DeltaV SIS
Advanced Function Blocks
State Transition Diagram

Dirk Tuchel

Senior SIS Lead Engineer,

Haan

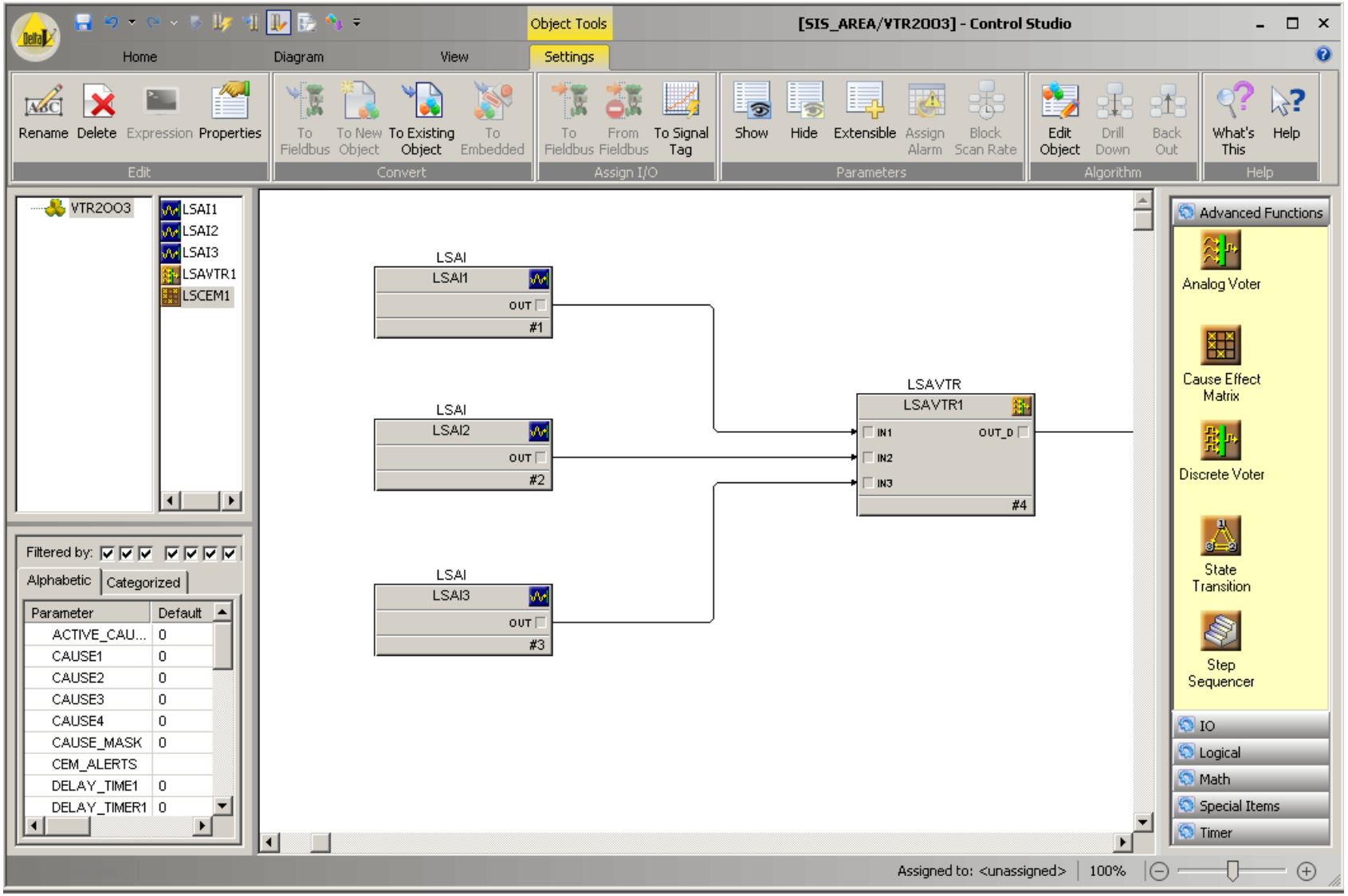
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Process Management

