

AVL Automation & Control solutions



AVL TESTMATE II – Digital Controller

AVL TESTMATE II is a complete digital test bed control and monitoring system with excellent torque and speed control for hydraulic, eddy current and AC dynamometers with an intuitive user interface.



AVL BOBCAT – Engine Test Automation & Control

AVL BOBCAT is an affordable and integrated automation system solution dedicated to specific engine testing needs from AVL's COMPACT product line for both existing and new test cell layouts.



AVL PUMA – Powertrain Test Automation & Simulation

AVL PUMA represents an integration platform and provides a powerful environment for all automation components for a broad range of test applications from emission certification to sophisticated vehicle simulation.

C AVL COMPACT™

Ready. Set. Go.

AVL BOBCAT automation & control

BOBCAT automation & control topics



- AVL BOBCAT – automation & control
- System Layout & Components
- Technical specs
- General look and feel
- Result Data Management & Processing

AVL BOBCAT – automation & control **covering needs**



Engine Performance Testing

Engine Durability

Engine Overhauling

Component development

Emission Certification for nonroad IC engines

Fuel validation testing

Educational Purposes

the COMPACT solution for test automation & control



AVL BOBCAT



AVL BOBCAT is a test bed automation system dedicated and optimized for defined applications in engine testing, developed at AVL North America.

Your benefits at a glance:

- Intuitive modular structure for creating test cell, engine and test run definition and procedure configuration
- User-friendly experience driven by aesthetic display pages and graphical drag-and-drop test set-up
- Quick operation that allows test runs to be defined and reused easier and initiated faster

system layout

IEEE1394



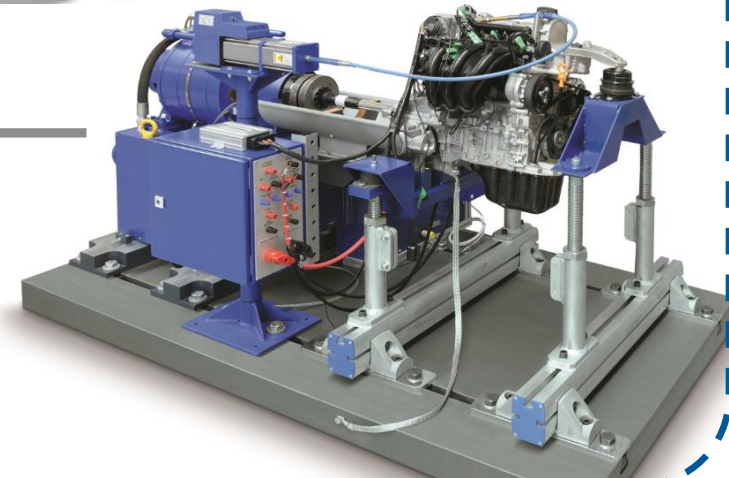
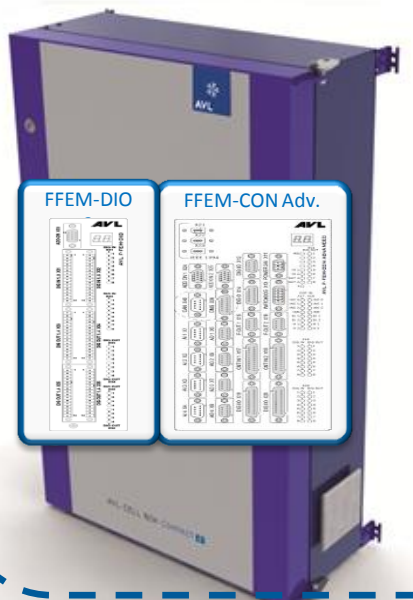
automation & control

COMPACT I/O Cube



IEEE1394

dyno / engine interface



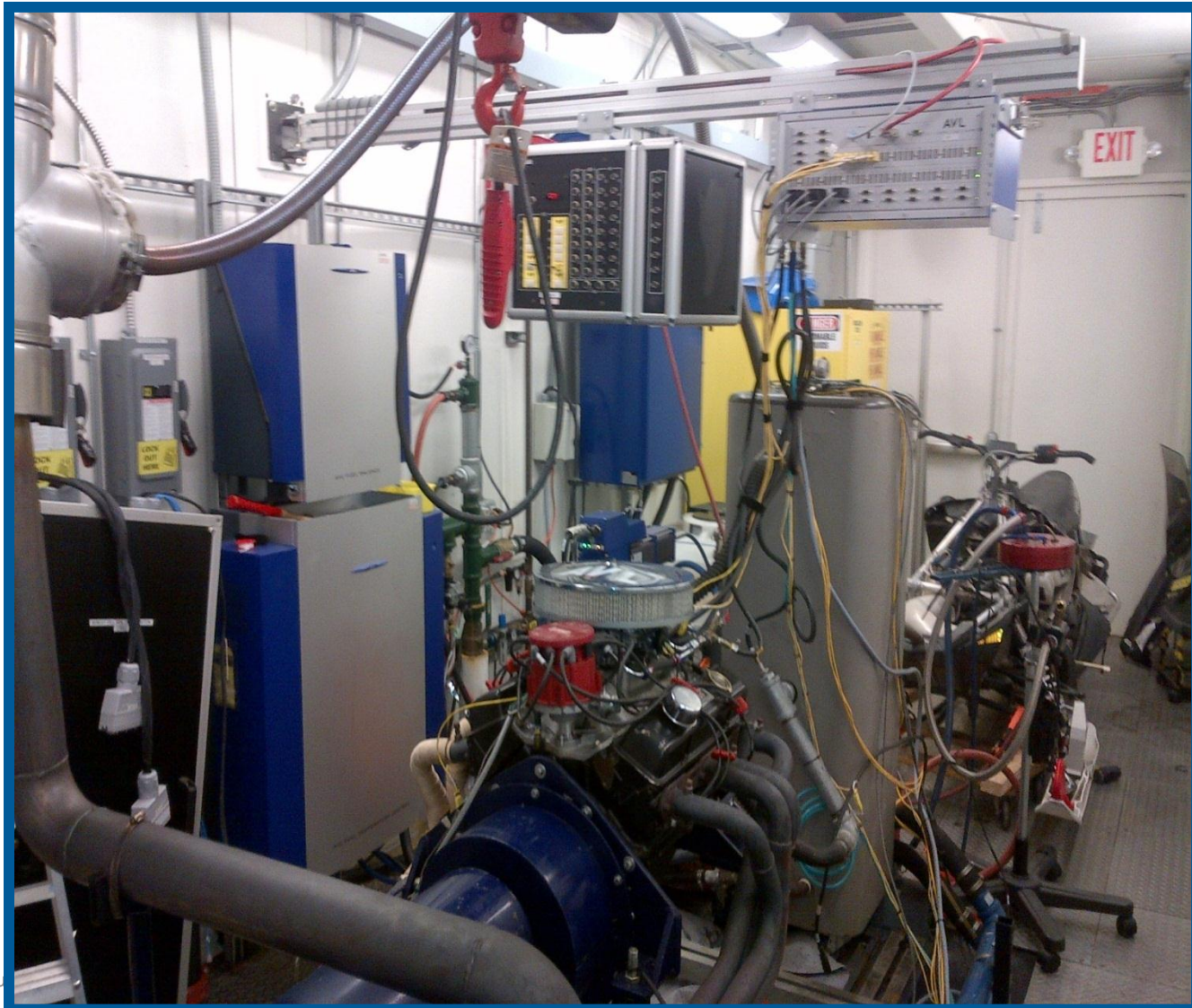
AVL BOBCAT – automation & control references



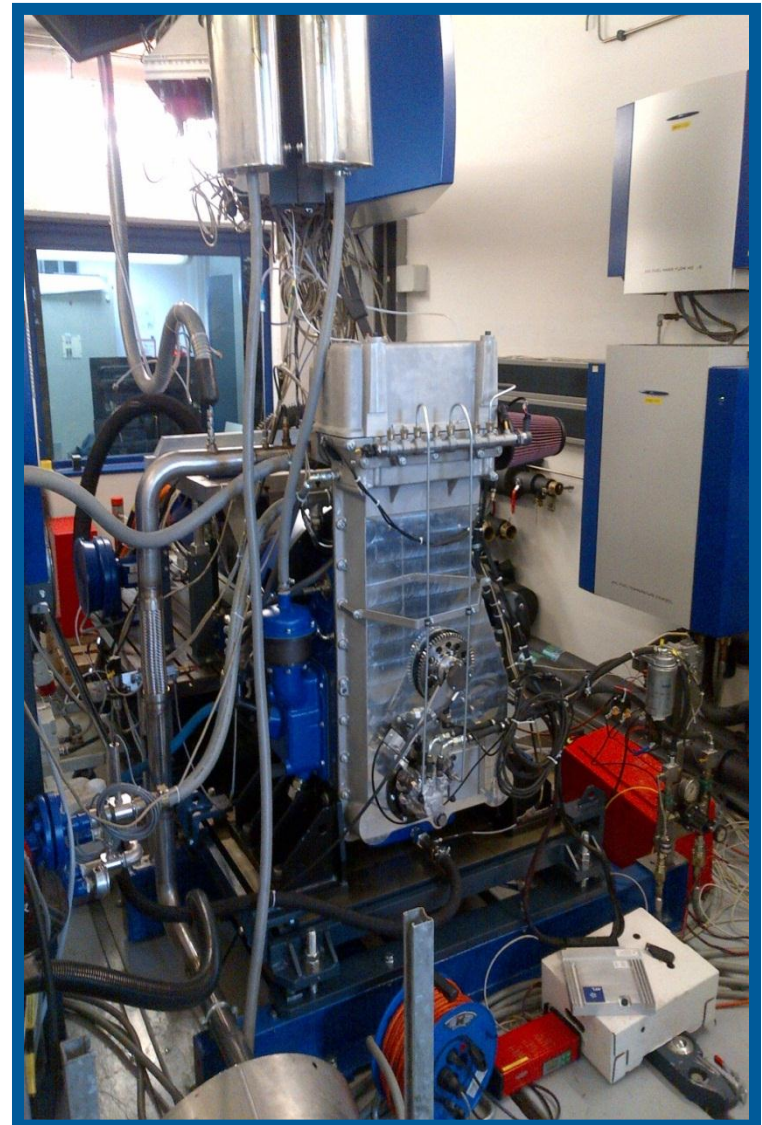
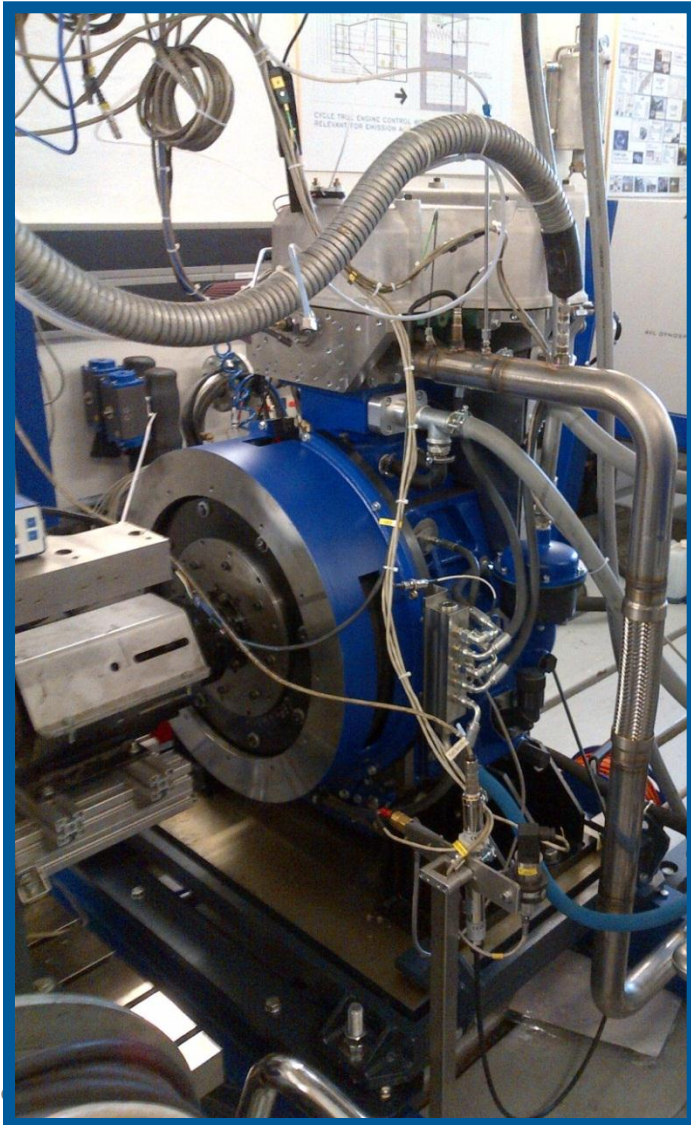
AVL BOBCAT – automation & control references



