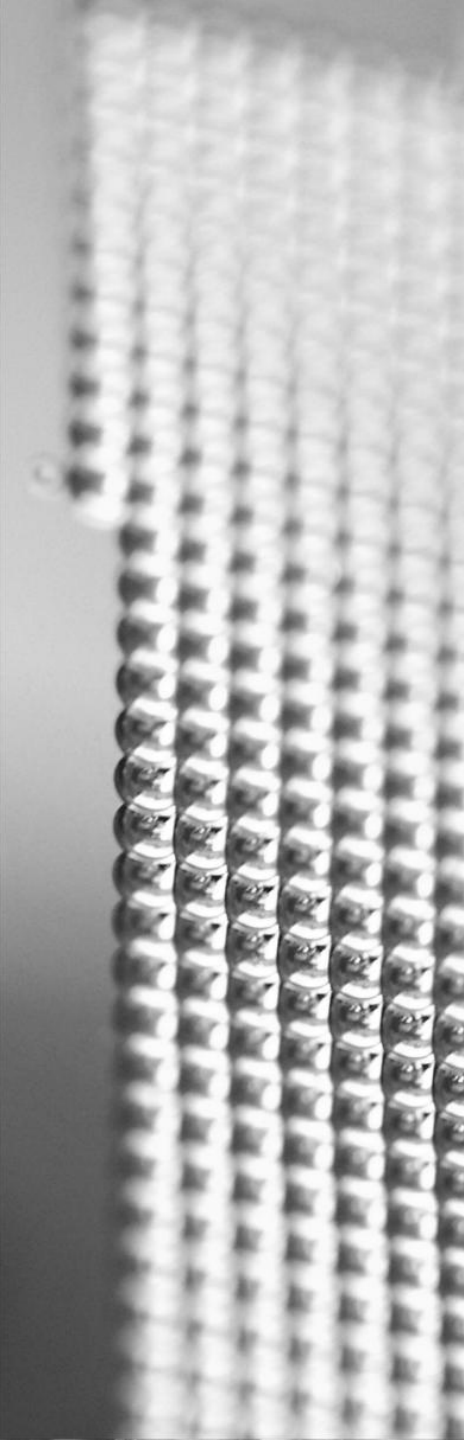


Company

Incorporated in 2013.
100% Family owned.

Continuous technology developments in diamond machining and polymer replication

Optics manufacturing by diamond machining and/or replication processes

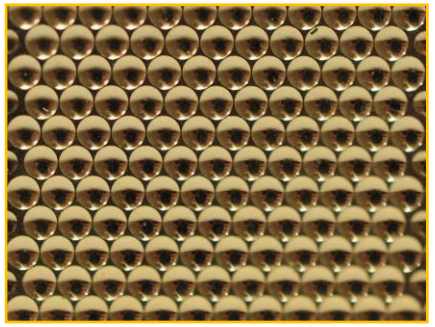
> 100 customers worldwide

Located in Liège (Belgium)

Our services

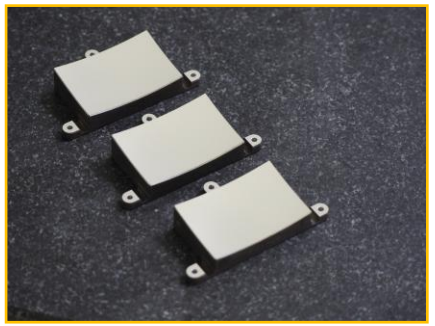
Technological solutions for manufacturing of your high precision optical and mechanical parts

