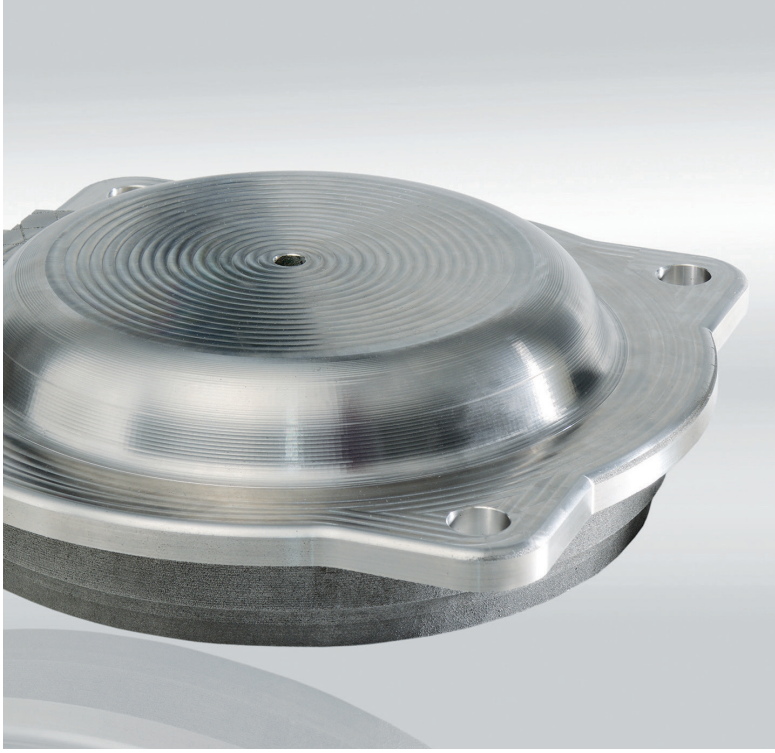

1 Additive manufactured wheel bearing cap with integrated sensor system, inside.
2 ... and outside.

Laser powder bed fusion for networked mobility solutions

With condition monitoring for a mobility turnaround

To achieve national and international climate targets, countries need to cut emissions in, among others, the transport sector; rail transport will play a central role in this. Indeed, it represents the most ecologically sensible alternative for domestic and European traffic, yet must overcome several hurdles. Avoiding "delays in operations" and increasing reliability not only improve the image of public transport, but also help it compete against less sustainable individual and air transport. Since the public transport is difficult to schedule and is sensitive to failures and delays, condition monitoring and predictive maintenance of train components can contribute to the mobility turnaround.

Sensor integration in metallic components

Since it manufactures layer by layer, the laser powder bed fusion (LPBF) process makes it possible to access the inside of metallic components during production for the first time. This advantage can be used to integrate sensors directly into complex lightweight components. In the Sense-TrAIn project, Fraunhofer ILT is developing process chains to integrate strain gauges that measure the mechanical stress in the component in three spatial directions. This is demonstrated in the project using the example of a wheel bearing cover of a wheelset for trains.

Networking intelligent components

By measuring the wheel bearing cover, technicians can draw conclusions about the condition of the wheel bearing and the entire wheelset. In cooperation with partners in the SenseTrAIn project, Fraunhofer ILT is developing an integrated system suitable for retrofitting, one that records measurement data, transmits it wirelessly to a cloud and evaluates it using artificial intelligence. The system can, thus, transmit relevant condition data and warnings to DB Systemtechnik's controlling department.

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