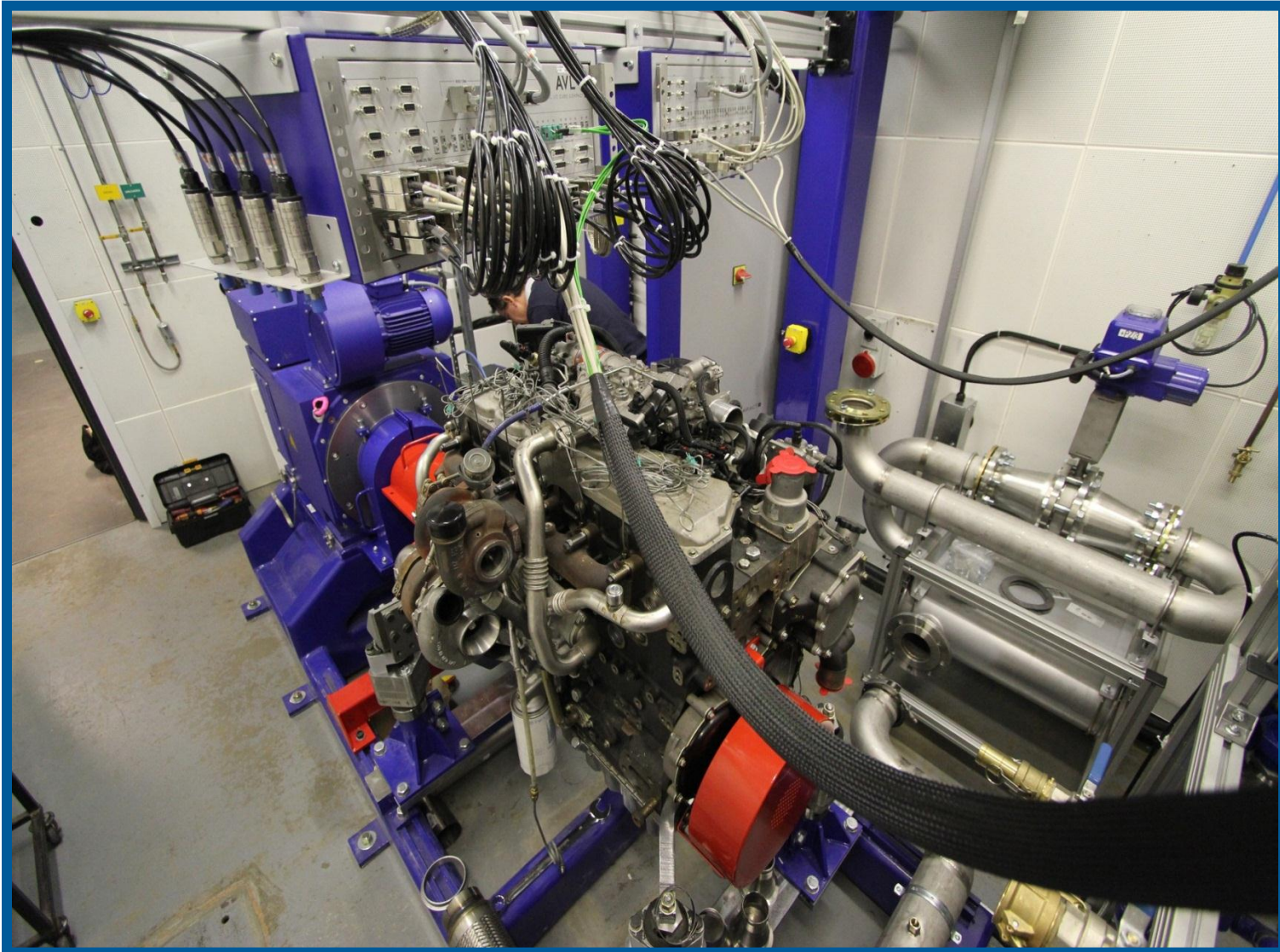
AVL BOBCAT – automation & control references



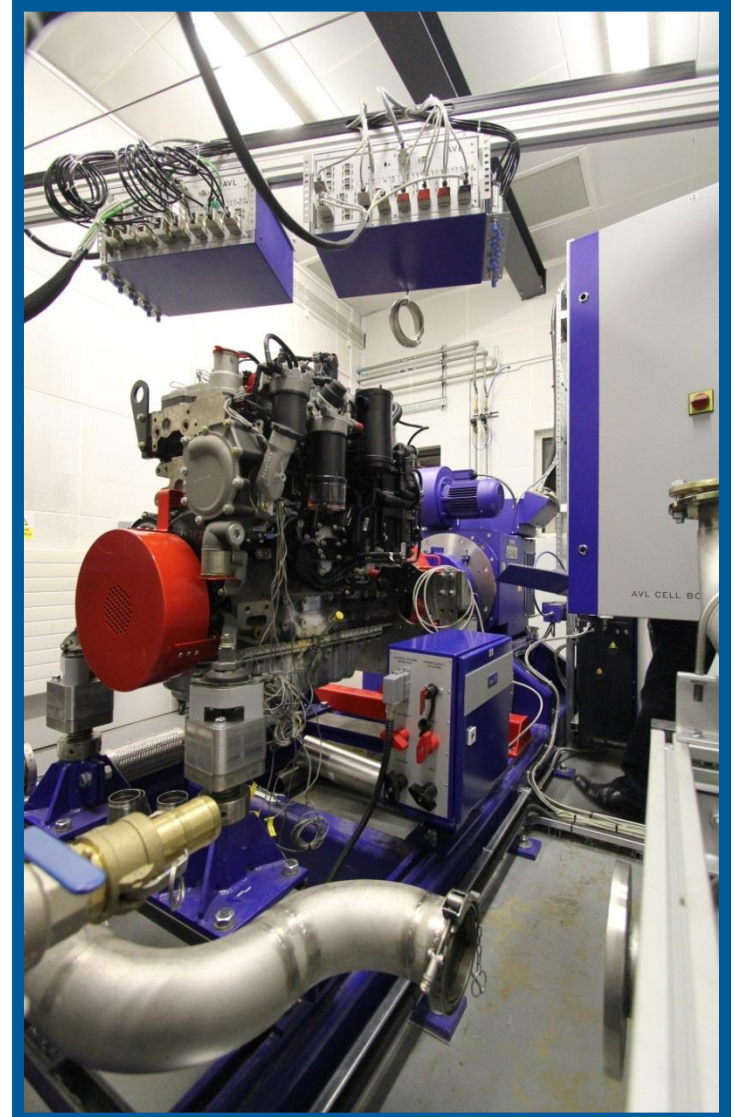
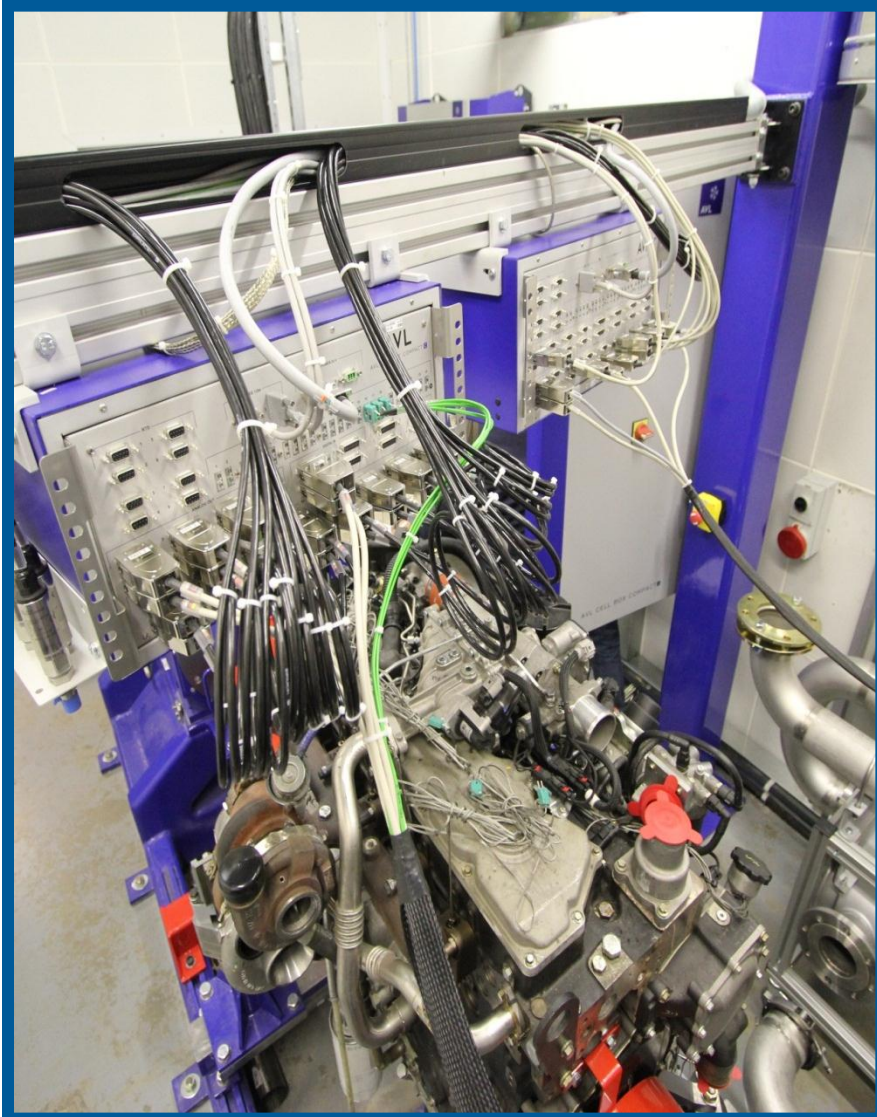
AVL BOBCAT – automation & control references



AVL BOBCAT – automation & control references



AVL BOBCAT – automation & control references



workstation



Included with the AVL BOBCAT automation & control software is a dedicated workstation. The hardware is extensively tested to ensure a failure free operation in a real time environment. As off the shelf PC solutions are limited in support and spare part availability, AVL can provide an extended warranty, to secure the full operation of the test cell.

Your benefits at a glance:

- Tested and proven workstation solution
- Extended warranty and spare parts availability
- Choice between desktop or rack design

operating panel



AVL COMPACT™

C

The AVL BOBCAT Operating Panel provides manual control of the test cell when not running an automatic test routine. It provides easy access to the most frequently performed tasks such as changing the control mode or turning on/off digital bits.

The panel contains a touch screen display, two knobs for adjusting the set point values, and eight physical pushbutton switches that can be programmed for digital control of the system. The panel can either be connected to the BOBCAT workstation or can be brought into the cell and connected to the Cell Box.

Your benefits at a glance:

- Precise control of engine & dyno set points via two rotary encoders
- Color touch screen for visual feedback & operation
- Programmable buttons for test sequences
- Connection via Ethernet outside or inside the test cell

cell box



The AVL BOBCAT Cell Box is a wall mounted enclosure that is the center of AVL COMPACT automation & control system used for controlling the engine and dyno and connection to other test cell devices. It serves to accommodate system components. It is connected to the BOBCAT workstation and measuring devices in the testcell. An E-stop circuit (located inside the CellBox) is used to safely protect the hardware.



The Cell Box contains the following main components:

- 24VDC PWS for all the I/O in the system and circuit protection for 24 VDC lines
- Power switch and AC power distribution and circuit protection
- PILZ E-Stop system and E-Stop string
- Connector for the Operator Panel
- F-FEM-CON ADVANCED and F-FEM DIO
- Compliance to directives: Compliance with the 2004/108/EC Electromagnetic Compatibility Directive

cell box

- 4 independent counter channels for data acquisition
- 18 digital inputs
- 26 digital outputs
- 4 analog inputs
- 1 analog input for strain gauge
- 4 analog outputs
- 2 frequency outputs
- 1 watchdog function for test bed monitoring
- Connection of 2 F-FEM-DIO modules with 16 digital inputs and
 - 16 digital outputs each

I/O cube



AVL COMPACT™

C

The COMPACT I/O Cube is designed as a versatile I/O module for the test cell to allow data acquisition and control of a wide variety of I/O devices. The Cube provides various input and output channels. The channel assignment is software-configurable by the user.

