



ABB DRIVE SERVICES

Electromechanical System Interaction Study (EMSI)

Service note for Drive System Consulting

To avoid issues when ramping up new installations or when solving problems with existing installations, ABB Drive System Consulting offers a service called Electromechanical System Interaction Study (EMSI). It helps in identifying potential critical points of failure or performance degradation, as well as providing guidelines and advice on how to mitigate these issues. ABB experts provide the service to develop solutions for various application challenges.

What is it about?

The EMSI service aids in the initial stages of ramping up a new installation or solving problems with existing installations. With the EMSI service, ABB offers the right solutions to avoid problems in getting installations running smoothly.

The EMSI follows a structured approach consisting of the following general steps:

- Defining the system: understand and focus on customer needs
- Identifying potential failure modes together

with the customer

- Assessing identified failure modes, taking customer needs and requirements as guidance
- Prioritizing risks: taking the best decisions together
- Developing solutions, in line with customer expectations
- Implementing selected improvement actions – feel the difference

The EMSI service consists of the following elements:

- Consulting on control design for mechanical

systems: understanding the process priorities and system-limiting factors

- Support for mechanical concept design from the automation perspective, bringing the benefits of ABB's expert knowledge
- Performance analysis and recommendations for existing installations – take advantage of ABB's proven experience in the field
- Mechanical operational stress analysis – combine findings and improvements into a comprehensive solution

Consulting on control design

The first step of the EMSI service is consulting on the control design. At this stage, the mechanical systems are identified and evaluated to get a full understanding of the customer's process priorities and any factors that impose limits on the system. Both the torque and speed control of a variable-speed drive play key roles in process control. By optimizing overall control, it is possible to achieve cost savings in both the mechanical and electrical systems, as it avoids unnecessary safety margins. In addition to this, robustness is increased, bringing additional benefits to the process.

Supporting the mechanical concept design

The second step of EMSI is providing support for the mechanical concept design. Electrical drives offer new options for what used to be entirely mechanical solutions. For example, gear stages can be omitted or energy can be recovered.

The precise drive models and integrated electro-mechanical simulations offered at this stage of the EMSI service give the possibility to compare designs. ABB has successfully executed studies like this for large-scale test facilities as well as for gas liquefaction.

Performance analysis and recommendations

Next, ABB performs a performance analysis, providing recommendations for existing installations. ABB's extensive experience in the field aids in making justified recommendations.

Electric drives have multiple sensors and powerful processing units, allowing data to be collected and analyzed at the interface between mechanics and electrics. Torsional behavior can be calculated from

torque and speed data during operation, so it is easy to conduct without the need for additional hardware or disturbances to the process. Depending on the system, the data also gives valuable information about the mechanical equipment, such as gears, couplings and shafts, as well as the load (load fluctuations and irregular disturbances both in supply and load).

Analysis of mechanical operational stress analysis

The final step of the EMSI is analysis of mechanical operational stress, which combines the findings and improvement recommendations into a comprehensive solution. Mechanical systems are typically designed to have long lifetimes. However, visible signs of wear and tear can sometimes be observed, and are often linked to boundary conditions or operations being different from assumptions made during the design phase. As variable-speed drives allow you to measure speed and torque, analyzing these faults is easy, and corrective actions are executed immediately. ABB offers a comprehensive solution, providing support in the design process to help ensure a more reliable system at startup with a potential longer useful life, and also offer long-term monitoring through our digital services to ensure any changes made to the process or application that affect the system can be identified and reported.

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