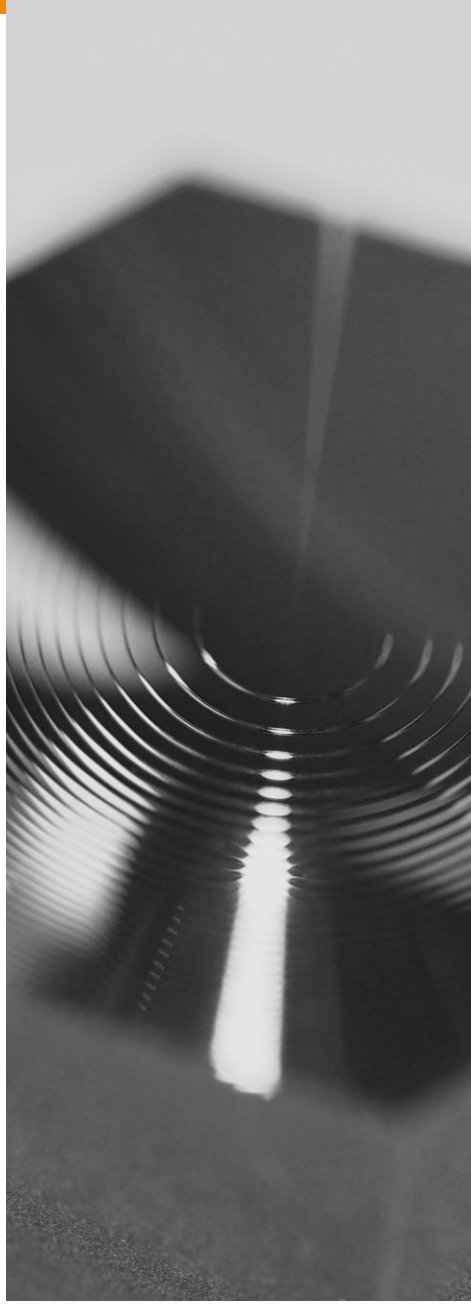
DPI® Lens array masters / inserts



Plastic optics

SPDT Services

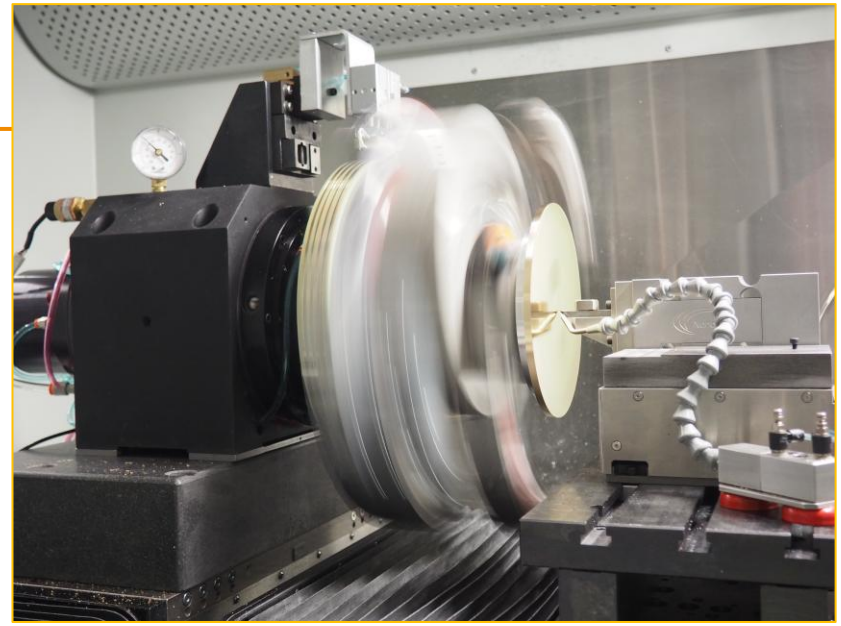


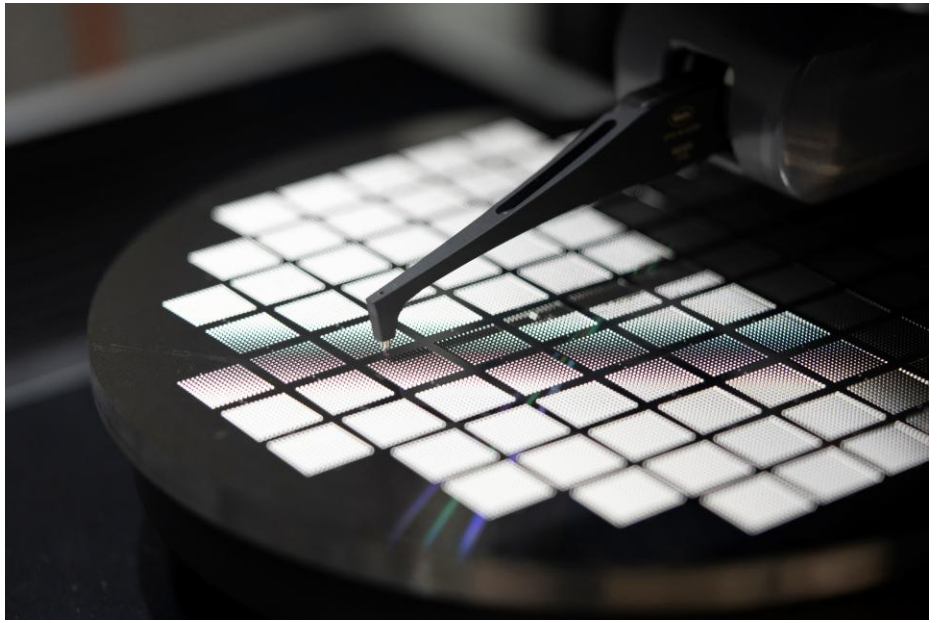


DPI® on-axis SPDT machining

Dynamic Part Indexing (DPI®) is:

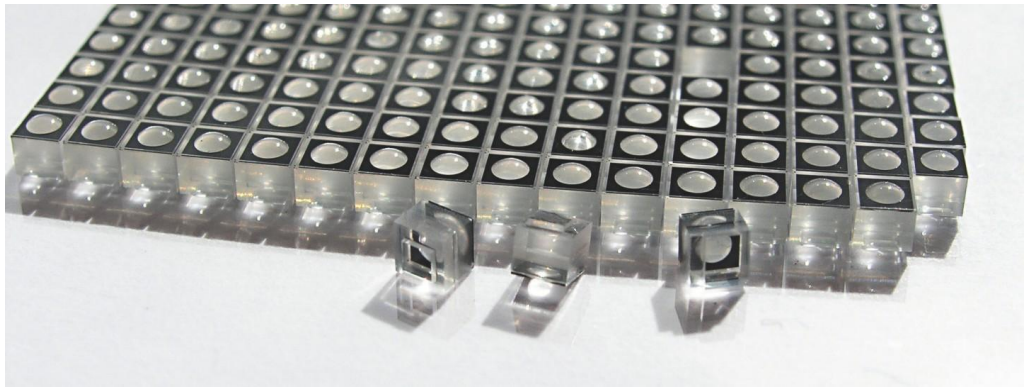
- A patented device 100% developed and owned by Wielandts UPMT
- Sequentially 2/3-axis turning of each lens of an array on the workspindle axis for best form and roughness
- Dynamically offset the part wrt the work-spindle in a balanced manner using eccentric rotary movements
- All lenses machined on same on-axis position ➔ repeatable form and roughness
- Design freedom: all lenses can be different (freeform) to compensate for replication repeatable errors





