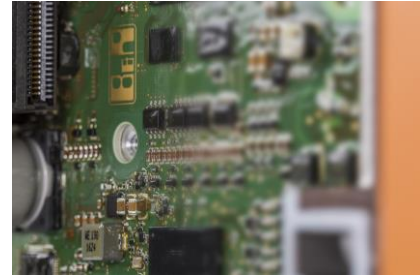


Master's Thesis

Lifetime Modeling of IGBT Modules

Motivation

Reliability of power modules, ensuring the operational capability in the field over a defined time-period is one of the most important quality features for servo drives. Power cycling, ambient conditions and other effects have a strong impact on the lifetime of power modules. Calculating the residual life of a module depending on the operation condition can become a significant factor to reduce outage time, save costs and prevent standstills in production plants.



Research Questions

- Identifying major factors influencing the lifetime of IGBT modules (solder joints, wiring, ...)
- Optimal methods to implement lifetime estimation regarding power and temperature cycling
- Analysis of limitations due to reduced number of values regarding phase current, DC link voltage and module temperature
- Possibility of online estimation of the remaining residual life Implementation options for existing standard servo drives

Tasks

- Literature study and benchmark of viable solutions for online lifetime estimation.
- Selection of the most promising method and detailed analysis of this approach considering availability of reduced measured values and parameters.
- Implementation of the algorithm procedure in a simulation model based on an existing IGBT module and available technology curves provided by module manufactures.

Further Information

- Start: asap (according to agreement)
- Workplace: EAM Institute, TU Graz (Workplace at B&R automation possible)

Contact

Univ.-Prof. Dipl.-Ing. Dr.sc.ETH **Michael Hartmann**
Head of Section Power Electronics

Electric Drives and Machines Institute
Graz University of Technology
Inffeldgasse 18, A-8010 Graz, Austria

Tel: +43 (316) 873-8604
E-mail: michael.hartmann@tugraz.at
www.eam.tugraz.at

Florian Holzner
R&D Motion Hardware Group leader

B&R Industrial Automation GmbH
B&R Straße 1,
5142 Eggelsberg, Austria

Phone: +43 7748 6586 1246
florian.holzner@br-automation.com
www.br-automation.com