

Thermal Spray Technology

May 29 – 31, 2008, 8:00 – 17:00

**Location MECC, Room 2.4, Thames
Maastricht, The Netherlands**

Instructors:

Dr. C.C. Berndt, FASM

Professor, Swinburne University of
Technology
Hawthorn, Victoria, Australia



Dr. R. Knight, FASM

Auxiliary Professor, Drexel University
Philadelphia, Pennsylvania, USA



Course Overview:

Thermal spray technology and coatings solve critical problems in demanding environments. They provide “solutions” to problems involving repair, wear, high temperature and aqueous corrosion, and thermal protection. Thermal spray can also be used to manufacture net-shapes, advanced sensors and materials for the biomedical and energy/environmental sectors. These and other emerging applications take advantage of the rapid and cost-effective capabilities of thermal spray technology in the OEM and repair industries.

Thermal spray processes - (twin wire-arc, combustion, high velocity oxy-fuel (HVOF), cold spray and plasma spray, and associated technologies) can deposit virtually any material as a surface coating onto a wide range of other materials. Coating reliability and effectiveness requires that these overlay coatings be selected, engineered and applied correctly.

This course provides (i) a thorough grounding and understanding of thermal spray processes, (ii) presents the complex scientific concepts in terms of simple physical models, and (iii) integrates this knowledge to practical applications and accepted thermal spray practices. NO mathematics is used to explain the processes or materials/mechanical engineering.

Participants are encouraged to contact the instructor(s) prior to the course so that any particular application or problem can be discussed as a case history.

Learning Objectives:

Upon completion of this course, participants should be able to:

- Describe the historical basis for thermal spray technology and the development of equipment and materials as it relates to present-day technology.
- Recognize the terminology, principles and underlying theory of thermal spray technology.

- Compare and contrast thermal spray technologies with respect to competing coating technologies - PVD, CVD, hardfacing, electroplating, etc.
- Explain how feedstocks are designed and manufactured and how to select them for different spray processes.
- Identify applicable testing methods and currently accepted industrial practices used for quality control of coatings.

Who Should Enroll:

- Technologists
- Engineers
- Technicians
- Technical marketing personnel
- Graduate students and other professionals entering the thermal spray field or who wish to update their knowledge

Course Outline:

1. Surface Science
2. Equipment & Theory
3. Processing & Design
4. Materials
5. Applications
6. Testing & Characterization

Instruction Language: All instruction from this course and all course materials will be in English.

Registration Fees:	Before May 14	After May 14
Member Fee: (TSS/DVS/IIW)	995 US Dollars	1.055 US Dollars
ASM Member Fee:	1.055 US Dollars	1.105 US Dollars
Non-Member Fee:	1.195 US Dollars	1.245 US Dollars
Student Fee:	295 US Dollars	345 US Dollars

Multiple registrants from the same company will receive the following discount:

- 3rd registrant from the same company = 25% discount
- 4th registrant from the same company = 40% discount
- 5th registrant from the same company = 55% discount

Participants receive the *Handbook of Thermal Spray Technology* and hardcopy of the instructor's presentation materials.

To register for the courses or for any questions, please contact customer service at customerservice@asminternational.org (Product code 253081508)

Understanding and Improving Your Thermal Spray Processes

May 30 – 31, 2008, 8:00 – 18:30
Location MECC, Room 2.5, Seine
Maastricht, The Netherlands

Instructors:

Dr. M. Boulos, TS-HoF

Professor, University of Sherbrooke
 Sherbrooke, Quebec, Canada



Dr. P. Fauchais, FASM, TS-HoF

Professor, Université de Limoges
 Limoges, France



Dr. J. Heberlein, FASM, TS-HoF

University of Minnesota
 Minneapolis, Minnesota, USA



Course Overview:

Thermal spray coatings are receiving increased attention as solutions to corrosion, wear and materials compatibility problems. Thermal spray processes using electric arcs, combustion and plasma spray can apply almost any material to the surface of another. These coatings must be correctly engineered and applied to operate as an overlay surface. Education is vital to understanding coating systems and improving thermal spray coating reliability. This 2-day course will review the processing science of a wide range of thermal spray coating processes. The theory of operation and practice of the coatings will be presented, including thermal spray process control, coating application, characterization and testing. Practical coating systems for electric arc, combustion and plasma spray will be reviewed using case studies.

