

Book Review

"THERMAL SPRAY RESEARCH AND APPLICATIONS"

This book represents the proceedings of the "3rd National Thermal Spraying Conference" (NTSC) that was held from 20-25 May, 1990 in Long Beach, California. The Editor of the proceedings mentions in the foreword that some 1,600 people from 25 countries attended this meeting. This 25% increase over the prior conference in 1989 can probably be attributed to the fact that the conference was held in conjunction with AeroMat'90 at a neighboring conference facility.

This conference volume was in production for over a year. The long lag between submittal and publishing can be reconciled when it is considered that 110 papers have been reviewed by a panel of 24 people and then organized and collated by the proceedings editor. (It can also be noted that many journals are now taking in excess of a year to publish papers.) I can confirm that the acceptance process for potential contributions was rigorous since my own papers were thoroughly examined and the many worthwhile comments resulted in a more substantial paper. The quality of presentation (*i.e.*, layout, figure clarity, comprehension) has been determined by the individual authors, since the book style is in a "camera-ready" format. The overall product is good and this makes this extensive volume easy to read. The individual papers within the book in most cases still represent the state-of-the-art of current technology.

This book is divided into the sections listed in the table below. These broadly correspond to the sessions held during

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Pub. in 1991 by ASM International®,
Materials Park, OH, 44073, USA.

Hard Bound, 792+ pages. Letter page
format (28.5 cm × 22 cm). Price is
\$76.00 to ASM International mem-
bers and \$95.00 to the general public.

the meeting. The numbers following each classification indicate how many contributions from each session have been published. Seven of the invited papers have also been published, and these are indicated.

It is difficult to review 110 papers! However some basic impressions of the technology and its directions can be gauged from the content of the proceedings. An initial comment concerns the incorporation of papers from the vendors' sessions. These are of uniform high quality and indicate the expanding role that the marketplace is contributing to the engineering base of the technology.

The table on sectional headings has been presented so that the topic areas are ranked with respect to the number of papers. Approximately 25% of the sections account for 50% of the contributions. These areas which have exhibited an increased activity over prior NTSC proceedings are HVOF, spray forming and composites, and statistical methods in thermal spray. Fertile areas of investigation, which seem to be increasing in visibility, are biomedical applications and automation. The topic of high temperature ceramic superconductors is not as conspicuous as in the previous volume of this series (2 papers in 1990 compared to 8 in 1989). I believe that these trends can be translated into the overall activity and commercial interests within the thermal spray field.

Several papers can be highlighted as being either a major technological advance, new and innovative research, applications orientated, or of practical tutorial benefit. These will be briefly described below.

The paper by Roman, *et al.* (from UTRC, Pratt & Whitney and Metco; USA) on "Plasma Spray Gun Particle Distribution Measurements Using Laser/2-d Imaging Techniques" demonstrates the potential of providing analytical plasma diagnostics for real time feedback control of the thermal spray process. The so-determined particle distribution, and eventually the particle temperature, will lead to optimal parametrization of coatings.

Wolke, *et al.* have a contribution titled "Plasma-Sprayed Hydroxyapatite Coatings for Biomedical Applications." This group of workers from the University of Leiden (The Netherlands) have contributed much to the field of bioceramic coatings. The current contribution details the biodegradation of hydroxyapatite coatings in physiological media. The paper documents the changes in crystal structure that can be observed. These structures determine the utility of the coatings; with a crystalline coating being preferred, since it reabsorbs at lower rates.

A paper titled "Development of Mass Production Technology of Arc Spraying for Automotive Engine Aluminum Alloy Valve Lifters" is presented by M. Nakagawa, *et al.*, Toyota

SECTIONAL HEADINGS IN "THERMAL SPRAY RESEARCH AND APPLICATIONS"

Processing science (2 invited papers)	13
High velocity oxygen fuel (HVOF)	11
Coating characterization and evaluation (1 invited paper)	9
Spray forming and composites	9
Statistical methods in thermal spray (1 invited paper)	8
Equipment and processes (1 invited paper)	7
Corrosion	7
Ceramics	7
Feedstock materials	6
Biomedical applications (2 invited papers)	5
Vendors' session	5
Surface treatment—pre-spray	5
Wear/erosion	4
Abradables	3
Surface treatment—post-spray	3
Thermal barrier coatings	3
Automation	3
High temperature ceramic superconductors	2

Motor Corp. and Otai Iron Works Corporation (Japan). This paper is a case study that outlines the implementation of a production process from concept to realization. The materials selection, spray process, testing methods, engine bench tests, rig tests, quality control, and evaluation aspects of the process are developed.

The tutorial contribution by S. Bisgaard (University of Wisconsin-Madison, USA) on "Optimizing Thermal Spray Processes—Going Beyond Taguchi Methods" is essential reading for anyone who intends to implement statistical method process control. The paper is easy to read and produces a succinct overview of the evolution of statistical methods that can be implemented by process and production engineers. The thrust of the author is to build on Taguchi methods and develop "Response Surface Methods" (RSM). The goal of this technique is to locate an optimum processing set of parameters and

then investigate the relationship of parameters near this optimum so that the overall system is more completely understood.

The brief overview of several papers is indicative of the high standard of this proceedings volume. One shortcoming of this book, in common with many conference proceedings, is the lack of author or subject indices. There is no doubt in my mind that such an index would substantially increase the value and usefulness of the proceedings.

This proceedings is essential for all practical and applications-orientated engineers or scientists who wish to have the most current technology in their hands. I highly recommend this book to engineering and corporate research libraries, since it is of archival quality.

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