FAST TRACK TO SKILLS.

AVL North America
Remote Training Catalog

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AVL REMOTE TRAINING – FAST TRACK TO SKILLS

Modern means of communication are opening up new ways of obtaining knowledge. Today, teaching and learning is no longer bound to geographical locations. With AVL's Remote Training, your classroom is where you are.

In this **AVL Remote Training Catalog** you will find all our trainings that are currently conducted remotely. The date is agreed individually with the customer.

Our certified trainers have prepared a perfect mix of theoretical lessons and hands-on exercises which have been especially designed for live online training including the use of relevant equipment for the participants (e.g. simulators). With its technical setup, AVL Remote Training offers virtually the same interactive experience as with a face-to-face environment.

Browse through our offering, no matter where you are – you are just one click away from developing your expertise!

Our entire training portfolio including our face-to-face training courses can be found on shop.avl.com. In case of any questions, you're welcome to contact us at skillscenter@avl.com.

Your AVL Skills Center Team

1. TRAINING FOR TESTBED SYSTEMS

1.1. REM.TRAIN. PUMA ENGINE TESTBED TNASKTRR24.01

REMOTE TRAINING – OPERATION & PARAMETERIZATION OF PUMA ENGINE TESTBED

This training refers to PUMA versions 1.5.3 and 2 – for a training dealing with older versions, please contact your local representative.

Target Group
Operation (Test Operator), Parameterization (Test Engineer)

Target
The participants are able to operate the PUMA Engine testbed automation system. Furthermore, the trainees are able to modify the parameters regarding the main automation system tasks for controlling, measurement and monitoring. Additionally, they know the main tools to perform automatic testruns.

The training includes:
- 8 sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Testbed Operating
  - Starting the PUMA system
  - PUMA operating steps and operator interface
  - Control of UUT and dyno
    - Control modes and demand values
    - Operating with panel, manual operation window and automatic mode
  - Monitoring
    - Handling of testbed and limit monitoring
  - Measurement
    - Operation of stationary and recorder measurement
    - Simple data evaluation with AVL CONCERTO
- PUMA Parameterization
  - Parameterization tools – the navigator
  - Parameter set overview and handling
  - Data acquisition and quantities in general
  - Measurement
    - Parameterization of steady state and recorder measurement
  - UUT Control
    - Overview of main UUT parameters (max. speed, start, stop…)
    - Overview of main UUT set values and controllers (ALPHA, TORQUE, SPEED)
  - Monitoring
    - Parameterization of testbed monitoring, limit monitoring and the post mortem recorder
  - Formulas
    - Parameters and functions of cyclic and on demand formulas in PUMA
  - Automatic testrun
    - Overview of main tools for program flow control and Dyno/UUT control
    - Parameterization of simple automatic testruns

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites

- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended
- Basic knowledge of the operation an unit under test

Cancellation and Rescheduling

Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:

- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

1.2. REM.TRAIN. PUMA E-MOTOR TESTBED TNASKTRR23.01

REMOTE TRAINING – OPERATION & PARAMETERIZATION OF PUMA E-MOTOR TESTBED

This training refers to PUMA versions 1.5.3 and 2 – for a training dealing with older versions, please contact your local representative.

Target Group
Operation (Test Operator), Parameterization (Test Engineer)

Target
The participants are able to operate the PUMA E-Motor testbed automation system. Furthermore, the trainees can modify the parameters regarding the main automation system tasks for controlling, measurement and monitoring. Additionally, they know the main tools to perform automatic testruns.

The training includes:
- 8 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Testbed Operating
  - Start the PUMA system
  - PUMA operating steps and operator Interface
  - Control of AVL E-Storage System, UUT and dyno
    - Operation and main states of the AVL E-STORAGE system
    - Control modes and demand values
    - Operating with panel, manual operation window and in automatic mode
  - Monitoring
    - Handling of testbed and limit monitoring
  - Measurement
    - Operation of stationary and recorder measurement
    - Simple data evaluation with AVL CONCERTO
- PUMA parameterization
  - Parameterization tools – the navigator
  - Parameter set overview and handling
  - Data acquisition and quantities in general
  - Measurement
    - Parameterization of steady state and recorder measurement
  - UUT Control
    - Overview of main UUT parameters (max. speed, start, stop…)
    - E-Motor Torque Controller (only in case of version PUMA 2 E-Motor)
  - Monitoring
    - Parameterization of testbed monitoring, limit monitoring and the post mortem recorder
  - Formulas
    - Parameters and functions of cyclic and on demand formulas in PUMA
  - Automatic test run
    - Overview of main tools for program flow control and Dyno/UUT control
    - Parameterization of simple automatic test runs

