

MDT Gas System Monitoring

Emilio Nanni
Stepan Kovar
August 8th 2007



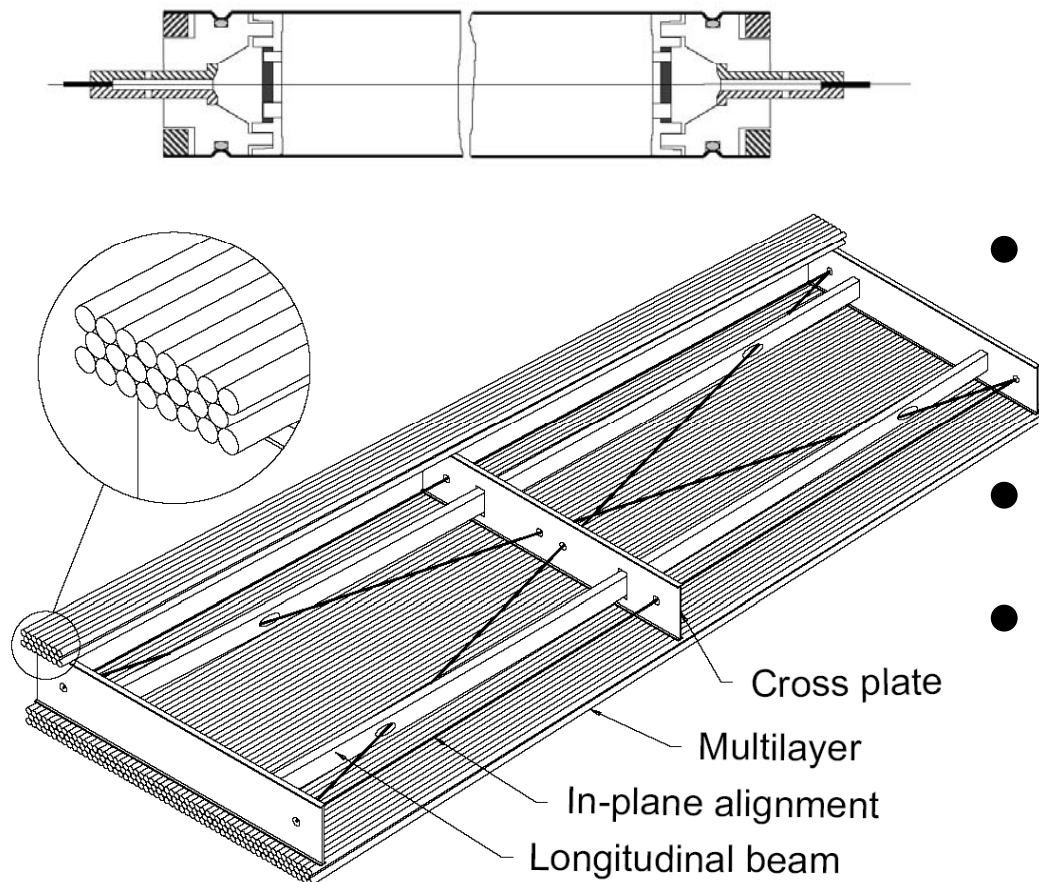
UM/CERN REU Summer 2007



Introduction

- Monitored Drift Tube (MDT) Control Systems Group
- Develop control systems to operate MDT chambers in the ATLAS experiment
 - Gas System
 - Voltage
 - Temperature
 - Magnetic Field Sensors
 - etc.

