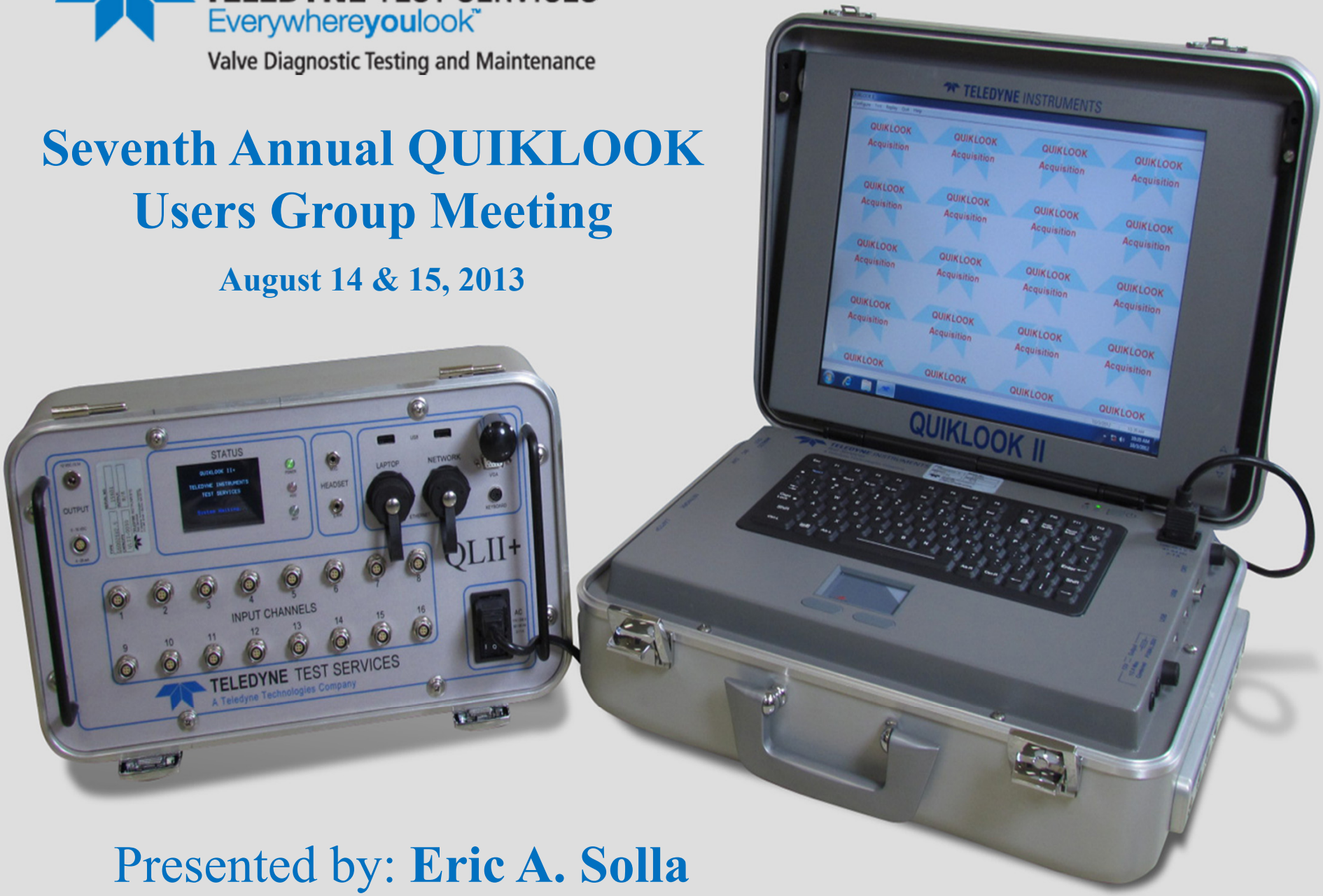
TELEDYNE TEST SERVICES
Everywhereyoulook™
Valve Diagnostic Testing and Maintenance

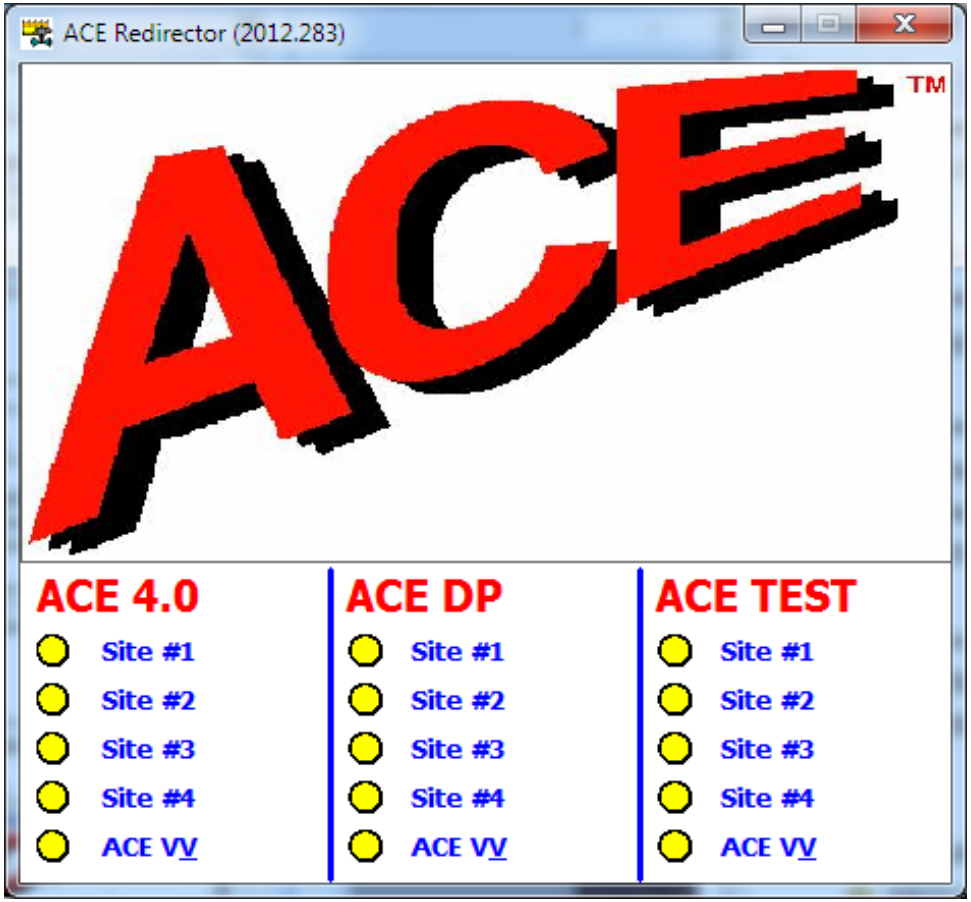
Seventh Annual QUIKLOOK Users Group Meeting

August 14 & 15, 2013



Presented by: **Eric A. Solla**

TELEDYNE TEST SERVICES
Everywhereyoulook™
Valve Diagnostic Testing and Maintenance



