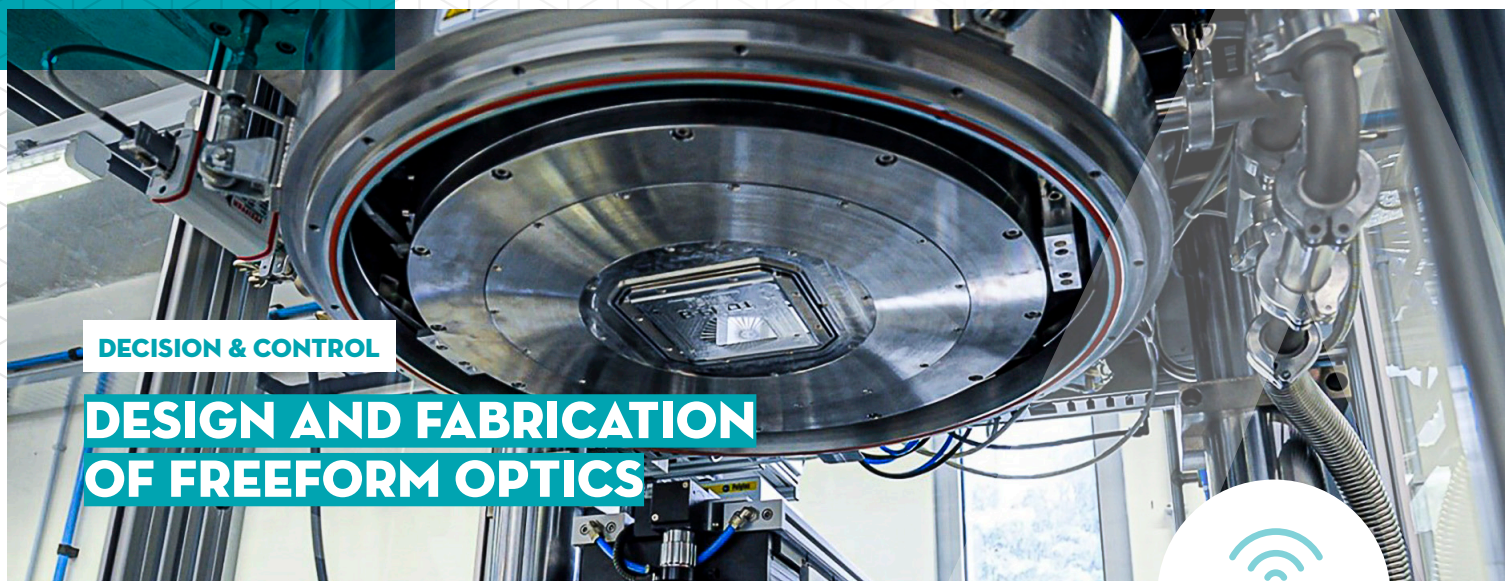


DECISION & CONTROL

DESIGN AND FABRICATION OF FREEFORM OPTICS

Flanders Make offers unique expertise and tools for "first-time-right" freeform optical design. We combine optical design, modelling, prototyping, manufacturing and testing to deliver optimal optical components and systems of random complexity. Leveraging our state-of-the-art machining and metrology equipment, we produce prototypes and replicas in plastic, glass and a selection of specialty optical materials.

The simplest definition of a freeform optic is an optical component with an optical surface lacking translational or rotational symmetry. Freeform optics have unique advantages for both imaging and non-imaging optical applications as they combine the best optical performance with a small form factor and low weight. We support companies by selecting the best suited, commercially available optics or by designing and fabricating customised freeform optics solutions. With our freeform optics technology platform, we offer:

- freeform optical design;
- modelling;
- prototyping;
- mould fabrication;
- metrology;
- validation testing;
- mass manufacturing.

After choosing or designing the correct optics, we can manufacture batches of diffractive, refractive and hybrid freeform optical components from 10s to 1000s at a pre-commercial level. We offer a wide variety of optical grade materials such as high-end plastics, glass or highly refractive index semiconductors. This allows us to span the entire optical transmission spectrum from UV to Midwave-IR.

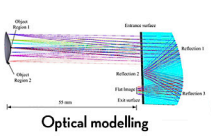
In this process, we use various unique software and hardware tools:

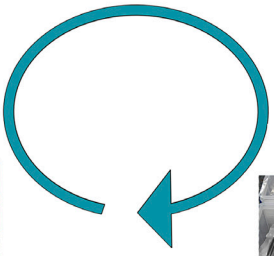
- **Design:** state-of-the-art commercial tools (Zemax, ASAP, Code V, Lumerical MODE/FDTD Solutions, OptSim, VirtualLab) combined with proprietary algorithms capable of "first-time-right" freeform optical design.
- **Manufacturing:** freeform optical components in polymers or glass through ultraprecision diamond tooling, ultraprecision grinding and polishing, hot embossing, injection moulding and glass press moulding.
- **Metrology:** state-of-the-art CMM and interferometry in ISO Class 7 cleanrooms.

