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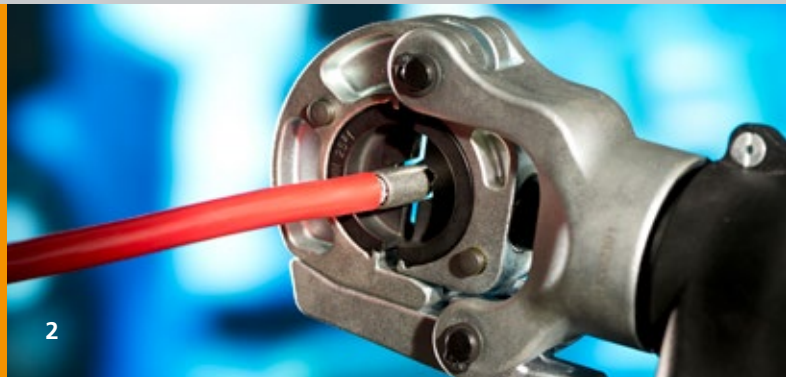
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1 *F-Crimp for automotive applications*
2 *Demonstration of a double-W-crimp connection on a cable lug with 25 mm²*

CYBER PHYSICAL CONNECTOR

INTELLIGENT DIAGNOSTIC INTERFACE FOR IOT AND AUTOMOTIVE

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Forschungsfabrik Mikroelektronik Deutschland

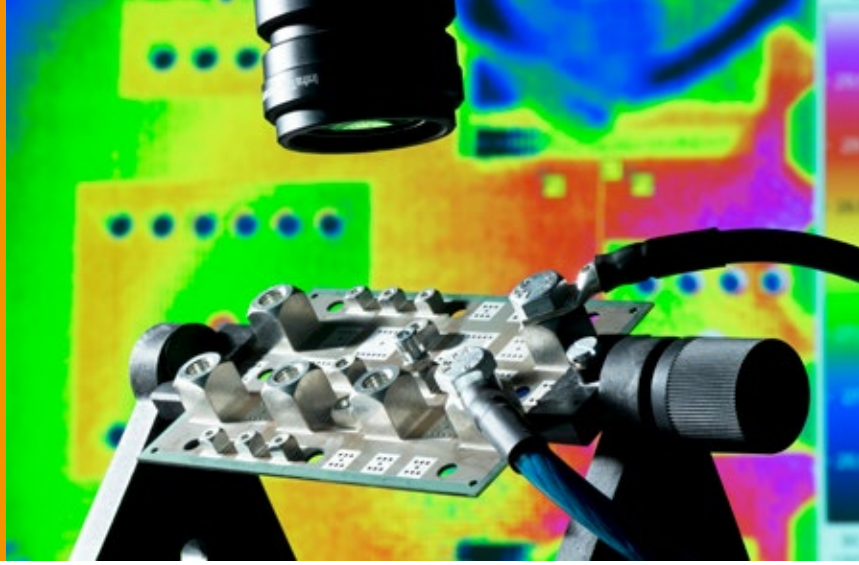
Application areas

Connectors and electric interconnection technologies play an important role for all mission critical systems. Electrical connectors are essential for secure transmission of data and power in the automotive world. For networked production of tomorrow the connection technologies provide the main interface between the machines, controls and data processing equipment.

Even the strictest quality controls and frequent inspections cannot guarantee one hundert percent protection from abruptly occuring defects; degradation phenomena are considered to be the most common failure cause in originally well-tested connectors. Such failures mainly occur on short notice and can cause a total crash of essentially important systems. Degradation in connectors is typically caused by ageing of the used materials, leading to leakages, humidity, creeping currents or power drops. Corrosion and contamination processes can cause the forming of layers with increased resistance on contact surfaces, leading to parasitic resistances. All these phenomena can be electrically detected, which makes it possible to detect and even foresee forthcoming failures in operation.

Technological innovation

The cyber physical connector, developed by Fraunhofer EMFT together with industrial partners, features integrated miniaturized electronic sensor systems, which enable live tracking of such parameters as energy consumption, failure status or temperature. The data is analyzed directly in the connector and wirelessly transmitted to a mobile device. The relevant phenomena are minimal and their unaltered detection is often possible only in the immediate proximity of the electrical contact, which makes the high grade of miniaturization



in the applied sensor, assembly and connection technologies essentially important. Such intelligent connection technologies combine sensor and analysis functionality, and are characterized by optimal usability, robustness and the capability of functioning under hard conditions, exposed to vibrations and dirt.

Benefits

The integration of innovative functionality to connection technologies enables measuring the current quality and sneaking degration in the connector plugs, allowing for early detection and foresight of failures. This results in higher efficiency in installation and startup procedures as well as in more reliable operation of the equipment in question. For the automobile this ensures the optimal availability and stability of the transmission of data and power, which is an essential prerequisite for automated driving.

Partners

- ERNI Production GmbH & Co. KG
- Finke Elektronik GmbH
- Siemens AG
- Weidmüller Interface GmbH & Co. KG

Funding

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Funded by ICT 2020 (Information and Communication Technologies) as one of the key technologies within the German government’s High-Tech Strategy 2020, with a focus on electronic systems.

3 *Climate testing of an electronic assembly*

4 *High-resolution thermal image analysis of press-fit connections*