

# VMS

## ECU Virtualisation

### Description

VMS, Virtual Magneti Marelli Server, is a new software module dedicated to the ECU virtualisation.

The VMS provides the support for the execution of the ECU embedded models on PC hardware.

The entire ECU system application code can be generated from models developed in Simulink.

These models can be compiled with target ECU or PC: in other words the entire ECU system can be fully tested, offline, in a PC platform.

The VMS is a part of the software architecture composed by the data analysis and the calibrations tools: WinTAX4, SYSMA.

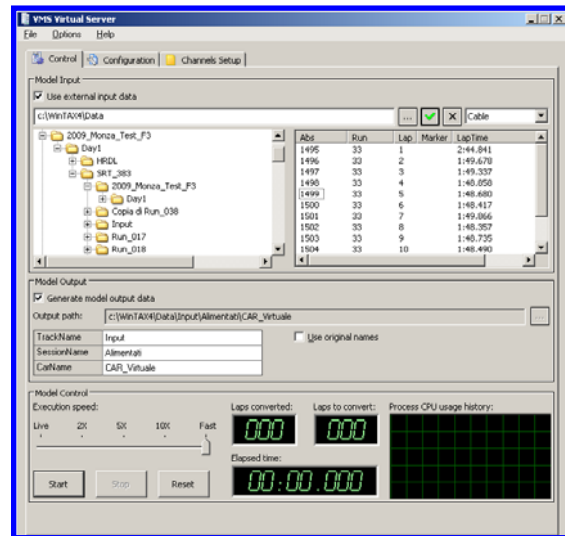
- WinTAX4 allows you to display, compare and analyse the data generated from VMS.
- SYSMA is used to program, calibrate and monitor the virtual ECU, as well as the real HW.

The VMS can be used to enrich data coming from real system or compare controls and strategies against logged data.

The VMS supports the “offline” and “live” mode.

### Main Features

- Configuration and live monitoring of ECU virtual system, using SYSMA application
- Interaction with real multiple CAN buses through PC's CAN interface
- Input from: Logged Data, Functions and WinTAX4 Virtual Channels
- Input from external applications through OLE/Automation protocol
- Integration with WinTAX Telemetry Data server, for real time live data distribution of virtual parameters
- Integration with WinTAX4 for logged data processing and analysis
- Offline Execution: offline processing of logged data
- Live Execution: real-time processing of telemetry live data, while car is moving on the track
- Channels Names: customisable Input & Output to adapt sw models to acquired logging tables
- Models Speed: execution speed of models users' customisable



### Benefits

- Confidentiality: input/output data encryption.
- Setup: simple installation package
- Integrated Task manager: monitoring of all operations to keep under control the execution status of models
- Logging of output in WinTAX4 data format
- Help: quick start user guide

### System Compatibility

- Compatible with: Windows® XP 32/64 bit, Windows® Vista 32/64 bit, Windows® 7 32/64 bit, Windows® 8 32/64 bit
- Compatible with Dual & Quad Core processor

### Typical Applications

In all applications with Magneti Marelli ECU

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### ECU Virtualisation

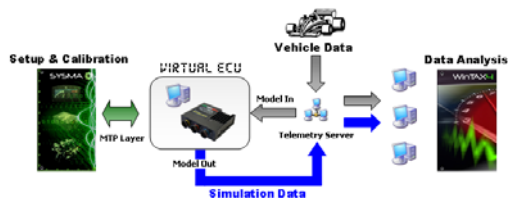
#### Main characteristics

The VMS allows processing of real time telemetry data.

- While vehicle is running on the track the models can be feed with live telemetry data and results can be displayed and analysed in real time.
- VMS can be connected with WinTAX4 Telemetry Server which re-distributes the real time virtual data stream to any WinTAX4 client connected.
- The WinTAX4 end user can switch between real and virtual stream at any time.

In the following figure the schema of VMS integration:

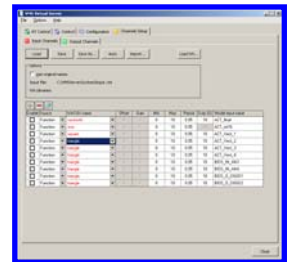
- The gray arrows is the real data coming from car or bike
- The concentrator is WinTAX4 Telemetry Server: it is responsible for data distribution to WinTAX4 clients and VMS.
- These data feed the ECU models loaded in VMS.
- The output (blue arrows) is the "virtual data" generated by VMS.
- They are again injected in WinTAX Telemetry Server to be re-distributed to all WinTAX4 clients, in parallel with real data.
- The VMS can be calibrated/tuned by Sysma via MTP layer (green arrows).



#### VMS: models and Input&Output setup

- Several different models can be loaded and executed by VMS at the same time
- The Input and Output of the models can be configured to adapt the software names to the logging table acquired signals and vice versa
- For each channel the user can configure its alias name, both for input and output lists, custom list can be saved, imported/exported
- VMS allows to filter the software variables to be exported: useless channels can be easily forced off in the output
- Inputs types: VMS allows you to use different source data types for inputs feeding. As default the inputs values are taken from the logged channels. In addition you can also feeds inputs via:

- Real Time Data, historic Logged Data
- WinTAX4 Math Channels, Constants values, Functions
- External Channels created via OLE/Automation protocol
- The available internal VMS Functions are: Sin wave, Triangular wave, Square wave and Sawtooth wave.
- For each of them input signals you can configure Min, Max values, Period and the Duty Cycle percentage.
- VMS also supports OLE/Automation for feeding Inputs from external applications, such as LabView®, Simulink® or Matlab®



#### ECU Virtualisation: Sysma as calibration and setup tool

- Sysma is the Magneti Marelli Motorsport tool dedicated for calibration and setup for ECU, Datalogger and Dashboard.
- Magneti Marelli Motorsport provides a complete development toolset for embedded code generation.
- All layers of ECU software can be developed either in C source and/or with auto-code generation tools, such as MathWorks (Simulink).
- The ECU models defined in auto-code can be compiled either with target HW or PC.
- VMS executes ECU models compiled from Simulink with target PC. The embedded source code, usually loaded on ECU or Datalogger, can be run on PC platform, with clear benefits (less time consuming, no need of real HW environment, test of different strategies at the same time etc.)
- The core of VMS also supports the Magneti Marelli proprietary MTP protocol.
- In this way the user can use Sysma to program the virtual ECU and/or to monitor its status.
- Sysma can use the CAN card connected to the PC to interact with embedded models.

#### Minimum PC requirements

- Processor: 1 gigahertz (GHz), recommended 4GHz or faster
- RAM: 1 gigabyte (GB) , recommended 4GB or greater
- Hard disk space: at least 2GB free
- Ethernet TCP/IP network interface 10/100/1000 Mbit/s

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January 2013  
rel. 01  
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