Training

Course Programme 2019

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**Course Overview**

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* OMCH = Oerlikon Metco AG, Wohlen
Thermal Spray Technology Training Course

Answering the technical questions raised in connection with thermal spraying requires an in-depth knowledge of the basic principles, the process being used, equipment and coating materials as well as the test methods and design requirements of the parts to be coated. This course provides the basic principles and processes of thermal spraying, describes the possibilities and limitations associates the course participant with the various systems used for thermal spraying. The participant obtains an overview of the coating materials and test methods used as well as the component design considerations necessary and the substrate pre-treatment steps.

Objectives
After attending this course, the participant …
… understands the physical principles of thermal spraying
… knows the features and benefits of the different thermal spray processes
   Plasma, Arc, HVOF and Combustion flame
… is able to judge the influence of the operating parameters on the coating properties

Target groups
- Managers of a coating shop which are using thermal spray processes
- Students of universities who are focused on thermal spraying
- Operators of thermal spray systems
- Employees of MetLab

Training program
Monday
- Features and benefits of the different thermal spray processes:
   Plasma, HVOF, Arc and Combustion Flame
- Basic principles of thermal spraying:
   from the surface activation to coating quality control
- Influence of the operating parameters onto the coating properties

Tuesday
- Practical work with a fully automated thermal spray system:
   thermal spraying of test samples
   (Coating process and spray materials are based on participations’ requests)
- Coating evaluation of a thermal sprayed coating
- Typical applications in thermal spraying

Wednesday
- Practical work in the MetLab
  Preparing of sprayed test samples (cutting, mounting, grinding, polishing)
- Analysis of coating with the microscope and according coating pictures

Thursday
- Repetition of training; questions and answers
- Final test
- Distribution of the course certificate

Duration
3 days
(Monday 2 pm to Thursday noon)

Place
Oerlikon Metco AG, Wohlen
Plasma Technology Training Course

Answering the technical questions raised in connection with thermal spraying requires an in-depth knowledge of the basic principles, the process being used, equipment and coating materials as well as the test methods and design requirements of the parts to be coated. This course provides the basic principles and processes of thermal spraying, describes the possibilities and limitations associates the course participant with the various systems used for thermal spraying. The participant obtains an overview of the coating materials and test methods used as well as the component design considerations necessary and the substrate pre-treatment steps.

Objectives

After attending this course, the participant …
… understands the physical principles of thermal spraying
… knows the features and benefits of the different thermal spray processes
   Plasma, Arc, HVOF and Combustion flame
… is able to judge the influence of the operating parameters on the coating properties
… is able to analyze plasma sprayed coating based on metallurgical pictures

Target groups

- Managers of a coating shop which are using thermal spray processes
- Students of universities who are focused on thermal spraying
- Operators of Plasma systems
- Employees of MetLab

Training program

Monday
- Features and benefits of the different thermal spray processes:
  Plasma, HVOF, Arc, and Combustion Flame
- Theoretical principles of the plasma process:
  from the surface activation to coating quality control
- Influence of the operating parameters onto the coating properties

Tuesday
- Explanation of design of a modern thermal spray system
- Coating evaluation of plasma sprayed coatings according to metallurgical pictures
- Coating parameters in using the plasma spray process

Wednesday
- Typical Application of plasma sprayed coatings
- Repetition of training; questions and answers
- Final test
- Distribution of the course certificate

Duration

2 days
(Monday 2 pm to Wednesday noon)

Place

Oerlikon Metco AG, Wohlen
HVOF Technology Training Course

Answering the technical questions raised in connection with thermal spraying requires an in-depth knowledge of the basic principles, the process being used, equipment and coating materials as well as the test methods and design requirements of the parts to be coated. This course provides the basic principles and processes of thermal spraying, describes the possibilities and limitations associates the course participant with the various systems used for thermal spraying. The participant obtains an overview of the coating materials and test methods used as well as the component design considerations necessary and the substrate pre-treatment steps.

Objectives

After attending this course, the participant …
… understands the physical principles of thermal spraying
… knows the features and benefits of the different thermal spray processes
   Plasma, Arc, HVOF and Combustion flame
… is able to judge the influence of the operating parameters on the coating properties
… is able to analyze HVOF sprayed coating based on metallurgical pictures

Target groups

- Managers of a coating shop which are using thermal spray processes
- Students of universities who are focused on thermal spraying
- Operators of HVOF systems
- Employees of MetLab

Training program

Monday
- Features and benefits of the different thermal spray processes:
   Plasma, HVOF, Arc, and Combustion Flame
- Theoretical principles of the HVOF process:
   from the surface activation to coating quality control
- Influence of the operating parameters onto the coating properties

Tuesday
- Explanation of design of a modern thermal spray system
- Coating evaluation of HVOF sprayed coatings according metallurgical pictures
- Coating parameters in using the HVOF spray process

Wednesday
- Typical Application of HVOF sprayed coatings
- Repetition of training; questions and answers
- Final test
- Distribution of the course certificate

Duration

2 days
(Monday 2 pm to Wednesday noon)

Place

Oerlikon Metco AG, Wohlen
Operator Training Course UniCoatPro-LF with WokaStar-610-S

Operating an HVOF installation including its peripherals requires training and experience. This course provides the necessary basic knowledge of HVOF-LF operations and an opportunity for the participants to become acquainted with the HVOF-LF installation UniCoatPro-LF in operation.

