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Continuous Liquid Interface Production (CLIP)

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Continuous liquid interface production (CLIP) can rapidly produce 3D parts using a range of polymeric materials. A DLP-based form of additive manufacturing, CLIP proceeds via projecting a sequence of UV images through an oxygen-permeable, UV-transparent window below a liquid resin bath. A thin uncured liquid layer, or dead zone, is created above the window and maintains a liquid interface below the advancing part. Above the dead zone, the curing part is drawn out of the resin bath creating suction forces that renew reactive liquid resin. The dead zone is created due to oxygen inhibition of photopolymerization, a process that is traditionally a nuisance in other photopolymerization applications. However, for CLIP oxygen inhibition and creation of the dead zone allows for a continuous mode of printing where UV exposure, resin renewal, and part elevation are conducted simultaneously. This continual process is fundamentally different from traditional bottom-up stereolithography printers where these steps must be conducted in separate and discrete steps. Furthermore, the relatively gentle nature of CLIP due to the established dead zone enables the use of unique materials with a wide range of mechanical properties. This presentation will showcase the CLIP technology and provide a detailed picture of interactions between different resin and process parameters. New applications for 3D printing that span the micro- to macro-scale enabled by CLIP's combination of unique materials and part production speed will also be presented.