

Active Torsional Vibration Control of Reciprocating Engines

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Abstract

In modern fuel injection systems for reciprocating engines non-uniform cylinder-wise torque contribution is a common problem, causing increased torsional vibration levels of the crankshaft and stress of mechanical components. In this paper a method for reducing the torsional vibration of the crankshaft is presented. This technique balances the cylinder-wise torque contributions by utilizing the measured angular speeds of the crankshaft system. The proposed method is successfully tested on a 6 MW common-rail diesel engine-generator set where the torsional vibration level of the considered orders was significantly reduced, with up to an 80% stress reduction of the driveline.

Keywords: Diesel engines, engine systems, fuel injection, torque control, vibration

1 Introduction

The general awareness of the environmental impact of the combustion of fossil fuels has increased substantially during the past two decades. This has naturally affected the development of the environmental legislation throughout the world. In the early 1990's the automotive industry acknowledged the fact that malfunctioning automotive engine control

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