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ADOSE DELIVERABLE D3.10; PUBLIC SUMMARY

PROTOTYPE OF MULTIFUNCTIONAL IMAGER - PLANAR LIGHTGUIDE

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1. TARGET OF DEVELOPMENT

Workpackage 3 of the ADOSE project develops a multifunctional and multispectral vision sensor. The work reported below was focused on the version using planar lightguide plates. The demonstrator was realized by rapid prototyping technologies ready to be transferred to high volume injection moulding techniques. The assembly steps are demonstrated to elucidate the cost effective and easy mounting approach.

2. PROTOTYPE COMPONTENS

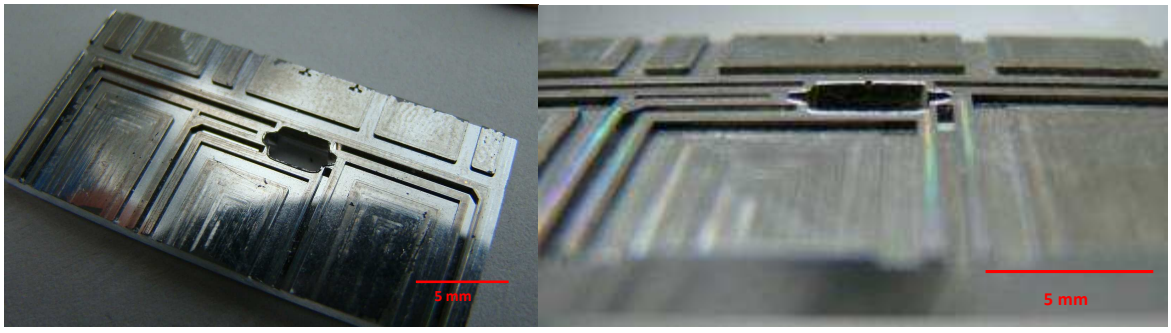

Figure 1: Hot embossed lightguide plates after Al-coating deposition and before sealing by means of the cover plate

Hot embossing is a well suited rapid prototype technology and the results are easy to transfer to injection moulding for high volume processes. The lightpipe approach in plastic materials was identified as the most cost effective solution for mass production. Aluminium was chosen for the reflective coating because of cost effectiveness and its wide spectra reflectivity.

The working principle is demonstrated in the figure below: for test purpose 4 fibers are used to couple light of four different colours into the lightpipe plate instead of the collimating optics. Due to effective light guiding the light spots can be seen at the out coupling.

Figure 2: Lens holder made by rapid prototyping with lenses and IR-filter

The lenses have been designed according to the optical requirements of the light pipe plate and were manufactured using hot embossing at Fraunhofer IZM. These lenses are necessary to collect the light and to steer it inside the MFOS housing to the light pipe plate. As to see from the figure below a little interconnect plate realizes the mechanical fixture and positioning of optics and electronic board both together.

Finally the MFOS prototype consists of 4 main parts able to be preassembled easily as shown below.

Figure 3: Prototype component parts: 1) housing with imager optic; 2) LED mirror and fog/twilight optic; 3) imager chip with mounting for the lightpipes; 4) lightpipes coated with aluminium

3. EASY CLICK-BY-CLICK ASSEMBLY

As to see the module can be mounted in an easy way. The process is shown in the following figures elucidating the click-by-click approach.

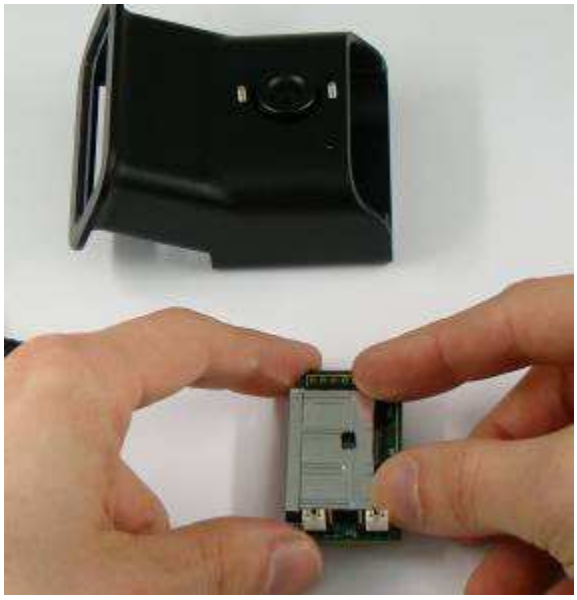

Figure 4: Step 1 - fixing the light pipe on the Chip

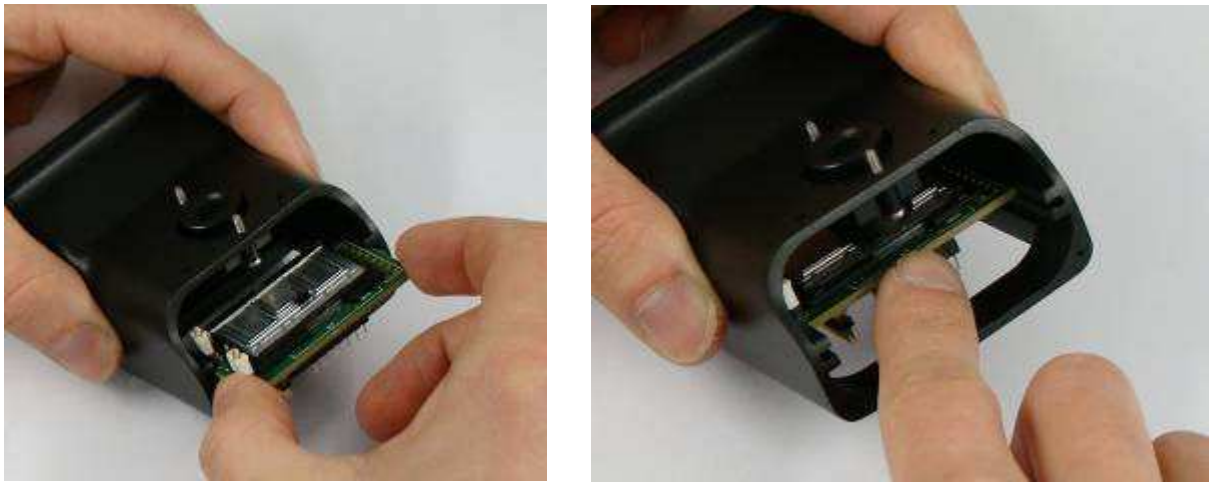

Figure 5: Step 2 - push the electronic in to the housing

Figure 6: Step 3 - push the front panel with optic into the housing

4. CHARACTERISATION

In order to get confirmation of successful prototype assembly a simple test setup was used. The main results can be summarized as follows:

- the light pipe channels allow light propagation and a signal can be detected at the chip
- the click-by-click assembly works easily
- the optical design is tolerant enough to fit to the manufacturing and alignment tolerances
- there is no crosstalk between signal channels at the corners/ROI and the camera image

Figure 7: Functional indication of the ROI in the 4 corners of the chip image. The markers are transparent. The solar function in the left down corner is more bright indicating sun light coming from the left side