Call for Papers

IEEE Journal of Emerging and Selected Topics in Power Electronics

Special Issue on Integrated Machine Drives

Integrated machine drives (IMDs), which combine the machine, power converter, and control system into a single unit, offer significant advantages in terms of efficiency, compactness, and ease of use. By eliminating the need for external control equipment, IMDs provide highly efficient and seamless solutions for a variety of industrial and commercial applications. Their integrated design reduces the mass and volume required for the converter and controller housing and removes the need for lengthy machine-converter connections, resulting in cost savings of 20% to 40%.

Earlier generations of IMDs mounted the inverter in a separate converter box attached to the machine housing, but advancements now allow for full integration of the converter and controller inside the same housing. The latest generation of IMDs embraces a modular design philosophy, where each modular unit consists of a portion of the machine, along with its corresponding converter, and controller. With appropriate design, this modular approach can be adopted to enhance IMD scalability, customization, and fault tolerance.

However, significant technical challenges remain in the development of IMDs to enhance their performance and accelerate their market adoption. The thermal coupling of the machine and converter creates heat dissipation issues, while the size and design of the DC-link capacitor must be optimized to avoid excessive size, vibration, and over-temperatures. Careful consideration of the IMD's structural design is required at every stage of the IMD design process including converter selection, combined cooling of the IMD machine and power converter, and vibration isolation to protect all sensitive power converter components. Additionally, electromagnetic interference (EMI) between the converter, machine, and external power source must be addressed.

IMDs are increasingly applied across a widening range of industries, including electric vehicles, industrial automation (e.g., robots, conveyors), aerospace (e.g., actuation systems, UAV propulsion), and renewable energy (e.g., wind turbines, solar trackers). They also enhance performance and energy efficiency in home appliances (e.g., HVAC, washing machines) and medical devices (e.g., imaging systems, surgical robots). Beyond these, IMDs are proven valuable in marine, agricultural, railway, and construction machinery where they are delivering valuable performance, efficiency, and reliability improvements.

Topics of interest include, but are not limited to:

- Novel IMD architectures to improve their performance metrics including mass/volume, efficiency, and fault tolerance
- Power converter integration and optimization for IMDs
- Embedded control techniques for IMDs including sensor optimization for integrated designs
- Sensorless control strategies for IMDs
- Thermal management and reliability of IMD systems
- Application of high-performance materials and manufacturing methods in IMDs Novel machine designs tailored to enhance the IMD performance characteristics and metrics
- IMD applications in automotive, aerospace, robotics, industrial automation, and building equipment
- Electromagnetic compatibility (EMC) including both interference and susceptibility in IMDs
- IMD energy efficiency and system-level integration
- Safety and fault-tolerant design in IMD systems for demanding applications including safety-critical equipment
- Integration without compromising sustainability, including design for recycling
- Novel integration of magnetic bearings into machines e.g. making use of stator windings.
- Integration of gearbox functions into machine via magnetic gears or novel topologies.
- Integration of drive with the load in a manner which produces significant system advantages.

All submissions should be made through *Manuscript Central* at http://mc.manuscriptcentral.com/jestpe-ieee. The cover page should be clearly marked with "Special Issue on Integrated Machine Drives" and the appropriate manuscript type should be selected when uploading the submission. Manuscripts submitted for this special issue will be handled by the guest editorial board outlined below. For more information on special issues and electronic submissions, please go to http://www.ieee-pels.org/publications/jestpe.

Deadline for Submission of Manuscript: 30 September 2025

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Proposed Timeline

- **31 May 2025:** Call for papers to IEEE JESTPE Ed. Office
- **30 Sep 2025:** Manuscript submission deadline
- **31 Jan 2026:** Final acceptance notification

- **28 Feb 2026:** Manuscript forwarded to IEEE for publication
- **April 2026:** Special Issue appears in IEEE JESTPE