DPI® masters markets and applications

- MLA sensors for mobile applications, LiDAR, …
- Automotive MLA headlights/carpets
- Masters for roll-to-roll replication for lighting applications
- Single lenses fully populated masters for camera applications
- WLO master for healthcare applications
- WLO master for LBS optics
- …



Plastic optics manufacturing processes

1. Injection molding for lens arrays
2. HiFi Optics® compression molding
3. Diamond turning

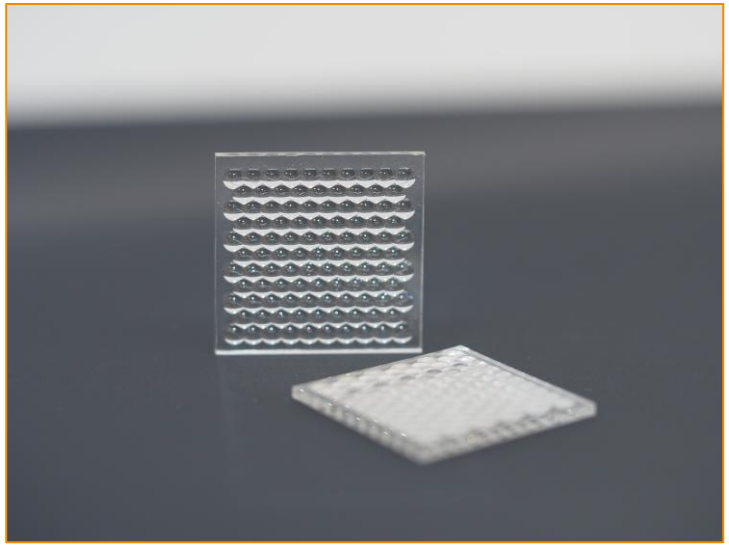
1 Injection molding for lens arrays

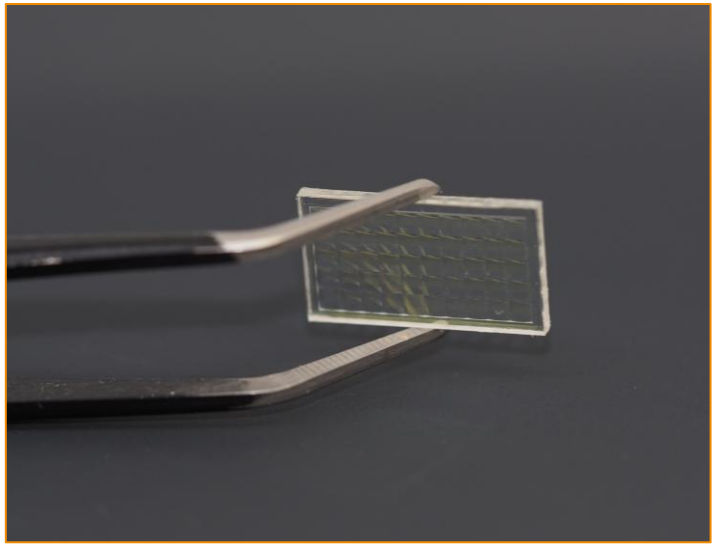
Using:

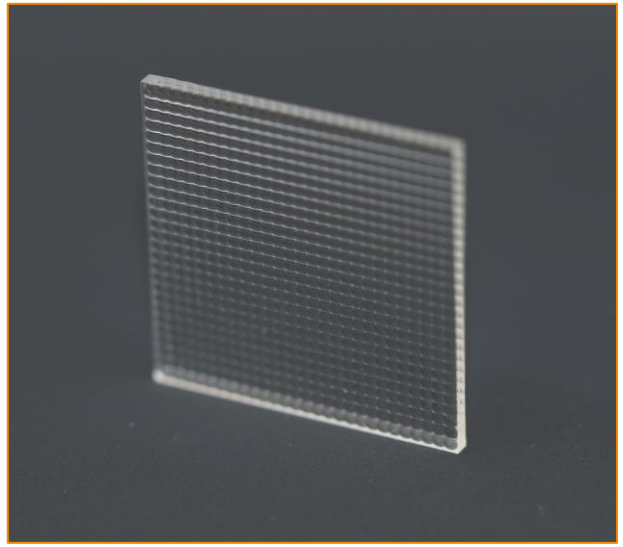
- Proprietary molding tool
- DPI® manufactured mold inserts

Applications: AR/VR, LiDAR, lighting, healthcare, …

	Special injection molding process
SFE	Down to 300 nm p-v
Ra roughness	< 10 nm
Thickness	0.6 - 3 mm
Max slope	< 40°
Fill factor	100%
Double sided	Yes
Alignment	<10µm
Shapes	Aspheres, diffractives, freeforms
Materials	Optical thermoplastic materials: PMMA, PC , COC, COP

