



# Bachelor or Master Thesis

## *Methods of adaptive and selective tolerance adjustment in electric motor production using the example of Hairpin stator technology*

### Initial Situation:

The ongoing electrification of the global vehicle fleet is leading to an increasing importance of electric traction drives. A central field of innovation for E-Drives is the stator production in Hairpin design, a winding structure made of solid electrical conductors. The large-scale production facilities currently used by OEMs and suppliers of the automotive industry for the production of hairpin stators are characterized by high plant investment, high reject rates and long ramp-up times. The integration of short-term changes to the product, which frequently occur in the case of disruptive innovation such as hairpin technology, can therefore only be realized at extremely high cost.

### Your task:

You are working on the development of methods for adaptive and selective tolerance compensation in hairpin stator production. Starting with a process and tolerance analysis, you will analyze process limitations of the Hairpin process chain. The focus is on Hairpin production and assembly. In order to increase process stability and quality in large-scale production environments, you will develop solution strategies

for integrated and tolerance-related process optimization in Hairpin technology.

The concrete tasks include e.g:

- Identification of tolerance dependent components and processes in an E-Drive system (based on Hairpin-Stator-Technology)
- Construction of a tolerance-based model
- Development of inline and offline tolerance compensation systems
- Integration of measurement technology in data-based industry 4.0 systems
- Quantification of the performance and added value potential through integrated tolerance compensation systems

### Your profile:

- Study of mechanical engineering, economic engineering, automotive engineering (or comparable)
- Interest in product and production engineering systems in the electric drive train
- Good knowledge in construction methodology, CAD, MS Office
- Independent and structured working
- Communication & teamwork skills
- Motivation and commitment
- Business fluent written and spoken English or German is mandatory

### Offered:

- Extensive support
- Collaboration in an exciting and highly topical field of research
- Development of expert knowledge for future technologies in e-mobility
- Cooperation in a motivated team
- Delimited tasks, fast processing possible
- Possibility of jointly writing a paper
- Modern offices with free coffee and water

### Are you interested?

Please send a current grade sheet, curriculum vitae and certificates together with a letter of motivation to the e-mail address below.

### Your Contact at PEM:

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