Following channels are provided:

- 16 universal measurement channels for the measurement of voltages, currents, resistances and measuring bridges
- 24 temperature measurement channels for measurement of thermo couples
- (types K, J, R, S, T, B, E and N)
- 8 temperature measurement channels for measurement of RTDs (Pt100, Pt1000)
- 8 analog outputs for voltages or currents (for demand value setting)
- 16 digital outputs (8 relay, 8 transistor outputs for digital or PWM)
- 16 digital inputs

TC cube



AVL COMPACT™

C

The COMPACT T/C Cube is designed as a versatile IO module for the test cell to allow data acquisition and control of a wide variety of IO devices. The Compact Thermo Cube provides 16 universal measurement channels and 64 temperature measurement channels. The channel assignment is software-configurable by the user.

Following channels are provided:

- 16 universal measurement channels can measure voltages, currents, resistances and measuring bridges.
- 64 temperature measurement channels are split into
 - 56 channels for measurement of thermo couples (types K, J, R, S, T, B, E and N)
 - 8 channels for measurement of RTDs (Pt100, Pt1000)
- The signals are first conditioned with a low pass filter and then converted to physical units and transferred to the automation system as physical units via an IEEE1394 interface.
- The acquisition rate is selectable for each channel (1Hz, 10Hz, 100Hz) depending on the sensor type (1Hz, 10Hz for temperature channels).

cube comparison

				Signal Types and Channel Numbers							
Modul Name	Type Number	Material Number	Connector Type	TC	Universal Channel Voltage $\pm 13,5$ V, Current ± 25 mA Low Voltage $\pm 2,4$ V, ± 75 mV TC, Resistance, DMS, RTD	Low Voltage $\pm 2,4$ V, ± 75 mV, TC, RTD	Analog out ($\pm 10,5$ V, ± 21 mA)	Digital In	Counter ^{*1)}	Digital Out	Frequency Out ^{*2)}
TC Cube	6260.63	GK0448	DSUB-9		16	8					
			Omega	56							
I/O Cube	6260.64	GK0449	DSUB-9		16	8	8				
			Omega	24							
			DSUB-15					16	8	16	8

throttle actuator



The AVL Throttle Actuator Compact is a Linear Rotary Screw (LRS) type throttle actuator used for controlling the mechanical throttle on an engine. It is equipped with automatic range calibration for easy setup. Force, speed, displacement, and acceleration limiting and definable e-stop position ensure the maximum security and ease of use.

Throttle Actuator COMPACT	
Max. Force	890N
Linear Stroke	76mm
Time for full stroke	0.1s

technical specs

Feature	Description
Operating system	Windows XP or Windows 7
Realtime operating system	INtime
Runtime states	Empty, testcell Loaded, engine loaded and test loaded
Application modes	Setup, runtime and data browsing
Modes of operation	Manual and automatic
Channels	Analog IO, digital IO, temperature, formula, filters, PID, limits, custom and dependent
Channel frequencies	1, 10, and 100 Hz (1kHz for F-FEM CON channels)
Calibration type	16-point linear fit and (cRIO only) 6th order polynomial
Calibration history	History maintained, trace maintained
Limit monitoring types	Testcell limit (monitored either in testcell load or engine loaded states), engine limit and group (monitored in when engine has started)
Limit monitoring reactions	Low and high warnings and alarms; SoftStop, HardStop, Message, Idle and Exception on alarms.
Limit Monitoring frequencies	Same frequency as the channel being monitored
Filters types	Cut-off frequency, Integrator, Value changed/not changed, moving average, invalid value and minimum/maximum/range
Maximum number of channels	4750
Maximum number of PID channels	10
Maximum number of formula channels:	Maximum flow rate (summation of all formula channel frequencies) 5000.
Maximum number of filter channels	32 of each filter types (6 filter types)
Maximum number of custom channels:	Limited by performance, not licensed
Maximum number of testcell limit Channels	128
Maximum number of engine limit channels	128
Supported number of displays	2
Maximum number of active recorders	3 concurrently activated recorders and 1 blackbox recorder.
Maximum number of recorder config	32
Recording frequencies	1, 10, 100 Hz (1kHz for F-FEM CON channels)
Maximum number of CAN ports	8 (4 for each CAN card)
Repository table	Provide data array and its runtime dynamic switching
Test result data	Export data as CVS and ATF, and import it to Santorin database
Testmate Control modes	Speed/Position, Torque/Position, Dyno/Position, Speed/Torque, Torque/Speed, Dyno/Speed, Dyno/Torque, Speed/Aux, Torque/Aux, Dyno/Aux (only one Aux supported)

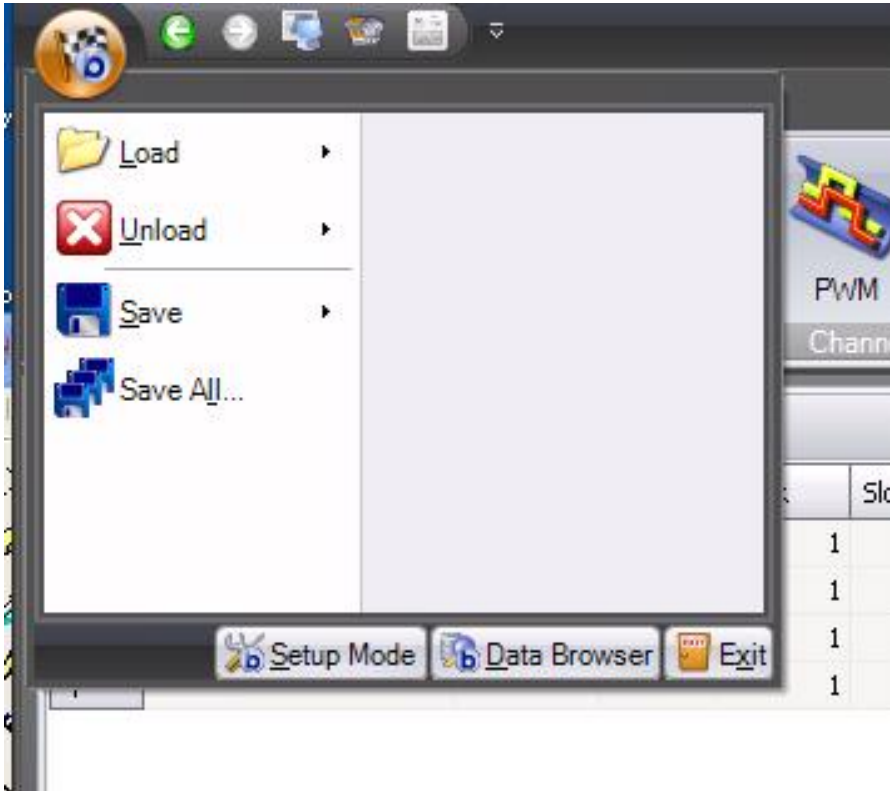
supported devices

Name	Description
AVL 733S	Fuel balance meter. It is used to determine fuel consumption based on a pre-selectable measurement time or measurement weight.
AVL 735	Fuel mass consumption meter allows you to measure the fuel consumption of a combustion engine.
AVL 753C	Fuel conditioning system is used to maintain the fuel temperature at a specific setpoint, and within narrow tolerance limits. It is used together with the AVL fuel mass flow meter (AVL 735S) and AVL fuel balance (AVL 733S), and can also be retrofitted to existing fuel consumption measuring devices.
AVL 415	Smoke meter. It is used to measure the soot content of the exhaust gas from diesel engines.
AVL 415S	Smoke meter. It is used to measure the soot content of the exhaust gas from diesel engines.
AVL 439	Opacimeter. It is used to measure the opacity of exhaust gas both in static and dynamic engine state.
AVL 442	Blowby meter serves to continuously measure and monitor the blow by gas. The blow by gas flows through leaks of pistons, piston rings, valve guides, and in case of turbochargers through bearings and bearing seals, into the crankcase and escapes through the casing ventilation.
AVL 483	Micro soot sensor measures the low soot concentrations in the diluted exhaust gas of particle emitting combustion engines.
PEUS CFO	CFO propane injection kit. It is used to check CVS dilution systems in emission gas testing for conformity.
HMT 333	Vaisala Weather Station
PTU 300	Vaisala Weather Station

supported devices

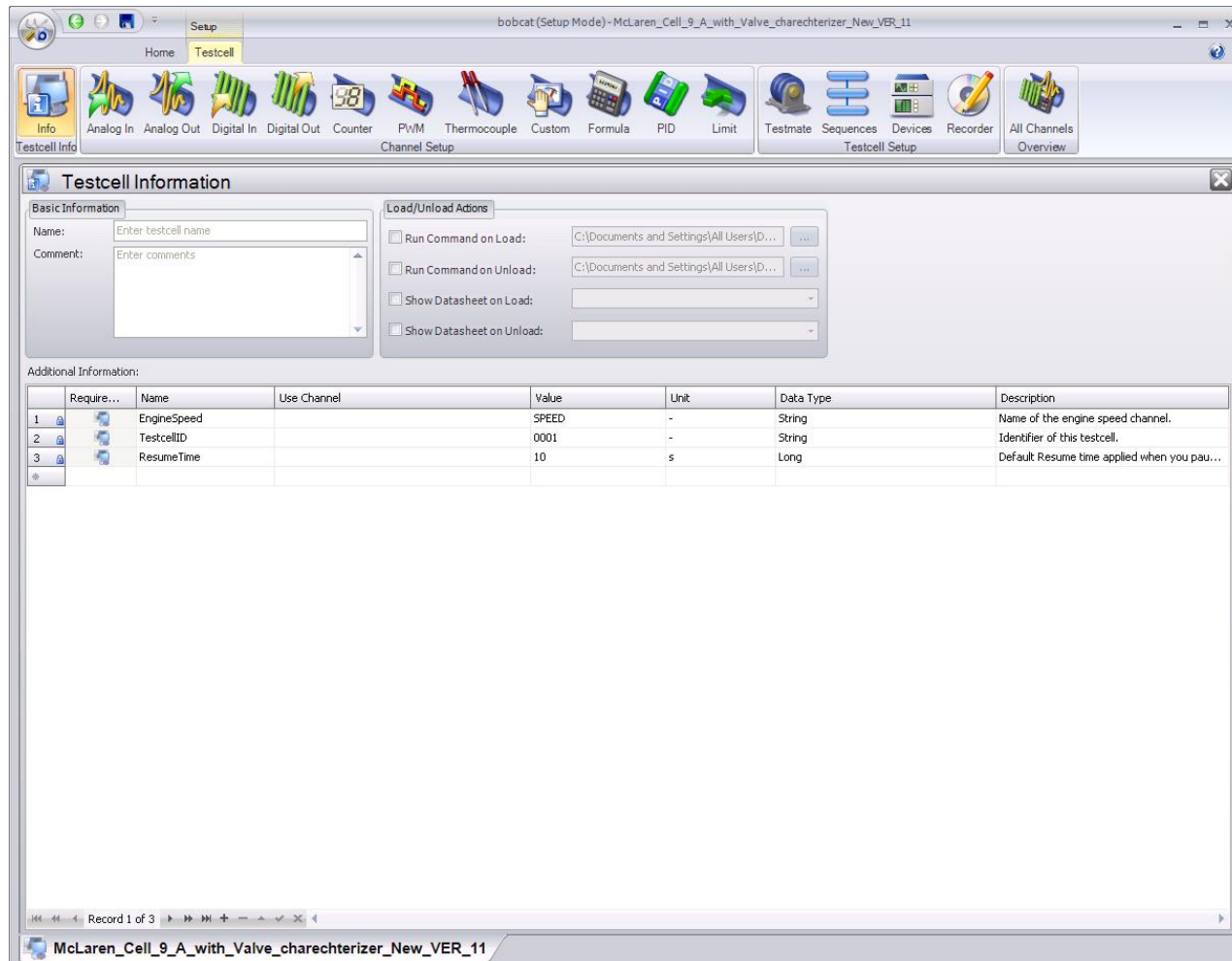
Name	Description
CVS	A CVS (Constant Volume Sampler) dilutes the exhaust sampled from a vehicle under test on a chassis dyno or from an engine on an engine test bed. The diluted exhaust is fed into the exhaust analyzers, where the actual exhaust analysis takes place.
Simplex_LB	Simplex load bank (customer specific, not officially supported)
FMU3G	Taylor fuel measurement (customer specific, not officially supported)
Agilent	Agilent power supplier
EBH	It is used to control and communicate with AMA i60 Combi, Horiba MEXA, SESAM FTIR, CEBII bech, etc. See Puma document for more information.
Emissions Benches	It is used to interface with AVL GEM 110, Horiba Mexa 7000, and AVL i60 emissions benches
CAS/ACAP	Interface to combustion analysis systems from MTS (A&D). It is also used to interface ACAP from MTS as well as CAS from FEV. Specific versions do apply.
SPC	The SPC is a compact partial flow dilution system that extracts engine exhaust, dilutes it with conditioned dilution air (to simulate reactions in the atmosphere), and samples the diluted exhaust over particulate filters. The filters are weighed to determine the amount of particulate matter in the exhaust.
CAN	ASAP2 CAN driver
ASAP3	ASAP3 driver
CUTY	CUTY - Communication Utility, which is enabling communication to Cummins ECUs using ASAP3. A Cummins MC System.
IndiCom	IndiCom is a user interface and control software for AVL Indicating systems.

