

# Preface

The **International Thermal Spray Conference 2001 (ITSC 2001)**, held 28–30 May in Singapore, represented the second full collaboration between three world-class societies to develop “the premier” international conference series on thermal spraying. It is a great honor to welcome you to ITSC 2001 in the Pacific Rim, a joint initiative between the Thermal Spray Society (TSS), an affiliate society of ASM International; the German Welding Society (DVS-Deutscher Verband für Schweißtechnik); and the International Institute of Welding (IIW).

This event offers a unique opportunity for thermal spray practitioners to experience one of the fastest-growing international markets for thermal spray products, services, and new developments. More than 600 delegates from 25 countries are expected to join us as we explore the theme, “Advancing Thermal Spray in the 21st Century.”

During three days of technical sessions, ITSC participants and delegates will have the unique opportunity to exchange their know-how and experience and to learn about the latest technological trends. Nearly 250 technical presentations by the world’s thermal spray experts, unlimited networking opportunities, Job Shop and Equipment Showcases, and local industry tours offer an invaluable opportunity that will not present itself in this format in this region for another three years.

In addition, during a 2½ day exposition, ITSC participants can learn about the latest advances in top-level performance from more than 40 exhibitors.

These proceedings comprise the technical papers presented at ITSC 2001. Of well over 300 submissions, approximately 195 manuscripts were accepted following a high standard of manuscript preparation in accordance with strict guidelines. The proceedings cover a broad range of topics on developments in thermal spray research and industrial applications. They are grouped topically by chapter as follows:

- |   |   |
|---|---|
| 1. Invited Review   | 11. Diagnostics and Process Control                 |
| 2. Applications   | 12. Formation Impact and Solidification of Droplets |
| 3. Thermal Barrier Coatings                               | 13. Modeling and Simulation                         |
| 4. Ceramics, Intermetallics, and Metal Composite Coatings | 14. Mechanical Properties                           |
| 5. Polymer Feedstocks and Coatings                        | 15. Wear and Erosion                                |
| 6. Nanostructured Materials                               | 16. Corrosion Properties and Characteristics        |
| 7. Cold Spray Processes and Coatings                      | 17. Non Destructive Testing and Quality Control     |
| 8. Equipment and Systems                                  | 18. Commercial Aspects                              |
| 9. Coating Treatments                                     | 19. Extra Papers                                    |
| 10. Microstructural Focused Studies                       | 20. Historical Endnote                              |

The successful organization and administration of ITSC 2001 was the result of many cooperative efforts over many months. The organizers of the conference, exposition, education program, and these proceedings are to be commended for their hard work in making ITSC 2001 yet another premier event.