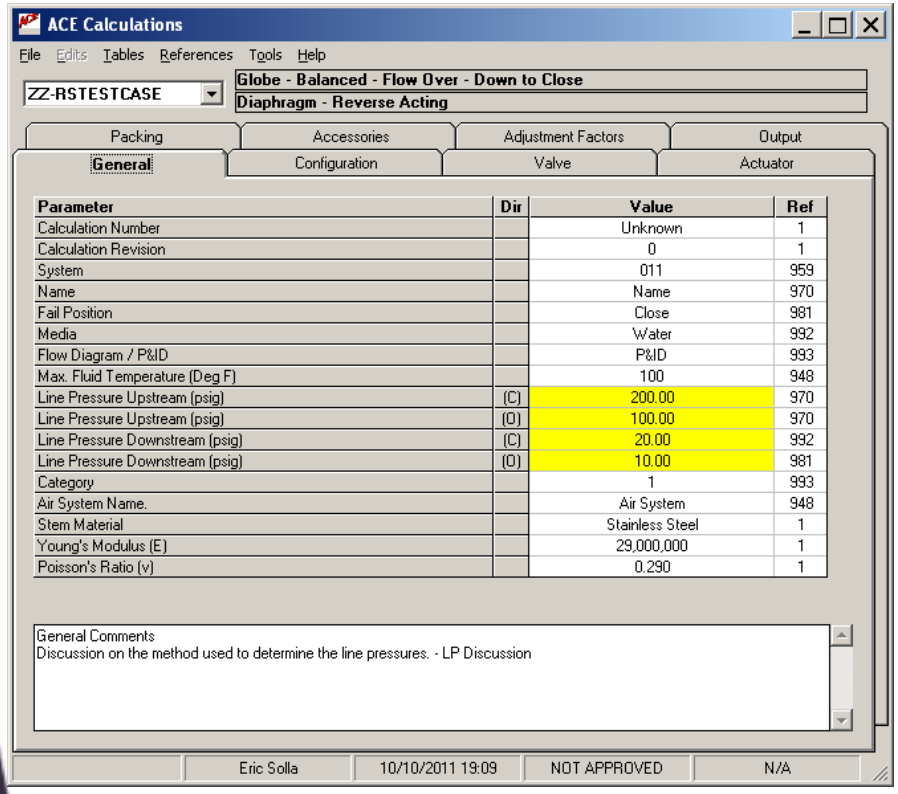
Software Engineer

Eric A. Solla

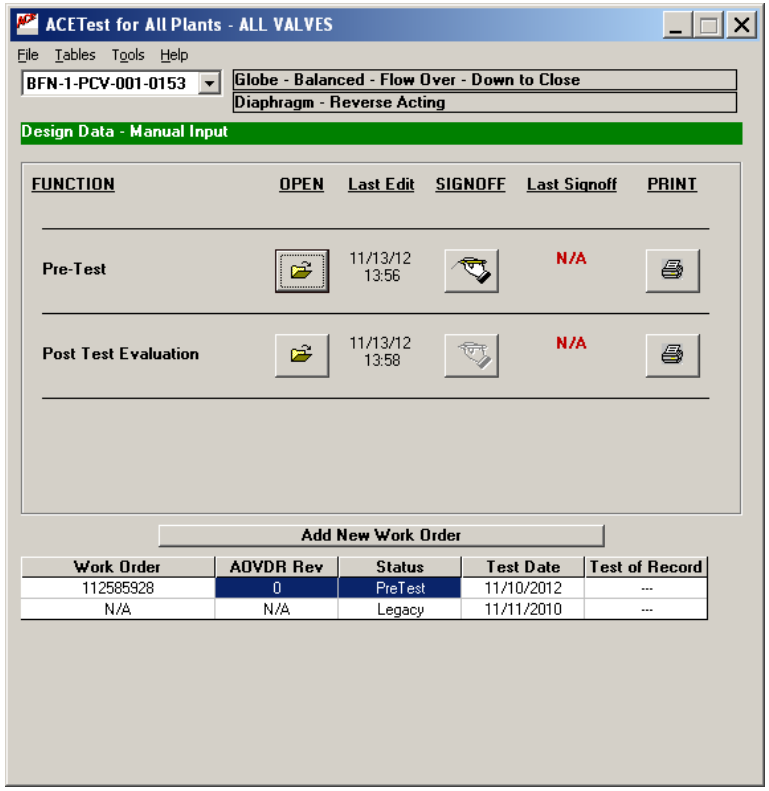
ACE Software

Integrated

Design Calculation Software
ACE



Test Analysis Software
ACETEST

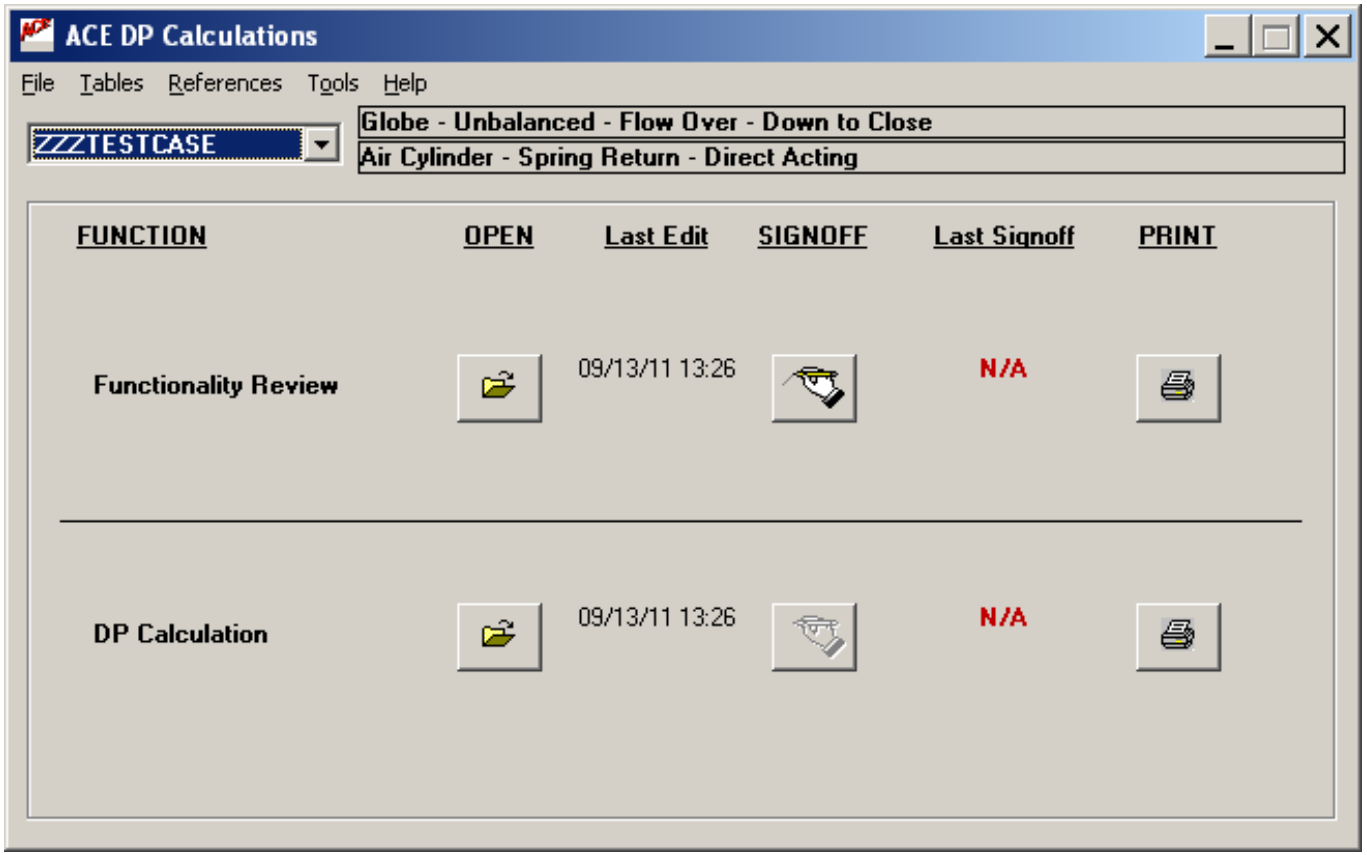


ACE Software History

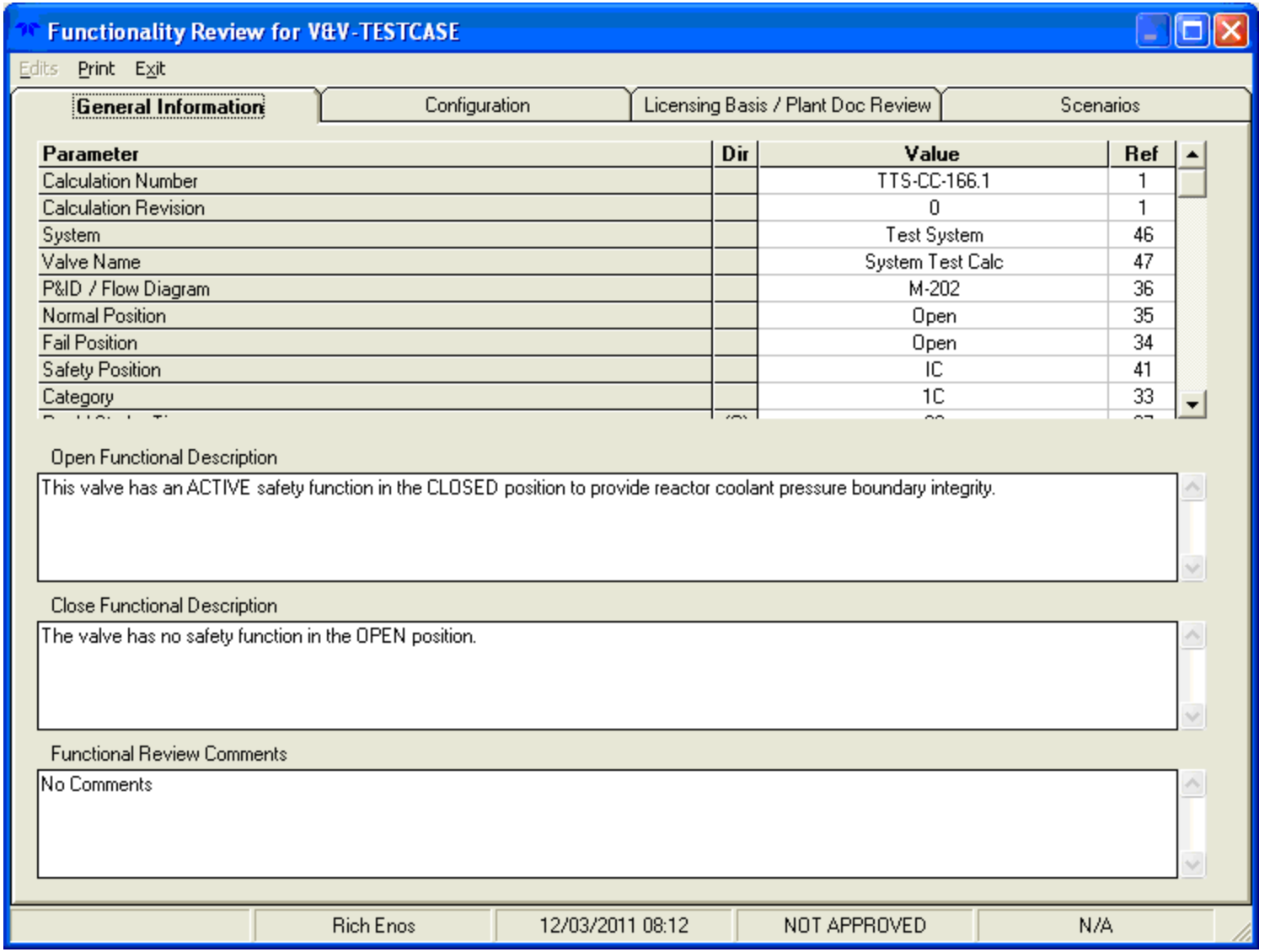
- 2009 – Purchase ACE 3.0 from Areva