Notes
- Training class is conducted in English
- Max. participants: 6 persons
- Training regarding „E-STORAGE SYSTEM" will be performed on operator level in this training. Detailed training regarding „E-STORAGE SYSTEM" is not part of supply.
- If an AVL e-Power measurement system is installed at the testbed we recommend to order the "TRAINING HW E-POWER MEASUREMENT SYSTEM" (TTEPOWEROP.01) in addition.

Prerequisites

- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended

Cancellation and Rescheduling

Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:

- >14 calendar days prior to training start: 50% of the training fee
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1.3. REM.TRAIN. PUMA HYBRID ENGINE TESTBED TNASKTRR25.01

REMOTE TRAINING – OPERATION & PARAMETERIZATION OF PUMA HYBRID ENGINE TESTBED

This training refers to PUMA versions 1.5.3 and 2 – for a training dealing with older versions, please contact your local representative)

Target Group
Operation (Test Operator), Parameterization (Test Engineer)

Target
The participants are able to operate the PUMA Hybrid Engine testbed automation system. Furthermore, the trainees can modify the parameters regarding the main automation system tasks for controlling, measurement and monitoring. Additionally, they know the main tools to perform automatic testruns.

The training includes:
- 8 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Testbed Operating
  - Start the PUMA system
  - PUMA operating steps and operator Interface
  - PUMA hybrid control strategy
  - Operation and main states of the AVL E-STORAGE system
  - Operating with panel, manual operation window and in automatic mode
  - Handling of testbed and limit monitoring
  - Operation of stationary and recorder measurement
  - Simple data evaluation with AVL CONCERTO
- PUMA parameterization
  - Parameterization tools – the navigator
  - Parameter set overview and handling
  - Data acquisition and quantities in general
  - Parameterization of steady state and recorder measurement
  - Overview of main UUT parameters (max. speed, start, stop…)
  - Demand value to the HCU
  - Parameterization of testbed monitoring, limit monitoring and the post mortem recorder
  - Parameters and functions of formulas in PUMA
  - Overview of main tools for program flow control and Dyno/UUT control
  - Parameterization of simple automatic test runs

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
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2. TRAINING FOR MONITORING, CONTROL AND SIMULATION

2.1. REM.TRAIN. EMCON 400 TNASKTRR20.01

REMOTE TRAINING – OPERATION AND PARAMETERIZATION OF EMCON 400

This training refers to EMCON versions 5.4.3 and 6.R.x – for a training dealing with older versions, please contact your local representative

Target Group
Parameterization (Test Engineer), Maintenance & Service (Calibration / Maintenance / Service Personnel)

Target
The participants are able to operate the EMCON 400 via menus on the operating panel. In addition they know the principal system architecture and the parameterization of the EMCON system. The participants integrate EMCON 400 I/O components into the system.

The training includes:
- 8 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Hardware overview
- PUMA – EMCON integration, Engine and Dyno Interfaces
- Discussing the EMCON parameter with practical examples
- Modification of the EMCON parameter to extend EMCON functions
- Connection possibilities and hardware environment (example F-FEM-CON, ETC-FEM-FIO)
- Basic explanation of engine and dynamometer controllers for stationary purposes
- Demand value setting with operating panel or PUMA automation system
- Parameter menue
- Parameter blocks
- Safety concept

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended
- Experience in operation and parameterization of the PUMA Open System

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

REMOTE TRAINING – OPERATION TESTBED CONTROLLER (STAND ALONE ADVANCED)

This training refers to version EMCON 6.

Target Group
Operation (Test Operator), Parameterization (Test Engineer), Maintenance & Service (Calibration / Maintenance / Service Personnel)

Target
The participants are able to operate the Testbed Controller. They understand and the principal functions of the Testbed Controller and are able to adjust the engine-dyno controllers.