SIS Advanced Function Blocks

- Analog Voter
- Discrete Voter
- CEM (Cause and Effect Matrix)
- Step Sequencer
- State Transition Diagram

all function blocks TÜV certified

2oo3 Voter


Object Tools
[SIS_AREA/VTR2003] - Control Studio
Home
Diagram
View
Settings
Rename
Delete
Expression
Properties
Edit
To Fieldbus
To New Object
To Existing Object
To Embedded
Convert
To Fieldbus
From Fieldbus
To Signal Tag
Assign I/O
Show
Hide
Extensible
Assign Alarm
Block Scan Rate
Parameters
Edit Object
Drill Down
Back Out
Algorithm
What's This
Help
Help
VTR2003
LSAI1
LSAI2
LSAI3
LSAVTR1
LSCEM1
Filtered by:
Alphabetic
Categorized
Parameter
Default
ACTIVE_CAU...
CAUSE1
CAUSE2
CAUSE3
CAUSE4
CAUSE_MASK
CEM_ALERTS
DELAY_TIME1
DELAY_TIMER1
LSAI
LSAI1
OUT
#1
LSAI
LSAI2
OUT
#2
LSAI
LSAI3
OUT
#3
LSAVTR
LSAVTR1
IN1
IN2
IN3
OUT_D
#4
Advanced Functions
Analog Voter
Cause Effect Matrix
Discrete Voter
State Transition
Step Sequencer
IO
Logical
Math
Special Items
Timer
Assigned to: <unassigned>
100%

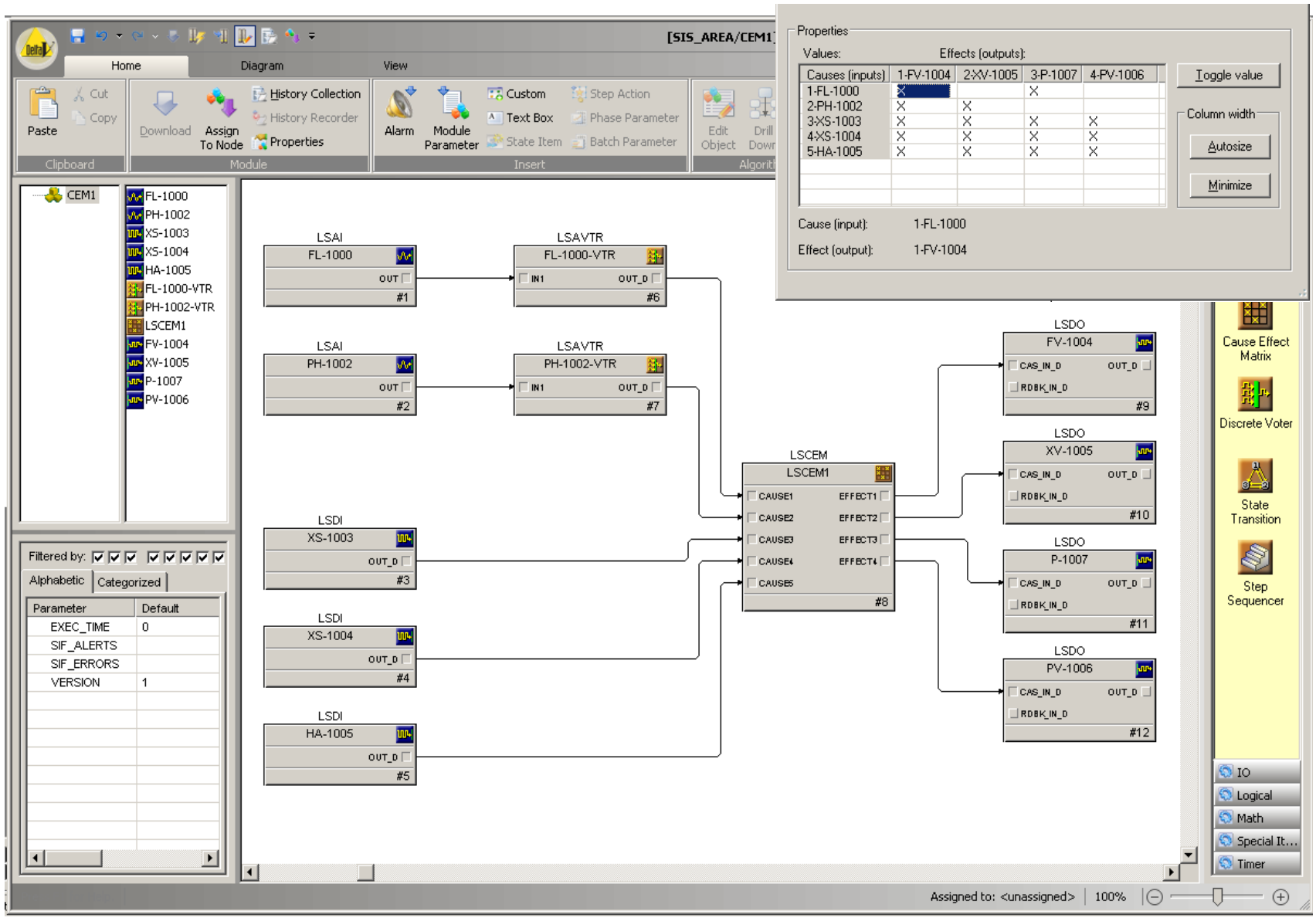
Cause and Effect Matrix

TAG #	Description	SIL	INSTRUMENT RANGE	TRIP VALUE	UNITS	OPENS VALVE FV-1004	OPEN VALVE XV-1005	STOP PUMP P-1007	CLOSE VALVE PV-1006	NOTES
FL-1000	Flow to main reactor R-100	2	0-200	100.0	gpm	X		X		1
PH-1002	Reactor internal pressure	2	0-800	600	psi	X	X			1, 2
XS-1003	Loss of control power					X	X	X	X	
XS-1004	Loss of instrument air					X	X	X	X	
HA-1005	Manual shutdown					X	X	X	X	

