

# CONTENTS

## PART I: COMPRESSORS AND NOVEL INTAKE SYSTEMS

1 Prediction and measurement of turbocharger compressor wheel temperature <i>A Yamagata, S Nagai, K Nakano, and T Kawakubo, Ishikawajima-Harima Heavy Industries Company Limited, Yokohama, Japan</i>	3
2 Turbocharger compressor development for diesel passenger car applications <i>H Chen and J F Yin, Honeywell Turbo Technologies Limited, Skelmersdale, UK</i>	15
3 The reduction of turbocharger whoosh noise for diesel powertrains <i>D Evans, Ford Motor Company Limited and A Ward, Ricardo UK Limited</i>	29
4 The influence of installation parameters on turbocharged automotive engine performance <i>G Capon, A Leong, and T Morris, Ford Motor Company Limited, UK</i>	43
5 Using the centrifugal compressor as a cold air turbine <i>M Müller, S Sumser, P Fledersbacher, K Rößler, and K Fieweger, DaimlerChrysler AG, Germany, and H-J Bauer, University of Karlsruhe, Germany</i>	55
6 Extending the knock limit of a turbocharged gasoline engine via turboexpansion <i>J W G Turner, R J Pearson, and N Milovanovic, Lotus Engineering, UK, and D W Tait, Loughborough University, UK</i>	69
7 Turbo-cooling applied to light duty vehicle engines <i>C D Whelan and R A Richards, WDL Limited, UK</i>	81

## PART II: IMPROVED MODELS FOR CYCLE SIMULATION

8 A one-dimensional model for variable and fixed geometry radial turbines for turbochargers <i>J M Luján, J R Serrano, C Cervelló, and F J Arnau, Universidad Politécnica de Valencia, Spain, and S Soltani, Renault, France</i>	97
9 Analysis of turbocharger non-adiabatic performance <i>S Shaaban and J R Seume, University of Hannover, Germany</i>	119
10 Part-load performance prediction of turbocharged engines <i>S Shaaban and J Seume, University of Hannover, Germany, R Berndt, Technical University Berlin, presently Ingenieurgesellschaft Auto und Verkehr IAV GmbH, Germany, H Pucher, Technical University Berlin, Germany and H J Linhoff, Linhoff Engineering, Germany</i>	131

### **PART III: ELECTRO BOOST SYSTEMS**

- 11 Development of electrically assisted turbocharger for diesel engine  
*Y Yamashita, S Ibaraki, and H Ogita, Mitsubishi Heavy Industries Limited, Tokyo, Japan* 147
- 12 The design and testing of an electrically assisted turbocharger for heavy duty diesel engines  
*O Ryder, Holset Engineering Company Limited, Huddersfield, UK, H Sutter, ATE GmbH, Germany, and L Jaeger, Iveco Motorenforschung AG, Switzerland* 157

### **PART IV: TURBINES**

- 13 A numerical study of the performance characteristics of a radial turbine with varying inlet blade angle  
*L Barr, S W T Spence, and A McNally, Queen's University Belfast, UK* 169
- 14 Experimental study on the performance of a variable geometry mixed flow turbine for automotive turbocharger  
*S Rajoo and R Martinez-Botas, Imperial College London, UK* 183
- 15 Turbocharger turbine performance under steady and unsteady flow: test bed analysis and correlation criteria  
*M Capobianco and S Marelli, University of Genoa, Italy* 193
- 16 Flexible turbocharger turbine test rig MONA VI  
*D Filsinger, G Fitzky, and B Phillipsen, ABB Turbo Systems Limited, Baden, Switzerland* 207
- 17 Active control turbocharger for automotive application: an experimental evaluation  
*A Pesiridis and R Martinez-Botas, Imperial College London, UK* 223

### **PART V: MECHANICAL ASPECTS**

- 18 Thermomechanical analysis of a turbocharger turbine wheel based on CHT-calculations and measurements  
*T Heuer, B Engels, H Heger, and A Klein, BorgWarner Turbo Systems Engineering GmbH, Germany* 235
- 19 Dynamics of mistuned radial turbine wheels  
*X Sheng, D C Clay, and J Allport, Holset Engineering Company Limited, Huddersfield, UK* 251
- 20 Improving analysis capability in order to reduce turbine HCF  
*S T Kitson, D C Clay, D H Brown, R O Evans, D M Eastwood and P K Tootill, Holset Engineering Company Limited, Huddersfield, UK* 261

21 Axial load capacity of V-section band clamp joints <i>K Shoghi, BorgWarner Turbo Systems, Bradford, UK, S Barrans and P Ramasamy, University of Huddersfield, UK</i>	273
--	-----

## **PART VI: ADDITIONAL PAPERS**

22 Reliability trends, operating issues and acceptance criteria related to exhaust gas turbochargers used in the marine industry – a classification society view <i>K Banisoleiman and N Rattenbury, Lloyd's Register, London, UK</i>	289
23 A novel method of high efficiency pressure charging <i>A O Dye, Epicam Limited, Linton, Cambridgeshire, UK</i>	305
24 Turbine wheel design for Garrett advanced variable geometry turbines for commercial vehicle applications <i>H Chen, Honeywell Turbo Technologies Limited, Skelmersdale, UK</i>	317
25 Compact long-route exhaust gas recirculation mixer design and optimization <i>J Yin, N Deschatrettes, O Han, and P Renaud, Honeywell Turbo Technologies Limited, Skelmersdale, UK</i>	329
26 Transient performance prediction of the turbocharging system with the variable geometry turbochargers <i>H Uchida, A Kashimoto, and Y Iwakiri, Toyota Central R &amp; D Laboratories Incorporated, Aichi, Japan</i>	341
27 Plain and full floating bearing simulations with rigid shaft dynamics <i>I McLuckie, S Barrett, and B K Teo, Advanced Integrated Solutions Limited, Market Harborough, Leicestershire, UK</i>	351