

Additive manufacturing of force sensors

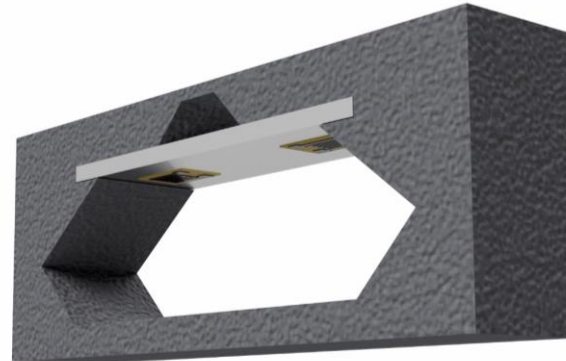
Disruptive manufacturing of application-specific force sensors based on laser-based powder-bed-fusion

Status quo

Structural integrated force and torque sensors are increasingly required in fields such as plant construction and medical engineering. All these fields share the requirement of complex structures. This complicates a simplified integration of commercial general-purpose sensors. Laser-based powder-bed-fusion (LPBF) of metals, as an additive manufacturing process, enables the production of application-specific sensors.

Our technology: Disruptive manufacturing based on additive manufacturing

Manufacturing of the deformation element is done by interrupting the additive manufacturing process after printing a base body to insert a measuring element carrier. The process is then continued to create a firmly bonded material connection. The additive manufacturing process enables application-specific adaption in terms of size and mechanical connection.



Benefits

- ✓ High degree of individualization of the deformation element enables structural integration.
- ✓ Adjustable sensor parameters in the manufacturing process.
- ✓ Fully encapsulation of the sensor element enables increased reliability through protection of environmental influences.

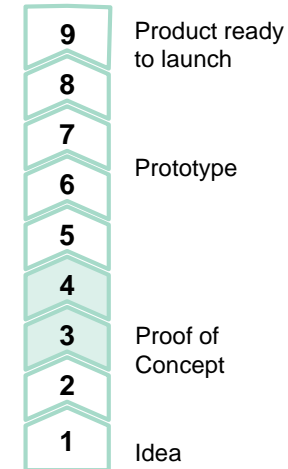
Application possibilities

These sensors can be used for condition monitoring or predictive maintenance purposes (Industry 4.0) as well as in medical engineering (robotic and haptic systems such as telemanipulators in surgery).

Commercialization opportunities [Please don't change]

There are various possibilities for cooperation between the industrial partner and TU Darmstadt: from an exchange with the know-how carriers of the technology up to a close cooperation in case of further development needs. The technology is protected by intellectual property rights and can be used by the industry partner after a sale or licensing agreement.

Current stage of development Technology Readiness Level (TRL)



The technology development is at Level 3-4: Multiple deformation elements were applied with sensor elements after manufacturing. Measurements show a well strain transmission with linearty errors of 0,1% for a nominal force of 15N.

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