

# Electromechanical System Interaction (EMSI) Study

## Increasing the lifetime of your drivetrain



Want to avoid issues when ramping up and operating your new or existing drive system installation? ABB offers you the service of an Electromechanical System Interaction (EMSI) study. EMSI is the solution of choice to identify potential critical points of failure or performance degradation in a drive system. Study provides guidelines on how to mitigate these issues.

**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
- Mechanical operational stress analysis

The EMSI service follows a structured approach starting with defining and focusing on the relevant parts of the drive system, identifying potential installation issues, assessing and prioritizing risks, developing and implementing the right solution.

**Main benefits**



**Maximize uptime**

- Avoid unplanned shutdowns due to equipment failure



**Cost optimization**

- Minimized system design iterations and installation time
- Increase the lifetime of the underlying equipment



**Co-innovation**

- World-class consultancy and collaboration to develop new solutions

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## EMSI Workflow



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## EMSI in more details

### 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. 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 electromechanical 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.

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For more information, please contact your local ABB representative or visit:

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