The training includes:
- 6 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Hardware system overview
- Connection possibilities and hardware environment
- Dyno Interface
- Explanation of the Testbed Controller by means of practical examples
- Adjustment of engine and dynamometer controllers for stationary purposes
- Operation of the Testbed Controller via operating panel
- Parameter menue
- Recall mode

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
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3. TRAINING FOR TESTBED AUTOMATION

3.1. REM.TRAIN. PUMA TESTRUN PREPARATION TNASKTRR26.01

REMOTE TRAINING – DEVELOPMENT OF AUTOMATIC TESTRUNS IN PUMA

This training covers the creation of automatic testruns in the PUMA automation system of version 1.5.3 or 2. For a training dealing with older versions, please contact your local representative.

Target Group
Parameterization (Test Engineer)

Target
The participants can parameterize automatic test runs according to complex test requirements and display the results.

The training includes:
- 6 sessions (3-hour block each), date and time schedule to be agreed
- Training material
- AVL certificate for participants

Content
- Functions and tools
  - General functions like cut / copy / paste ..., search, compare
  - Quantities versus local variables
  - Link status, import functions and version handling
- BSQ (Block SeQuences)
  - General properties (timing) and program flow elements
  - Operator interface commands and online window (debugging)
  - Structural elements (group, subroutine, exception)
- SSQ (Step SeQuences)
  - SSQ demand value definition, properties of steady state and dynamic SSQ
  - Step buffer handling, export/import example
- Recorder
- Steady State Measurement
- Exception Handling
  - Exception types, definition of exception handlers, remind / recover
- Library Handling
  - Purpose and overview
  - Functions and tools
- Creation of a complex automatic testrun example

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

REMOTE TRAINING – DEVELOPMENT OF VB SCRIPTS IN PUMA

This training covers the development and integration of VB scripts into the PUMA automation system version 1.5.3 or 2. For a training dealing with older versions, please contact your local representative.

Target Group
Parameterization (Test Engineer)

Target
The participants understand the basic usage of scripting in PUMA (Activation Objects, Scripting, Extensibility Scripts, State Machine and BSQ/SSQ). They can create, modify and test the scripts in the PUMA system.

The training includes:
- 8 Sessions (3-hour block each), date and time schedule to be agreed
- Training material
- AVL certificate for participants

Content
- Introduction into the VB programming language
- VB script syntax and best practices
- VB concepts: variables, constants and control structures
- VB concepts: functions, subroutines, data arrays
- Basic introduction into scripting in PUMA
- Creation and modification of script contexts
- Definition of hand-over parameters (system channels / script parameters)
- Integration of scripts into the automatic testrun (BSQ/SSQ)
- Execution of scripts from other PUMA components
- Practical exercises using extensibility scripts
- Debugging and problem analysis

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended.
- It is necessary to have basic knowledge in programming languages e.g. C++, VBA, VBS and to understand the fundamental concepts of those, e.g. functions/subroutines, hand-over of parameters by reference and by value, indexed data types
- Experience in operation and parameterization of the PUMA System
- Knowledge of creating automatic test runs with BSQ / SSQ

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

REMOTE TRAINING – SETUP & PROGRAMMING TEST CELL CONTROL (TCC)

This training covers design and development of the TCC in the PUMA versions 1.5.3 and 2. For a training dealing with older versions, please contact your local representative.

Target Group
Parameterization (Test Engineer)

Target
The participants can define and test the programmable test cell control according to their requirements.

The training includes:
- 4 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Function of the Automation System Controller (ASC)
  - Editing Extensibility scripts
- Functions of the Test Cell Control (TCC)
  - States
  - Actions
  - Triggers
- PUMA application examples with ASC and TCC

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, webcam and 2nd monitor recommended
- Experience in operation and parameterization of the PUMA System
- Basic knowledge about VB Scripts

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

REMOTE TRAINING – PARAMETERIZATION AND TROUBLESHOOTING FOR A2CAN AND CANOPEN

Target Group
Operator, Parameterization & Test Engineer

Target
The participants are able to understand the structure of CAN-Bus, to set it up and to parameterize it in the PUMA software.

The training includes:
- 2 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Basics of the CAN-Bus
- Technical Data
- Bitrates and cabling
- CAN-Signals and Messages
- Creation and modification of a DBC file
- Basics of the CANopen Pressure Transducers
- Practical exercise on Remote Simulator

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended
- PUMA Basic knowledge
- “REMOTE SEMINAR PUMA IO INTERFACES” (TTRPUMAIOI.01)

Cancellation and Rescheduling
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- 14 calendar days or less prior to training start: 100% of the training fee

REMOTE TRAINING – OPERATION & PARAMETERIZATION OF ISAC 400

This training refers to PUMA versions 1.5.3 and 2 – for a training dealing with older versions, please contact your local representative.