AVL BOBCAT – automation & control programs



- Setup
Set up the Testcell, Engine, and Test Files
- Run Mode
Run the Tests on the Engine in the Testcell using the files created in Setup
- Data Browser
View the gathered data and export as csv or ATF file

AVL BOBCAT – automation & control setup



AVL BOBCAT – automation & control setup – physical channels



Setup the physical I/O channels in the system

- Analog Inputs
- Analog Outputs
- Digital Inputs
- Digital Outputs
- Counter Inputs
- PWM Outputs
- Thermocouples

Set the specifications of the channel

- Units
- Decimal places
- Update frequency (1, 10, 100Hz, 1kHz for FFEM-CON)
- Hardware information
- Calibration

Channel Name	Unit	Decimal Places	Update Frequency [Hz]	Rack	Slot	ID	Terminal Configuration	Signal Input Range	Calibration Type	Description
1 ALPHA	%	2	100	1	1	AQ0	RSE	+/-10V	Table	
2 OVP	%	2	100	1	1	AQ1	RSE	+/-10V	Table	0=OPEN, 100=d...
3 IVP	%	2	100	1	1	AQ2	RSE	+/-10V	Table	0=OPEN, 100=d...
4 TORQUE	ft-lbf	2	100	1	1	AQ3	RSE	+/-10V	Table	
5	-	2	100	1	1	AQ4	RSE	+/-10V	Table	
6 R1_ACH5	-	2	100	1	1	AQ5	RSE	+/-10V	Table	
7 R1_ACH6	-	2	100	1	1	AQ6	RSE	+/-10V	Table	
8 R1_ACH7	-	2	100	1	1	AQ7	RSE	+/-10V	Table	
9	-	2	100	1	1	AQ8	RSE	+/-10V	Table	
10	-	2	100	1	1	AQ9	RSE	+/-10V	Table	
11	-	2	100	1	1	AC...	RSE	+/-10V	Table	
12	-	2	100	1	1	AC...	RSE	+/-10V	Table	
13	-	2	100	1	1	AC...	RSE	+/-10V	Table	
14	-	2	100	1	1	AC...	RSE	+/-10V	Table	
15	-	2	100	1	1	AC...	RSE	+/-10V	Table	
16	-	2	100	1	1	AC...	RSE	+/-10V	Table	
17 R1_ACH16	-	2	100	1	1	AC...	RSE	+/-10V	Table	
18 R1_ACH17	-	2	100	1	1	AC...	RSE	+/-10V	Table	
19 R1_ACH18	-	2	100	1	1	AC...	RSE	+/-10V	Table	
20 R1_ACH19	-	2	100	1	1	AC...	RSE	+/-10V	Table	
21 R1_ACH20	-	2	100	1	1	AC...	RSE	+/-10V	Table	
22 R1_ACH21	-	2	100	1	1	AC...	RSE	+/-10V	Table	
23 R1_ACH22	-	2	100	1	1	AC...	RSE	+/-10V	Table	
24 R1_ACH23	-	2	100	1	1	AC...	RSE	+/-10V	Table	
25	-	2	100	1	1	AC...	RSE	+/-10V	Table	
26	-	2	100	1	1	AC...	RSE	+/-10V	Table	
27	-	2	100	1	1	AC...	RSE	+/-10V	Table	
28	-	2	100	1	1	AC...	RSE	+/-10V	Table	
29	-	2	100	1	1	AC...	RSE	+/-10V	Table	
30	-	2	100	1	1	AC...	RSE	+/-10V	Table	
31	-	2	100	1	1	AC...	RSE	+/-10V	Table	
32	-	2	100	1	1	AC...	RSE	+/-10V	Table	
33 P_OIL_ONTL	psi	2	100	2	4	AQ0	RSE	+/-10V	Table	
34 P_H2O_ONTL	psi	2	100	2	4	AQ1	RSE	+/-10V	Table	
35 XDUCKER_3	psi	2	100	2	4	AQ2	RSE	+/-10V	Table	
36 XDUCKER_4	psi	2	100	2	4	AQ3	RSE	+/-10V	Table	

AVL BOBCAT – automation & control setup – formula



- Uses scripting language for writing simple or complex formulas
- To be replaced with a simple formula editor (conceptually to be like formula editor in Excel)
- Can update formulas at 1, 10, or 100 Hz

bobcat (Setup Mode) - McLaren_Cell_9_A_with_Valve_charechterizer_New_VER_11

Home Testcell

Info Analog In Analog Out Digital In Digital Out Counter PWM Thermocouple Custom Formula PID Limit Testmate Sequences Devices Recorder All Channels Testcell Setup Overview

Formula Channels

Currently using 354 out of maximum flow rate of 5000.

	Channel Name	Unit	Decimal Places	Update Frequency [Hz]	Formula	Description
1	BHP	-		2	10 power	
2	NormalizedSpecificGravity	-		2	1 NormSPG	
3	FuelFlowPPH	-		2	1 FFFpph	
4	BSFC	-		2	1 FuelFlowPPH/BHP	
5	SaturatedVaporPress	-		2	1 s	
6	CurrentVaporPress	-		2	1 0.000367*(1+0.00064...	
7	CorrectedVaporPress	-		2	1 SaturatedVaporPress - ...	
8	CorrectedBaro	-		2	1 P_BARO-CorrectedVap...	
9	REB	-		2	1 rREB	
10	AFRATIO	-		2	1 0	
11	StarterStop	-		2	1 bStarter	
12	OilTempCO	%		3	10 OilCO	
13	H2OTempCO	%		2		
14	VehicleSpeed	-		2		
15	Eng_Timer	-		2		
16	DynoSafetyWaterShutOff	-		2		
17	Nul	-		0		
18	CalculateMValue	-		2		
19	CalculateInletValveCh	-		2		
20	CalculateOutletValveCh	-		2		
21	FakeCatDataCalc	-		2		

Record 11 of 21

McLaren_Cell_9_A_with_Valve_charechterizer_New_VER_11

Formula Script:

```
dim bStarter as long
temp=Starter
bStarter=0
if(Starter==1) then
    if(SPEED>=EngineStartedRecognitionSpeed) then
        Starter=0
        bStarter=1
    endif
endif
endif
```

Formula:

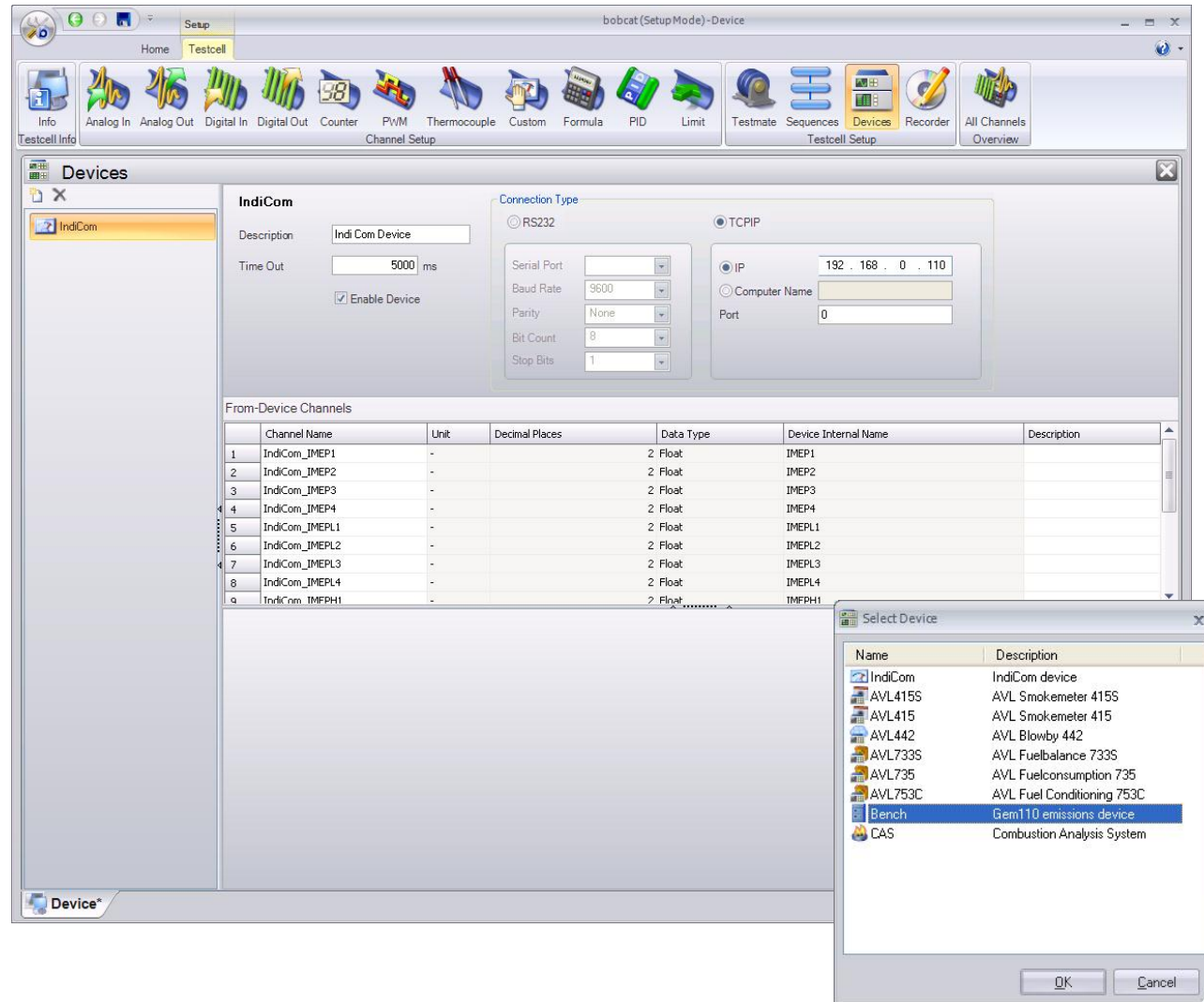
bStarter

Check OK Cancel

AVL BOBCAT – automation & control setup – devices



- GUI for device driver allows setup of the device and the measurement channels for the device
- Channels from devices can be used throughout BOBCAT
- Device driver GUI's will be added as customers request them and then will be available as standard devices



AVL BOBCAT – automation & control calibration



bobcat (Run Mode) : Device

Home Testcell Channels Screens

Start Idle Stop Testmate Start Pause System Log Combined Limits Referenced Channels Operational Data Sequence Debugger Tracer Unload Reload Screen1 Screen3