- 2011 – ACE 4.0 Beta
  - New User Interface Similar to Midas
  - Calcs and Methodologies Stay Same as ACE 3.0
  - Added many of the Standard Midas Features
- 2012 – ACE 4.0 Release
- 2013 – ACE 4.1 Release

ACE DP

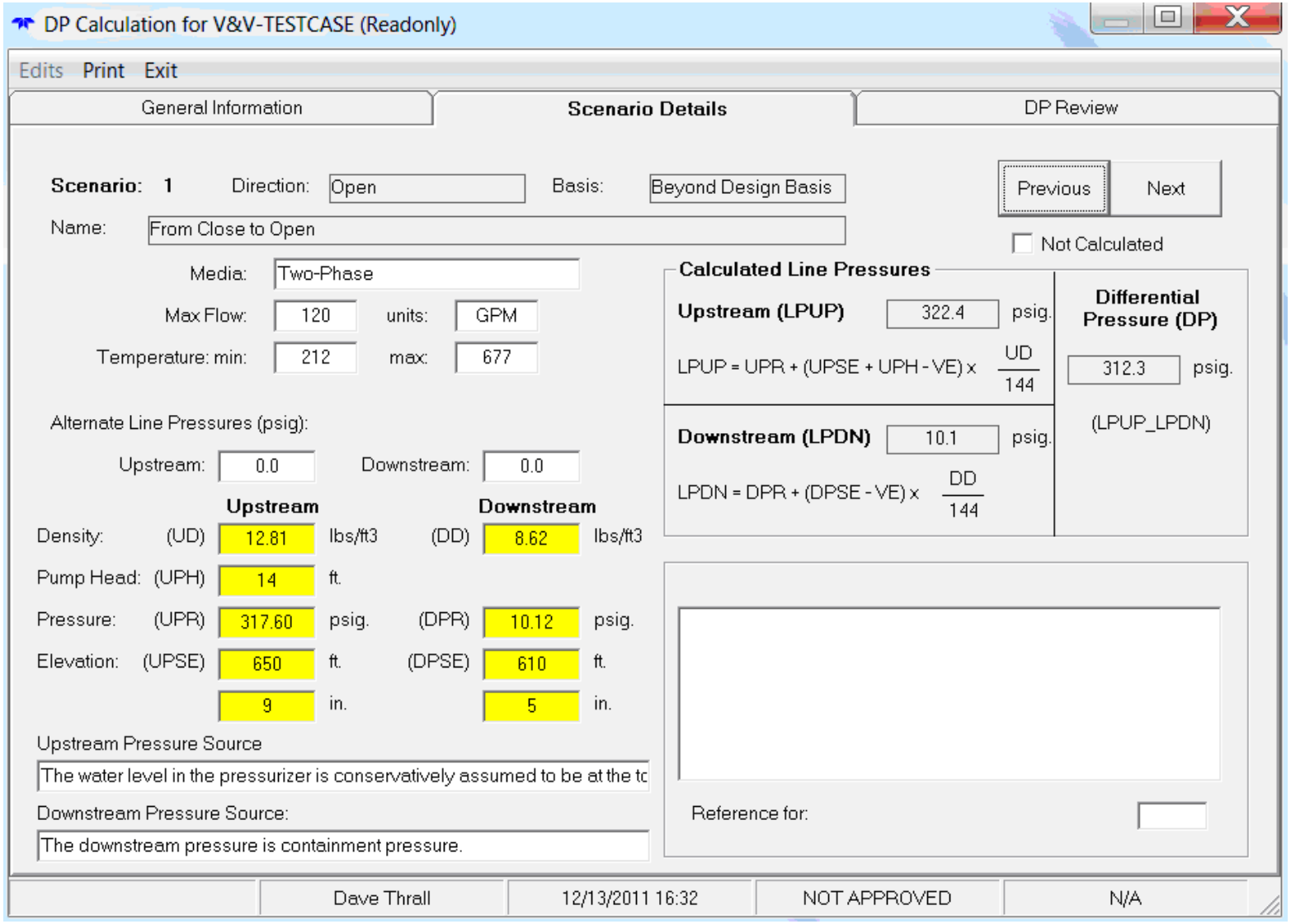
- ACE DP
  - Separate program
  - Same functionality as ACE 3.0 system module