MDT Chambers



- Hollow tube filled with Argon gas and a wire at HV
- Muons ionize the Argon gas
- 1,200 Chambers
- Many tubes in a chamber

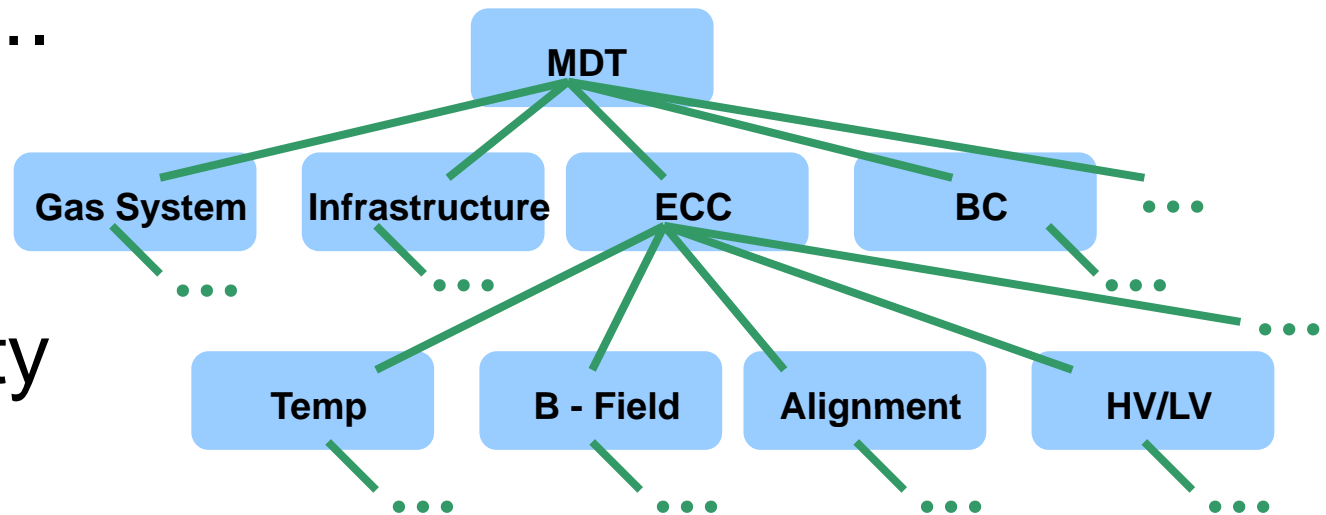
Definitions

- Gas Mapping – Physical setup of the gas system for MDT chambers
- Chamber Status – The functionality of a chamber
- Gas Flow – The flow rate and pressure of the gas
- PVSS – Software used to develop and manage all tools in this presentation

Finite State Machine (FSM)

- Framework built for a hierarchy of items that monitor overall health of the detector
- Each item is assigned a flag – On, Off, Unknown....