Analog Input Channels

Channel N...	V...	Decimal Pl...	Update Frequency ...	Raw V...	Raw...	Terminal Configu...	Signal Input R...	Calibration ...	Descri...	Ove...	Override Scaled Value
1 Analog_Inpu...	100...	-	2	100	1 1 ... 1000000... V	Differential	+/-10V	Table			0
2 Analog_Inpu...	100...	-	2	100	1 1 ... 1000000... V	Differential	+/-10V	Table			0
3 Analog_Inpu...	100...	-	2	100	1 1 ... 1000000... V	Differential	+/-10V	Table			0
4 Analog_Inpu...	100...	-	2	100	1 1 ... 1000000... V	Differential	+/-10V	Table			0
5 Analog_Inpu...	100...	-	2	100	1 1 ... 1000000... V	Differential	+/-10V	Table			0
6 Analog_Inpu...	100...	-	2	100	1 1 ... 1000000... V	Differential	+/-10V	Table			0
7 Analog_Inpu...	100...	-	2	100	1 1 ... 1000000... V	Differential	+/-10V	Table			0
8 Analog_Inpu...	100...	-	2	100	1 1 ... 1000000... V	Differential	+/-10V	Table			0
9	-	-	2	100	1 1 ... 1000000... V	RSE	+/-10V	Table			0
10	-	-	2	100	1 1 ... 1000000... V	RSE	+/-10V	Table			0
11	-	-	2	100	1 1 ... 1000000... V	RSE	+/-10V	Table			0
12	-	-	2	100	1 1 ... 1000000... V	RSE	+/-10V	Table			0
13	-	-	2	100	1 1 ... 1000000... V	RSE	+/-10V	Table			0
14	-	-	2	100	1 1 ... 1000000... V	RSE	+/-10V	Table			0
15	-	-	2	100	1 1 ... 1000000... V	RSE	+/-10V	Table			0
16	-	-	2	100	1 1 ... 1000000... V	RSE	+/-10V	Table			0
17 Analog_Inpu...	0.00	-	2								
18 Analog_Inpu...	0.00	-	2								
19 Analog_Inpu...	4.00	-	2								
20 Analog_Inpu...	100...	-	2								
21 Analog_Inpu...	100...	-	2								
22 Analog_Inpu...	100...	-	2								
23 Analog_Inpu...	100...	-	2								
24 Analog_Inpu...	100...	-	2								
25	-	-	2								
26	-	-	2								
27	-	-	2								
28	-	-	2								

Record 1 of 32

Calibration Type

Table Polynomial

Measurement Length: 5 s

Current Average Value: 10000000000.00

Commit to row 16

Raw [V]	Scaled [-]
1 0	0
2 1	1
3 2	4
4 3	9
5 4	16
6 5	25
7 6	36
8 7	49
9 -1	1
10 -2	4
11 -3	9
12 -4	16
13 -5	25
14 -6	36
15 -7	49
16	

Raw: 10000000000.000 Scaled: 10000000000.00

Scaled [-]

Raw [V]

User Name: Unknown User

Comment:

OK Cancel Apply

Testcell Loaded

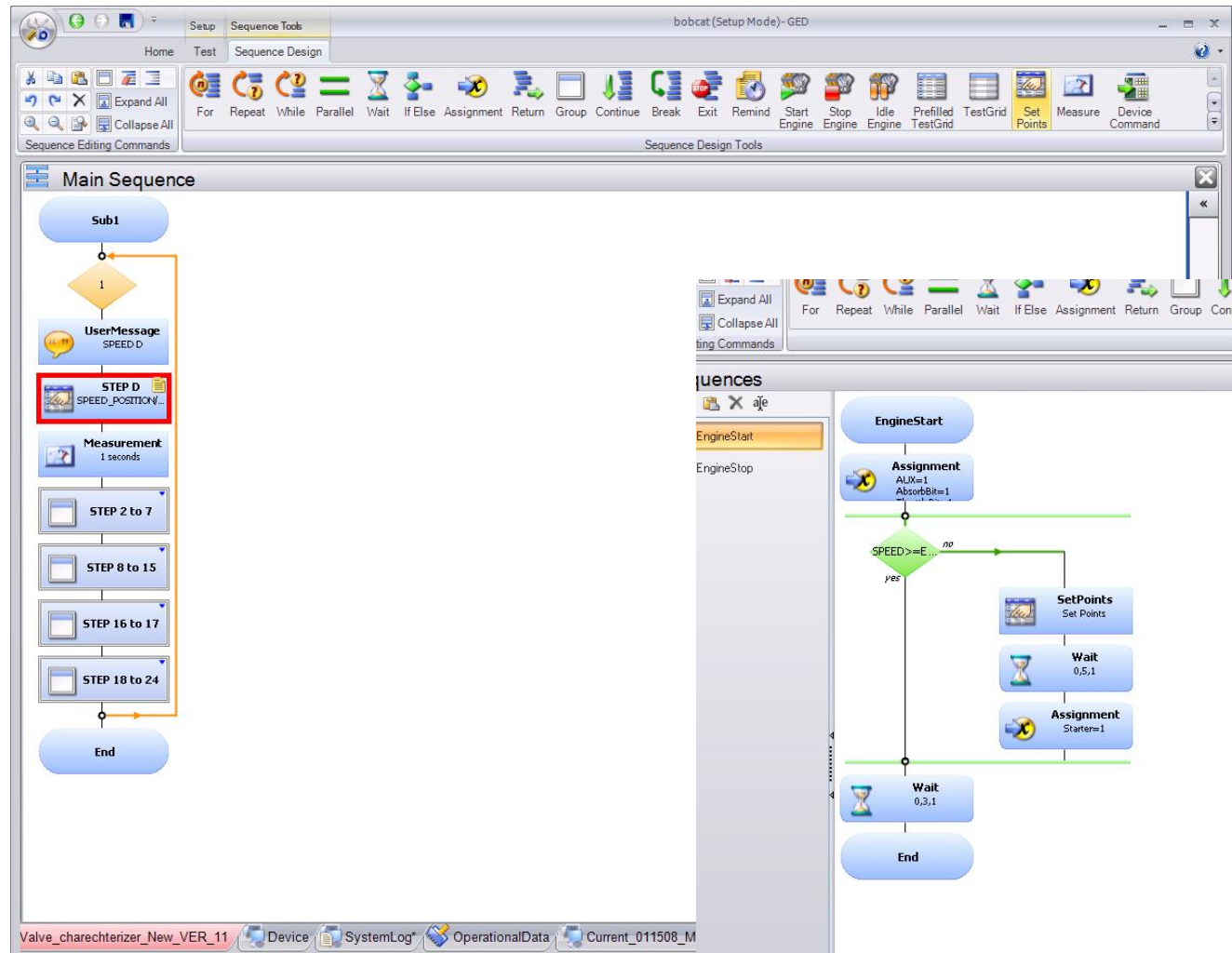
T...	Time	Client	Message
	2008-02-11 09:56:19.828	bobcat	Test Parameters [M
	2008-02-11 10:01:16.296	Screens	Failed to display C:\
	2008-02-11 10:01:16.296	Screens	Assembly 'BobCatCo
	2008-02-11 10:01:27.281	Screens	Failed to display C:\
	2008-02-11 10:01:27.281	Screens	Assembly 'BobCatCo
	2008-02-11 10:04:02.890	bobcatController	Unloading Test Para

- Calibrate analog input channels
- Up to 16 point calibration possible
- Done during runtime so sampling actual points possible
- Can vary the sample time for accurate snapshot of point
- Calibration is applied immediately to the channel

AVL BOBCAT – automation & control sequence/test run editor



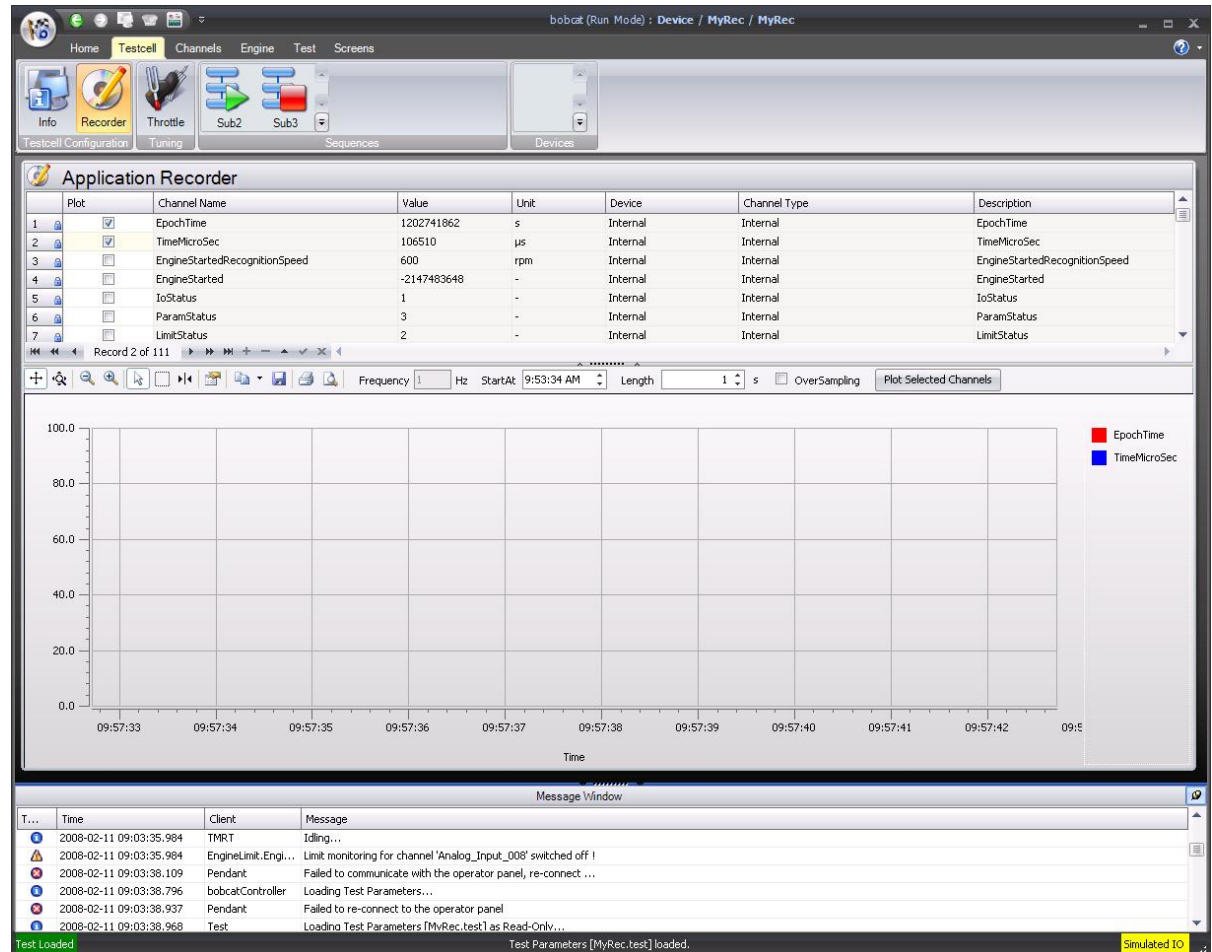
- Create test sequences quickly and easily
- Can be simple or complex
- Uses simple “drag and drop” technology
- Create loops, parallel paths, sub routines, grids, measurements, etc.



