

# INFLUENCE OF CONTROL LOOP ON TORSIONAL VIBRATIONS OF ROTATING MACHINERY

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Keywords: torsional vibrations, control loop influence

## Abstract

Any disturbance in load involves torsional vibrations of rotating machinery. E.g. such stress dynamics is resulting from an irregularity of diesel engine running. Overshoots created by the irregularity of engine running are particularly dangerous when one or more of engine cylinders are not acting. The most dangerous case is of a possible resonance between some disturbance component frequency and the rotating equipment natural frequency. Therefore ship classification societies require validation test of propulsion system torsional vibrations created by an irregularity of diesel engine running.

It turns out that an engine control loop influences the above-mentioned vibrations. Simulation calculations present considerable differences between e.g. ship propulsion system dynamics with and without engine control loop.

The engine control loop may as well improve as deteriorate rotating equipment vibrations. An appropriate architecture and parameters of the engine control loop allow to improve rotating equipment vibration characteristics, and even to avoid dangerous mechanical stress transients.

An influence of diesel engine control loop on rotating equipment dynamics has been a topic of research. Comparative investigations have been carried out. There is a significant influence of diesel engine control loop on rotating equipment dynamics. Numerical calculations concerning torsional vibrations of rotating machinery should consider this influence.

With the aid of simulation the sensibility of ship propulsion rotating equipment torsional vibrations on engine control loop architecture and parameters has been investigated. Some simulation results have been proven by measurements in ship power plants.