

# PUMA open testbed automation system of AVL supports ASAM GDI to enable GDI device integration

“AVL has created the companion standard for emission benches and emission sampling systems. This is an important step for powertrain testing. This brings integration to a new level of flexibility and interchangeability that will benefit the GM Powertrain new laboratory in Pontiac, MI USA.”

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## i Summary

Enable easy integration of various devices to the testbed automation system to represent different application is a main task of testbed automation.

AVL has now integrated the ASAM GDI framework into the new release of the testbed automation software PUMAOpen.

At the same time ASAM GDI drivers for AVL emission measurement devices (emission bench AMAXxxx series, GEM110, CEB-II) and sampling systems (CVS) are available. ASAM GDI device drivers for PTS systems are under development and will be released until Q3/2007.

ASAM GDI, with defined Interfaces to the application and the different companion specifications for device types, enables fast integration of devices.

## ii Situation

Test and automation systems mostly require proprietary drivers for each connected device or subsystem. Also each device family or sometimes different firmware versions require device driver modifications. Such an inhomogeneous environment involves a lot of time and effort of the system integrator and OEM.

Existing companion standards with a defined standard interface and functionality reduces this effort. Each device which is compliant to this standard should be integrated easily and switching from one device to another is easily done by loading different configuration file (application DCD).

## iii Challenges

Target of the project was to integrate ASAM GDI framework into the automation systems environment in a way, that:

- GDI devices integrated in the system have the same behavior (PUMA device)
- Implementation is generic to face the advantage of adding additional GDI devices to the system without touching software

## iv Solution

AVL developed an integrated ASAM GDI coordinator based on ASAM GDI specification 4.3.1 which is integrated as a “PUMA device”. Therefore, for the user a GDI-device has the same behavior than other PUMA devices added to the automation system.

According to the ASAM GDI specification, the GDI framework is divided in three parts: Coordinator, Device driver and Platform adapter.

The coordinator implementation as a “PUMA device”, which supports realtime functionality, recommends that the coordinator is divided in two parts. The “non-realtime” part and a “realtime” part running in the realtime system of PUMAOpen.

The device drivers are developed as dll or rsl components to be used in realtime or none realtime environment. The integrated coordinator supports both solutions.

As part of the GDI environment of PUMA the device configuration editor is available to generate new configuration tree out of the dcd and also to generate the specific device configuration. Basically this editor generates a

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tree view of the class model described in the DCD (device capability description). It provides additional PUMA specific properties and attributes which are necessary to integrate the GDI device as a PUMA device. Specific class descriptions (e.g. analyzer) are pre-configured and saved in an object library. In case of ebench the device has several pre-configured analyzer objects describing different analyzer types from different vendors (e.g. FID, CLD). To configure the device specific configuration these objects are added by drag and drop to the configuration tree.

General use case is, that prepared device configurations are deployed with the system.

### vi Challenges during the project

Generating companion specifications requires a common understanding of device functionalities.

AVL, as leader of two ASAM GDI workgroups for ebench and sampling systems, has developed a reference implementation for the companion specifications worked out by ebench workgroup (emission bench) and ess workgroup (emission sampling systems), which are mandatory to get an ASAM GDI companion specification released.

### vi Business benefits

Integration effort can be reduced because there is no need to define and maintain proprietary interfaces. ASAM GDI allows any vendor to offer their devices compliant to companion specification.

Integration of these ASAM GDI devices is simply reduced to exchange device driver, configuration file (application DCD) and if needed to add platform adapter extension.

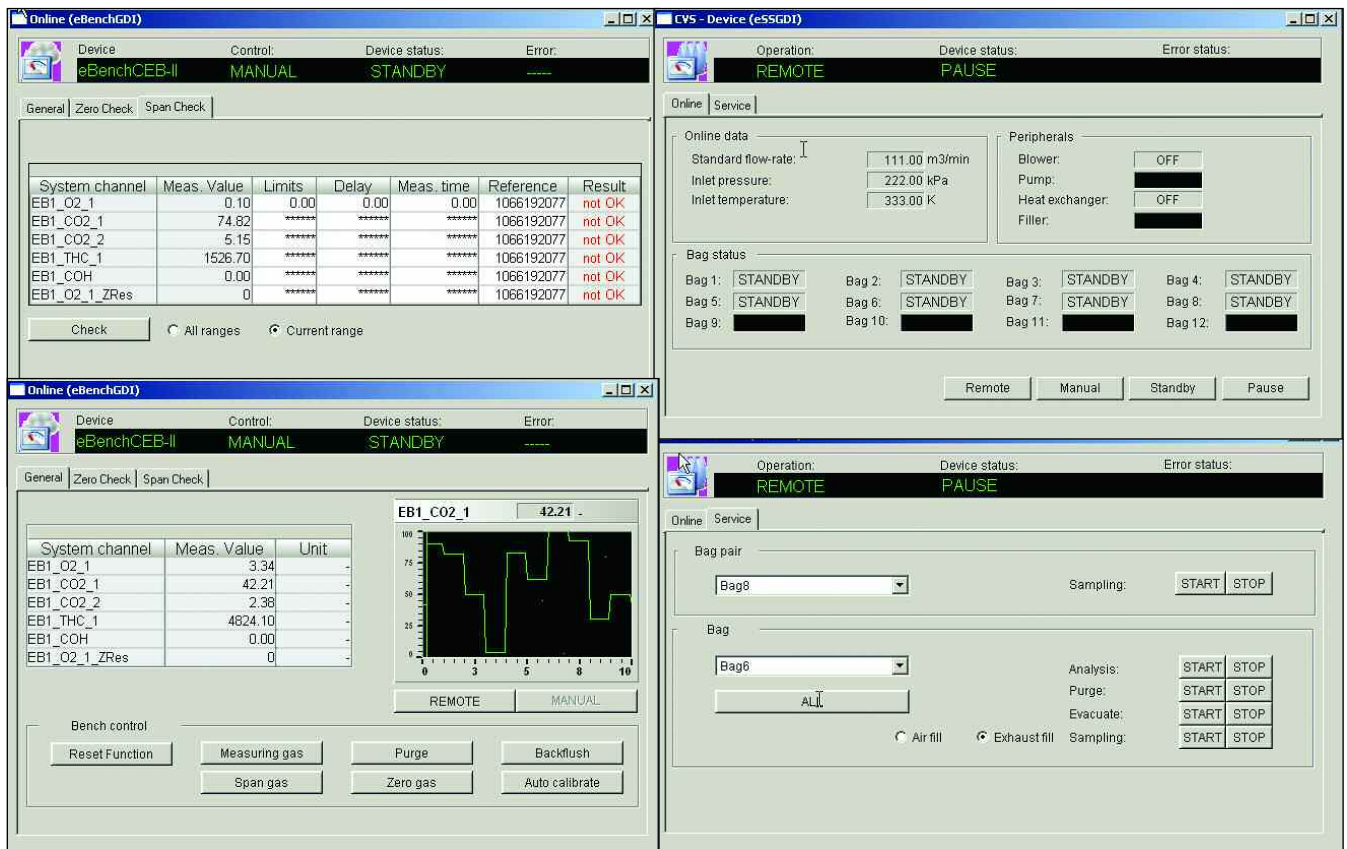


Figure 1: Online operation of GDI devices in PUMA Open.