

Preface

Rail transport has played a very significant role in development of modern civilization over past 150 years. Due to its capability of bulk transportation of passengers and goods, it has proved to be more environmentally benign and energy efficient on a per capita basis, compared to any other mode of transportation such as road or air. Due to large system size and longer service life of involved systems, technological advancements in the field of combustion engine technology, alternative fuels, emission control technologies, system design and control, etc., are being implemented at a comparatively slower pace in railways across the globe. However, due to increased global awareness of global warming and air pollution, railways are committing themselves for setting up and meeting more stringent emission norms worldwide.

An international workshop, 3rd ISEES Workshop on “Sustainable Energy, Environment & Safety with Railway Centric Theme”, was held at Research Designs and Standards Organisation (RDSO), Lucknow, India during December 21–23, 2015 under the aegis of International Society for Energy, Environment and Sustainability (ISEES). This workshop provided a platform for discussions between eminent scientists and engineers from various countries including India, USA, South Korea, Thailand and Austria. In this workshop, eminent speakers presented their views related to different aspects of technology developments related to railroad transportation, use of numerical tools and modeling tools, and use of sophisticated experimental techniques, which enhanced our understanding of locomotive combustion technology. In addition, there is a great deal of interest in emissions control and use of advanced materials, production and utilization methods of various alternative fuels in conventional IC engine-based power trains, sophisticated and reliable control of big and complex energy systems in railroad transportation sector.

In recent past, lot of developmental activities related to reduction of emissions, using exhaust heat recovery system for electrical power generation, turbocharging, space-heating, increasing mechanical output and other feasible applications for increasing overall power train efficiency have been undertaken. For planning strategic implementation of these advancements in railways, an integrated and

comprehensive plan needs to be developed. This research monograph is an effort in this direction and contains the main topics covered in the workshop and provides the latest developments in this domain. Main theme of this monograph is technological development of locomotive for overcoming current challenges related to energy saving, emission reduction and improving passenger comfort. Various chapters focus on effective utilization of fuels, production and utilization of other non-conventional fuels, emissions and noise reduction, effective power utilization and power production from waste heat, and fundamental study of combustion processes for increasing efficiency and reducing emissions.

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We hope that researchers in various fields related to locomotive technologies such as emission control, efficiency improvement, alternative fuel production and utilization, noise and vibrations control will find this monograph helpful.

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