ACE DP


Functionality Review for V&V-TESTCASE
Edits
Print
Exit
General Information
Configuration
Licensing Basis / Plant Doc Review
Scenarios
Parameter
Dir
Value
Ref
Calculation Number
TTS-CC-166.1
1
Calculation Revision
0
1
System
Test System
46
Valve Name
System Test Calc
47
P&ID / Flow Diagram
M-202
36
Normal Position
Open
35
Fail Position
Open
34
Safety Position
IC
41
Category
1C
33
Open Functional Description
This valve has an ACTIVE safety function in the CLOSED position to provide reactor coolant pressure boundary integrity.
Close Functional Description
The valve has no safety function in the OPEN position.
Functional Review Comments
No Comments
Rich Enos
12/03/2011 08:12
NOT APPROVED
N/A

ACE DP


DP Calculation for V&V-TESTCASE (Readonly)
Edits Print Exit
General Information
Scenario Details
DP Review
Scenario: 1
Direction: Open
Basis: Beyond Design Basis
Previous
Next
Name: From Close to Open
Not Calculated
Media: Two-Phase
Max Flow: 120 units: GPM
Temperature: min: 212 max: 677
Calculated Line Pressures
Upstream (LPUP) 322.4 psig.
LPUP = UPR + (UPSE + UPH - VE) x UD/144
Differential Pressure (DP)
312.3 psig.
(LPUP_LPDN)
Downstream (LPDN) 10.1 psig.
LPDN = DPR + (DPSE - VE) x DD/144
Alternate Line Pressures (psig):
Upstream: 0.0 Downstream: 0.0
Upstream
Downstream
Density: (UD) 12.81 lbs/ft3 (DD) 8.62 lbs/ft3
Pump Head: (UPH) 14 ft.
Pressure: (UPR) 317.60 psig. (DPR) 10.12 psig.
Elevation: (UPSE) 650 ft. (DPSE) 610 ft.
9 in. 5 in.
Upstream Pressure Source
The water level in the pressurizer is conservatively assumed to be at the tc
Downstream Pressure Source:
The downstream pressure is containment pressure.
Reference for:
Dave Thrall
12/13/2011 16:32
NOT APPROVED
N/A

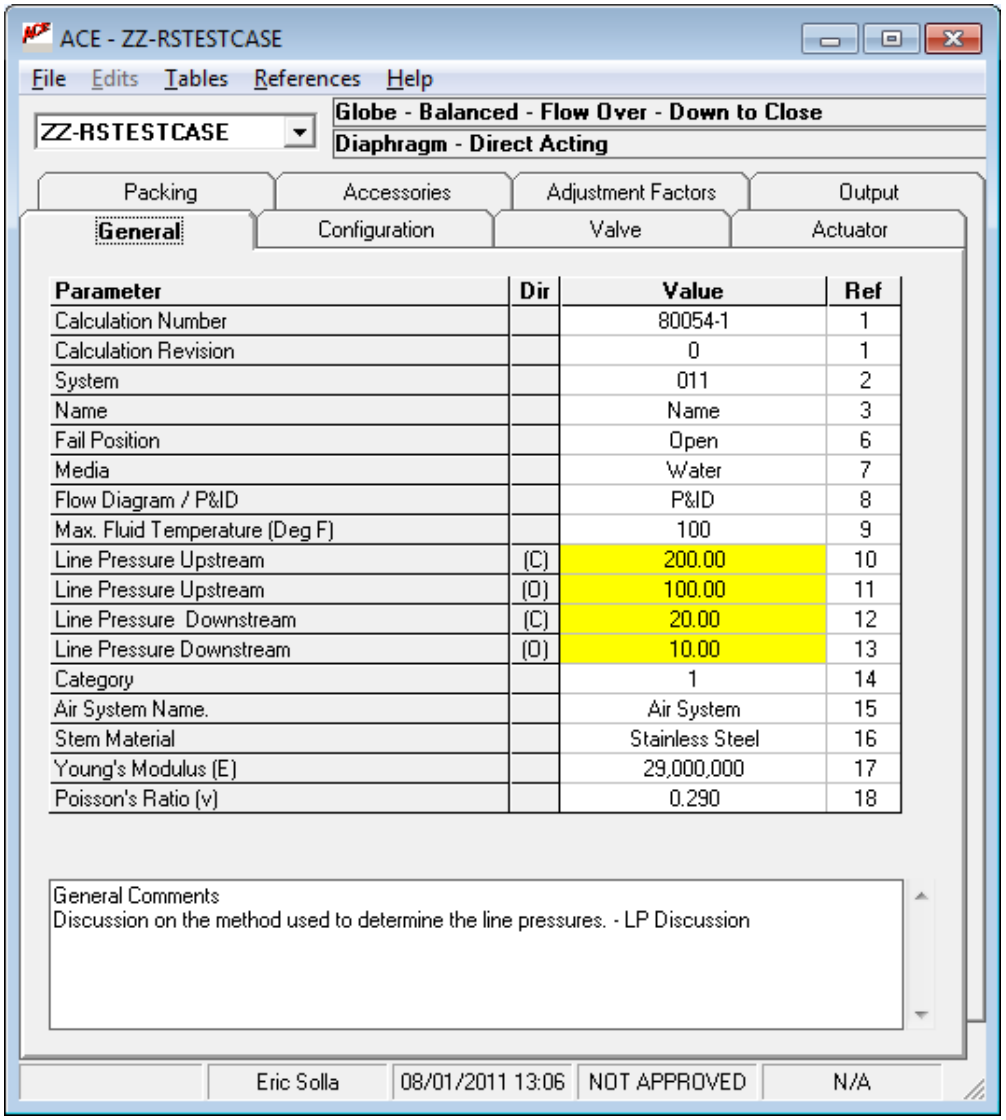
ACE Basics

Design Calculation Software

- Inputs (General, Valve, Operator, Accessories & others)
- Calculated Outputs
- Input References
- Tools
- Margins
- Reports
- Documentation

