

Book Review

Protective Coating Processes 1990-1991

Introduction

Engineers and scientists are infamous for re-inventing the wheel when it comes to performing "original research," particularly in the applications-oriented field of thermal spray coatings and technology. The reason for this is simple; it is becoming very difficult to keep abreast of all the articles that are being published in a diversity of trade magazines and scientific journals. Few libraries are physically capable of stocking all of these resources, and not every researcher or engineer has access to an economical easy-to-use database. *Protective Coatings Processes 1990-1991* to a large extent is intended to fill such needs so that quick and productive manual or database searches can be conducted.

This book is a follow-up edition of the 1989-1990 report and part of the Industry Reports Series published by ASM International. The Industry Reports Series has been designed to provide comprehensive and organized corporate intelligence on materials-related topics for specific industries. This edition contains more than 1000 references that cover the July 1990 to November 1991 period. The references include journal papers, conference papers, books, and patents selected from METADEX (Metals Abstracts/Metal Abstract Index), EMA (Engineered Materials Abstract), and MBF (Metals Business File). The references present an overview of the scientific and industrial developments in the protective coatings area and are therefore targeted toward engineers and practicing scientists.

Hardcopy Format

This book consists of a printed report and PC (DOS compatible) software. The printed report is organized into six separate sections: (1) Coatings and Processes by Source (52 pages and 25 tables), (2) Technology and Applications by Source (79 pages and 30 tables), (3) Materials in Coatings and Processes (60 pages and 15 tables), (4) Materials in Technology and Applications (96 pages and 16 tables), (5) Reference Section (84 pages), and (6) Appendix (30 pages). Each table consists of a two-sided page. The first four sections contain easy-to-use tables, a list of short summaries for each of the cited references, and the citation numbers used in the Reference Section. The Reference Section consists of full abstracts and the original source documentation number as published in METADEX or other databases. The Appendix contains an overview of selected protective coating terms, with their explanation and a list of coatings organizations, associations, and societies.

The printed report is organized so that it is easy to perform thorough searches for cross-referenced data. The "book" is bound in a ring binder and it is therefore easy to pull out various articles for review.

Ed. R. V. Zaretsky

Pub. ASM International[®], Materials Park, OH, 44073, USA, 1992.

Bound in ring binder, Letter page format (28.5 × 22 cm), estimate 600 pages. Price = USD \$325.00

Software

The PC software (two 5.25 in. high-density diskettes, with other formats available on request) requires a PC/XT-compatible computer and when installed occupies about 2.2 Mb of hard disk memory. Installing the software by means of the automatic installation procedure was easy and required no special computer skills.

The installed program contains all the information printed in the looseleaf book in a database format (see the example below). There was no noticeable difference in the performance of this software between the average 286 and fast 386 machines. A vintage XT computer also performed reasonably rapid during searches.

The five pages that constitute the program manual is inadequate and possibly confusing to the computer illiterate or novice. The manual provides the bare basics of how to run the program and methods to conduct a search. It does not dwell on essential details such as configuration for specific user hardware, printing, etc. In most cases, this may not be a problem for users; however, some experimentation was required to print using a laser printer. Also, although most of the common printers are supported, the driver for the Postscript printer was not available. Of course, these are quibbles that detract from an otherwise good product, but they do raise questions such as "Will the publisher maintain a software help line for their product?" and "Will it be easy for international buyers to get assistance?" These are important questions because most engineers and scientists who could benefit from the advantages that this software offers cannot afford to be distracted by fixing software problems. Those who *are* computer hacks might like to know that *Protective Coating Processes 1990-1991* is based on Folio Views 2.0 (Folio Corporation, Utah, 1990). A runtime version of Folio Views 2.0 is provided so that the data can be processed. There is no file transfer mechanism built into the program that allows database transport into other database formats.

The program permits extensive searches on any word or any combination of words that (1) may, (2) must, or (3) must not occur in the reference. Selected areas in the references (such as authors, materials, and corporate sources) can be searched individually. Therefore, the search possibilities are much broader than in the printed report where only a hand-search strategy is available. Selected references can be printed to a computer file or downloaded to the printer.