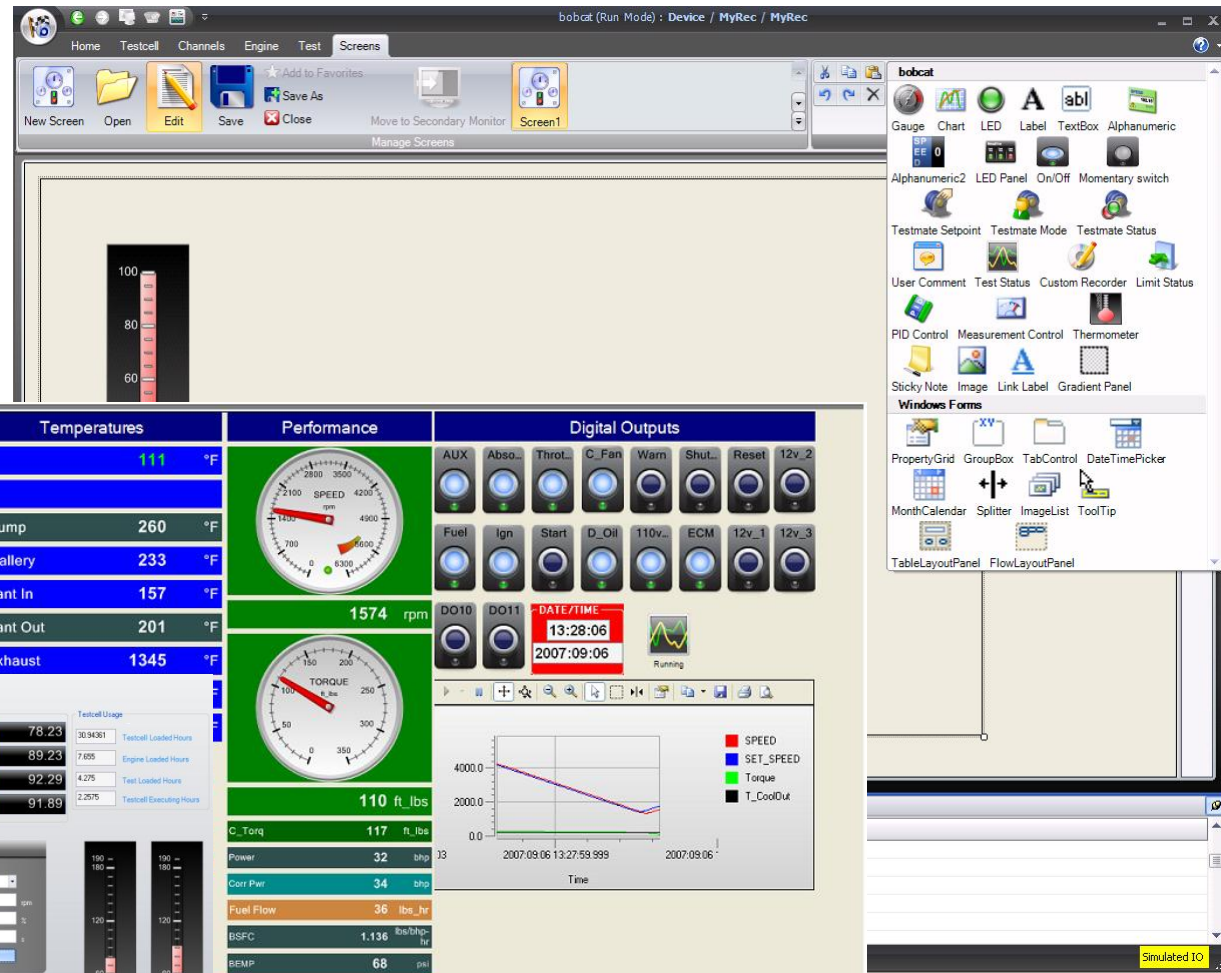
AVL BOBCAT – automation & control recorder



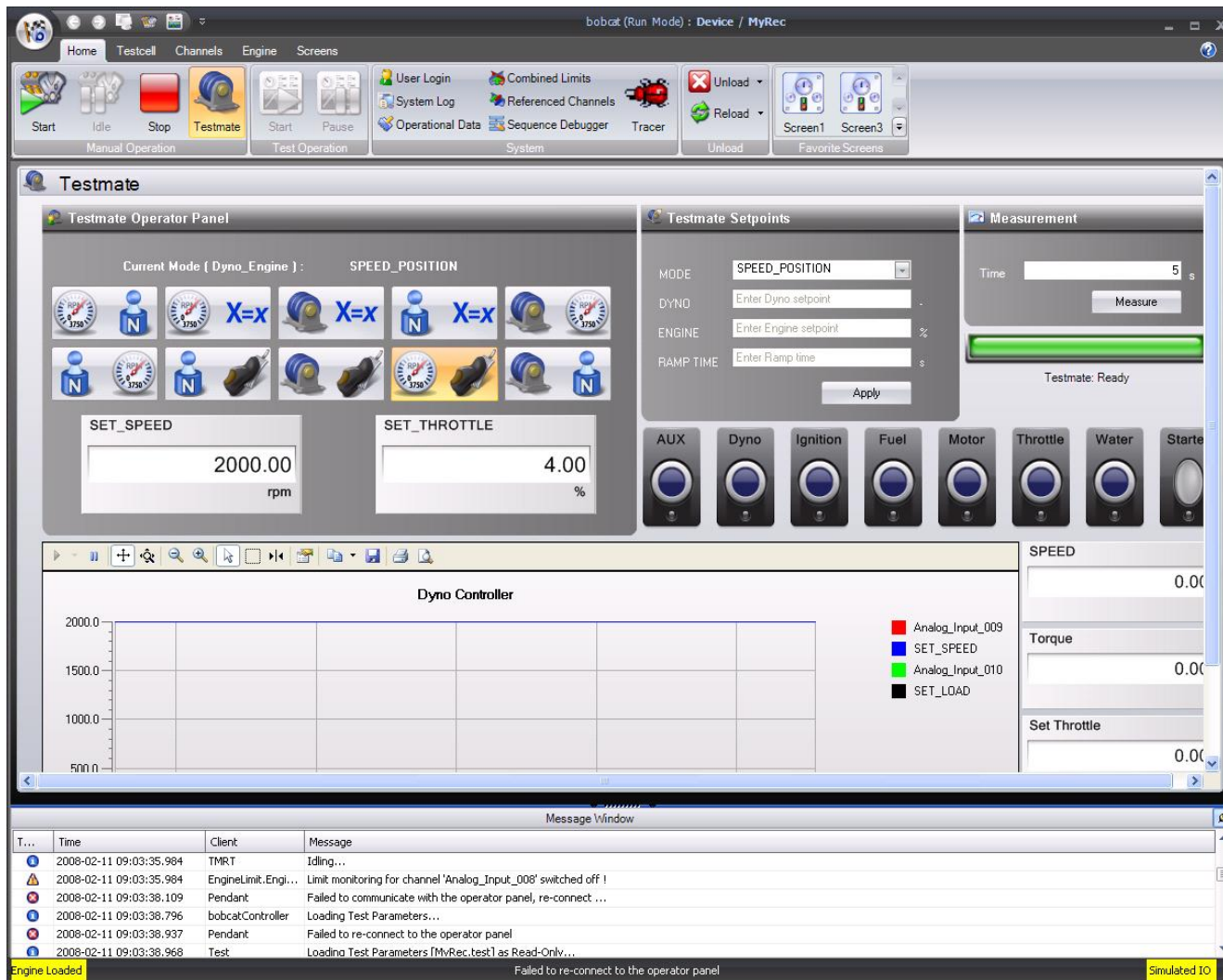
- Can view the Application Recorder in Run Mode
- Can add Application Recorder channels to the plot
- Can zoom, pan, print, and save the plot



AVL BOBCAT – automation & control screen builder



AVL BOBCAT – automation & control run mode



- View status and control in Run Mode
- Change operating modes and setpoints
- Toggle digital output bits
- View input and output signals on chart object
- Integrated with optional Operator Panel

AVL BOBCAT – automation & control data browser

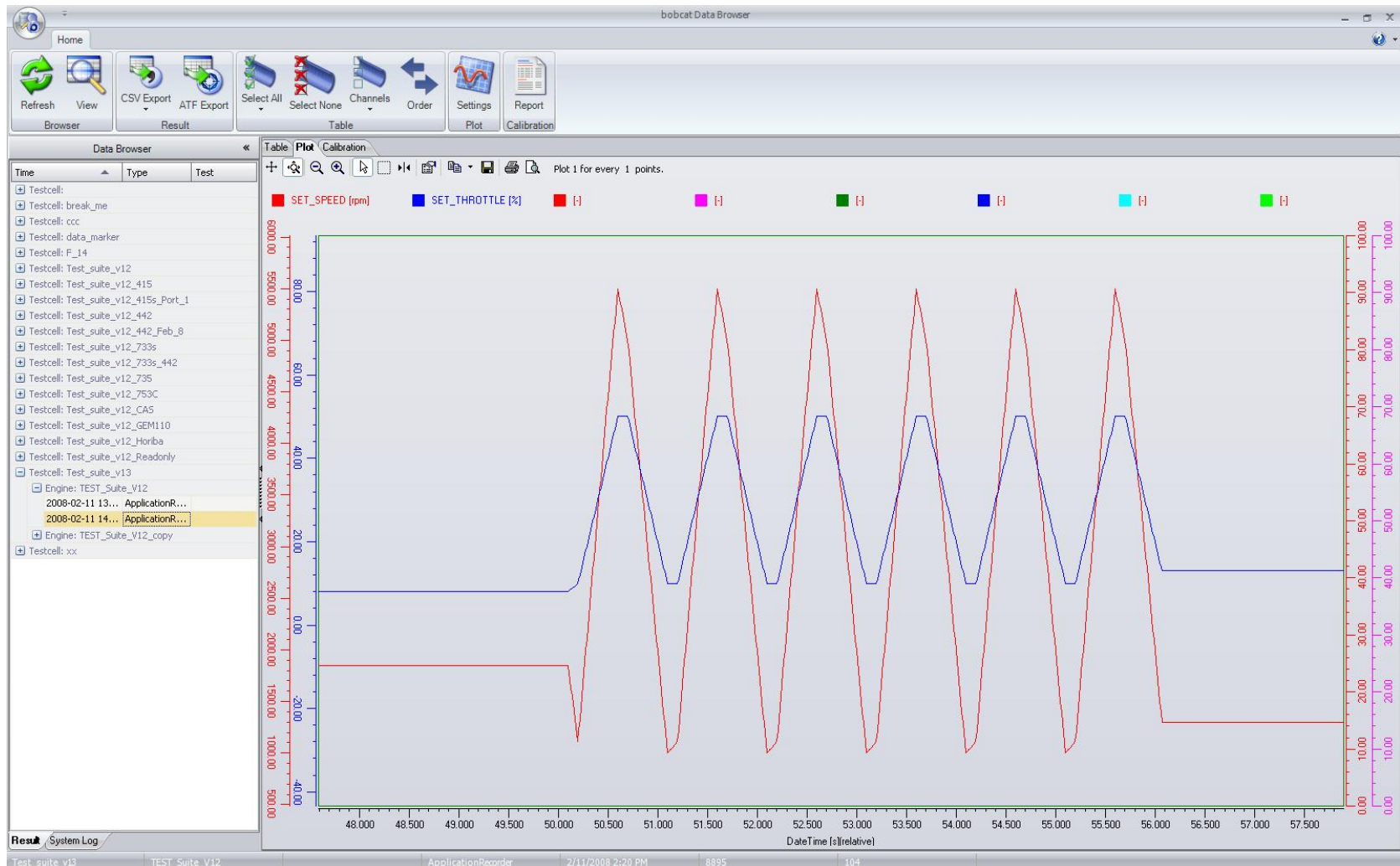


The screenshot shows the AVL BOBCAT Data Browser software. The interface includes a toolbar with icons for Refresh, View, CSV Export, ATF Export, Select All, Select None, Channels, Order, Settings, and Report. The main window displays a table of data points with columns for Time, Type, Test, and various sensor readings. A 'Channels' dialog box is open, showing a list of channels with checkboxes for selection. The status bar at the bottom indicates 'Record 1 of 558' and '1/28/2008 10:24 AM'.