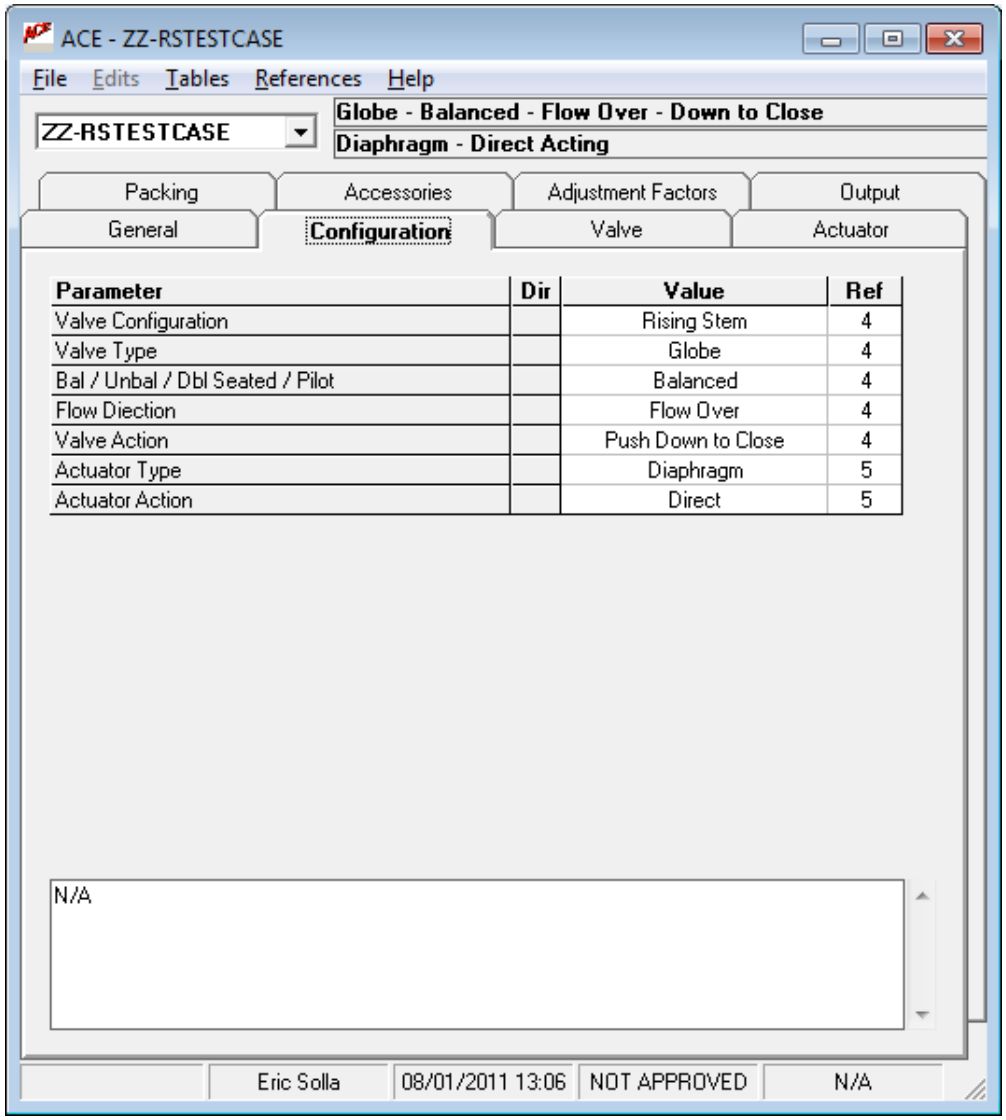
ACE Basics

General



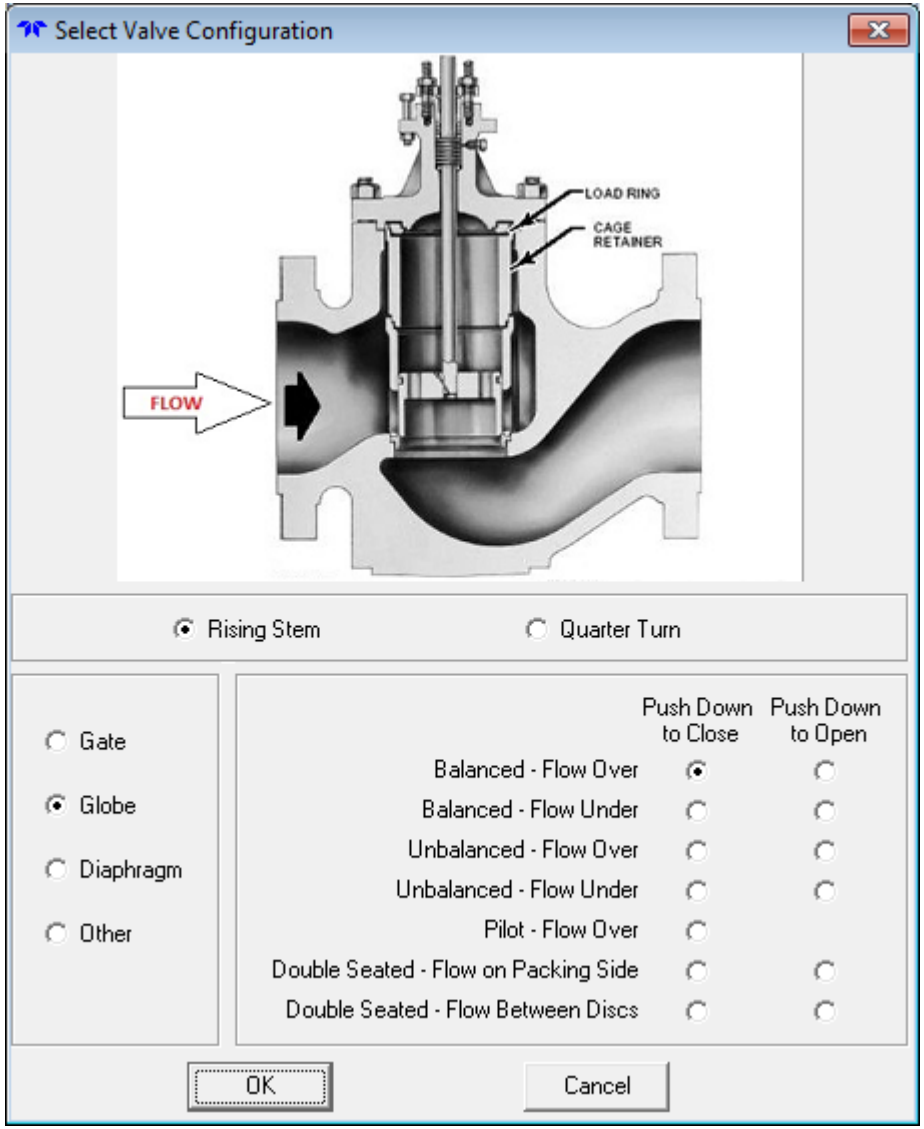
ACE Basics

Configuration



