4D Printing: Flexibility Through Thermoresponsive Materials

Connecting Elements, Sealing Caps, and Morphing Structures

Objects with thermoresponsive properties offer intelligent solutions for the industry. At Fraunhofer IAP, we develop shape memory polymers that are specifically tailored to the needs of our customers. We validate the materials using additive manufacturing in the fused filament fabrication (FFF) process and characterize the manufactured objects regarding their functionality and reliability. Our innovative materials enable 4D printing directly on site and open up attractive fields of application in the infrastructure sector – for example, for sealing transport lines, closing pipes, or connecting hose systems. They also offer effective corrosion protection.

We are also working on shape morphing: printed objects change their shape in response to temperature changes and align themselves to form customized structures. Such self-unfolding objects save space during transport and open up new applications in the aerospace, toy, and furniture industries.

4D-printed material for joining technology: After additive manufacturing, the material deforms when heated and fixes its new shape after cooling.

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exhibit overview