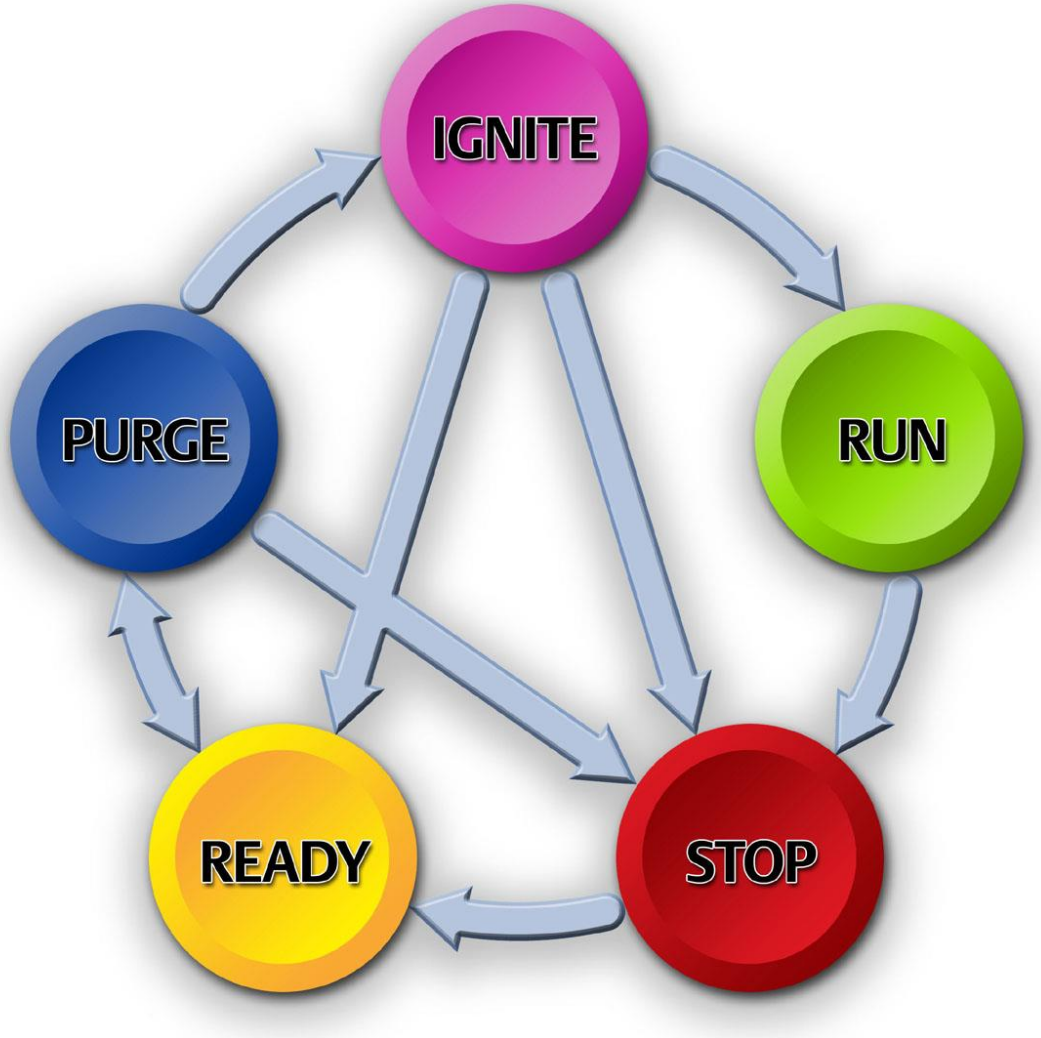
Notes:
1. Two-second delay required before closing FV-1004.
2. Reset located at valve PV-1006.