Learning Objectives:

Upon completion of this course, participants should be able to:

- Summarize thermal spray processing science, applications and practice.
- Describe how thermal spray processing interacts with the materials it is designed to protect.
- Perform a techno-economic comparison of different technologies.

Who Should Enroll:

This course is designed for process, application, development and design engineers, researchers and quality-control personnel. It will also be helpful for anyone involved in specifying materials, materials suppliers, sales representatives and technical management.

Course Outline:

1. Introduction and Course Objectives
2. Overview of Thermal Spray Techniques
3. Flame Spraying Systems
4. Cold Spray
5. Characteristics of the Plasma State
6. Plasma Spraying I - D.C. Plasma Spraying
7. Plasma Spraying II - R.F. Induction Plasma Spraying
8. Wire-Arc Spraying
9. Plasma Transferred Arc
10. Plasma/Particle Interactions
11. Process Diagnostics
12. Powder Production for Thermal Spraying
13. Surface Preparation
14. Deposit Formation and Coating Properties
15. Thermal Spray Process Controls
16. Industrial Applications of Plasma Spray
17. Summary, Conclusions and Discussion

Instruction Language: All instruction from this course and all course materials will be in English.

Registration Fees:	Before May 14	After May 14
Member Fee:	795 US Dollars	845 US Dollars
(TSS/DVS/IIW)		
ASM Member Fee:	835 US Dollars	885 US Dollars
Non-Member Fee:	975 US Dollars	1.025 US Dollars
Student Fee:	255 US Dollars	305 US Dollars

Multiple registrants from the same company receive the following discount:

- 3rd registrant from the same company = 25% discount
- 4th registrant from the same company = 40% discount
- 5th registrant from the same company = 55% discount

To register for the courses or for any questions, please contact customer service at customerservice@asminternational.org (Product code 259381508)

The Metallographic of Gas Turbine Coatings

May 31, 2008, 8:00 – 17:00

Location MECC, Room 2.6, Danube
Maastricht, The Netherlands

Instructors:

D. G. Puerta

Director of Metallurgical Engineering
IMR Test Labs
Lansing, New York, USA



Course Overview:

Sound metallographic practices are a prerequisite for the accurate evaluation of gas turbine coatings. Poor preparation can lead to false conclusions about coating integrity and spray booth parameters. This course covers a wide range of topics relating to the metallographic preparation and evaluation of gas turbine coatings. Emphasis is placed on equipment and consumables selection, and how these choices influence the observed structure of a given coating.

In addition to an overview of metallographic preparation, we also discuss common issues encountered with various coating families (e.g. hardcoats, ceramic (TBCs), etc.). Methods are covered which can help to ensure that the true coating microstructure has been revealed.

Learning Objectives:

Upon completion of this course, participants should be able to:

- Describe the basic elements of metallographic preparation (sectioning, mounting, grinding, and polishing).
- Discuss the relationship between consumables, preparation recipes, and coating structure.
- Determine if features observed within a given coating are inherent or have been induced during metallographic preparation.

Who Should Enroll:

This course is designed for anyone involved in either the processing or evaluation of thermal spray coatings

Course Outline:

1. The Use of Coatings Within a Turbine
2. Metallography Overview
3. Sectioning
4. Hot and Cold Mounting
5. Grinding
6. Polishing I – Selection of fine grinding and polishing consumables
7. Polishing II – Recipes and coating families
8. Metallographic Standards
9. Evaluation of Coatings I – Image analysis
10. Evaluation of Coatings II – Electron microscopy
11. Evaluation of Coatings III – Issues specific to the different coating families

Registration Fees:	Before May 14	After May 14
Member Fee:	475 US Dollars	525 US Dollars
(TSS/DVS/IIW)		
ASM Member Fee:	525 US Dollars	575 US Dollars
Non-Member Fee:	645 US Dollars	695 US Dollars
Student Fee:	195 US Dollars	245 US Dollars

Multiple registrants from the same company will receive the following discount:

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- 4th registrant from the same company = 40% discount
- 5th registrant from the same company = 55% discount

To register for the courses or for any questions, please contact customer service at customerservice@asminternational.org (Product code: 251281508)