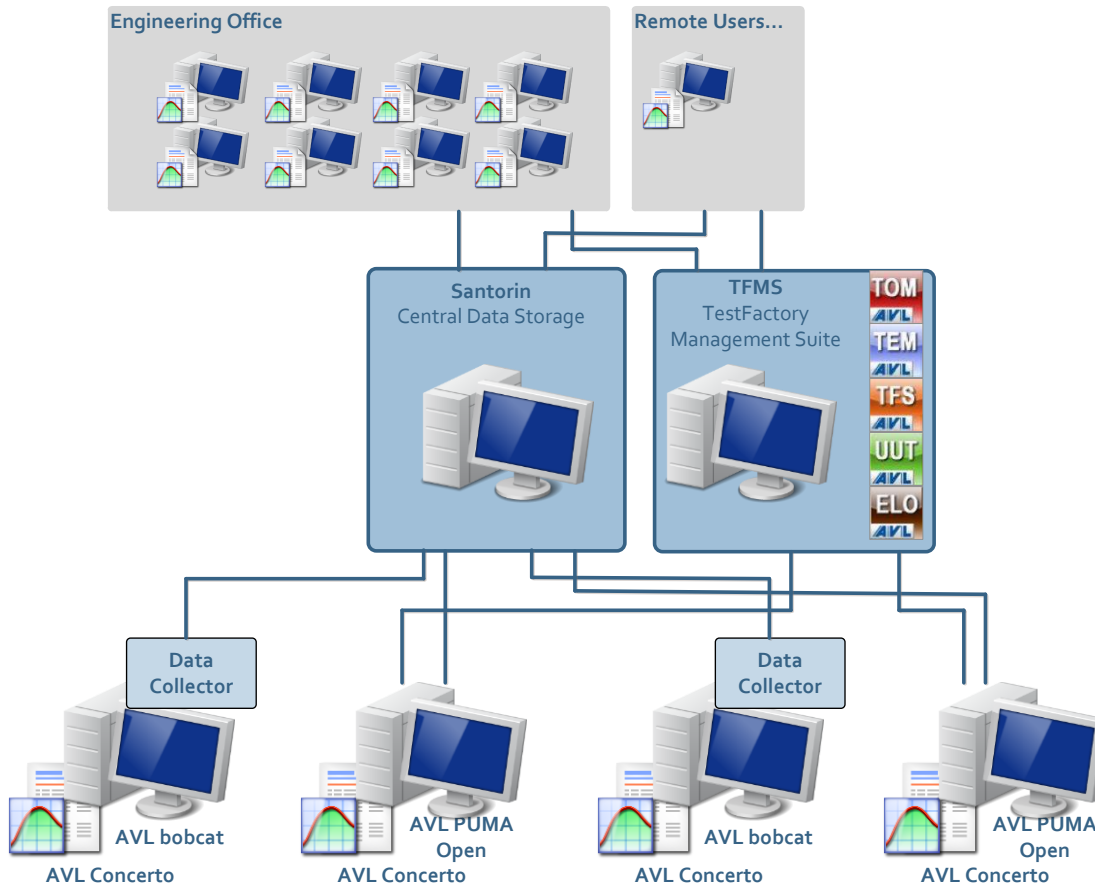
Time	Type	Test	Channel	Value	Unit
2008-01-28 10:24:00	Application...	MyRec	A_34_ftlbs	37534	ft_lbs
2008-01-28 10:24:00	Application...	MyRec	A_34_ftlbs.Max	600.00	ft_lbs
2008-01-28 10:24:00	Application...	MyRec	A_34_ftlbs.Min	600.00	ft_lbs
2008-01-28 10:24:00	Application...	MyRec	A_34_ftlbs.StdDev	600.00	ft_lbs
2008-01-28 10:24:00	Application...	MyRec	AbsorbBit	0	-
2008-01-28 10:24:00	Application...	MyRec	AFRATIO	0	-
2008-01-28 10:24:00	Application...	MyRec	Age_Cycle	0	-
2008-01-28 10:24:00	Application...	MyRec	AI_17	1201533857	psi
2008-01-28 10:24:00	Application...	MyRec	AI_17.Max	600.00	psi
2008-01-28 10:24:00	Application...	MyRec	AI_17.Min	600.00	psi
2008-01-28 10:24:00	Application...	MyRec	AI_17.StdDev	600.00	psi
2008-01-28 10:24:00	Application...	MyRec	AI_18	1201533857	inHg
2008-01-28 10:24:00	Application...	MyRec	AI_18.Max	600.00	inHg
2008-01-28 10:24:00	Application...	MyRec	AI_18.Min	600.00	inHg
2008-01-28 10:24:00	Application...	MyRec	AI_18.StdDev	600.00	inHg
2008-01-28 10:24:00	Application...	MyRec	AI_19	1201533857	inHg
2008-01-28 10:24:00	Application...	MyRec	AI_19.Max	600.00	inHg
2008-01-28 10:24:00	Application...	MyRec	AI_19.Min	600.00	inHg
2008-01-28 10:24:00	Application...	MyRec	AI_19.StdDev	600.00	inHg

- Can pick and choose the channels to be selected and exported
- Can export as few or as many channels as desired

AVL BOBCAT – automation & control data browser



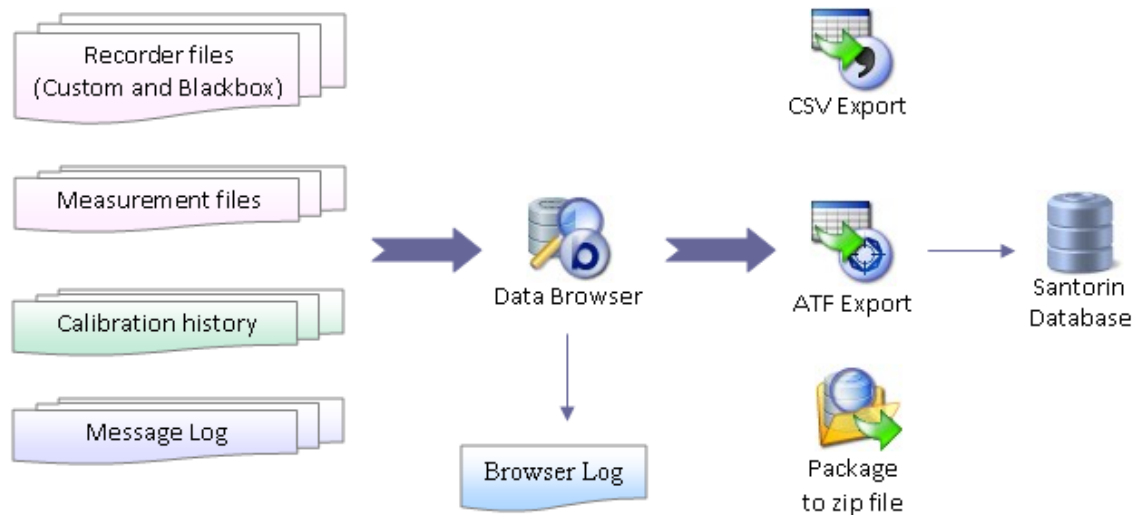
AVL automation & control – BOBCAT & PUMA platform



- BOBCAT can coexist in the testfield with PUMA Open
- Data logged at BOBCAT can be stored at Santorin central host by using a Data Collector interface

BOBCAT automation & control

data browser



Data Browser that can be used to view the result data files (custom recorder, blackbox recorder and measurement files)

The browser provides a better analytical view of the data displaying it in different formats, such as tables and plots

The browser can be used to export the data files to CSV (Comma Separated Values) or ATF (ASAM Transport Format) formats, or to a Santorin database. The data files can also be packaged into zip files for distribution

The Data Browser browser logs details of all errors during operations, such as loading of data files to an error log which can be viewed in the browser itself. The browser can also be used to view calibration history and message log

BOBCAT DataBrowser

user interface



Tools & Functions Ribbon

The ribbon contains several groups of icons for navigation, browser actions, export, history, statistics, custom settings, and plot settings. A 'Configuration1' dropdown is also visible.

File Browser
(Data sorted by Testcell, then by Engine)

- Testcell : Bobcat_EEP_GoldenEngine
 - Engine : Engine_EEP
 - <Engine Data>
 - Run Number: 1
 - Run Number: 2
 - Run Number: 3
 - Run Number: 4
 - Run Number: 5
 - Run Number: 7
 - Run Number: 8
 - Type : EngineMeasurement
 - 2010-... Default
 - 2010-... SPCMeas
 - Type : Recorder
 - 2010-... SPCRec1
 - 2010-... SPCRec1
 - Test : NMode_SteadyState
- Testcell : CDX_testcell
- Testcell : CFO_Testcell

Data Display Area
(tables, plots, template, calibration, message log)

Measurement Number	Duration [s]	Date [-]	Time [-]	DateTime [DateTime]	EpochTime [s]	TimeMicroSec [μs]	EngineStarted [rpm]	EngineStarted [-]	IoStatus [-]
1	2	2010-11-29	13:52:49.387	2010-11-29 ...	1291056769	387522	500.00	0	1
2	1	2010-11-29	13:57:55.807	2010-11-29 ...	1291057075	807528	500.00	0	1

Record 1 of 2

BOBCAT DataBrowser

table



bobcat Data Browser - SampleResults_20101111105759_CustRec

Home

Navigation: Result, Calibration History, Refresh, View, CSV, ATF, Host, Calibration, Package, Calibration History, Show All, No Statistics, Custom, Plot Settings, Configuration1

File Browser

Time	Name
+ Run Number: 6	
+ Run Number: 7	
+ Run Number: 9	
+ Run Number: 14	
+ Run Number: 15	
+ Run Number: 16	
+ Run Number: 17	
+ Run Number: 21	
+ Run Number: 22	
+ Run Number: 24	
+ Run Number: 27	
+ Run Number: 29	
+ Run Number: 30	
+ Run Number: 43	
+ Run Number: 52	
+ Run Number: 72	
+ Run Number: 74	
+ Run Number: 78	
+ Run Number: 80	
+ Run Number: 83	
+ Run Number: 85	
+ Run Number: 86	
+ Run Number: 89	

Table | Plot | Header | Calibration | Message Log

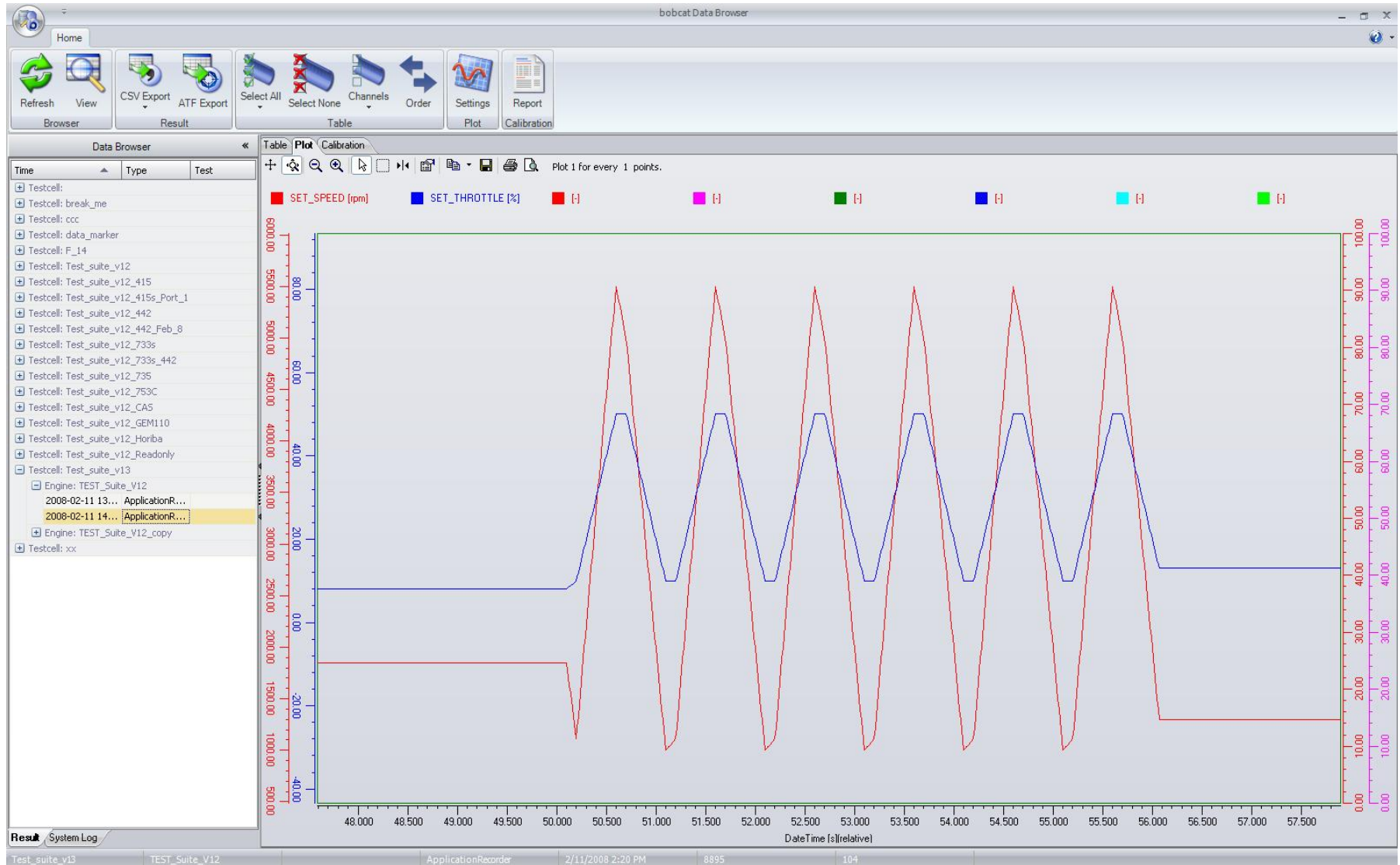
RecordingTime [s]	amp	BagAnalysisSta [-]	Pressure_CFO [kPa]	Pressure_CFO [kPa]	Volflow_CFO_I [-]	Temp_CFO_Blc [K]	Volflow_CFO [l/min]	SPEED [rpm]	TORQUE [Nm]
0	0	0	567.0000	100.1234	0.00	328.0000	0.0001	1000.37	
0.1	0	0	567.0000	100.1234	0.00	328.0000	0.0001	1000.27	
0.2	0	0	567.0000	100.1234	0.00	328.0000	0.0001	1000.17	
0.3	0	0	567.0000	100.1234	0.00	328.0000	0.0001	1000.07	
0.4	0	0	567.0000	100.1234	0.00	328.0000	0.0001	999.97	
0.5	0	0	567.0000	100.1234	0.00	328.0000	0.0001	999.87	
0.6	0	0	567.0000	100.1234	0.00	328.0000	0.0001	999.77	
0.7	0	0	567.0000	100.1234	0.00	328.0000	0.0001	999.67	
0.8	0	0	567.0000	100.1234	0.00	328.0000	0.0001	999.57	
0.9	0	0	567.0000	100.1234	0.00	328.0000	0.0001	1000.47	
1	0	0	567.0000	100.1234	0.00	328.0000	0.0001	1000.37	
1.1	0	0	567.0000	100.1234	0.00	328.0000	0.0001	1000.27	
1.2	0	0	567.0000	100.1234	0.00	328.0000	0.0001	1000.17	
1.3	0	0	567.0000	100.1234	0.00	328.0000	0.0001	1000.07	
1.4	0	0	567.0000	100.1234	0.00	328.0000	0.0001	999.97	
1.5	0	0	567.0000	100.1234	0.00	328.0000	0.0001	999.87	
1.6	0	0	567.0000	100.1234	0.00	328.0000	0.0001	999.77	
1.7	0	0	567.0000	100.1234	0.00	328.0000	0.0001	999.67	
1.8	0	0	567.0000	100.1234	0.00	328.0000	0.0001	999.57	
1.9	0	0	567.0000	100.1234	0.00	328.0000	0.0001	1000.47	

