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SMART MACHINE PARTS ALERT USERS TO DAMAGE AND WEAR



US scientists are using advanced 3D printing to create machine components that alert users when they are damaged or worn.

Scientists from the [United Technologies Research Center](#) and [University of Connecticut](#), US, are creating smart machine components which alert users to damage and wear. To create these components, the scientists are using direct write technology, an advanced form of 3D printing.

Direct write technology works by extruding semisolid metal ink from a nozzle to draw fine lines. This silver filament – which can conduct electric current – is then embedded into 3D printed machine components. If any damage occurs to the component, it will alter the current. Therefore, the silver filaments function as damage detecting sensors. To assess the damage, engineers can use real-time voltage readings. This removes the need to disassemble all the components of the machine.

Furthermore the sensor lines are only 15 microns wide, which is much thinner than the average human hair. This enables the technology to sense damage that is minute and difficult to detect. Sameh Dardona, an Associate Director at the United Technologies Research Center, said: “These sensors can detect any kind of wear, even corrosion, and report that information to the end user. This helps us improve performance, avoid failures, and save costs.”

Here at Springwise, we have previously featured 3D printing innovations including a [3D printed house](#) that can be built in one day. This innovation is a collaborative project between US non-profit and a construction technology company with the goal to provide better housing for the developing world. Another example is a Dutch design studio that is [3D printing homeware](#) using algae bioplastic and

other organic waste products. By using algae as a production material, the designers aim to help reduce levels of CO₂.

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Takeaway:

Direct write technology is enabling smarter machinery by integrating new intelligent functions into components. The technology could help eliminate redundant electronics packaging, resulting in a significant reduction of mass and assembly complexity. What other manufacturing innovations can help improve performance and save costs?