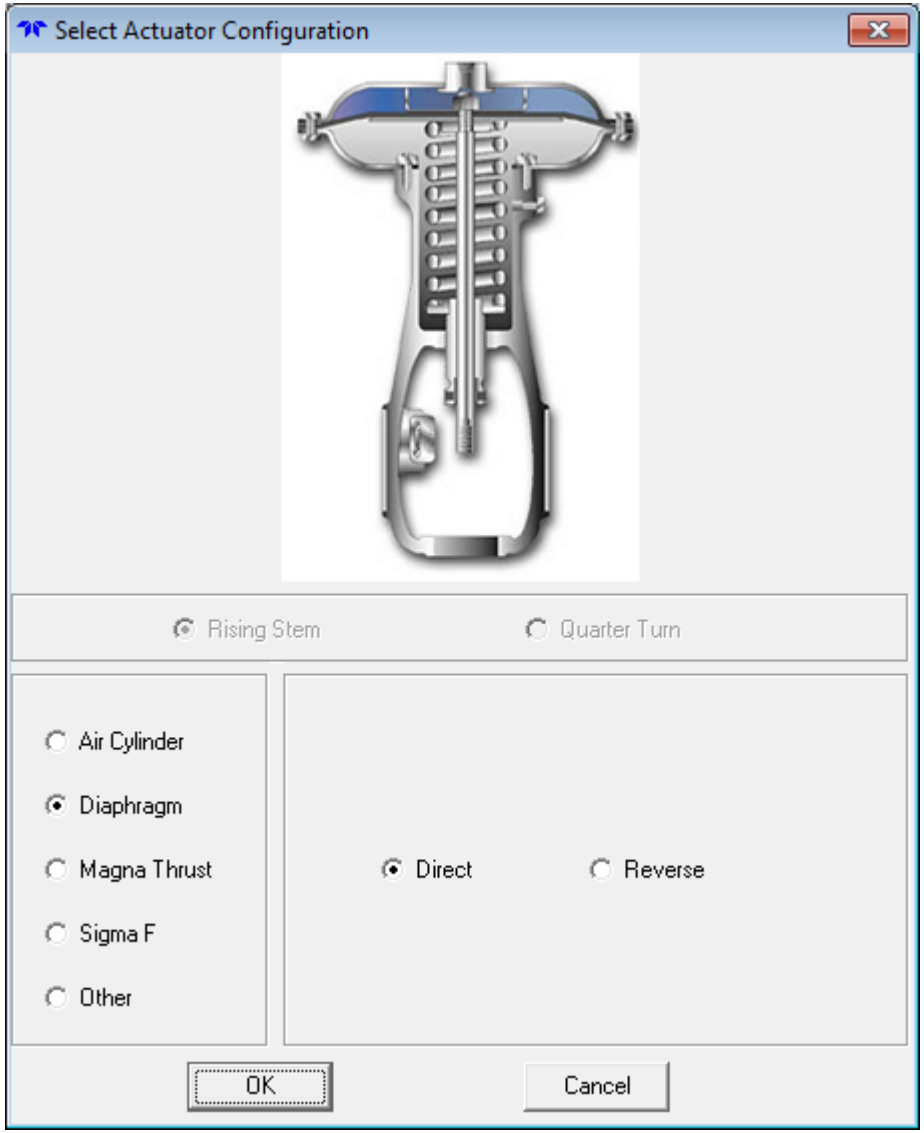
ACE Basics

Valve Configuration



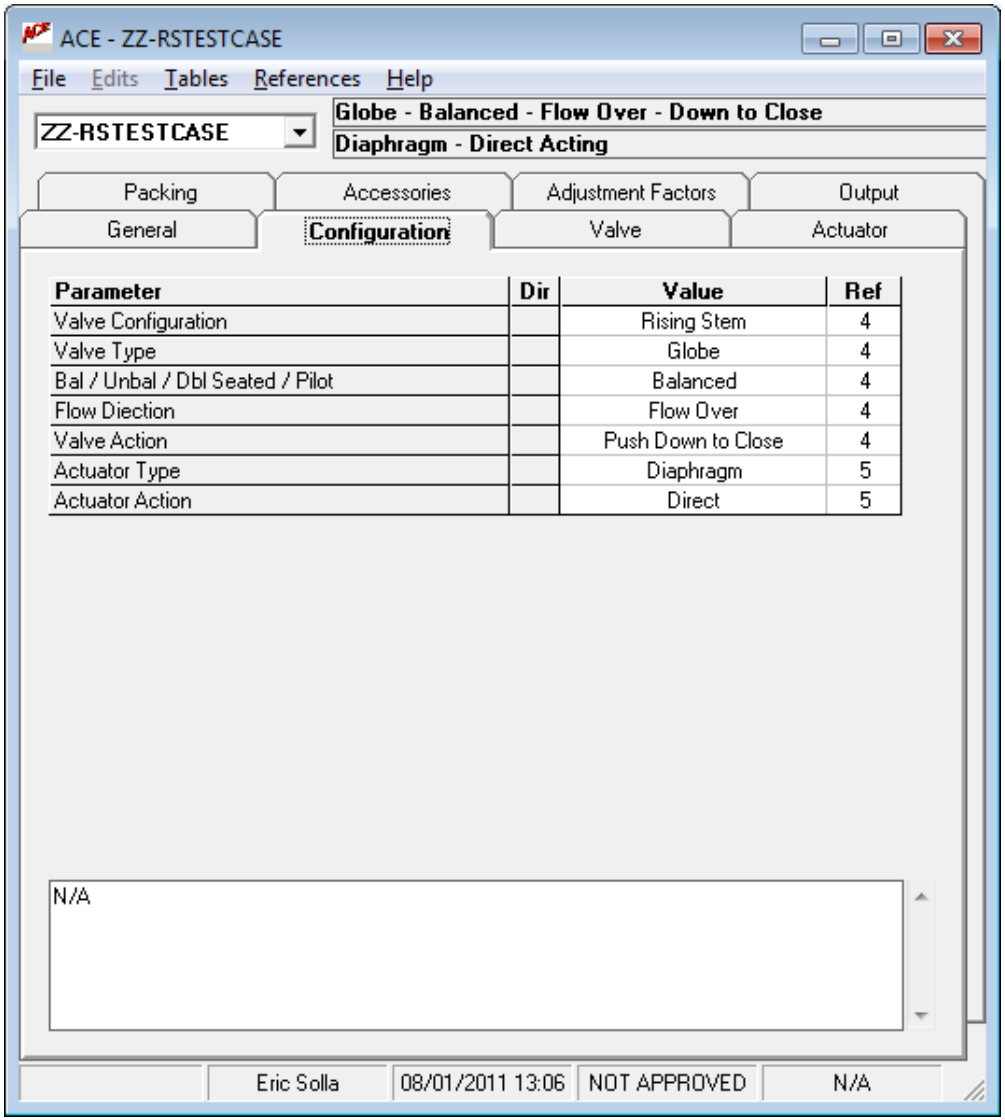
ACE Basics

Actuator Configuration



