



## Current Topics

# Reliability evaluation of crimp connections

Crimp connections have long been established in many industrial sectors due to their cost efficiency, easy handling and excellent electrical properties (AC/DC). To ensure electrical stability during operation or over the planned service life, plastic deformations of the crimp barrel and strands must take place during the crimping process in order to form and maintain gas-tight contact surfaces. Thermal stress, corrosive environmental influences, and other factors can have a significantly impact on reliability and long-term behavior.

The Fraunhofer EMFT offers comprehensive expertise in the reliability assessment and damage analysis of crimp connections, as well as certified training with modern crimping laboratories. Our range of services is based on in-depth research and state-of-the-art analysis methods as well as various test procedures to ensure that your crimp connections meet the highest quality and safety standards.

### Our services in detail:

#### 1. Cross-section inspection:

- Detailed analysis of the microstructure of crimp connections using light microscopy and scanning electron microscopy (SEM).
- Identification of microcontacts and possible structural defects such as microcracks.

#### 2. CT scans for internal structural investigations:

- Use of computed tomography (CT) for three-dimensional visualization of the internal structure of crimp connections.
- Detection of internal defects and inhomogeneities.

#### 3. Evaluation of contact surfaces using SEM and EDX:

- High-resolution scanning electron microscopy (SEM) for the examination of contact surfaces.
- Analysis of oxide-free areas using energy-dispersive X-ray analysis (EDX).

#### 4. Temperature-dependent investigations:

- Climate and environmental simulation to evaluate the long-term behavior of crimp connections
- Empirical studies on the correlation between temperature stress and changes in properties.

#### 5. Electrical measurements and resistance analysis:

- Quantitative evaluation of electrical contact behavior under defined conditions.
- Resistance measurements for the assessment of electrical performance.

#### 6. Systematic analysis of design parameters:

- Systematic analysis of constructive parameters, including crimp height, width, compression factor, and their influence on electrical contact behavior.
- Evaluation of the crimping tools, with e.g. GoNo testing and the manufacturing process
- Mechanical tests such as tensile and bending test

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<sup>1</sup> Crimp barrel after temperature cycling test. ©Fraunhofer EMFT/Bernd Müller

<sup>2</sup> Virtual micrograph B-Crimp. ©Fraunhofer EMFT/Bernd Müller

<sup>3</sup> Microsection 4-indent crimp with microcrack. ©Fraunhofer EMFT/Bernd Müller