

## Width and Depth [Editor's Column]

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## Width and Depth

**A** new year is underway, so we can ship another issue of our *IEEE Industrial Electronics Magazine* with exciting developments in the diverse area of industrial electronics. This issue covers both width and depth.

Two articles in this issue highlight activities in electric machines: “Induction-Machine-Based Starter/Generator Systems,” by Feifei Bu et al., discusses cage-type induction machines for starter/generator setups in automotive and avionics applications. It provides a good overview on the principles, topologies, and controls and serves as a great entry point into this topic. Electrification of transport is one of the dominating topics for the coming decades and will boost activities in this direction.

“Reliability-Oriented Design of Electrical Machines,” by Michael Galea et al., is also driven by electrification of transport but sheds some light on the important aspect of safety. Instead of observing reliability and safety aspects to create statistical models and methods, this article promotes a much more holistic method. The design phase

of electric machines is already expected to contain reliability aspects.

Automation and control is the topic of the next two articles. “Why We Need Automation Models,” by Jürgen Jasperneite et al., shows how automation models that are established, such as the classical automation pyramid, will need to adapt to cover the newest developments in Industry 4.0 and the Internet of Things. Reference architectures for Industry 4.0 and cyberphysical systems are presented and compared, and their relation to modern distributed computational architectures is discussed.

“Motion-Control Techniques of Today and Tomorrow,” by Michael Ruderman et al., reviews the principles of things in motion: theory, controls, models, measurement, and the environment the application is in. Unlike most industrial magazine articles, we allowed a substantial number of formulas here, because they really support the essence of the article. We hope it helps to brush up your understanding of motion control.

**THE DESIGN PHASE OF ELECTRIC MACHINES IS ALREADY EXPECTED TO CONTAIN RELIABILITY ASPECTS.**

The topic of the last article is at the heart of industrial electronics. “Surveying Solid-State Transformer Structures and Controls,” by Felipe Ruiz Allende et al., shows how solid-state transformers can be used to control the power flow in distribution grids. They offer a number of useful services for a smarter and more active distribution grid. They can integrate energy storage, provide help with harmonics and transients, actively support voltage stability, and—besides transforming between two sides—also support bidirectional power flow. Solid-

state transformers clearly are a central component of the intelligent power grid of the future, and this article gives a great overview on their various aspects.

I hope that the selected articles help you in your business or research and provide the right inspiration and pointers to proceed. Electrification of the last remaining large business sectors (transport, industry) will keep the IEEE Industrial Electronics Society busy during the coming years. Stay tuned for firsthand information on the latest developments. 