

CET – 09/09/2025

Reliability Analysis and Product Improvement of Industrial DC/AC Converters Based on Customer Return Data

Description:

Industrial DC/AC converters play a crucial role in ensuring reliable power conversion for demanding applications. As product lifetimes increase and customer expectations regarding quality and robustness grow, converter reliability has become a key factor for market competitiveness. Field failures and customer returns represent a valuable source of information to better understand defect mechanisms, identify recurring weaknesses, and guide product improvement.

The proposed master thesis will focus on investigating the defectology of CE+T Power industrial DC/AC converters through a systematic analysis of customer return data. The student will classify and quantify the main types of failures, identify statistical trends, and correlate them with product design, manufacturing processes, and operating conditions. Specific quality tools such as the 8D methodology, Pareto analysis, Ishikawa diagrams, and Failure Modes and Effects Analysis (FMEA) will be applied to structure the problem-solving process and ensure a robust evaluation of root causes.

Based on this analysis, the student will propose technical and organizational improvements to enhance product reliability. These recommendations may include design modifications, component selection strategies, process control measures, or additional validation and testing procedures. The ultimate objective of the thesis is to deliver actionable recommendations that contribute to reducing field failures, improving customer satisfaction, and strengthening CE+T Power's product leadership.

The thesis will involve close collaboration with CE+T's quality, R&D, industrialization, production, and customer service teams. Depending on progress, the work may also extend towards the development of predictive models for failure occurrence, leveraging reliability engineering techniques and statistical methods.

Address:

CE+T Power, Rue du Charbonnage, B-4020 Wandre, Belgium

CE+T Power offers:

- The opportunity to work on a stimulating and highly relevant industrial challenge with a direct impact on product quality and reliability.
- Access to real-world customer data, enabling the student to gain hands-on experience in reliability analysis and quality management.
- Collaboration with multidisciplinary teams (R&D, quality, production, industrialization, customer service) and the possibility to interact with international partners.

- A contribution to the development of innovative solutions that strengthen the competitive advantage and customer satisfaction of CE+T Power.

Prerequisites:

- **Strong knowledge of electricity and power electronics:** solid understanding of the operating principles of electrical circuits, electronic components, and power converter architectures.
- **Background in statistics and database management:** ability to analyze complex datasets, extract relevant trends, and apply statistical tools to support decision-making.
- **Strong interest in energy conversion systems:** motivation to deepen knowledge of industrial DC/AC converter technologies and their role in demanding applications.
- **IT skills:** comfortable with digital tools and ideally with programming, particularly in **Python**, to automate analyses, develop scripts, and implement statistical models.