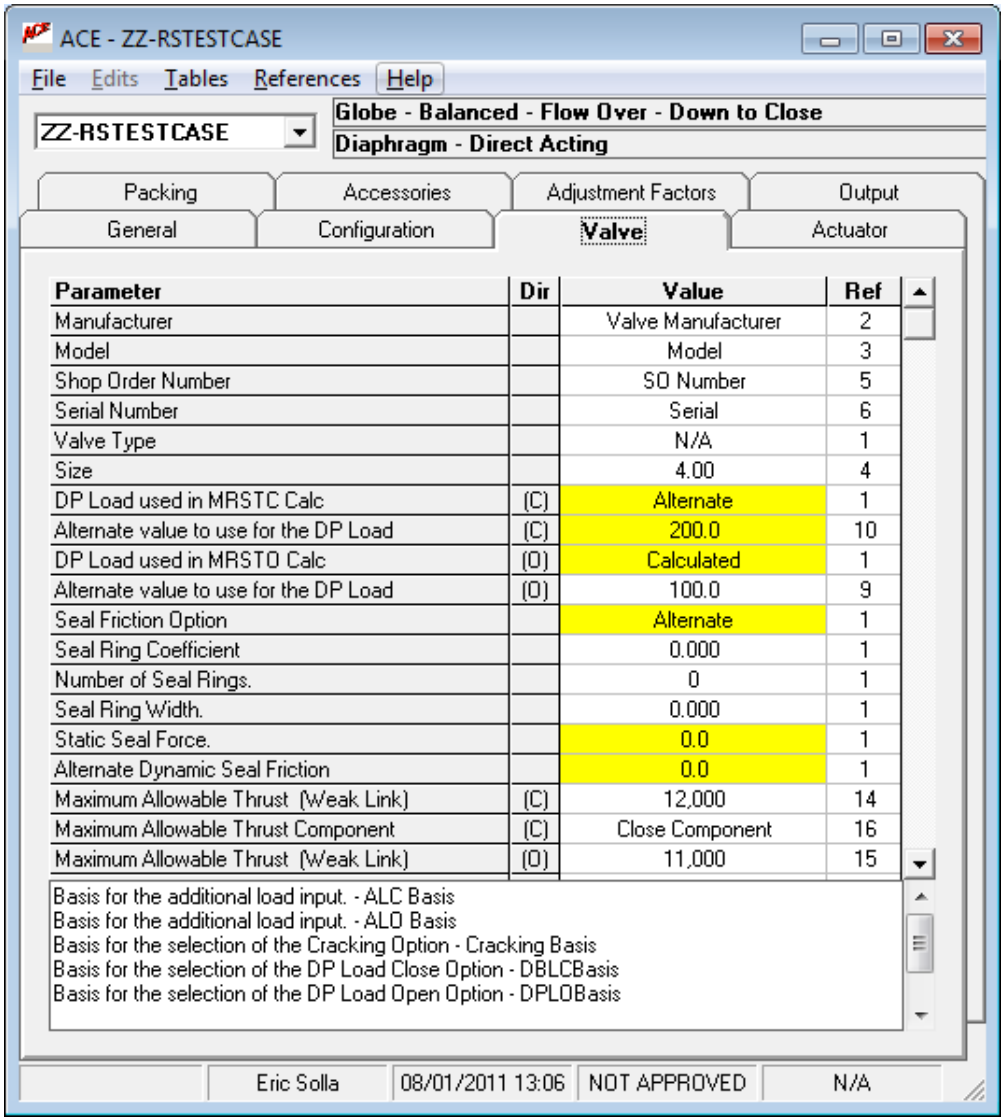
ACE Basics

Configuration



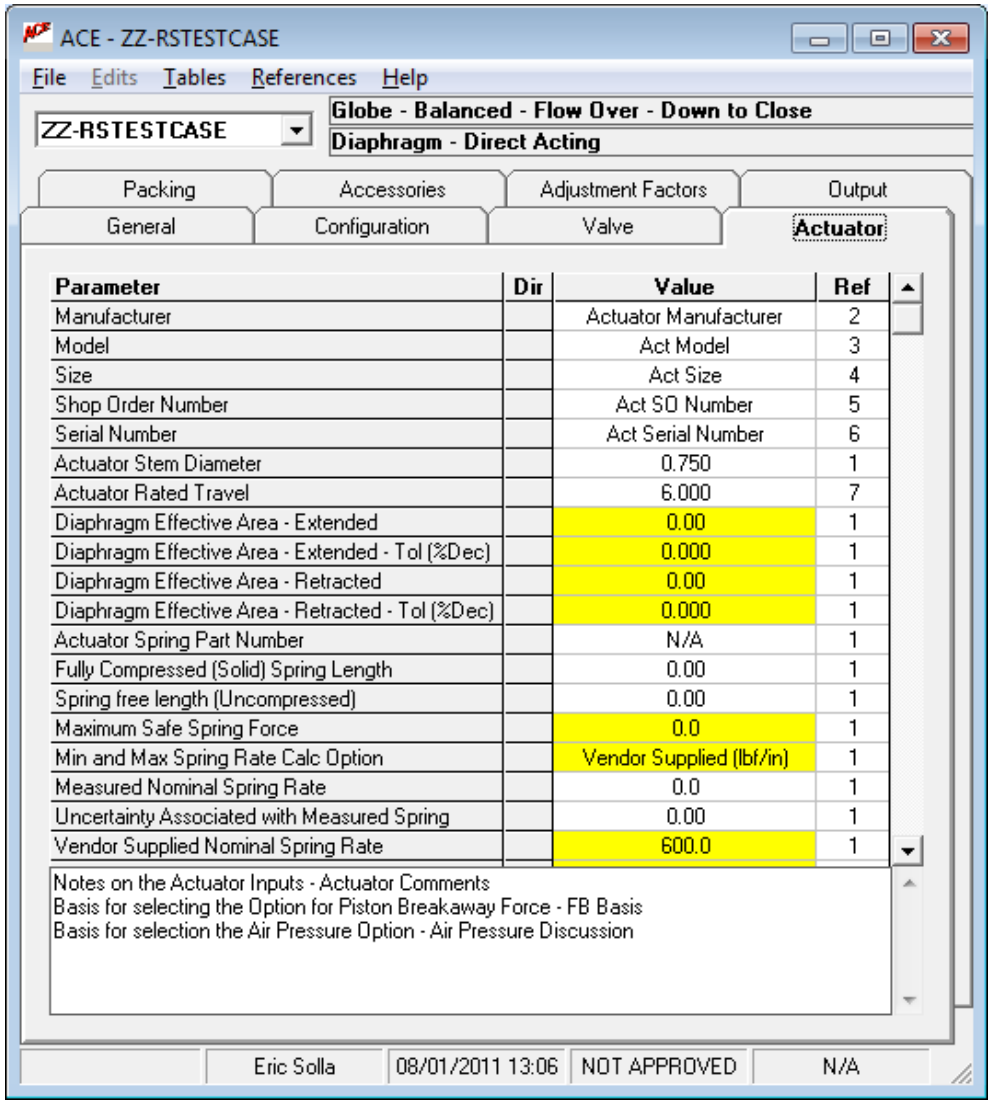
ACE Basics

Valve