Table 5-2 Cause-and-Effect Diagram

CEM – Cause and Effect FB



Typical BMS Sequence



Three Main Logic Parts to a BMS



States & Transitions

- When to move from one state to another
- What triggers / permits logic to transition between states

State Transition Diagram

Outputs

- Valve positions defined for each state

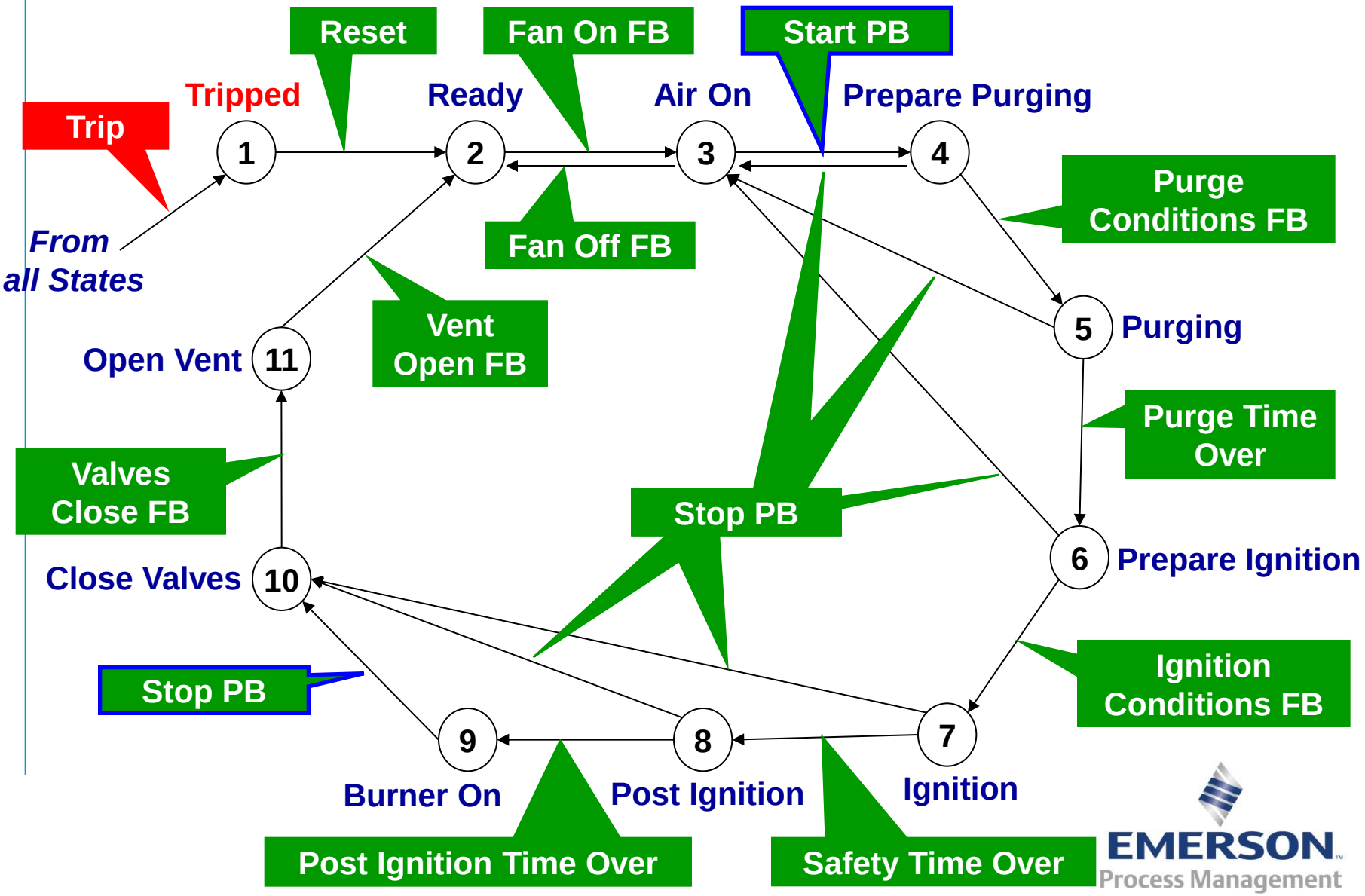
Step Sequencer

Trips and Permissives

- Including which is active during each state

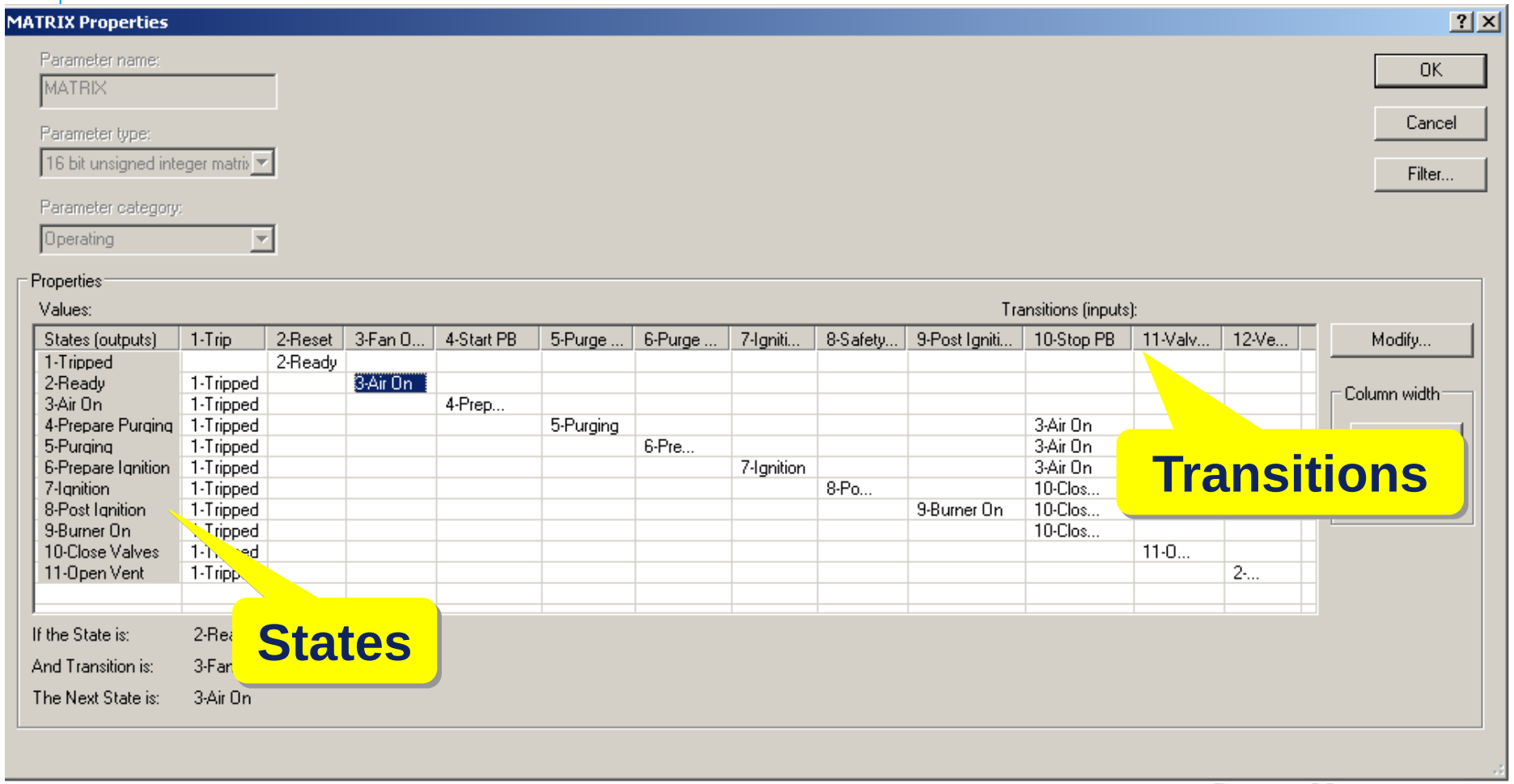
Cause & Effect

State Transition Diagram



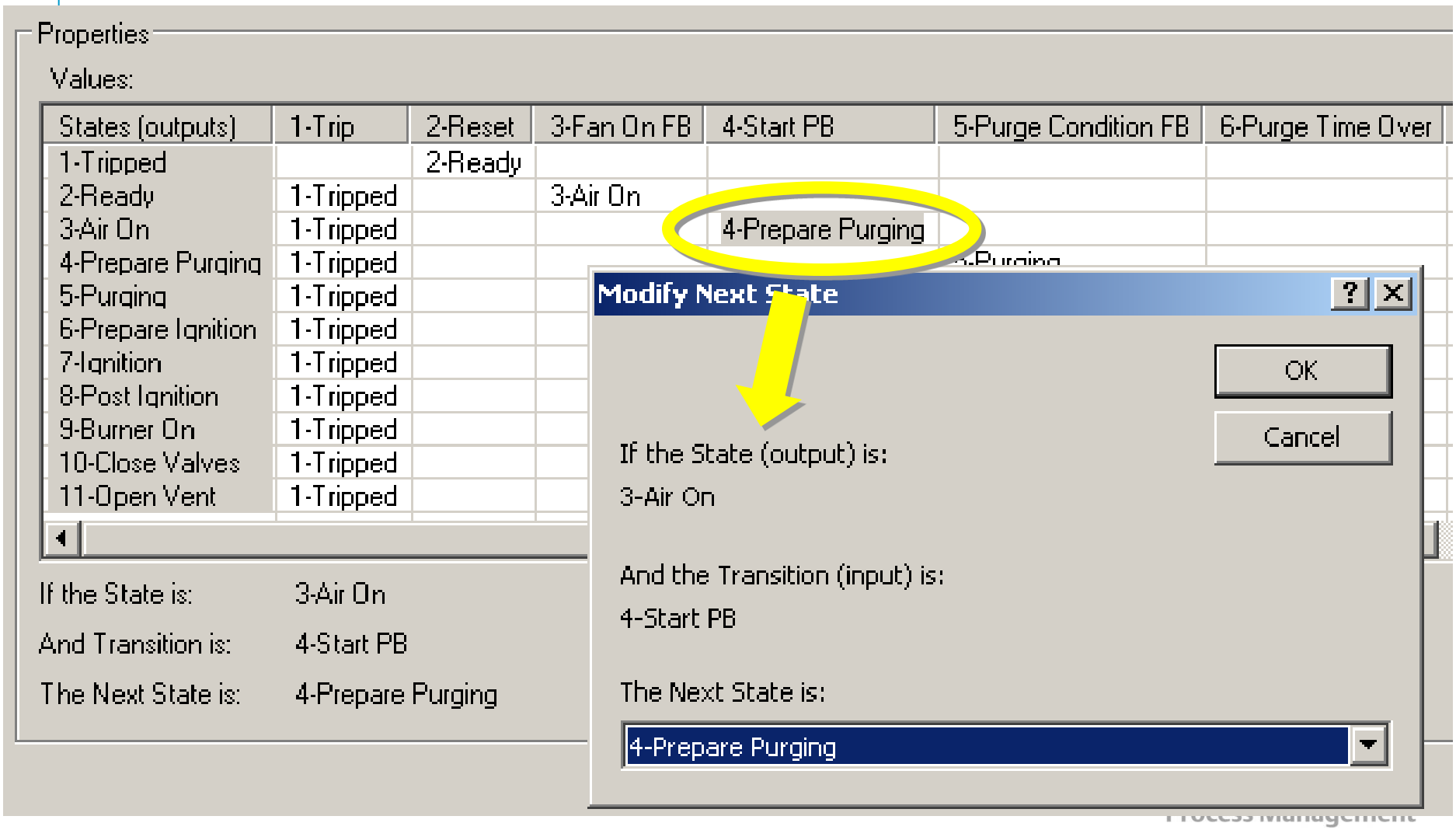
STD Configuration

- Realisation with **State Transition Diagram FB**



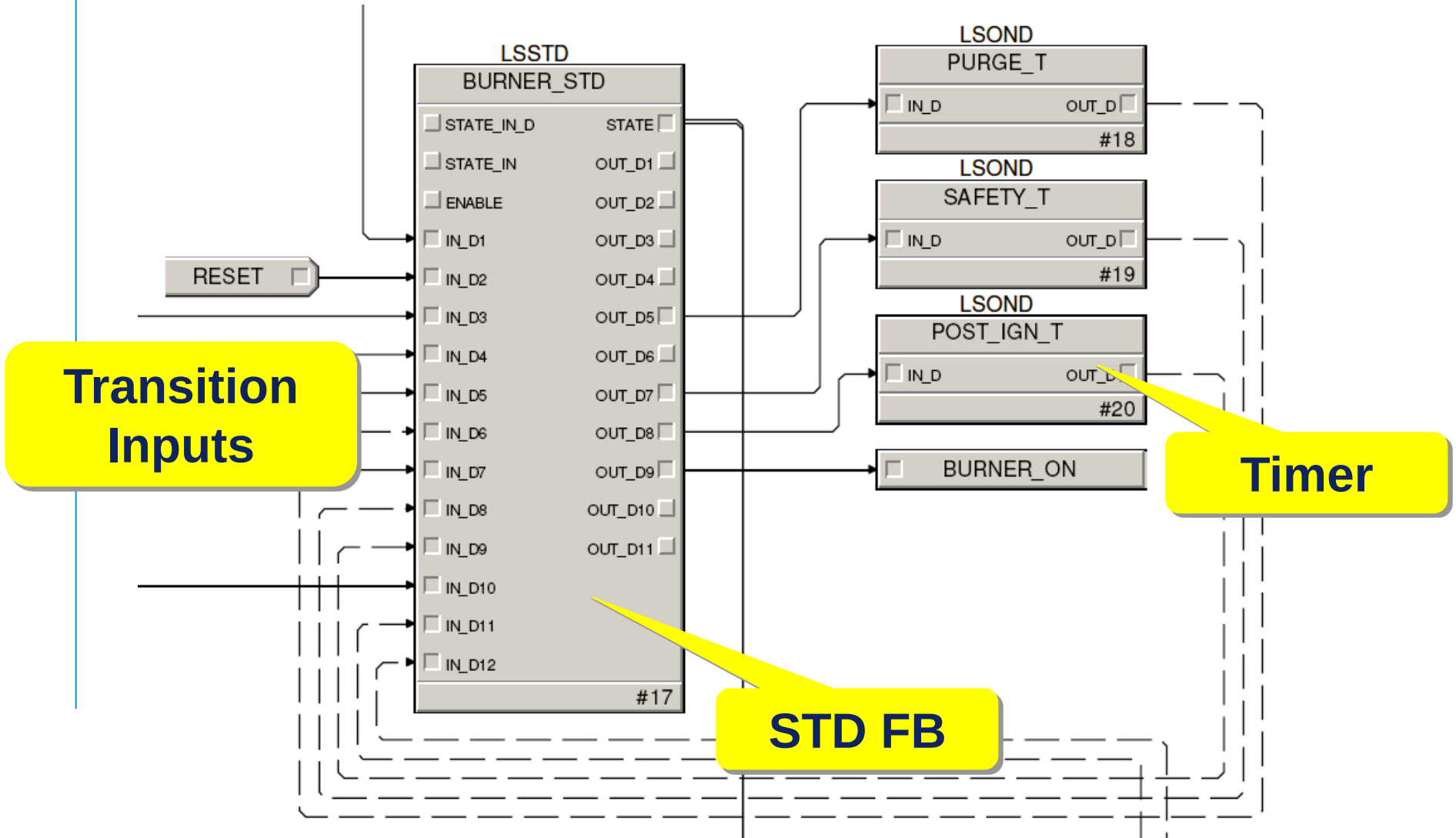
