Foreword

Direction in Research and Development

Research-Domain 11 Research Leader

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Shortly after meeting the challenges of the 1978 emission regulation in Japan and the Muskie Law regulating exhaust emissions in 1970 in the United States, the argument arose as to whether we, as researchers, should continue combustion engine and catalyst research. In 1990, several in the research community were of the opinion that diesel combustion research should be halted because the future of the diesel engine would be limited due to introduction in Japanese of a strict new diesel emission regulation.

However, several engineers considered the diesel engine to be an indispensable power source and would remain important well into the future. As such, these engineers recognized that improvements in fuel economy and exhaust emissions were essential to the future of the diesel engine. This opinion reflects both the sense of responsibility and conviction of engineers regarding the importance of diesel combustion technology well into the future.

At present, continued research in the field of diesel combustion is important due to the need to reduce tailpipe emissions in diesel cars. Moreover, the high thermal efficiency associated with diesel engines has led engineers to predict that the percentage of diesel cars in Europe will rise to over 50% in 2010.

The argument as to whether to continue to enhance current technology or develop future technology is central to the research and development field. The direction of future research is an important problem not only for engineers, but also for the industries to which these engineers belong. Conviction and sense of responsibility are, and have always been, qualities that are essential to the engineer, and these qualities are of fundamental importance in determining the correct future direction of research based on a broad understanding of science, technology and the needs of society.

This special issue features “Challenges in Realizing Clean High-performance Diesel Engines”. Research and development on the reciprocating engine appears to be threatened by the arrival of fuel cell technology. Both technologies are considered to be competing technologies in future power source research, therefore we should assemble the results of research in current technologies for future generations. However, I think many years will pass before fuel cell cars, and their associated benefits, become feasible. I believe that continued research and development of the reciprocating engine is of great importance in power source technology for the future.