

# Preface

Third edition of the International Conference on Condition Monitoring of Machinery in Non-Stationary Operations (CMMNO13) was held in Ferrara, Italy. This yearly event merges an international community of researchers who met—in 2011 in Wrocław (Poland) and in 2012 in Hammamet (Tunisia)—to discuss issues of diagnostics of rotating machines operating in complex motion and/or load conditions.

The growing interest of the industrial world on the topics covered by the CMMNO13 involves the fields of packaging, automotive, agricultural, mining, processing, and wind machines in addition to that of the systems for data acquisition. The participation of speakers and visitors from industry makes the event an opportunity for immediate assessment of the potential applications of advanced methodologies for the signal analysis.

As a matter of fact, signals acquired from machines often contain contributions from several different components as well as noise. Therefore, the major challenge of condition monitoring is to point out the signal content that is related to the state of the monitored component. This is before all else demanding when the machines operate in non-stationary conditions.

The book is the collection of the CMMNO13 Proceedings, and it is divided into the following parts, namely:

Part I: Keynote Speeches

Part II: Rolling Bearing Diagnostics

Part III: Modelling of Dynamics and Fault in Gear Systems

Part IV: Signal Processing for Machine Condition Monitoring

Part V: Experimental and Numerical Modeling of Machine Dynamics

Part VI: Mechanical Systems Diagnostics

Part I collects some of the speeches given at CMMNO13 by: Prof. Nicolò Bachschmid, Prof. Cécile Capdessus and Prof. Diego Galar.

The topic of the Part II and III is the vibration analysis for the diagnosis of faults in Gearbox and Bearings. De facto, these components play a pivotal role in the rotating machine scenario. Even if the study on incipient failure detection of gearboxes and bearings started over two decades ago, there is still a great need to implement new algorithms for fault diagnostics especially when the machine operates in nonstationary conditions.

Part IV shows that modern condition monitoring extensively requires advanced signal processing techniques. This part embraces complex techniques as well as the use of the “Instantaneous Angular Speed” and the “Empirical Mode Decomposition”.

Part V addresses the expected steps for success of condition monitoring methods: test rig development and the numerical modeling of machine dynamics. As a matter of fact, the real behavior of machines can be only studied with numerical models experimentally validated.

In the last parts of the book, a miscellaneous of particular case studies involving cutting tools, excavators, rolling mills, and water distribution networks are presented. The papers presented in this part give the solution to individual applications of monitoring and diagnostics of such complex machines. The presented test cases come directly from industry needs and observation of industrial real problems.

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