STD Configuration

- Realisation with **State Transition Diagram FB**

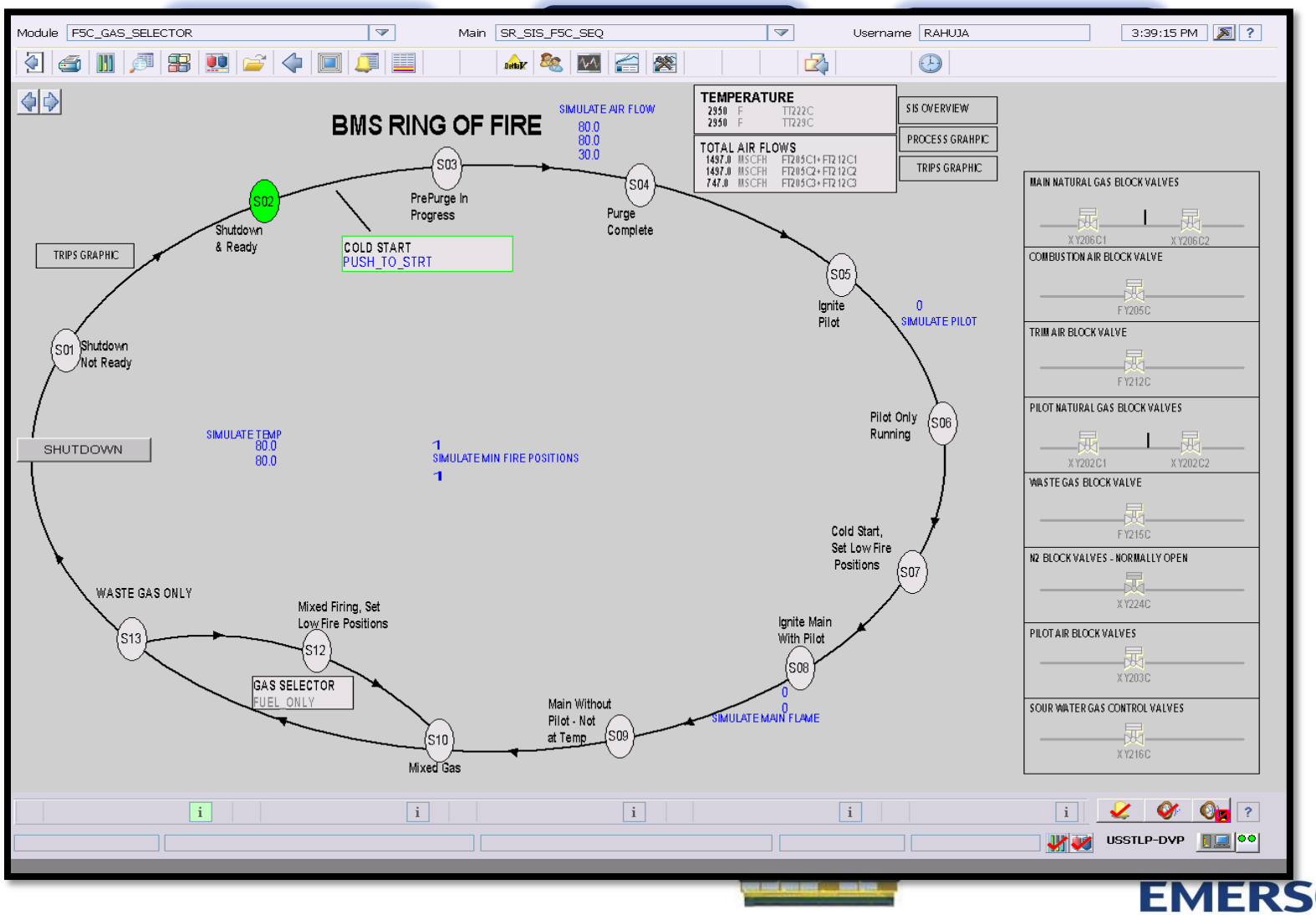


STD Configuration

- Realisation with **State Transition Diagram FB**

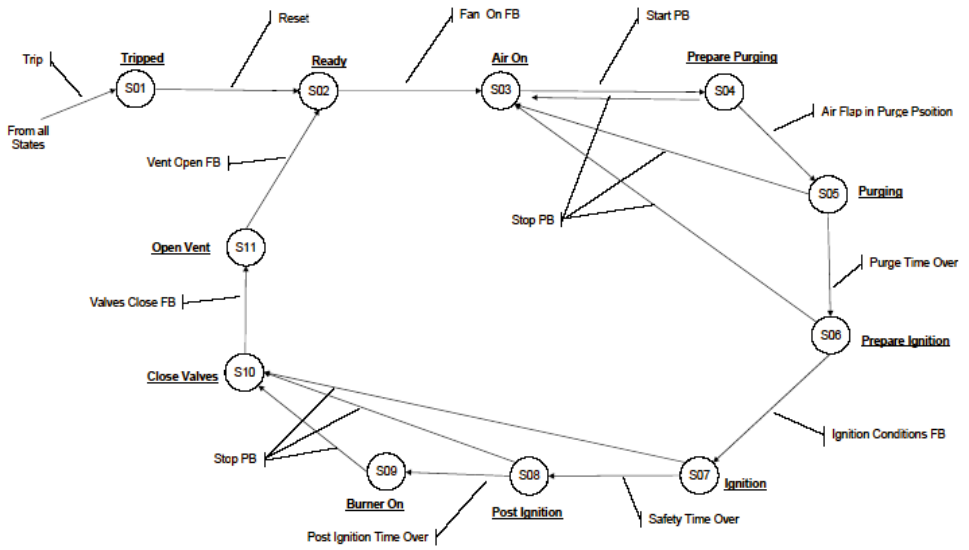


BMS visualization

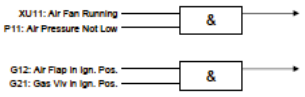


EMERSON
Process Management

Documentation



State Transition Diagram



State-Transition-Diagram

States and Outputs

TAG	Description	OUT	Stade	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
			Enable																	
			Tripped																	
			Ready																	
			Air On																	
			Prepare Purging																	
			Purging																	