Objectives

After attending the course, the participant …
… understands the physical principles of the HVOF-LF spray process
… knows the features and benefits of the different thermal spray processes as well as the features and benefits between the HVOF-GF and HVOF-LF gun
… is able to manipulate an UniCoatPro-LF spray system

Target groups

- Operator of an HVOF system type UniCoatPro-LF
- Managers of a coating shop which is using the HVOF process

Training program

Monday
- Features and benefits of the different thermal spray processes
  Plasma, HVOF, Arc, and Combustion Flame
- Theoretical principles of the HVOF-LF process
  from the surface activation to coating quality control
- Influence of the operating parameters onto the coating properties

Tuesday
- Physical basis of the HVOF flame
- Conditions of temperature and velocity in the spray flame
- Maintenance of a WokaStar-610-S HVOF gun

Wednesday
- Operating of an UniCoatPro-LF spray system
- HVOF spraying of test samples with an UniCoat HVOF-LF
  Powders: WOKA 3102 WC - 12Co
  WOKA 3652 WC - 10Co4Cr
  WOKA 7102 Cr3C2 - 20(Ni20Cr)

Thursday
- Evaluation of the sprayed samples in the metallurgical laboratory
- Hardness test, metallurgical coating analysis at the microscope
- Repetition of training; questions and answers
- Final test
- Distribution of the course certificate

Duration

3 ½ days
(Monday 2 pm to Thursday 5 pm)

Place

Oerlikon Metco AG, Wohlen
Operator Training Course UniCoatPro Plasma with F4MB-XL

Operating a modern plasma installation requires training and experience. This course provides the necessary basic knowledge of plasma operations and an opportunity for the participants to become acquainted with the UniCoat Plasma equipment in operation.

Objectives

After attending the course, the participant …
... understands the physical principles of the plasma spray process
... knows the features and benefits of the different thermal spray processes
... is able to manipulate an UniCoat Plasma spray system
... learn about influences of the plasma operating parameters onto the coating

Target groups

- Operator of an UniCoatPro Plasma equipment
- Managers of a coating shop which is using the HVOF process

Training program

Monday
- Features and benefits of the different thermal spray processes:
  Plasma, HVOF, Arc, and Combustion Flame
- Theoretical principles of the plasma process:
  from the surface activation to coating quality control
- Influence of the operating parameters onto the coating properties

Tuesday
- Physical basis of the Plasma spray plume
- Conditions of temperature and velocity in the plasma spray plume
- Principle powder injection
- Maintenance of a F4MB-XL plasma gun

Wednesday
- Operating of an UniCoat Plasma spray equipment
- Plasma spraying of test samples with an UniCoat Plasma and F4MB
  Material:
  | Metco 204NS | ZrO₂ 8Y₂O₃ |
  | Metco 68F-NS-1 | Co 28Mo 8Cr 2Si |
  | Metco 450-NS | Ni 5Al |

Thursday
- Evaluation of the sprayed samples in the metallurgical laboratory
- Hardness test, metallurgical coating analysis at the microscope
- Repetition of training; questions and answers
- Final test
- Distribution of the course certificate

Duration

3 ½ days
(Monday 2 pm to Thursday 5 pm)

Place

Oerlikon Metco AG, Wohlen
Operator Training Course MultiCoat™ Plasma with TriplexPro-210

Operating a modern plasma installation requires training and experience. This course provides the necessary basic knowledge of plasma operations and an opportunity for the participants to become acquainted with the MultiCoat Plasma equipment in operation.