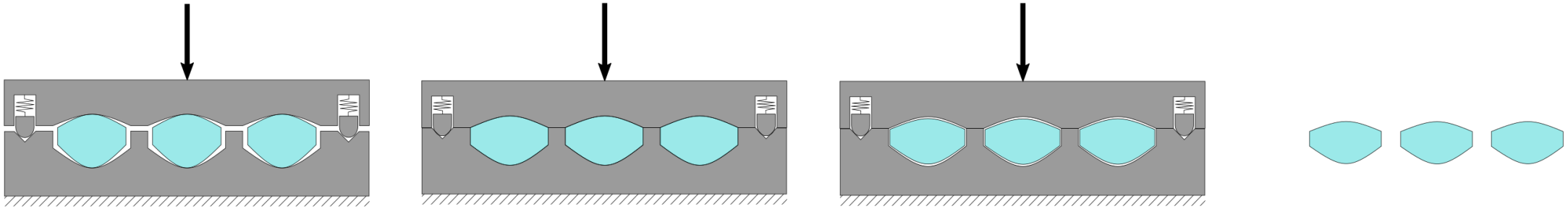






2 HiFi Optics® compression molding for AR

Proprietary Isothermal Compression Molding Process



1. Preforms inserted in multi-cavity ultra precision mold with adapted alignment system

2. Isothermal compression molding of lenses

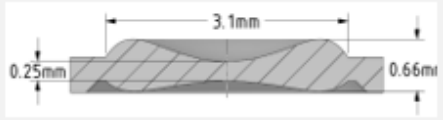
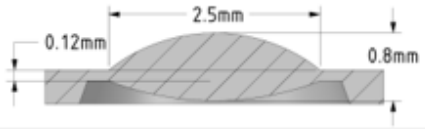
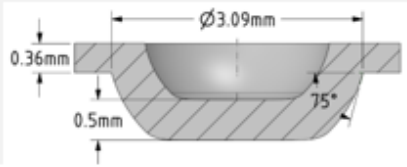
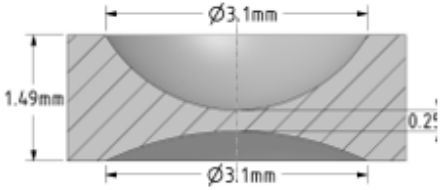
3. Isotropic shrinkage of lenses during cooling

4. Demolding of HiFi Optics® lenses

No temperature gradient for high shape accuracy and low residual stress

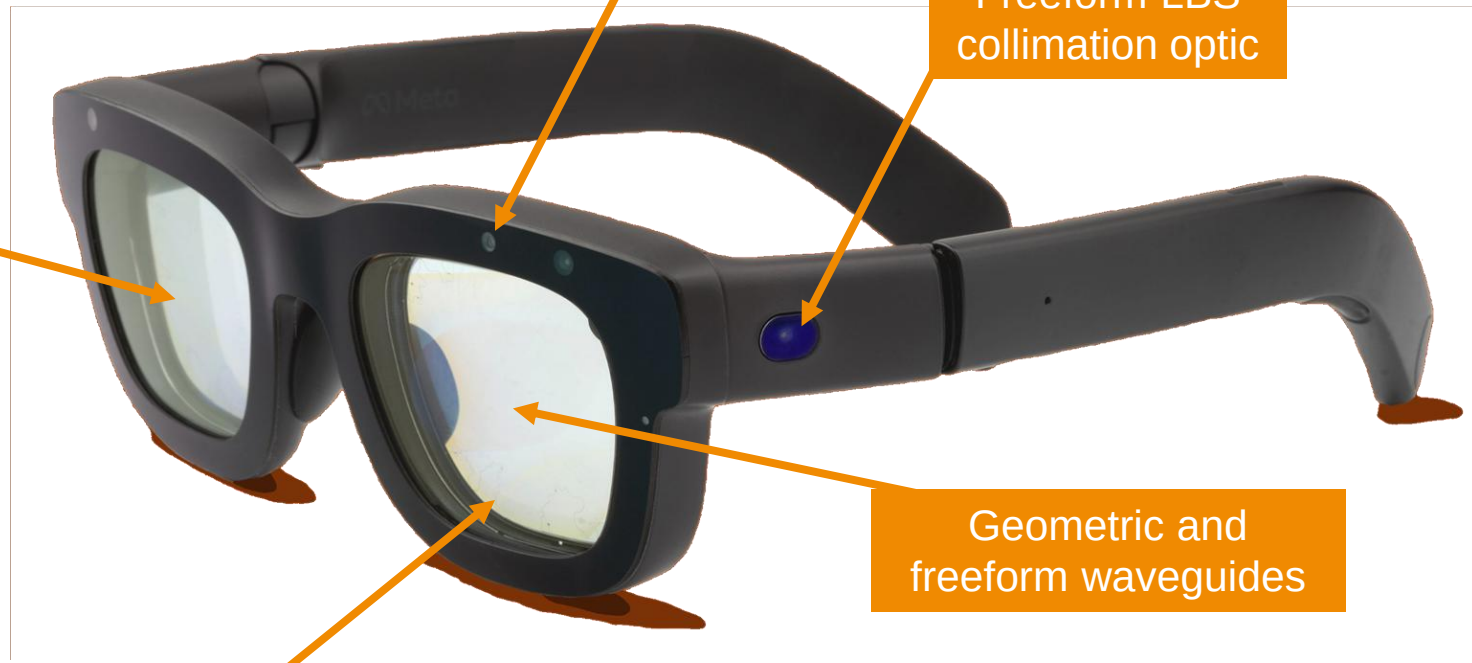
2 HiFi Optics® compression molding for AR