Target Group
Operation (Test Operator), Parameterization (Test Engineer)

Target
The participants are able to parameterize and operate the dynamic testbed. They are able to execute and adjust the parameters to pass statutory dynamic test profiles, parameterize various vehicles, different road load definitions and different drivers.

The training includes:
- 8 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Basic model of vehicle and driver simulation
- Parameterization of a vehicle and road-load definition
- Adjustment of the driver
- Operation of the dynamic testbed
- Creation of dynamic sequences
- Optimization of gear shifts and controllers according to legal cycles

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended

Cancellation and Rescheduling
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REMOTE TRAINING – IGEM 2 BASICS

Scope of the iGEM application, legislation requirements and cycles, software structure. Configuration for different applications and for different testing environments (LD, HD, NRMM, SORE, engine or chassis dyno).

Target Group
Operation (Test Operator, Test Engineer)

Target
The participants understand the function of AVL iGEM 2 and are able to operate the test bed-automation system. The meaning of “pretest dialog values” is known and AVL iGEM 2 test runs can be executed. Additionally, they are able to evaluate test results with CONCERTO and create test specific reports.

The training includes:
- 5 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Combustion process
  - Combustion and emissions
  - Aftertreatment systems
- Emission legislation requirements and basic calculation
  - Differences between different applications (Light Duty, Heavy Duty, NRMM, SORE)
  - Specific grams calculation example
- Emission measurement devices overview
- iGEM 2 Structure
  - Parameters
  - Data Base
  - Results
- Operating with the system
  - Selection of test cycle, test limits and parameterization of iGEM 2 Pre Test Dialog
- Generating a test result report
  - Access to results via CONCERTO
  - Generate report with EMA working environment in CONCERTO
  - Understanding the report contents

Notes
- Training class is conducted in English
- Max. participants: 6 persons
- Training of customer specific functions can only be provided using the actual customer system

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended
- PUMA 2 knowledge (Operator level)
- Experience in emission testing (engine test cell and/or chassis dyno)

Cancellation and Rescheduling

Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:

- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

REMOTE TRAINING – iGEM 2 VEHICLE INSTALLATION AND PARAMETERIZATION

Installation of iGEM 2 on an already installed PUMA 2 system. Commissioning of parameters, execution of emission cycle, generation of test report, customizations.

Target Group
Testbed Engineer

Target
The participants are able to understand how the system works, to configure and parametrize it, to keep it efficient and operational. They know how to make small adjustments if necessary. Furthermore they are able to generate the test report and find the root cause of possible errors.

The training includes:
- 5 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Installation on iGEM 2
  - iGEM 2 packages and EMA license
- Parameterization of iGEM 2
  - System parameter (EBH, MDV, CHM blocks)
  - Unit Under Test parameter
  - Test Run Parameter (BSQ)
  - Test Facility parameter
  - Drivers Aid (IDA)
  - Mapping
- Emission Cycle Structure
  - BSQ structure (EMA Chassis.tst)
  - ELD and ECD structure
  - ECD and ELD modification
  - Devices handling
  - Customization of Recorder
- Generating a test result report
  - Generate report with EMA working environment in CONCERTO
  - Report troubleshooting
  - Customization of report

Notes
- Training class is conducted in English)
- Max. participants: 6 persons
- Training of customer specific functions can only be provided using the actual customer system

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended
- PUMA 2 knowledge (Operator level)
- iGEM 2 Basics
- Experience in emission testing (chassis dyno)

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

REMOTE TRAINING – IGEM 2 ENGINE HD INSTALLATION AND PARAMETERIZATION

Installation of iGEM 2 on an existing PUMA 2 system. Commissioning of parameters, execution of emission cycle, generation of test result report, customizations.

Target Group
Testbed Engineer

Target
The participants are able to understand how the system works, to configure and parametrize it, to keep it efficient and running. They know how to modify or change something when required. Furthermore they are able to generate the result report and find the root cause of possible errors.