			Prepare Ignition																	
			Ignition																	
			Post Ignition																	
			Burner On																	
			Close Valves																	
			Open Vent																	
	XV21 Gas Vlv 1	1									X	X	X							
	XV22 Gas Vlv 1	2									X	X	X							
	XV23 Vent Vlv	3								X	X	X	X	X						
	XU71 Ignitor	4									X									
	Purge Position	5						X	X											
	Ignition Position	6								X	X	X								
		7																		
		8																		

Remarks

Outputs

States and Trips

TAG	Description	OUT	Transition	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	H81: ESD Pushbutton	1			X	X	X	X	X	X	X	X	X	X	X					
	T71/72: Furnace Temp. High 1c	2			X	X	X	X	X	X	X	X	X	X	X					
	XU11: Air Fan Not Running	3			X		X	X	X	X	X	X	X	X	X					
	P11: Air Pressure Low	4			X		X	X	X	X	X	X	X	X	X					
	P21: Gas Pressure Low	5			X					X	X	X	X							
	P22: Gas Pressure High	6			X					X	X	X	X							
	X71: No Flame	7			X							X	X							
	X71: Flame	8			X				X											
	G11: Air Flap Not in Pur																			
	G12: Air Flap Not in Ig																			
	G21: Gas Vlv Not in Ig																			
	Gas Valves Not Close																			
	Any Valve Failure																			

Remarks

Trips

States and Transitions

TAG	Description	OUT	Transition	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		ENA																		
	Trip	1			1	1	1	1	1	1	1	1	1	1	1					
	Reset	2		2																
	Fan On FB	3			3															
	Start PB	4				4														
	Purge Condition FB	5					5													
	Purge Time Over	6						6												
	Ignition Condition FB	7							7											
	Safety Time Over	8								8										
	Post Ignition Time Over																			
	Stop PB																			
	Valve Close FB																			
	Vent Open FB																			

Remarks

Transitions

Revision	Prepared	Checked	Description	Approved	Date
P1	A. Fuchs		Fist Issue		01.08.2006
					Date

Title: Gas Burner
State Transition Diagram

Drawing No.:

Customer: Emerson Exchange

Project:

EMERSON. Process Management