Proprietary Isothermal Compression Molding Process

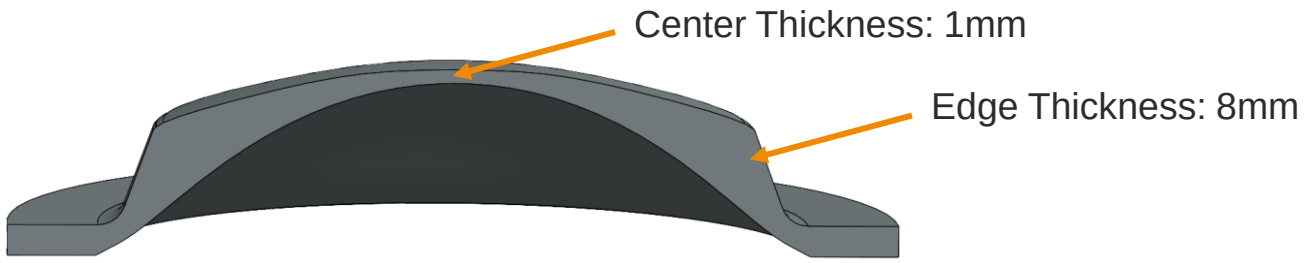
Dogbone		GMR = 0.38
Large MR		MR = 6.7
Slope lens		Slope = 75°
Small MR		MR = 0.17

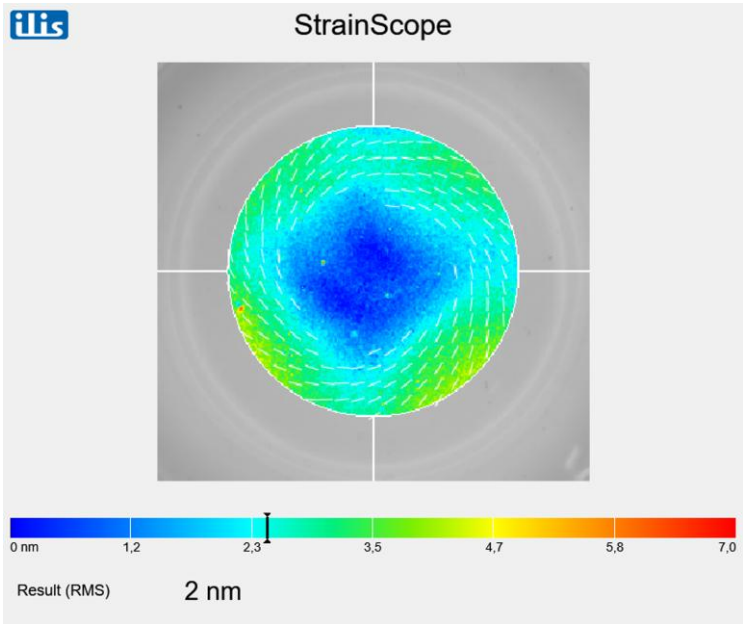
	HiFi Optics® compression molding
Form irregularity	Down to 150 nm p-v
Ra roughness	< 5 nm
Position accuracy	Optical surfaces co-alignement: 1-2 µm
Minimum thickness	< 200 µm
Aspect ratio	> 5
Max slope	Up to 75°
Birefringence	Down to 10nm/cm
Shapes	Aspheres, diffractives, freeforms
Materials	PMMA, PC (Mitsubishi EP Series, …), COC (Mitsui APEL), COP (Zeonex)

