



Training

Course Programme 2021

Oerlikon Metco
Rigackerstrasse 16
5610 Wohlen

P +41 56 618 81 81
F +41 56 618 81 00

Course Overview

Content	Place	Page
Thermal Spray Technology Training Course	OMCH*	3
Plasma Technology Training Course	OMCH*	4
HVOF Technology Training Course	OMCH*	5
Operator Training Course UniCoatPro-LF with WokaStar-610-S	OMCH*	6
Operator Training Course UniCoatPro Plasma with F4MB-XL	OMCH*	7
Operator Training Course MultiCoat Plasma with TriplexPro-210	OMCH*	8
Operator Training Course MultiCoat Plasma with SinplexPro	OMCH*	9
Operator Training Course MultiCoat HVOF-GF with DJM2600	OMCH*	10
Operator Course Training Electric Arc Spraying	OMCH*	11
Online Sensor Technology Training with Accuraspray-G3C	OMCH*	12
Quality Control of Thermal Sprayed Coatings	OMCH*	13
Air Plasma Spraying of TBC	OMCH*	14

* 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 ... <ul style="list-style-type: none">... 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	<ul style="list-style-type: none">- 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	<p>Monday</p> <ul style="list-style-type: none">- 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 <p>Tuesday</p> <ul style="list-style-type: none">- 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 <p>Wednesday</p> <ul style="list-style-type: none">- Practical work in the MetLab Preparing of sprayed test samples (cutting, mounting, grinding, polishing)- Analysis of coating with the microscope and according coating pictures <p>Thursday</p> <ul style="list-style-type: none">- 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 ... <ul style="list-style-type: none">... 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	<ul style="list-style-type: none">- 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 <ul style="list-style-type: none">- 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 <ul style="list-style-type: none">- 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 <ul style="list-style-type: none">- 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 ... <ul style="list-style-type: none">... 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	<ul style="list-style-type: none">- 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	<p>Monday</p> <ul style="list-style-type: none">- 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 <p>Tuesday</p> <ul style="list-style-type: none">- 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 <p>Wednesday</p> <ul style="list-style-type: none">- 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 Cr ₃ C ₂ - 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 ZrO ₂ 8Y ₂ O ₃ 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 ... <ul style="list-style-type: none">... 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	<ul style="list-style-type: none">- Operator of a MultiCoat Plasma equipment- Managers of a coating shop which is using the Plasma process									
Training program	<p>Monday</p> <ul style="list-style-type: none">- 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 <p>Tuesday</p> <ul style="list-style-type: none">- 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 <p>Wednesday</p> <ul style="list-style-type: none">- Operating of a MultiCoat Plasma spray equipment- Plasma spraying of test samples with a MultiCoat Plasma and TriplexPro-210 <table><tr><td>Material:</td><td>Metco 204NS</td><td>ZrO₂ 8Y₂O₃</td></tr><tr><td></td><td>Metco 68F-NS-1</td><td>Co 28Mo 8Cr 2Si</td></tr><tr><td></td><td>Metco 450-NS</td><td>Ni 5Al</td></tr></table> <p>Thursday</p> <ul style="list-style-type: none">- 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	Material:	Metco 204NS	ZrO ₂ 8Y ₂ O ₃		Metco 68F-NS-1	Co 28Mo 8Cr 2Si		Metco 450-NS	Ni 5Al
Material:	Metco 204NS	ZrO ₂ 8Y ₂ O ₃								
	Metco 68F-NS-1	Co 28Mo 8Cr 2Si								
	Metco 450-NS	Ni 5Al								
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 ... <ul style="list-style-type: none">... 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									
Target groups	<ul style="list-style-type: none">- Operator of a MultiCoat Plasma equipment- Managers of a coating shop which is using the plasma process									
Training program	<p>Monday</p> <ul style="list-style-type: none">- 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 <p>Tuesday</p> <ul style="list-style-type: none">- 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 <p>Wednesday</p> <ul style="list-style-type: none">- Operating of an MultiCoat Plasma spray equipment- Plasma spraying of test samples with an MultiCoat Plasma and SinplexPro <table><tr><td>Material:</td><td>Metco 204NS</td><td>ZrO₂ 8Y₂O₃</td></tr><tr><td></td><td>Metco 68F-NS-1</td><td>Co 28Mo 8Cr 2Si</td></tr><tr><td></td><td>Metco 450-NS</td><td>Ni 5Al</td></tr></table> <p>Thursday</p> <ul style="list-style-type: none">- 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	Material:	Metco 204NS	ZrO ₂ 8Y ₂ O ₃		Metco 68F-NS-1	Co 28Mo 8Cr 2Si		Metco 450-NS	Ni 5Al
Material:	Metco 204NS	ZrO ₂ 8Y ₂ O ₃								
	Metco 68F-NS-1	Co 28Mo 8Cr 2Si								
	Metco 450-NS	Ni 5Al								
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 Cr ₃ C ₂ - 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 ... <ul style="list-style-type: none">... 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	<ul style="list-style-type: none">- 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 <ul style="list-style-type: none">- Classification of the different thermal spray processes- Basic principles of thermal spraying Tuesday <ul style="list-style-type: none">- Introduction into the continuous, real-time monitoring with Accuraspray-G3C- Spraying of test sample and monitoring of the spray plume output data Wednesday <ul style="list-style-type: none">- 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

Quality Control of Thermal Sprayed Coatings

Evaluation and analysis of a thermal sprayed coating requires training and experience. This course provides the necessary basic knowledge of the test methods of checking spray material and coatings as well as the operation of the laboratory equipment.

Objectives	After attending the course, the participant knows the different methods available to analyze a coating ... can carry out certain laboratory tests ... is able to evaluate plasma sprayed coatings ... knows the equipment necessary to analyze spray powders ... can carry out some test methods for checking powder
Target groups	<ul style="list-style-type: none">- Employees of a metallurgical laboratory- Managers of a metallurgical laboratory- Students of universities who are focused on spray plume monitoring in the thermal spraying
Training program	Monday <ul style="list-style-type: none">- Classification of the different thermal spray processes- Basic principles of thermal spraying Tuesday <ul style="list-style-type: none">- Preparation of metallographic samples (customers' samples)<ul style="list-style-type: none">- Preparation of the test samples- Metallurgical evaluation with microscope (unmelted particles, porosity, oxides, cracks)- Measurement of the porosity- Measurement of micro and macro hardness- Bond strength test- Roughness measurement Wednesday <ul style="list-style-type: none">- Powder check<ul style="list-style-type: none">- Measurement of the particle size distribution (Microtrac)- Morphology test (SEM, optical method)- 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.



www.oerlikon.com/metco
info.metco@oerlikon.com