- Based on the type and quantity of errors detector is deemed operational

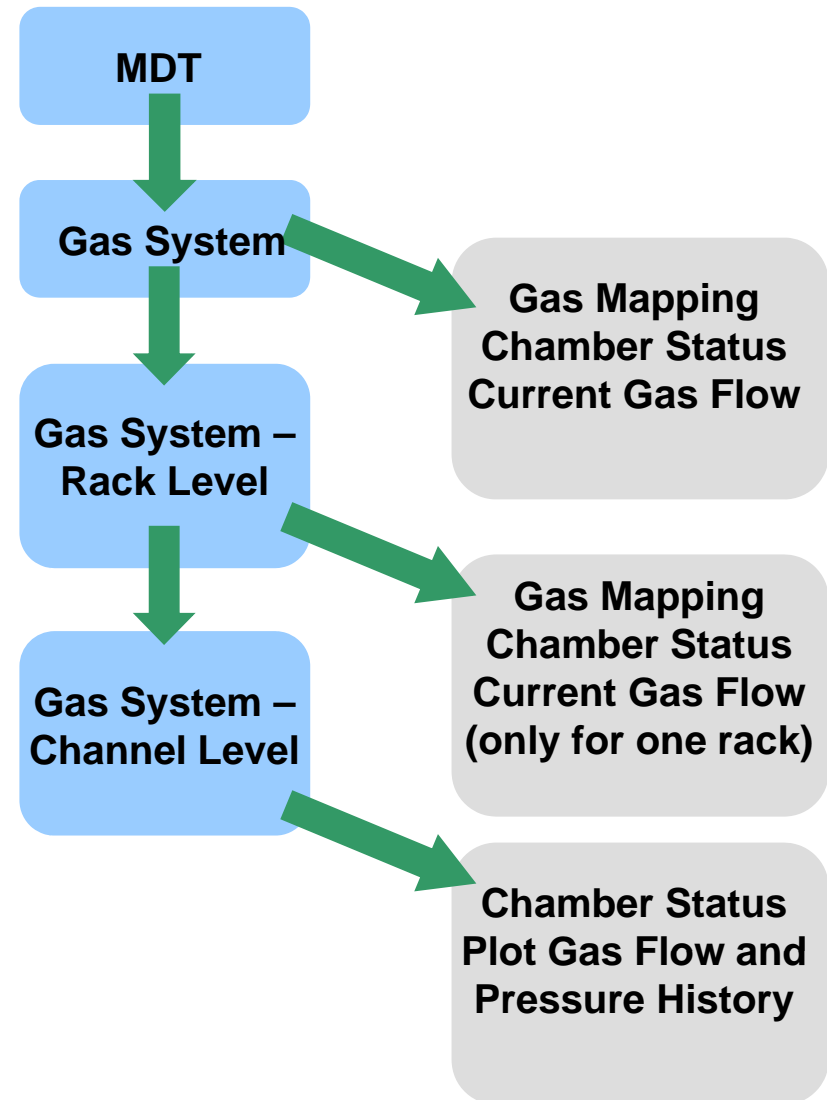


Problems with FSM

- Displays very little information – only current state
- Does not provide device history
- Cannot edit information about devices
- Cannot alter device states

FSM and Panels

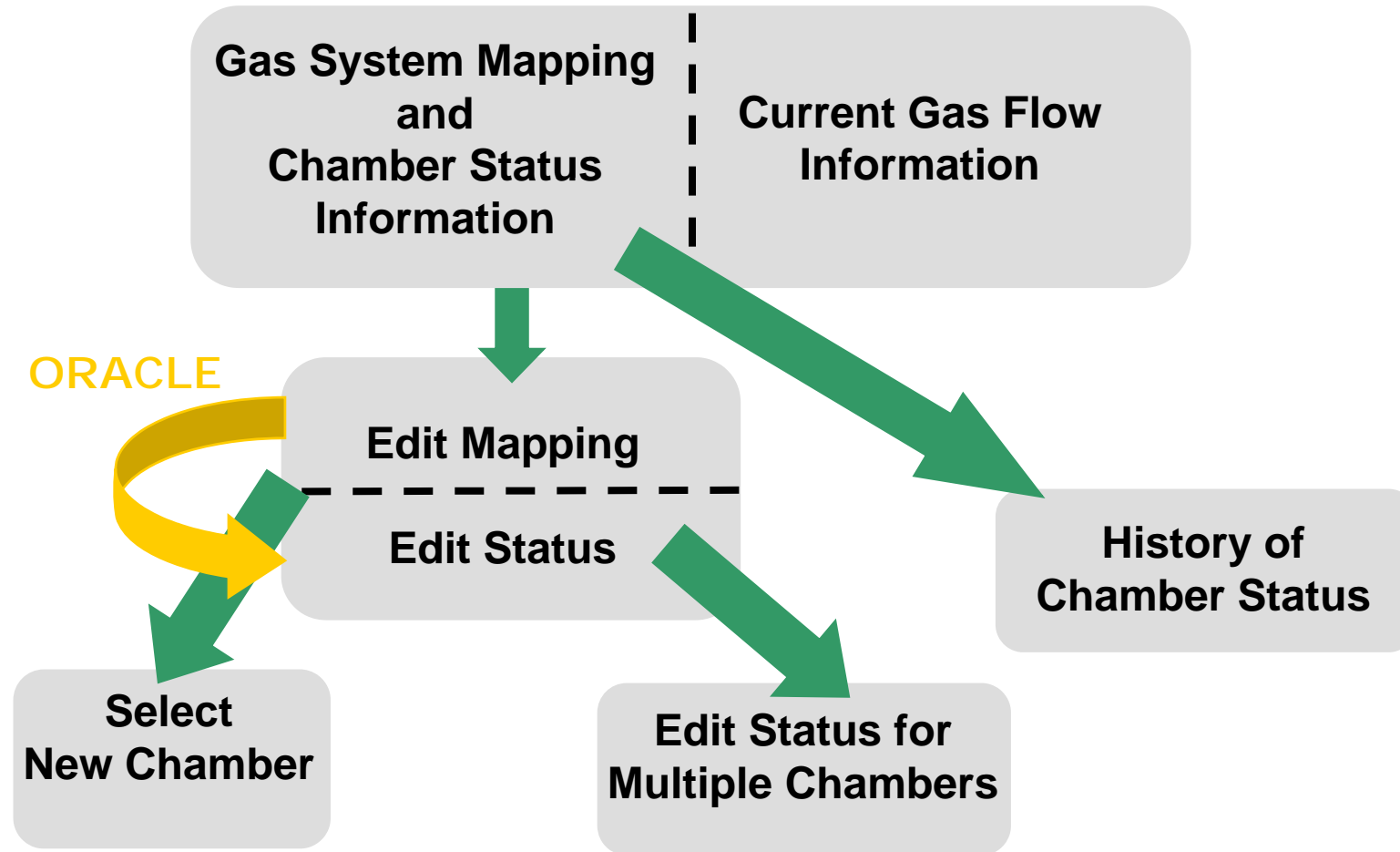
- As the operator navigates through the framework more specific information is accessed
- Panels display useful information for that level