Objectives
After attending the course, the participant ...
- understands the physical principles of the plasma spray process
- knows the features and benefits of the different thermal spray processes
- is able to manipulate an UniCoat Plasma spray system
- learn about influences of the plasma operating parameters onto the coating

Target groups
- Operator of a MultiCoat Plasma equipment
- Managers of a coating shop which is using the Plasma process

Training program
Monday
- Features and benefits of the different thermal spray processes
  Plasma, HVOF, Arc, and Combustion Flame
- Theoretical principles of the plasma process
  from the surface activation to coating quality control
- Influence of the operating parameters onto the coating properties

Tuesday
- Physical basis of a 3-cathode plasma spray plume
- Conditions of temperature and velocity in the plasma spray plume
- Principle powder injection
- Maintenance of a TriplexPro-210 plasma gun

Wednesday
- Operating of a MultiCoat Plasma spray equipment
- Plasma spraying of test samples with a MultiCoat Plasma and TriplexPro-210
  Material:  Metco 204NS ZrO₂ 8Y₂O₃
  Metco 68F-NS-1 Co 28Mo 8Cr 2Si
  Metco 450-NS Ni 5Al

Thursday
- Evaluation of the sprayed samples in the metallurgical laboratory
- Hardness test, metallurgical coating analysis at the microscope
- Repetition of training; questions and answers
- Final test
- Distribution of the course certificate

Duration
3 ½ days
(Monday 2 pm to Thursday 5 pm)

Place
Oerlikon Metco AG, Wohlen
Operator Training Course MultiCoat™ Plasma with SinplexPro

Operating a modern plasma installation requires training and experience. This course provides the necessary basic knowledge of plasma operations and an opportunity for the participants to become acquainted with the MultiCoat Plasma equipment in operation.

Objectives

- After attending the course, the participant …
- … understands the physical principles of the plasma spray process
- … knows the features and benefits of the different thermal spray processes
- … is able to manipulate a MultiCoat Plasma spray system
- … learn about influences of the plasma operating parameters onto the coating properties

Target groups

- Operator of a MultiCoat Plasma equipment
- Managers of a coating shop which is using the plasma process

Training program

Monday
- Features and benefits of the different thermal spray processes:
  - Plasma, HVOF, Arc, and Combustion Flame
- Theoretical principles of the plasma process:
  - from the surface activation to coating quality control
  - Influence of the operating parameters onto the coating properties

Tuesday
- Physical basis of the Plasma spray plume
- Conditions of temperature and velocity in the plasma spray plume
- Principle powder injection
- Maintenance of a SinplexPro plasma gun

Wednesday
- Operating of an MultiCoat Plasma spray equipment
- Plasma spraying of test samples with an MultiCoat Plasma and SinplexPro
  Material:
  - Metco 204NS ZrO₂ 8Y₂O₃
  - Metco 68F-NS-1 Co 28Mo 8Cr 2Si
  - Metco 450-NS Ni 5Al

Thursday
- Evaluation of the sprayed samples in the metallurgical laboratory
- Hardness test, metallurgical coating analysis at the microscope
- Repetition of training; questions and answers
- Final test
- Distribution of the course certificate

Duration

3 ½ days
(Monday 2 pm to Thursday 5 pm)

Place

Oerlikon Metco AG, Wohlen
Operator Training Course MultiCoat™ HVOF-GF with DJM2600

Operating an HVOF installation including its peripherals requires training and experience. This course provides the necessary basic knowledge of HVOF-GF operations and an opportunity for the participants to become acquainted with the HVOF-GF installation MultiCoat HVOF-GF in operation.

Objectives
After attending the course, the participant …
… understands the physical principles of the HVOF-GF spray process
… knows the features and benefits of the different thermal spray processes as well as the features and benefits between the HVOF-GF and HVOF-LF gun
… is able to manipulate an MultiCoat HVOF-GF spray system

Target groups
- Operator of an HVOF system type MultiCoat HVOF-GF
- Managers of a coating shop which is using the HVOF process

Training program
Monday
- Features and benefits of the different thermal spray processes:
  Plasma, HVOF, Arc, and Combustion Flame
- Theoretical principles of the HVOF-GF process:
  from the surface activation to coating quality control
- Influence of the operating parameters onto the coating properties

Tuesday
- Physical basis of the HVOF flame
- Conditions of temperature and velocity in the spray flame
- Maintenance of a DJM2600 HVOF gun

Wednesday
- Operating of an MultiCoat HVOF-GF spray system
- HVOF spraying of test samples with a MultiCoat HVOF-GF
  Powders: WOKA 3103 WC - 12Co
            WOKA 3653 WC - 10Co4Cr
            WOKA 7103 Cr3C2 - 20(Ni20Cr)

Thursday
- Evaluation of the sprayed samples in the metallurgical laboratory
- Hardness test, metallurgical coating analysis at the microscope
- Repetition of training; questions and answers
- Final test
- Distribution of the course certificate

Duration
3 ½ days
(Monday 2 pm to Thursday 5 pm)

Place
Oerlikon Metco AG, Wohlen
Operator Training Course Electric Arc Spraying

Operating a modern arc installation requires training and experience. This course provides the necessary basic knowledge of electric arc operations and an opportunity for the participants to become acquainted with the electric arc installation SmartArc, ECO ARC or FLEXI ARC in operation.