The training includes:
- 5 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Installation on iGEM 2
  - iGEM 2 packages and EMA license
  - File and folder deployed
- Parameterization of iGEM 2
  - System parameter (EBH, MDV, CHM blocks)
  - Unit Under Test parameter
  - Test Run Parameter (BSQ)
  - Test Facility parameter
  - Mapping
- Emission Cycle Structure
  - BSQ structure (EMA Engine.tst)
  - ELD and ECD structure
  - ECD and ELD modification
  - Devices handling
  - Customization of Recorder
- Generating a test result report
  - Generate report with EMA working environment in CONCERTO
  - Report troubleshooting
  - Customization of report

Notes
- Training class is conducted in English
- Max. participants: 6 persons
- Training of customer specific functions can only be provided using the actual customer system

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended
- PUMA 2 knowledge (Operator level)
- “REMOTE TRAINING iGEM 2 BASICS” (TTRIGEM2BA.01
- Experience in emission testing (engine test cell and/or chassis dyno)

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
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REMOTE TRAINING – FROM DATA SOURCE TO REPORT WITH CONCERTO

This training refers to all AVL CONCERTO 5 releases – for a training dealing with older versions, please contact your local representative.

Target Group
Operation (Test Operator), Data Evaluation (Post Processing personnel)

Target
The participants are able to handle the complete post-processing workflow with AVL CONCERTO from data import to visualization and evaluation.

The training includes:
- 4 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Overview of the data structure and data management
- Import of test result data from a wide variety of sources (for example: AVL PUMA, ETAS INCA, AVL iFiles, CSV, etc.)
- Creation of diagrams, tables and reports
- Evaluation and interpretation of measurement data
- Data comparison (of test results from the same data source)
- Exporting and merging of data
- Management of layouts and data sources in work environments and libraries
- Hands-on exercises with application examples for above topics

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended
- **CONCERTO Licenses for Installation on customer PC/Laptop can be provided but must be requested prior to training start**

Cancellation and Rescheduling
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- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

REMOTE TRAINING – AUTOMATIC DATA PROCESSING WITH CONCERTO

This training refers to all AVL CONCERTO 5 releases – for a training dealing with older versions, please contact your local representative.

Target Group
Data Evaluation (Post Processing personnel with established CONCERTO experience), Data Post Processing.

Target
The participants are able to design and implement advanced post-processing applications using AVL CONCERTO. This includes development of formulae/macros/scripts to extend the basic CONCERTO functionality and to automate large post processing tasks and create a GUI to guide operators through complex evaluation processes.

The training includes:
- 4 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Creation of CONCERTO formulae, macros and scripts
  - Resource management
  - Organization of CONCERTO components in multi user environments
  - Library concept
  - Advanced data source configuration
- Application development
  - Data handling (resampling, extracting, filtering, etc.)
  - Creation of GUI
  - Automation of work flows
  - Data export
- Hands-on exercises with application examples for above topics

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended
- TRAINING CONCERTO EVALUATION" or equivalent knowledge "TRAINING CONCERTO EVALUATION" (TT03AD001A.01)
- **CONCERTO Licenses for Installation on customer PC/Laptop can be provided but must be requested prior to training start**

Cancellation and Rescheduling
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REMOTE WORKSHOP – PYTHON IN AVL CONCERTO

This training refers to all AVL CONCERTO 5 R3 releases and newer.

Target Group
Data Evaluation Engineers with knowledge in Python. Experienced CONCERTO App Developer

Target
The participants understand how Python functions can be embedded in CONCERTO post processing applications. Practical examples should highlight the advantages of Python over CONCERTO scripting language.

The training includes:
- 4 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Introduction / Overview of the Python implementation
- Data transfer between CONCERTO / Python
- Data structures in Python
- Calculations / Automation with Python
- Comparison to existing CONCERTO scripting functionality
- Hands-on exercises with application examples for above topics

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites
- Remote training via Web-Services: Stable internet connection required
- Headset, Webcam and 2nd screen recommended
- “TRAINING CONCERTO ADVANCED” (TNASKTR306.01) or equivalent knowledge
- Basic skills with Python are mandatory, this is NOT a training for Python coding
- **CONCERTO licenses for Installation on customer PC/Laptop can be provided but must be requested prior to training start**

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

4. TRAINING FOR TEST INFORMATION MANAGEMENT

4.1. REM.TRAIN. AVL PUMA 2 SHARE TNASKTRR22.01

REMOTE TRAINING – ADMINISTRATION & MAINTENANCE OF PUMA 2 SHARE (formerly Santorin HOST)

This training refers to PUMA 2 Share (formerly Santorin HOST 5.5) or above. For a training dealing with older versions, please contact your local representative.