Objectives

- Graphical interface for gas system monitoring of specific chambers
- Gas Mapping management
- Chamber Status management
- Gas Flow monitoring

Gas System Level



Gas System Level

QuickTest: MDT_GAS_DISTRIBUTION.pnl (System1 - ATLMDTSCS; #1)

Module Panel Scale Help

en_US.iso88591

Available Chambers:

Filter By: **ML1:** **ML2:**

Chamber	Atlas Part ID	Rack	Channels	HV OK	HV Ctrl	Gas In	Gas Out	HV OK	HV Ctrl	Gas In	Gas Out
BOS1A02	20MMMPIC000001	69	01 02	NO	OFF	OFF	OFF	NO	OFF	OFF	OFF
BOS1A04	20MMMPIC000002	70	05 06	NO	OFF	OFF	OFF	NO	OFF	OFF	OFF
BOS1A06	20MMMPIC000030	70	17 18	NO	OFF	OFF	OFF	NO	OFF	OFF	OFF
BOS1A08	20MMMPIC000097	69	19 20	NO	OFF	OFF	OFF	NO	OFF	OFF	OFF
BOS1A10	20MMMPIC000005	67	01 02	NO	OFF	OFF	OFF	NO	OFF	OFF	OFF
BOS1A16	20MMMPIC000006	67	19 20	NO	OFF	OFF	OFF	NO	OFF	OFF	OFF
BOS1C02	20MMMPIC000071	69	01 02	NO	OFF	OFF	OFF	NO	OFF	OFF	OFF
BOS1C04	20MMMPIC000046	70	05 06	YES	ON	ON	ON	YES	ON	ON	ON
BOS1C06	20MMMPIC000047	70	17 18	NO	OFF	OFF	OFF	NO	OFF	OFF	OFF

Chamber: BOS1A08 Atlas Part ID: 20MMMPIC000097 Rack: 69 Chamber History

Gas Mapping:

	Rack	Channel	Rack Level	Gas Volume	Gas Flow HV Side	Manifold Location	Gas Flow RD Side	Manifold Location
ML1:	69	19	L7	0	OUT	S8/9	IN	S8/7
ML2:	69	20	L7	0	IN	S8/9	OUT	S8/7

