Thermal Management of Electronic Systems

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PREFACE

The Eurotherm Committee has chosen Thermal Management of Electronic Systems as the subject of its 29th Seminar, at Delft University of Technology, the Netherlands, 14-16 June 1993. This volume constitutes the proceedings of the Seminar.

Thermal Management is but one of the several critical topics in the design of electronic systems. However, as a result of the combined effects of increasing heat fluxes, miniaturisation and the striving for zero defects, preferably in less time and at a lower cost than before, thermal management has become an increasingly tough challenge. Therefore, it is being increasingly recognised that cooling requirements could eventually hamper the technical progress in miniaturisation.

It might be argued that we are on the verge of a revolution in thermal management techniques. Previously, a packaging engineer had no way of predicting the temperatures of critical electronic parts with the required accuracy. He or she had to rely on full-scale experiments, doubtful design rules, or worst-case estimates. This situation is going to be changed in the foreseeable future. User-friendly software tools, the acquisition and integrity of input and output data, the badly needed training measures, the introduction into a concurrent engineering environment: all these items will exert a heavy toll on the flexibility of the electronics industries. Fortunately, this situation is being realised at the appropriate management levels, and the interest in this seminar and the pre-conference tutorials testifies to this assertion.

The Organising Committee succeeded in assembling an interesting programme embracing over 35 oral and poster presentations, four invited lectures, two pre-conference tutorials, a special session on European co-operation, and exhibits. It is a pleasure to look back and conclude that the seminar was a great success. About 100 people from 12 different countries attended the seminar, which was well above expectations. The same holds for the two tutorials, about 25 persons each participated. The subjects of the papers are equally divided between numerical and experimental analysis, which clearly shows that experimental work is by no means a dead end. The exhibition provided the opportunity to have a look at the newest versions of today's thermal analysis software and some very interesting products as well. A survey of the exhibitors can be found under the Acknowledgements, where we take the opportunity to thank them for their financial support.

However, despite its success, other initiatives are needed as well. It is the objective of the Eurotherm Seminars to be a popular forum for high-level scientific and technical interchange of ideas on a wide range of special topics, while the primary aim is to stimulate discussion and liaison between specialists groups. Dr. Kaveh Azar, chairman of the 8th SEMI-THERM conference, Austin, 1992, said in his preface: "SEMI-THERM is perhaps the only conference that provides a medium to present current and near future development work. It also attempts to merge contributions from the universities and industrial communities."

We would be happy if the 'thermal management' community in Europe could establish the same tradition in communication as our colleagues in the USA, and one of the most appropriate ways is to organise an Eurotherm seminar like this on a regular basis. After the lively session on European coordination, it was decided to organise a Thermal Management seminar every two years. IMEC in Leuven, Belgium, volunteered to take the initiative for 1995.

We would like to acknowledge the contribution of the Scientific Committee for helping us to ensure the quality of the proceedings, and we would also like to thank the authors, invited speakers and tutorial lecturers for their valuable contributions to the success of this seminar. We owe many thanks to Mrs Sharmila Sewmar, who managed to stay in control of the many things that had to be done, and still remain smiling, besides her normal job as secretary to professor Hoogendoorn.

We are very grateful to the J.M. Burgers Centre for Fluid Mechanics, the host of the seminar, which got many compliments on the perfect organisation, the very nice facilities and the general ambiance of the old city of Delft.

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