Target Group
Test Field Administrator, IT Administrator

Target
The participants are able to administrate and parameterize a PUMA 2 Share system according to test field requirements and are also able to carry out necessary maintenance task to ensure data security/safety

The training includes:
- 8 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- System design / Test field set up
- Administration
  - PUMA quantities
  - Projects
  - Users
  - Database (STORM)
- Parameterization via AVL Navigator
- Functions
  - Result replication
  - Weather station
  - Tables (Central/Master-Data)
  - Test field data distribution (TFDD)
- Automation of administrative tasks
  - Email Distributor (EMD)
  - AutoProc
- Archiving
- DataBridge
- AVL Santorin Backup

Notes
- Training class is conducted in English
- Max. participants: 6 persons
- Training on/with customer's server is subject to clarification before training. If remote connection is not possible the training will be held on generic server simulators provided by AVL Skills Center

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

5. TRAINING FOR EMISSION ANALYSIS AND MEASUREMENT

5.1. REM.TRAIN. MICRO SOOT SENSOR PLUS TNASKTRR51.01

REMOTE TRAINING – OPERATION & BASIC MAINTENANCE AT MICRO SOOT SENSOR PLUS (AVL 483)

This training refers to Micro Soot Sensor Plus.

Target Group
Operation (Test Operator), Maintenance & Service (Calibration / Maintenance / Service personnel)

Target
The participants are able to operate the AVL Micro Soot Sensor, to perform measurements and to carry out simple maintenance.

The training includes:
- 2 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
Session 1:
- Basic knowledge of emissions measurement
- Overview of system set-up. Installation, important parameters and options
- Operation the Micro Soot Sensor Plus
  - Measurement principle and procedures, operating states and functions, controlling

Session 2:
- Maintenance
  - Cleaning windows, measuring cell, sampling lines, changing the filter elements, cleaning dilution cell and high pressure option
  - Calibration check, laser / microphone linearity check and automatic checks, temperature reference measurement
  - Leak check (internal & external) and leak detection
  - Service & measurement data logging – fingerprint (helpline report)

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended
- Basic knowledge of mechanics, measurement techniques
- General testbed knowledge

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

REMOTE TRAINING – MICRO SOOT SENSOR 2 (MSS 2 – AVL 497)

Target Group
Testbed Engineers / Leaders, Technicians in Sales, Service, Commissioning, Engineering and Development

Target
The participants know the features of the MSS 2 (AVL 497) including operation, checks and regular maintenance work and integration of options (like PSU, EPU, M.O.V.E) and accessories.

The training includes:
- 2 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
Session 1:
- Theoretical part – introduction
  - Basic knowledge of emissions measurement
  - Overview of system set-up. Installation, important parameters and options
  - Measurement principle, features / specifications and MSS 2 concept with advantages in the testbed and for RDE applications
- Sensor and base unit components, pneumatics
- Communication and boards
- Operating states and functions of the MSS 2

Session 2:
- Verifications, (automatic) checks and relative calibration, temperature reference measurements
- Maintenance
  - Cleaning windows, measuring cell, sampling lines, changing the filter elements, cleaning dilution cell and high-pressure option
  - Leak check and leak detection
  - Service & measurement data logging – helpline report

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended
- Basic knowledge of mechanics, measurement techniques
- General testbed knowledge

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

REMOTE TRAINING – UPGRADE TO MICRO SOOT SENSOR 2 – MSS 2 (AVL 497)

Operation & basic maintenance at Micro Soot Sensor 2.

Target Group
Operation (Test Operator), Maintenance (Calibration / Maintenance / Service / Commissioning personnel)

Target
The participants know the differences to the MSS Plus and are able to operate the AVL Micro Soot Sensor MSS 2, to perform measurements and to carry out basic service and maintenance.

The training includes:
- 2 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
Session 1:
- Repeating measuring principles and functionality of the Micro Soot Sensor
- Differences MSS Plus to the MSS 2, installation and overview of system set-up
  - Operating the MSS 2 via PC (Device Control Software) and PUMA system, operating states and functions, important parameters and features, data quality and correlation

Session 2:
- MSS 2 range of applications
- MSS 2 options (RDE)
- Maintenance with focus on differences MSS Plus to the MSS 2

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended
- Basic knowledge of mechanics, measurement techniques
- General testbed knowledge
- Basis knowledge of Micro Soot Sensor Plus preferable

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

REMOTE TRAINING – OPERATION & BASIC MAINTENANCE AT OPACIMETER (AVL 439)

Target Group
Operation (Test Operator), Maintenance & Service (Calibration / Maintenance / Service personnel)

Target
The participants are able to operate the Opacimeter, to perform measurements and to carry out simple maintenance.