Measurements and Status:

	Rack	Channel	Pressure	Isolation Valve	In Flow	Out Flow	DIP Bad	DIP Invalid
ML1:	69	19	964 mb	FALSE	0.2 L/h	1 L/h	FALSE	FALSE
ML2:	69	20	1045 mb	FALSE	0.6 L/h	0.3 L/h	FALSE	FALSE

Edit

Gas System Level

MDT Update (System1 - ATLMDTSCS; #1)

Chamber Name: BOS6C10
Atlas Part ID: 20MMPIC000076
Viewing From: Local Datapoint

Gas Mapping:

ML1:			ML2:		
Rack Level	Rack Number	Channel	Rack Level	Rack Number	Channel
37	67	3	L1	67	4
Gas Volume	Gas Flow HV Side	Manifold Location	Gas Volume	Gas Flow HV Side	Manifold Location
0	OUT	S10/12	0	IN	S10/11
		Gas Flow RD Side			Manifold Location
		IN			S10/9
		Manifold Location			Manifold Location
		S10/9			OUT

Log Window
Running Synchronization Test...
No need to update.

Close Update

Check Time Stamp View from Datapoint View from Database Clear Log Window

Chamber Status:

ML1:		ML2:	
High Voltage OK	Gas In Valve	High Voltage OK	Gas In Valve
<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> On <input type="radio"/> Off	<input checked="" type="radio"/> Yes <input type="radio"/> No	<input checked="" type="radio"/> On <input type="radio"/> Off
High Voltage Control	Gas Out Valve	High Voltage Control	Gas Out Valve
<input checked="" type="radio"/> On <input type="radio"/> Off	<input checked="" type="radio"/> On <input type="radio"/> Off	<input checked="" type="radio"/> On <input type="radio"/> Off	<input checked="" type="radio"/> On <input type="radio"/> Off

Group Update Update

Available Chambers (System1 - ATLMD...)

Filter By:

Chamber Name: BIS
Atlas Part ID: EPB

Chamber	Atlas Part ID
BIS8A02	20MMEPBC000041
BIS8A04	20MMEPBC000045
BIS8A06	20MMEPBC000043
BIS8A08	20MMEPBC000044
BIS8A10	20MMEPBC000042
BIS8A12	20MMEPBC000046
BIS8A14	20MMEPBC000047
BIS8A16	20MMEPBC000048
BIS8C02	20MMEPBC000033
BIS8C04	20MMEPBC000034
BIS8C06	20MMEPBC000035
BIS8C08	20MMEPBC000036
BIS8C10	20MMEPBC000037
BIS8C12	20MMEPBC000038
BIS8C14	20MMEPBC000039
BIS8C16	20MMEPBC000040

Cancel Select

Gas System Level

Multiple Chamber Status Update (System1 - ATLMDTSCS; #1) [?] [X]

Available Chambers:

Filter By: Chamber Atlas Part ID HV OK HV Control Gas In Gas Out ML1: HV OK HV Control Gas In Gas Out ML2: HV OK HV Control Gas In Gas Out

Chamber	Atlas Part ID	HV OK	HV Control	Gas In	Gas Out	HV OK	HV Control	Gas In	Gas Out
BEE1A08	20MMEPBC000004	YES	OFF	OFF	OFF	NO	ON	OFF	OFF
BOG4C12	20MMALUC000009	YES	OFF	OFF	OFF	NO	ON	OFF	OFF
BOL2A03	20MMFIAC000010	YES	OFF	OFF	OFF	NO	ON	OFF	OFF
EIL1A11	20MMBMCC000006	YES	OFF	OFF	OFF	NO	ON	OFF	OFF
EML5A03	20MMMICC000067	YES	OFF	OFF	OFF	NO	ON	OFF	OFF
EMS4C04	20MMMICC000027	YES	OFF	OFF	OFF	NO	ON	OFF	OFF

Selected Chambers:

Chamber	Atlas Part ID	HV OK	HV Control	Gas In	Gas Out	HV OK	HV Control	Gas In	Gas Out
BOG4C12	20MMALUC000009	YES	OFF	OFF	OFF	NO	ON	OFF	OFF
BOL2A03	20MMFIAC000010	YES	OFF	OFF	OFF	NO	ON	OFF	OFF
EIL1A11	20MMBMCC000006	YES	OFF	OFF	OFF	NO	ON	OFF	OFF
EML5A03	20MMMICC000067	YES	OFF	OFF	OFF	NO	ON	OFF	OFF

Chamber Status:

ML1:		ML2:	
High Voltage OK	Gas In Valve	High Voltage OK	Gas In Valve
<input checked="" type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> On <input checked="" type="radio"/> Off	<input type="radio"/> Yes <input checked="" type="radio"/> No	<input type="radio"/> On <input checked="" type="radio"/> Off
High Voltage Control	Gas Out Valve	High Voltage Control	Gas Out Valve
<input type="radio"/> On <input checked="" type="radio"/> Off	<input type="radio"/> On <input checked="" type="radio"/> Off	<input checked="" type="radio"/> On <input type="radio"/> Off	<input type="radio"/> On <input checked="" type="radio"/> Off

Gas System Level

Activity Filter (System1 - ATLMDTSCS; #1) ? x

Chamber: BEE1A02

Activity of:
ML1 - HV OK

Start Date: Stop Date:

Year: 2007 2007

Month: 7 8

Day: 31 6

Hour: 16 23

Minute: 0 19

Cancel Select Clear Log Window

Log Window

This is the history for chamber BEE1A02 for the state of ML1 - HV OK

On: 7/31/2007 at 16:7:20
The status of ML1 - HV OK changed to 999.

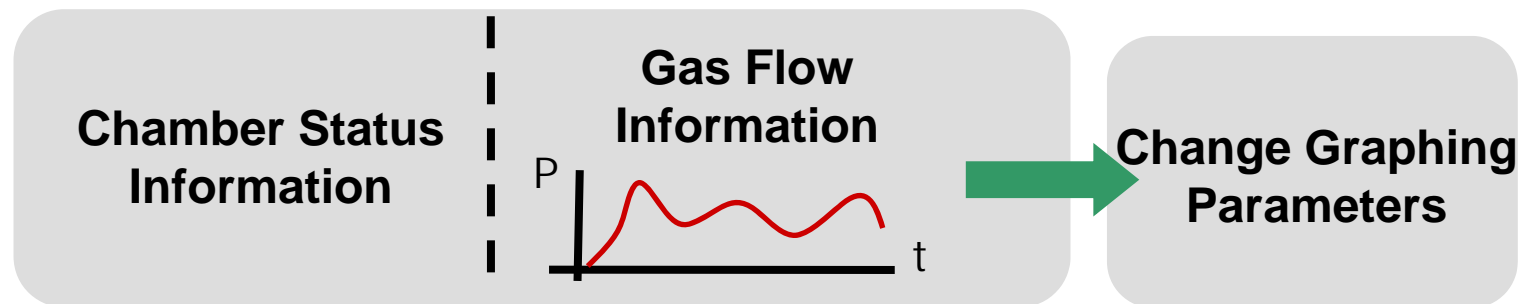
On: 7/31/2007 at 16:8:38
The status of ML1 - HV OK changed to 456.

On: 7/31/2007 at 16:8:48
The status of ML1 - HV OK changed to 876.