**Albert Kay**  
ITSC 2001 General Co-Chair  
ITSC 2001 Technical Co-Chair



**Dr. Peter Heinrich**  
ITSC 2001 General Co-Chair



**Erich Lugscheider**  
ITSC 2001 Technical Co-Chair



**Khiam Aik (Michael) Khor**  
ITSC 2001 Technical Co-Chair

- 1st National Thermal Spray Conference** (1987) 14–17 September, Orlando (FL)  
Reference: "Thermal Spray: Advances in Coatings Technology," Ed. D.L. Houck, Pub. ASM International, Materials Park, OH, USA, 1988, 426+ pages. ISBN: 0-87170-320-3. SAN: 204-7586. 59 papers published and 730 attendees.
- 2nd National Thermal Spray Conference** (1988) 24–28 October, Cincinnati (OH)  
Reference: "Thermal Spray Technology—New Ideas and Processes," Ed. D.L. Houck, Pub. ASM International, Materials Park, OH, USA, 1989, 469+ pages. ISBN: 0-87170-335-1. SAN: 204-7586. 61 papers published and 1300 attendees.
- 3rd National Thermal Spray Conference** (1990) 20–25 May, Long Beach (CA)  
Reference: "Thermal Spray Research and Applications," Ed. T.F. Bernecki, Pub. ASM International, Materials Park, OH, USA, 1991, 792+ pages. ISBN: 0-87170-392-0. SAN: 204-7586. 110 papers published and 1600 attendees.
- 4th National Thermal Spray Conference** (1991) 4–10 May, Pittsburgh (PA)  
Reference: "Thermal Spray Coatings: Properties, Processes and Applications," Ed. T.F. Bernecki, Pub. ASM International, Materials Park, OH, USA, 1991, 556+ pages. ISBN: 0-87170-437-4. SAN: 204-7586. 79 papers published and 1300 attendees.
- 13th International Thermal Spray Conference** (1992) (5th National Thermal Spray Conference—1992) 28 May–5 June, Orlando (FL)  
Reference: "Thermal Spray: International Advances in Coatings Technology," Ed. C.C. Berndt, Pub. ASM International, Materials Park, OH, USA, 1992, 1044+ pages. ISBN: 0-87170-443-9. SAN: 204-7586. 161 papers published and 1600 attendees.
- 6th National Thermal Spray Conference** (1993) 7–11 June, Anaheim (CA)<sup>1</sup>  
Reference: "Thermal Spray: Research, Design and Applications," Ed. C.C. Berndt and T.F. Bernecki, Pub. ASM International, Materials Park, OH, USA, 1993, 691+ pages. ISBN: 0-87170-470-6. SAN: 204-7586. 105 papers published and 1250 attendees.
- 7th National Thermal Spray Conference** (1994) 20–24 June, Boston (MA)<sup>1</sup>  
Reference: "Thermal Spray Industrial Applications," Ed. C.C. Berndt and S. Sampath, Pub. ASM International, Materials Park, OH, USA, 1994, 800+ pages. ISBN: 0-87170-509-5. SAN: 204-7586. 126 papers published and 1500 attendees.
- 8th National Thermal Spray Conference** (1995) 11–15 September, Houston (TX)<sup>1</sup>  
Reference: "Thermal Spray Science & Technology," Ed. C.C. Berndt and S. Sampath, Pub. ASM International, Materials Park, OH, USA, 1995, 774+ pages. ISBN: 0-87170-541-9. SAN: 204-7586. 126 papers published and 1200 attendees.
- 9th National Thermal Spray Conference** (1996) 7–11 October, Cincinnati (OH)  
Reference: "Thermal Spray: Practical Solutions for Engineering Problems," Ed. C.C. Berndt, Pub. ASM International, Materials Park, OH, USA, 1996, 992+ pages. ISBN: 0-87170-583-4. SAN: 204-7586. 131 papers published and 1350 attendees.
- 10th National Thermal Spray Conference** (1997) 14–18 September, Indianapolis (IN)  
Reference: "Thermal Spray: A United Forum for Scientific and Technological Advances," Ed. C. C. Berndt, Pub. ASM International, Materials Park, OH, USA, 1997, 1020+ pages. ISBN: 0-87170-618-0. SAN: 204-7586. 137 papers published and 950 attendees.
- 15th International Thermal Spray Conference** (1998) 25–29 May, Nice, France<sup>1</sup>  
Reference: "Thermal Spray: Meeting the Challenges of the 21st Century," Ed. C. Coddet, Pub. ASM International, Materials Park, OH, USA, 1998, 1693+ pages. ISBN: 0-87170-659-8. SAN: 204-7586, 272 papers published.

**2nd United Thermal Spray Conference (1999) 17–19 March, Dusseldorf, Germany**

Reference: "Tagungsband Conference Proceedings" Ed. E. Lugscheider, P. A. Kammer, Pub. DVS Deutscher Verband für Schweißen, Germany, 1999, 879+ pages. ISBN 3-87155-653-X. 170 papers published.

**1st International Thermal Spray Conference (2000) 8–11 May, Montréal, Québec, Canada<sup>1</sup>**

(The first ITSC sponsored by the ASM-Thermal Spray Society, The DVS-German Welding Society, and the IIW-International Institute of Welding)

Reference: "Thermal Spray: Surface Engineering via Applied Research," Ed. C.C. Berndt, Pub. ASM International, Materials Park, OH, USA, 2000, 1383+ pages. ISBN 0-87170-680-6 SAN 204-7586 199 papers published and 1068 attendees.

**International Thermal Spray Conference (2001) 28–30 May, Singapore**

Reference: "Thermal Spray 2001: New Surfaces for a New Millennium," Ed. C.C. Berndt, K.A. Khor, E. Lugscheider, Pub. ASM International, Materials Park, OH, USA, 2001, 1361+ pages. 185 papers published.

**Footnote**

<sup>1</sup> These proceedings are still available and can be obtained through ASM International's Customer Service.