VISIBLE LIGHT 3D PRINTING: FROM MACRO TO NANO

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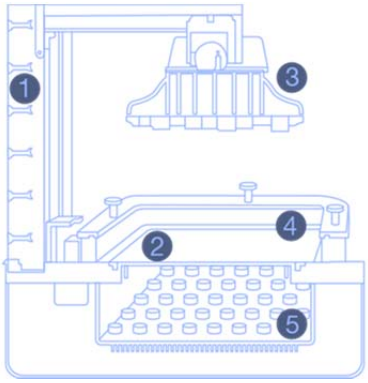
In this talk, we would like to focus on visible light 3d printing : from the concept of photpolymerization using longer wavelengths to the realization in 3d printers and it's application for mass-manufacturing.

At Photocentric, we have pioneered and established the use of the visible light emitted by liquid-crystal display (LCD) screens for 3d printing, thus offering a low-energy, scalable alternative to UV-based 3d printers. The typical setup of an LCD screen driven 3d printer is depicted in Figure 1. The LCD screen displays an image consisting of pixels, that in turn cure 3-dimensional voxels of photopolymer in the vat, thus creating an object layer by layer. This technology allows for the creation of a whole layer of the object at once, enabling an extremely fast building process.



1. Linear drive
2. LCD screen
3. Build platform
4. Photopolymer vat
5. Visible light

Figure 1: Visible light LCD printer

The rapid progress in 3d printer development has led to faster, larger and more accurate machines which in turn has increased the demand for faster, more accurate and functional materials, suitable for the fabrication of end-user parts. This result can be achieved by using light-curable thermoset photopolymer resins. As a result of the chemical cross-links between the polymer chains these resins are very stable, possessing long-lasting mechanical properties. The use of visible light for 3d printing leads to isotropic properties in the final parts.

In this talk, we would like to walk the audience through the formulation of new photopolymer materials, taking into account different parameters that affect their performance and present the use of visible light 3d printing using different case studies: from mass-manufacturing (macro scale) plastic items to customized highly accurate applications (nano-scale).