Record 1 of 1051

Bobcat_EBP_Gol... | Engine_EEP | NMode_SteadySt... | Run Number: 93 | Recorder | 2010-11-11 10:5... | Rows: 1,051 | Channels: 44

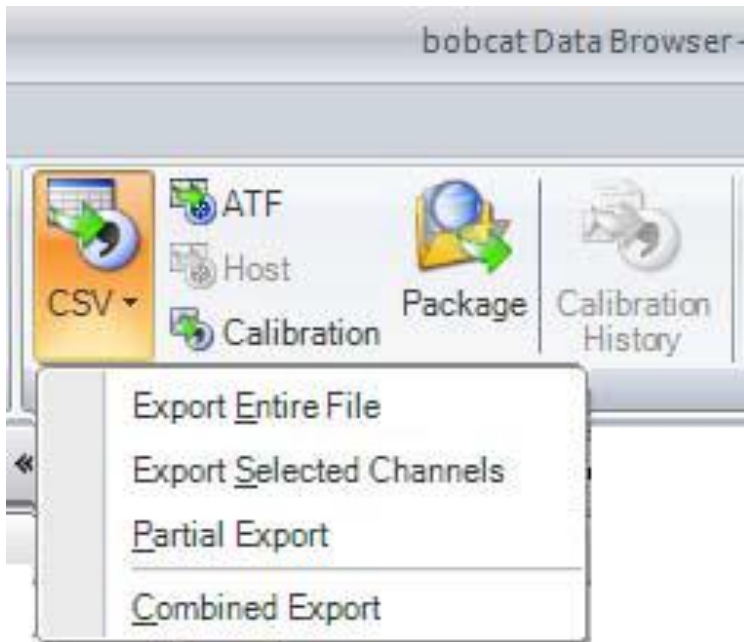
BOBCAT DataBrowser

plot



BOBCAT DataBrowser

data export



Using the Data Browser, it is possible to export result files and calibration history to **CSV and ATF files**. It is also possible to export result data to a **Santorin host** using the Data Browser.

BOBCAT DataBrowser 2

new functions



...Data Comparison Mode

- overlay up to 25 data files with a single click
- export the average data

...Manage configurations for automatic reporting

- define up to 5 tables and 5 plots and generate a report based on a user definable template window

...Data Binning

- create a new data file based on a reference channel. This is helpful when the result file contains multiple runs of the same ramp, and the user would like to get an average value of all the runs based on specific rpm values

...Data Splitting

- split a data file into multiple files based on a reference channel. This is helpful when the result file contains multiple runs of the same ramp, and the user would like to overlay all the ramps

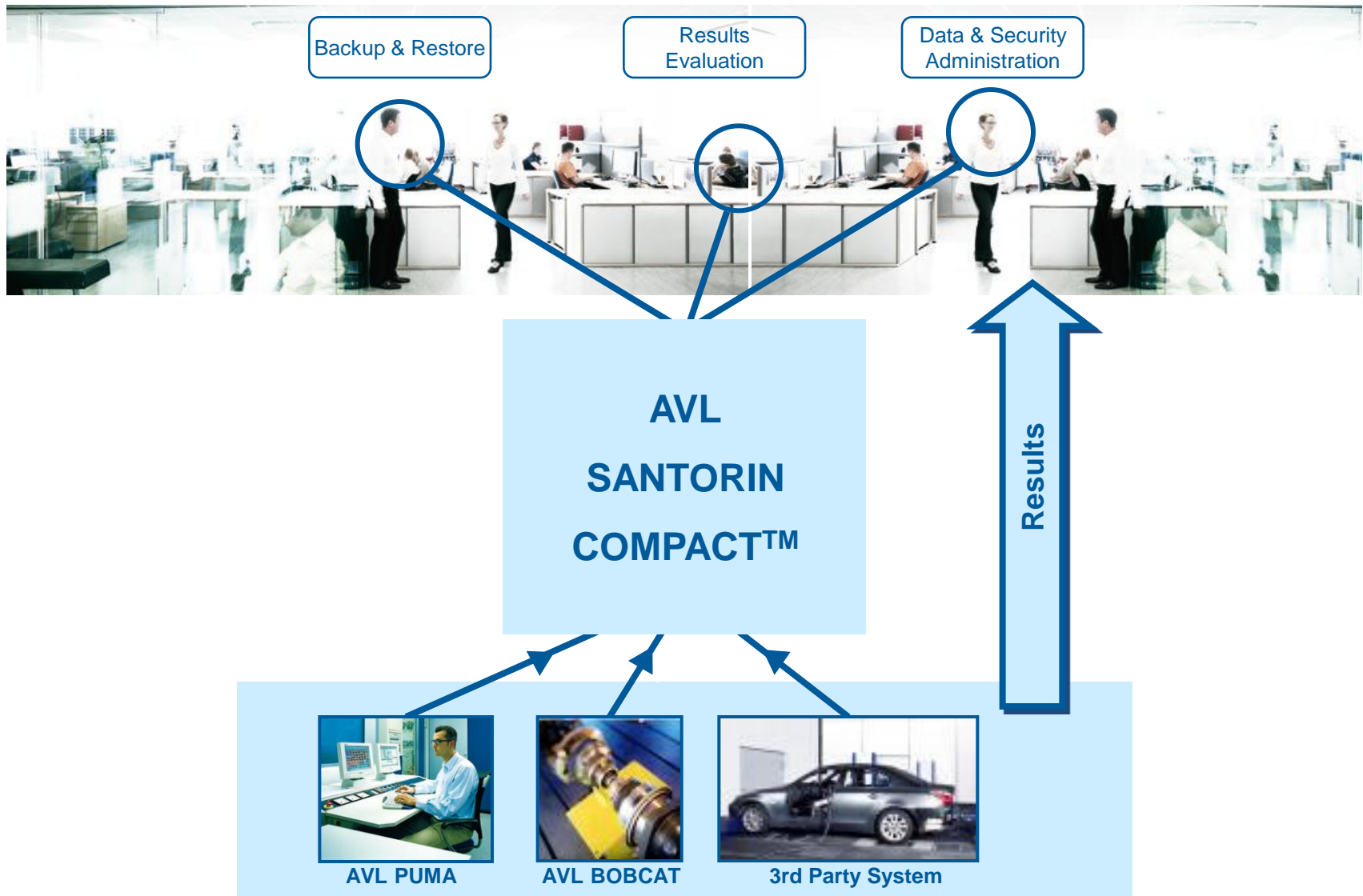
...Formula Calculator

- create up to 20 calculated channels per configuration with the easy to use formula calculator

...Data Browser Test Block

- Perform data binning, Open the latest data set and Automatically print the template using the default printer directly out of the testrun

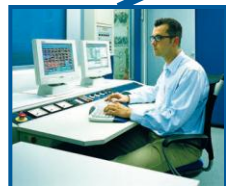
PRODUCT POSITIONING - SANTORIN COMPACT™



APPLICATIONS – RESULTS EVALUATION



- ❑ Comparable result data from different sources enables the comparison of results across the entire test facility with test bed from different suppliers.
- ❑ Common data evaluation based on common normnames / units is ensured by automatic data conversion during the import for PUMA Open , EDACS and 3rd party test beds
- ❑ SANTORIN COMPACT™ in combination with CONCERTO provides a seamless workflow from result data storage to result data visualization.



AVL PUMA



AVL BOBCAT

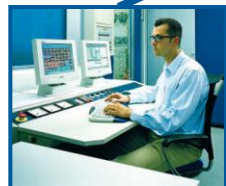


3rd Party System

APPLICATIONS – BACKUP & RESTORE



- ❑ The automatic and time triggered data backup includes all result data stored in the SANTORIN COMPACT™ data base.
- ❑ In case of an unexpected damage of the hardware or in case of data loose the guided restore helps you to re-establish your SANTORIN COMPACT™ and the stored result data.



AVL PUMA



AVL BOBCAT

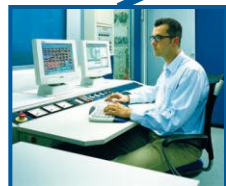


3rd Party System

APPLICATIONS – DATA & SECURITY ADMINISTRATION



- ❑ Central management of project access rights and user accounts throughout the test facility ensures secure and consistent project operation.
- ❑ Easy integration into enterprise's IT environment is ensured by using proven standards like Oracle database, MS Windows Server software and TCP/IP.



AVL PUMA



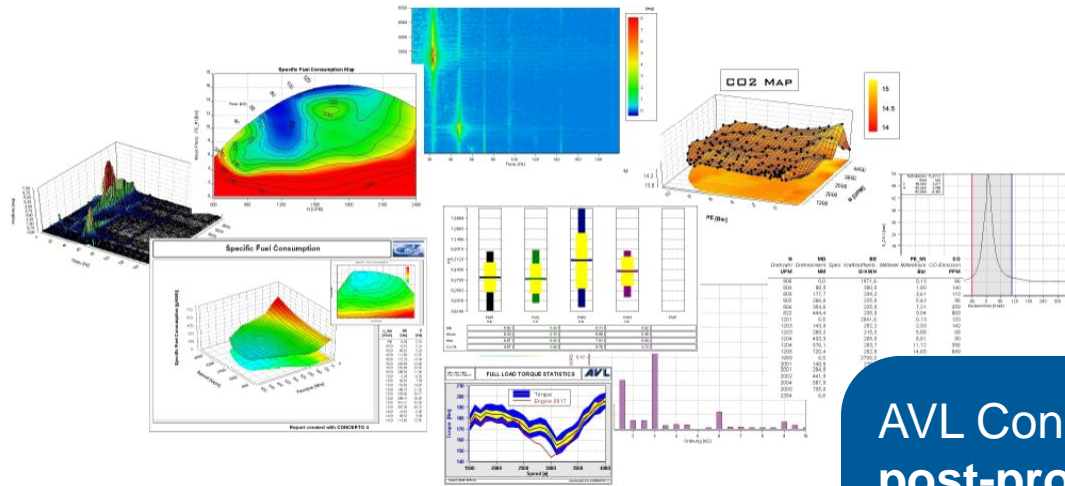
AVL BOBCAT



3rd Party System

BOBCAT automation & control

CONCERTO



AVL Concerto is a generic data analysis & post-processing tool. It is a standalone product which is independent of BOBCAT.

Concerto includes an extensive collection of file format filters, providing you with access to data from both AVL and non-AVL test systems and instruments.

To correctly access bobcat data, a minimum version of 4.3 is required.

post-processing platform