The training includes:
- 2 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
Session 1:
- Basic knowledge of emissions measurement
- Differences of previous generations to G004 (G005)
- Overview of system set-up (mechanical, pneumatical and electrical installation), installation and options
- Operating, measurement principle and procedures, operating states and functions, controlling the Opacimeter

Session 2:
- Maintenance
  - Cleaning window modules, measuring chamber and sampling lines, changing the filter element
  - Leak check, calibration and linearity check
  - Temperature reference measurement at measuring tube

Notes
- Training class is conducted in English)
- Max. participants: 6 persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended
- Basic knowledge of mechanics, measurement techniques
- General testbed knowledge

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

REMOTE TRAINING – OPERATION & BASIC MAINTENANCE AT SMOKE METER 415SE (AVL 415)

Target Group
Operation (Test Operator), Maintenance & Service (Calibration / Maintenance / Service personnel)

Target
The participants are able to operate the AVL Smoke Meter, to perform measurements and to carry out simple maintenance.

The training includes:
- 2 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
Session 1:
- Basic knowledge of particulate measurement
- Differences 415S to 415SE with an overview of system set-up and installation
- Operation
  - Measurement principle and different measurement procedures, parameters, operating states and functions, controlling the AVL Smoke Meter, options

Session 2:
- Maintenance
  - Cleaning reflectometer head, light gates, camshaft, sampling probe, sampling lines, white value plate, changing the filter element
  - Leak check, sampled volume check (using volume tester) and reflectometer head check (using reflectance standards)

Notes
- Training class is conducted in English
- Max. participants: 6. persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended
- Basic knowledge of mechanics, measurement techniques
- General testbed knowledge

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

REMOTE TRAINING – OPERATION AT AMA i60

This training refers to AMA i60 generation series.

Target Group
Operation (Test Operator), Maintenance & Service (Calibration / Maintenance / Service personnel)

Target
The participants understand the principles of analyzers and the layout of AMA i60. They are able to operate the main functions. The participants obtain a basic understanding of the foundations of emissions measurement.

The training includes:
- 6 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Basics of emissions measurement and legislation
- Overview of the customer specific system configuration
- HSS-prefilter
- Measurement principles of the analyzers
- Pneumatic layout of the customer specific analyzers
- Physical and pneumatic layout of AMA i60
- Electric components and control layout
- iGEM AMA software operation
- Operation of AMA i60
- Parameterization on operator level

Notes
- Training class is conducted in English
- Max. participants: 6 persons
- The training covers approximately 80% of the TTAMAI60OP.01 training

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

REMOTE TRAINING – OPERATION AT AMA SL

This training refers to the AMA SL generation.

Target Group
Operation (Test Operator), Maintenance & Service (Calibration / Maintenance / Service personnel)

Target
The participants obtain an understanding of the fundamentals of emission measurement. They understand the measuring principles of analyzers and the setup of the AMA SL and its components. The participants are able to operate the main functions.

The training includes:
- 6 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Basic knowledge about combustion process and the application
- General technical information and technical details about the AVL AMA SL
- Hardware structure
  - Pre-Filter
  - Chiller module
  - Power distribution unit (PDU), Analyzer valve unit (AVU) & Span gas unit (SGU)
  - Condensate removal & toxic waste
- Overall flow diagram of the system and Pre-Filter
- Gas paths for measure, zero & span gas adjustment and linearity check
- iGEM AMA bench control software
  - General information, iGEM AMA software structure and operation
  - Customer specific configuration of user interface (favorites, layout manager)
  - Checks, scheduling and diagnostics

Notes
- Training class is conducted in English
- Max. participants: 6 persons
- The training covers approximately 80% of the TNASKTR580.01 training

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

6. TRAINING FOR IN VEHICLE MEASUREMENT

6.1. REM.TRAIN. M.O.V.E DATA TOOLBOX TNASKTRR60.01

REMOTE TRAINING – AVL CONCERTO 5 M.O.V.E DATA TOOLBOX

A training to help you evaluate your PEMS measurement data for your certification or R&D needs.