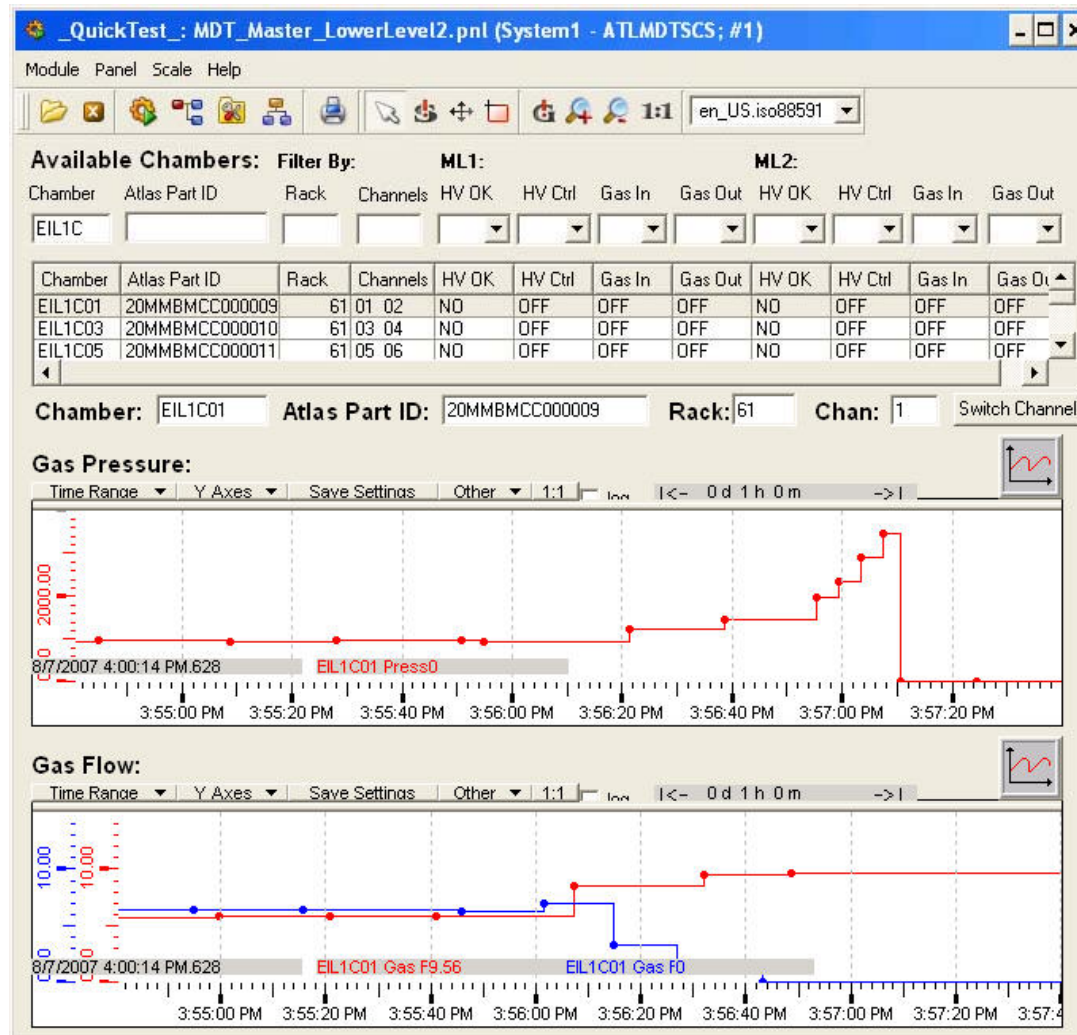
On: 7/31/2007 at 16:8:51
The status of ML1 - HV OK changed to 876.

On: 8/6/2007 at 16:36:41
The status of ML1 - HV OK changed to 876.

Gas System – Channel Level



Gas System – Channel Level



Conclusion

- Developed a graphical interface that can edit and manage Gas Mapping, Chamber Status and Gas Flow information
- Finish documentation for panels
- Further testing during Milestone 4 run in late August

Thanks

- Stepan Kovar
- Dr. Joerg Wotschack
- Dr. Jean Krisch
- Dr. Homer Neal
- Dr. Steve Goldfarb
- NSF and Ford for funding
- CERN Summer Student Program

Questions







- Screen Shot FSM with Panel