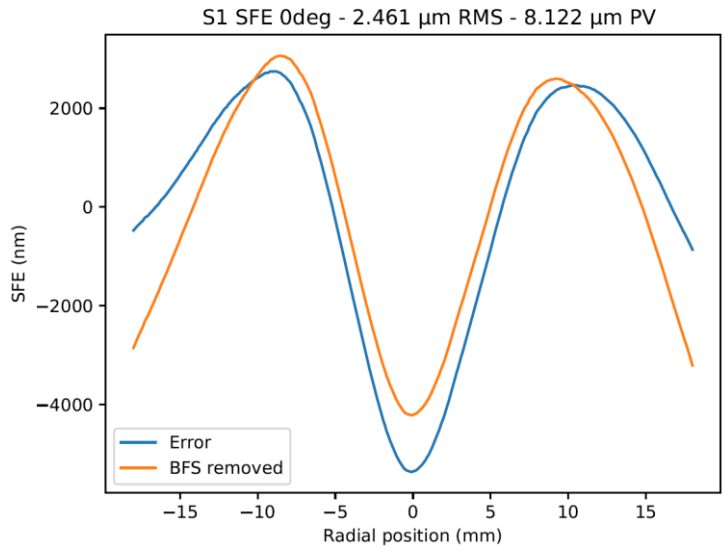
UPMT customer projects for AR/VR

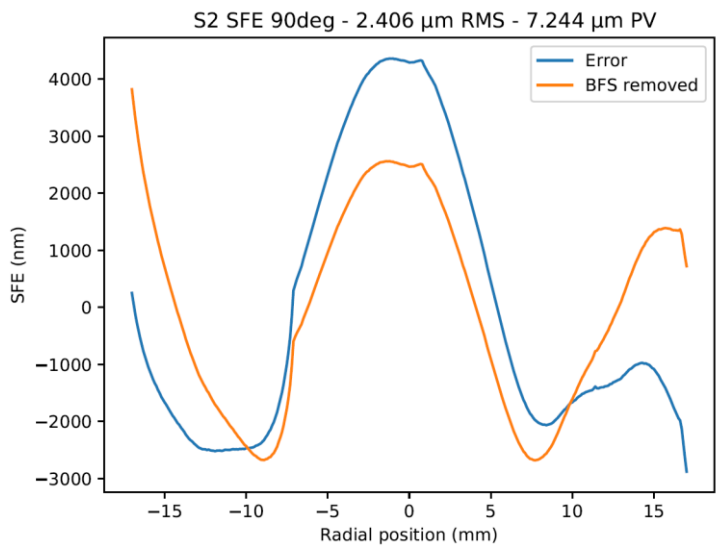


HiFi Optics® compression molding use case: pancake lenses

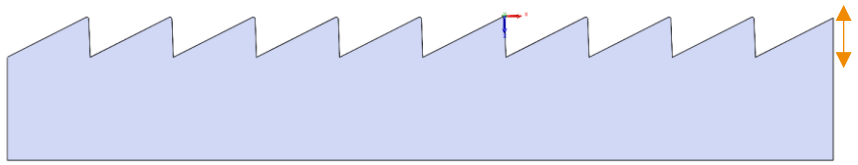




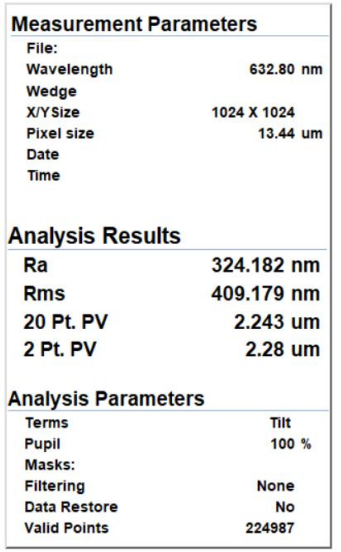


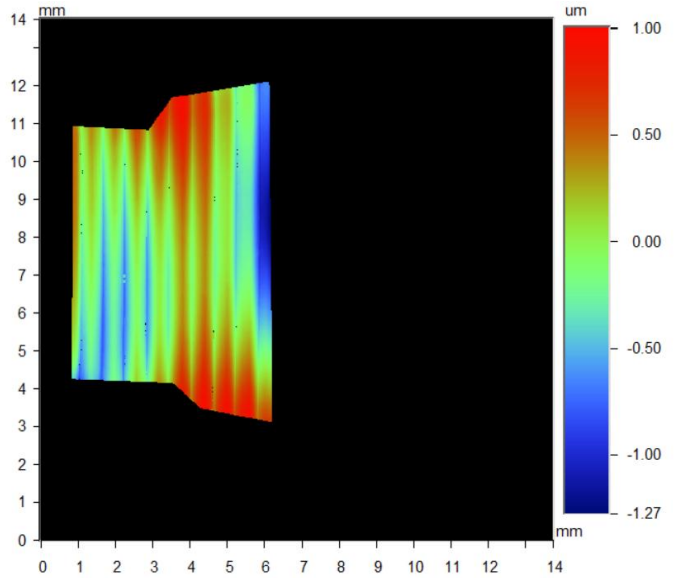


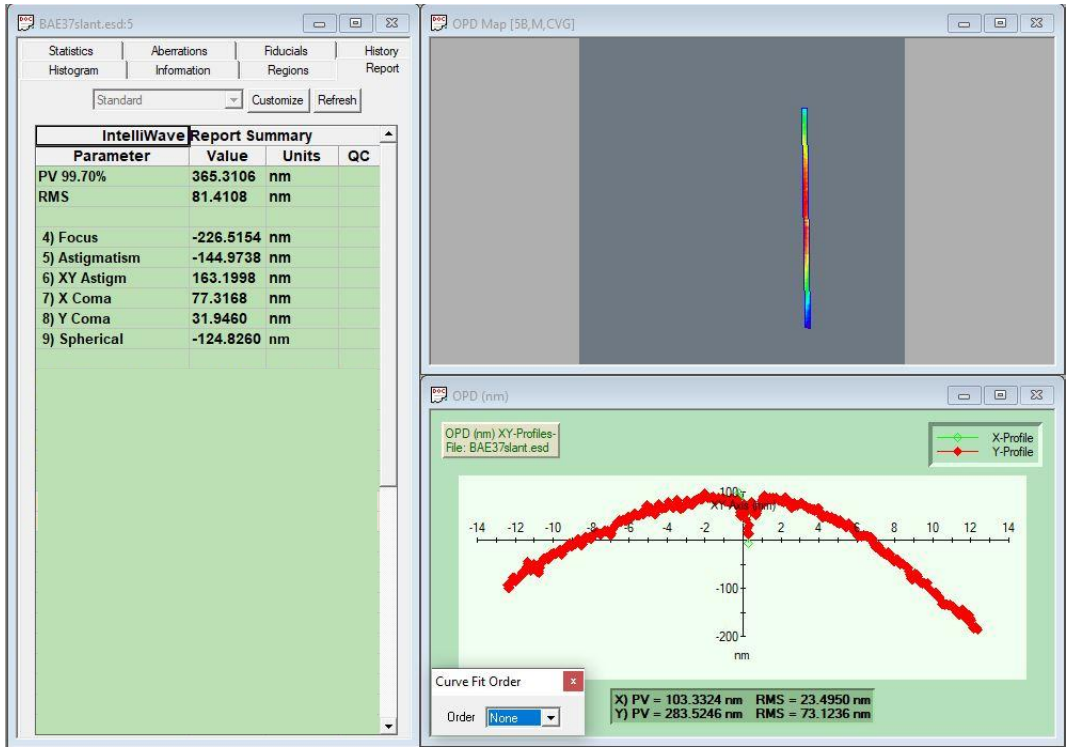
HiFi Optics® compression molding use case: geometric waveguides