Thermal Spray Searches

All databases of this kind cover only a limited number of reports for a given period. Therefore, results of the search provide an overview and not complete information. An advantage of this type of "presearch" database is the ease of finding information,

because references not directly related to protective coatings have been discarded. This is primarily important when a manual search is made using the printed report, because the overall number of references has been greatly reduced. The example below, a paper presented by Kingswell et al. at the 3rd NTSC, shows the full details that are presented in each reference. In this example, there were 212 entries that responded to the keyword of "plasma," 185 to "sprayed," and 46 to "alumina." The combination of "plasma and sprayed" reduced the search to 116 citations, and the more complex search of "plasma and sprayed and alumina" narrowed the field to 13 citations.

This report contains about 190 references from the thermal and plasma spray field. For example, 33 of the 110 papers that appear in "Thermal Spray Research and Applications" (Proceedings of the 3rd National Thermal Spray Conference, ASM International 1990, for book review see *JTST*, Vol 1(No. 1), 1992, p 17) are included in this report. Clearly, papers on topics such as plasma technology, processing science, etc., have been discarded. In total, this report contains about 32 papers on thermal barrier coatings, 4 on thick thermal barrier coatings; and 6 are concerned with residual stresses in thermal spray coatings.

The majority of the references are originally in English with roughly one third (337 papers) in other languages. All of the abstracts are in English. One of the big advantages connected with this series is the possibility to order a photocopy (eventually with the translation) of the references cited in this report. This may be important, particularly when the paper was published in some local scientific journal or in a conference proceedings.

Summary and Recommendations

Engineers that require fast, comprehensive searches for a troubleshooting exercise in the protective coatings area will make good use of this report. Engineers or scientists who require a thorough search in one specialized area may wish to conduct a direct search in the original databases (METADEX, EMA, MBF, etc.). On an even more pragmatic note, this book will be vulnerable to user abuse due to its looseleaf nature, and it is certain that pages and sections will be lost over time (especially if you have graduate students!).

The hard copy version of *Protective Coating Processes 1990-1991* is highly recommended for any group of engineers or scientist who may need to search literature rapidly and efficiently in this subject area. The 1990-1991 reporting period is still highly relevant to current literature searches. There is no doubt that the 1991-1992 book to be published in 1993 will be useful. Both university and industry/government research libraries will find both of these books very useful and in high demand by professional engineers.

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Sample Reference from the Computer Database

Table Number: 0093

Comparison of the Erosive Wear Behaviour of Vacuum Plasma Sprayed and Bulk Alumina.

The erosive wear of vacuum plasma sprayed (VPS) alumina has been compared with that of sintered (bulk) material as a function of erodent velocity and impingement angle. In the case of vacuum plasma spraying, two distinct coating types were considered (discontinuously and continuously sprayed) and the variations discussed in terms of the coating microstructure and residual stress levels developed during deposition. In all cases, the overall erosion behavior of bulk or VPS alumina is strongly influenced by an incubation period, and under certain circumstances, progression to a steady-state erosion rate is not observed. With increasing particle velocity and at high impingement angles, the steady-state erosion rates for both bulk and VPS materials have been determined, and the predominant wear mechanism identified as brittle fracture. With decreasing impingement angle, but at a constant erodent velocity, there is a change in the erosion process, and ductile fracture (plastic deformation and groove formation) becomes important. The lower processing temperatures that result from discontinuous spraying give rise to a decrease in intersplat bonding (reduced cohesion) and a reduction in the compressive stress level within the coating. Both of these effects give rise to an increase in steady-state erosion rates when compared with the continuously sprayed and bulk materials tested under identical conditions. Substrates were copper, tungsten, carbon and stainless steels.

Authors: R. Kingswell, D.S. Rickerby, K.T. Scott, S.J. Bull

Corporate Sources: AEA Technology, Rolls-Royce

Conference: Thermal Spray Research and Applications

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Date: 20-25 May 1990

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Address: Materials Park, Ohio 44073, USA

Date: 1991

Volume Reference: 9109-72-0414

Pages: 179-185

Language: English

Thesaurus Terms:

Aluminum oxide, Coatings

Carbon steels, Coating

Copper, Coating

Erosion rate

Plasma spraying

Sprayed coatings, Mechanical properties

Stainless steels, Coating

Tungsten, Coating

Wear

Materials:

Aluminum oxide

Carbon steels

Cu alloys

Tungsten compounds

Report Descriptors:

Coating characterization, Spray processes, Wear resistance

Source: METADEX: 9109-571133