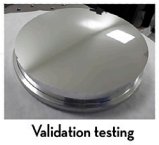

Mastering and Prototyping Technologies


Mould fabrication


Metrology & Quality control

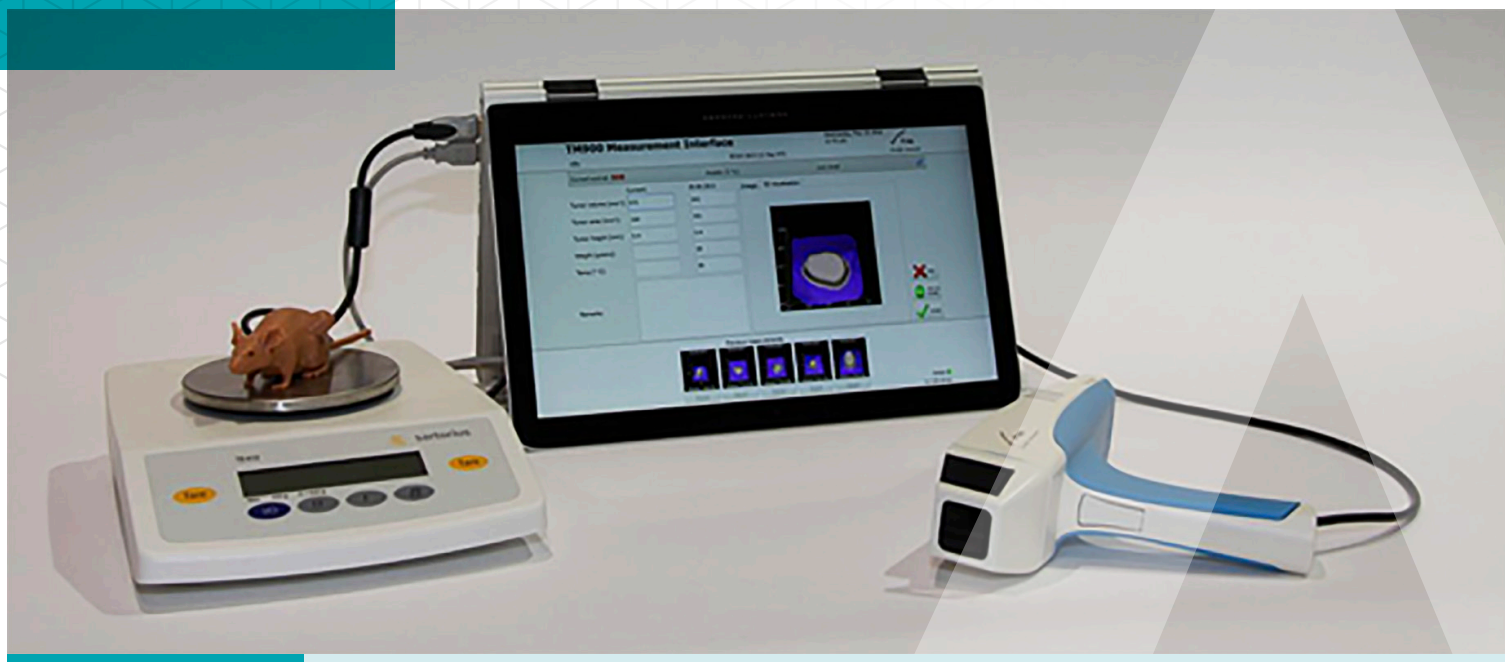

Optical modelling




Validation testing


Freeform optical design


Mass manufacturing



SUCCESS STORY

In a VLAIO Innovation Boosting project with the company Peira, we improved the resolution and imaging quality of a handheld medical diagnostic device, the TM900, which aims at making 3D stereoscopic images of subcutaneously implanted tumours in small rodents.

PROBLEM

The resolution and image quality of the current instrument was not sufficient.

SOLUTION

Through optical modelling, we proposed a new optical design with lens specifications that allow for improved resolution and image quality. We proposed two solutions, one based on commercial off-the-shelf optics and one based on customised freeform optics.

CUSTOMER VALUE

The improved resolution and image quality provides Peira with a unique selling proposition in the sense that the novel device allows to extract the volume of the imaged tumours and, as a result, to track the growth evolution of the tumours in preclinical research on mice.