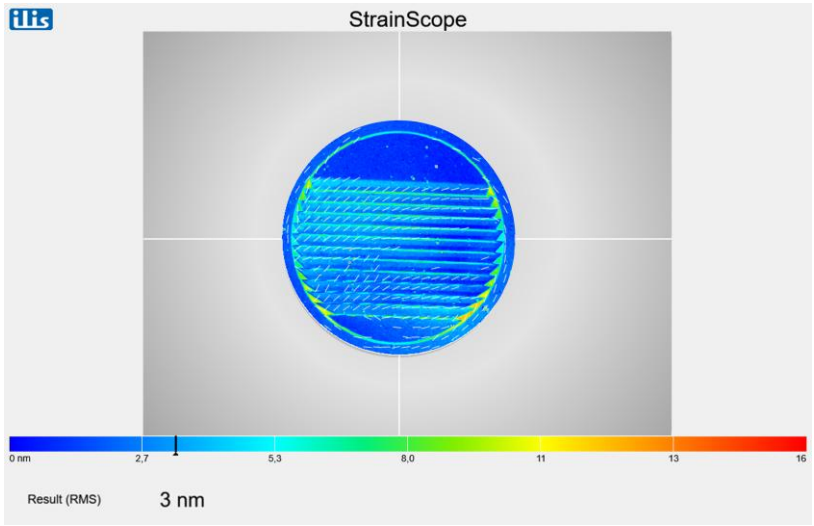


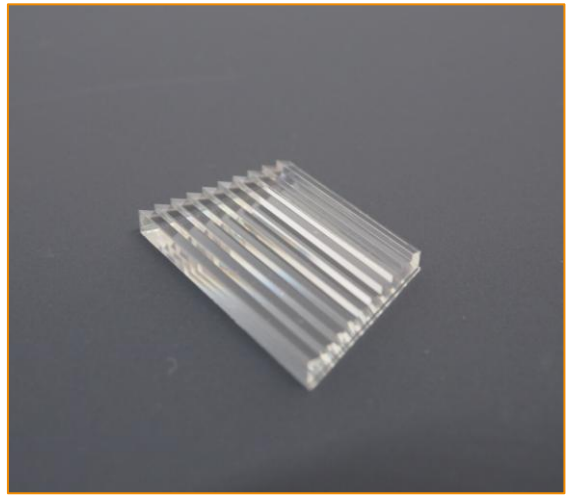
Slant height: 1mm







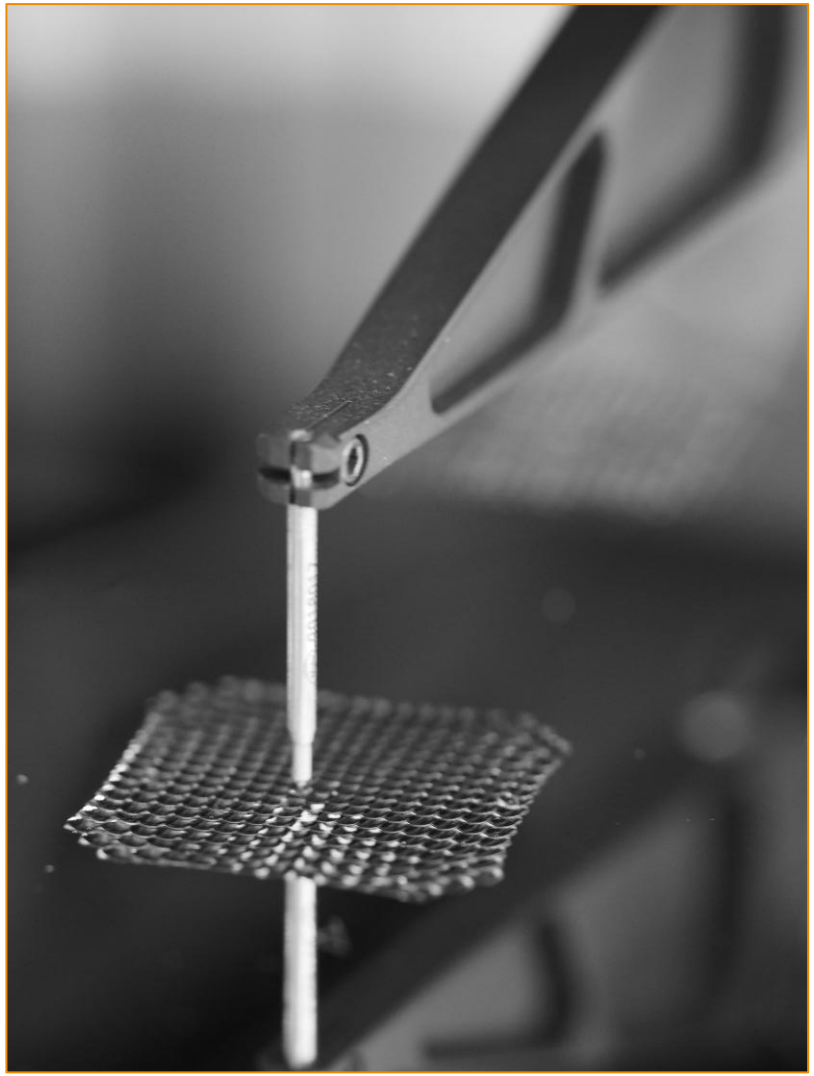




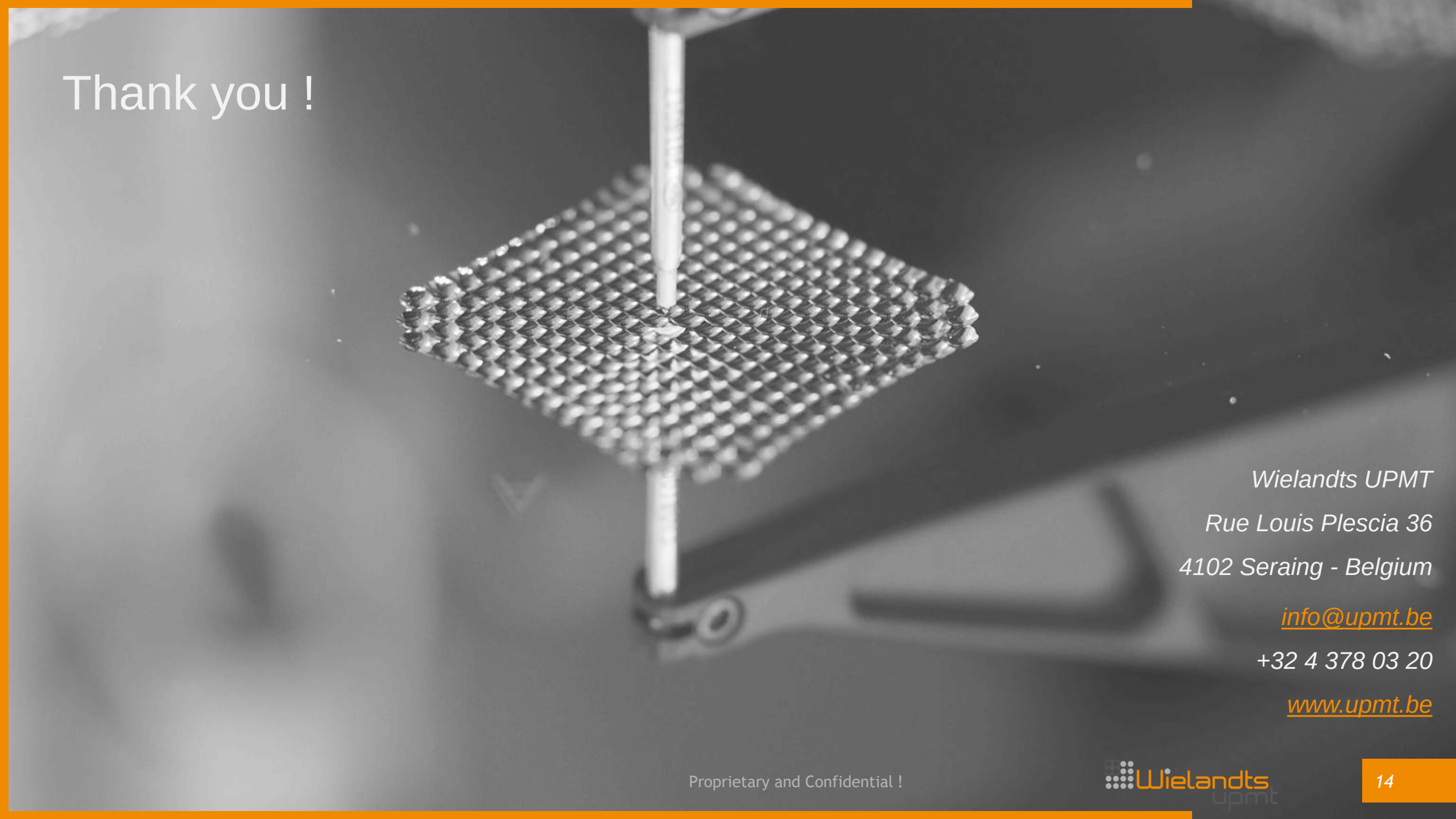
Plastic optics manufacturing services

From mold engineering to optics manufacturing and test, including:

- Mold and/or tooling design and engineering
- CNC machining of mold and/or tooling (3- and 5-axis)
- Diamond machining:
  - DPI®
  - Conventional 2-axes diamond turning
  - Freeform 3-axis turning
- Optics replication:
  - Special injection molding
  - HiFi Optics® compression molding
- Direct diamond machining
- Optical coatings from recognized suppliers
- Final shape : dicing – post processing (diamond saw dicing, milling)
- Metrology:
  - SFE
  - Birefringence
  - Roughness
  - Centration



Thank you !



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