Target Group
Testing and Data Evaluation Engineers

Target
The participants are able to evaluate measurement data recorded with AVL M.O.V.E systems with AVL CONCERTO utilizing M.O.V.E Data Toolbox Work Environment. They also receive an overview of legislation requirements (prior communication necessary) and a general update to CONCERTO`s functionalities to display data.

The training includes:
- 2 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Legislation Update (depending on customer needs)
- CONCERTO 5 MDT (last release or customer version), overview on functionalities
- Post processing and discussion of demo data (ideally provided by the customer)
- Independent repetition of post processing supported by the trainer
- Additional functionalities of CONCERTO 5 MDT
- Q&A-Session

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended
- Basic knowledge of RDE measurements is recommended

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

REMOTE TRAINING – M.O.V.E System Control Software Functionalities and Workflow

A guidance to getting the most out of your AVL M.O.V.E System Control and how to operate it most efficiently.

Target Group
Operation (Test Operator), Parameterization (Test Engineer), Data Evaluation (Post Processing personnel), Maintenance & Service (Calibration / Maintenance / Service personnel)

Target
The participants are able to operate an AVL M.O.V.E System via the AVL M.O.V.E System Control Software. They can set up tests with the appropriate hardware configuration and execute measurements for their application.
They are familiar with the theoretical background and parametrization of tests, with a focus on pre- and post-tests for PEMS testing.

The training includes:
- 2 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- AVL M.O.V.E System Control architecture (Hardware, Software)
- Interfaces (GPS, ambient conditions, CAN, OBD adapter)
- Integration of AVL devices (e.g. GAS PEMS, PM PEMS, PN PEMS, M.O.V.E EFM, FID iS Module and PLUTron)
- AVL M.O.V.E System Control operation
- Test configuration for Pre-, Main- and Post test
- Visualization of data (creation and customization of layout pages and display objects)

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended
- Basic knowledge of RDE measurements is recommended

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

7. TRAINING FOR BATTERY TEST SYSTEMS

7.1. REM.TRAIN. BATTERY TESTING OPERATION TNASKTRR30.01

REMOTE TRAINING – OPERATION OF LYNX FOR BATTERY TESTING

This training refers to the product E-STORAGE BT (Tester) and LYNX version 2.0 or above.

Target Group
Operation (Test Operator), Parameterization (Test Engineer)

Target
The participants are able to operate the LYNX automation system. They are able to define and execute manual measurements and run pre-defined test runs.

The training includes:
- 4 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Starting the system
- Manual and automatic operation
- Limit monitoring and operating states
- Definition and execution of manual measurements
- Operation of a pre-defined recorder
- Values and results display
- Overview of LYNX parameter sets (test cell-, stand-, battery- and test parameters)
- Selection of parameter sets
- Reviewing data with the Data Browser
- Using the message window
- Using the help functions

Notes
- Training class is conducted in English
- Max. participants: 6 persons

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee

REMOTE TRAINING – SET-UP OF LYNX FOR BATTERY TESTING

This training refers to LYNX version 2.0 and above in combination with E-STORAGE BT (Tester)

Target Group
Parameterization (Test Engineer)

Target
The participants are able to configure the LYNX automation system. They are able to set up channels, connect input/output devices, and parameterize automatic test runs.

The training includes:
- 4 Sessions (3-hour block each), date and time schedule to be agreed
- Training Material
- AVL Certificate for participants

Content
- Overview of hardware architecture
- Content of testcell-, stand-, battery- and test parameter sets
- Setting up input / output channels
- CAN channel configuration
- Writing automatic test runs, startup and shutdown routines
- Sequence library and subroutines
- Creating and use datasheets
- Setup of exception routine
- Creating and editing formulas
- Setting up of testcell limits and engine limit groups
- Data post processing with data browser (check of results)
- Importing and exporting of test run parameters

Notes
- Training class is conducted in English
- Max. participants: 6 persons
- “TRAINING LYNX BATTERY TESTING OPERATION” (TNASKTRR30.01) or equivalent knowledge about automation technics

Prerequisites
- Remote training via Internet-Services: Stable internet connection required
- Headset, Webcam and 2nd monitor recommended

Cancellation and Rescheduling
Cancellation or rescheduling of confirmed training dates are subject to the following cancellation policy and fees:
- >14 calendar days prior to training start: 50% of the training fee
- 14 calendar days or less prior to training start: 100% of the training fee