Objectives

After attending the course, the participant …

… understands the physical principles of the electric arc spray process

… knows the features and benefits of the different thermal spray processes as well as

… the features and benefits between the HVOF-GF and HVOF-LF gun

… is able to manipulate an electric arc spray equipment

Target groups

- Operator of an arc spray equipment
- Managers of a coating shop which is using the electric arc process

Training program

Monday

- Features and benefits of the different thermal spray processes:
  Plasma, HVOF, Arc, and Combustion Flame
- Theoretical principles of the electric arc process:
  from the surface activation to coating quality control
- Influence of the operating parameters onto the coating properties
- Physical basis of the electric arc

Tuesday

- Operating of an electric arc spray equipment
- Arc spraying of test samples with an electric arc equipment
  Wires:
  - Metcoloy 2
  - Fe 13Cr 0.5Mn 0.5Ni 0.25Si
  - Metco Aluminum
  - Al 99+
- Maintenance of arc spray guns and wire feed units

Wednesday

- Evaluation of the sprayed samples in the metallurgical laboratory
- Metallurgical coating analysis at the microscope
- Repetition of training; questions and answers
- Final test
- Distribution of the course certificate

Duration

2 ½ days
(Monday 2 pm to Wednesday 5 pm)

Place

Oerlikon Metco AG, Wohlen
Online Sensor Technology Training with Accuraspray-G3C

Precise and dependable detection and control of the thermal coating through the characterization of the spray plume temperature, particle velocity, light intensity, plume geometry and position opens new dimensions concerning increased requirements to the process repeatability.

Objectives

After attending this course the participant ...
... understands the basic principles of thermal spray process
... gets to know the advantages of real time monitoring and control of the spray plume
... can judge the dependence between equipment input data and spray plume output data
... understands the function of Accuraspray-G3C and can work with it

Target groups

- Operator of a thermal spray installation
- Managers of a coating shop which are using thermal spray processes
- Students of universities who are focused on spray plume monitoring in the thermal spray technology

Training program

Monday
- Classification of the different thermal spray processes
- Basic principles of thermal spraying

Tuesday
- Introduction into the continuous, real-time monitoring with Accuraspray-G3C
- Spraying of test sample and monitoring of the spray plume output data

Wednesday
- Preparation and evaluating of the sprayed samples
- Recognizing of the dependence between the spray input parameters and the output data of the Accuraspray-G3C
- Repetition of training; questions and answers
- Final test
- Distribution of the course certificate

Duration

2 ½ days
(Monday 2 pm to Wednesday 5 pm)

Place

Oerlikon Metco AG, Wohlen
Air Plasma Spraying of TBC’s

Air plasma spraying of TBC coatings requires training and experience. This course provides the necessary knowledge of plasma operations and an opportunity for the participants to become acquainted with the MultiCoat equipment in spraying TBC coatings.

Objectives

After attending the course, the participant …
… understands the physical principles of the plasma spray process.
… understands the influences of plasma spray parameters for TBC Coatings
… is aware of the spray parameter impacts upon the process.
… is able to optimize the coating program of the thermal spray system type MultiCoat.
… can optimize TBC coating properties sprayed with the F4 gun and Twin type feeder
… has a better technical attitude, knowledge and experience

Target groups

- Advanced Operators

Training program

Monday
- Features and benefits of Thermal Spray Processes
- Safety and health

Tuesday
- Principles of Plasma Spraying
  - Gun and part movement
  - Influence of spray distance, speed and overlapping
- Operating of the Plasma Spray System
  - Parameter programming and storing

Wednesday
- Operating of Plasma Spray System
  - Plasma spraying of test samples
  - Materials:  Bond Coat: Metco 450 NS
               Top Coat: Metco 204-NS

Thursday
- Different Set-ups, maintenance and trouble shooting of:
  - Plasma gun F4MB-XL
  - Powder feeder Twin-120A
- Evaluation of the plasma sprayed TBC coatings

Friday
- Repetition of training; questions and answers
- Final test
- Distribution of the course certificate

Duration

4 days
(Monday 2 pm to Friday noon)

Place

Oerlikon Metco AG, Wohlen
About Oerlikon Metco
Oerlikon Metco enhances surfaces that bring benefits to customers through a uniquely broad range of surface technologies, equipment, materials, services, specialized machining services and components. The surface technologies such as Thermal Spray, Thin Film, Plasma Heat Treatment and Laser Cladding improve the performance and increase efficiency and reliability. Oerlikon Metco serves industries such as aviation, power generation, automotive, oil & gas, industrial and other specialized markets and operates a dynamically growing network of more than 50 sites in EMEA, Americas and Asia Pacific. Oerlikon Metco, together with Oerlikon Balzers, belongs to the Surface Solutions Segment of the Switzerland-based Oerlikon Group.

Information is subject to change without prior notice.