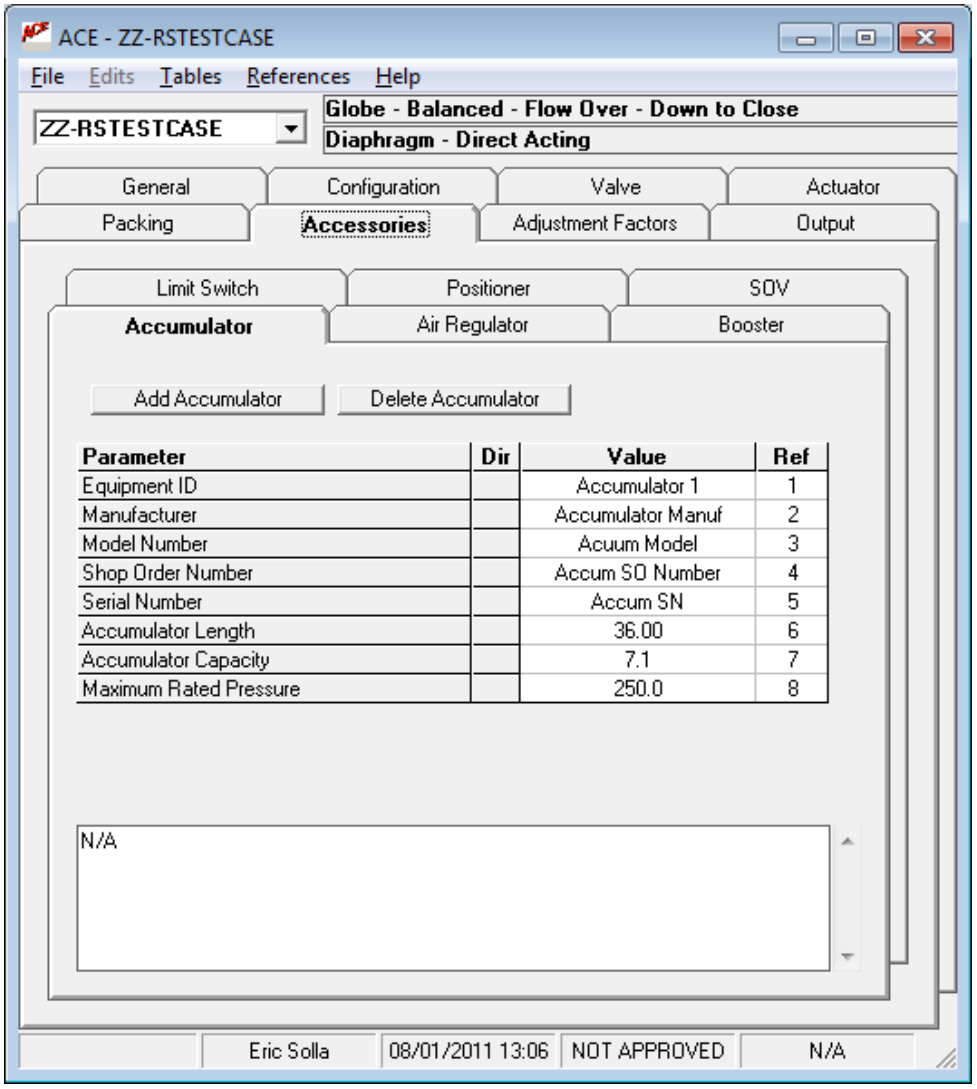
ACE Basics

Actuator



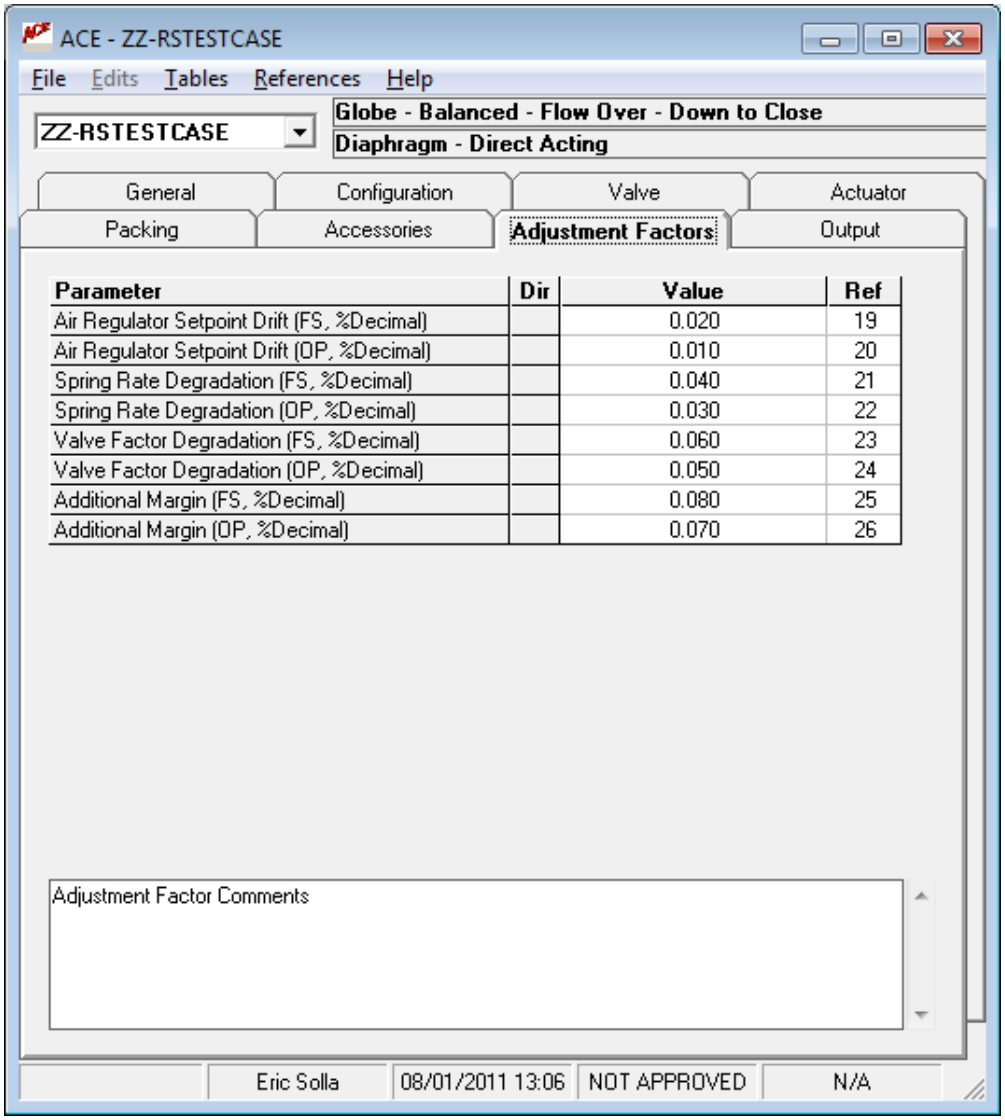
ACE Basics

Accessories



ACE Basics

Adjustment Factors



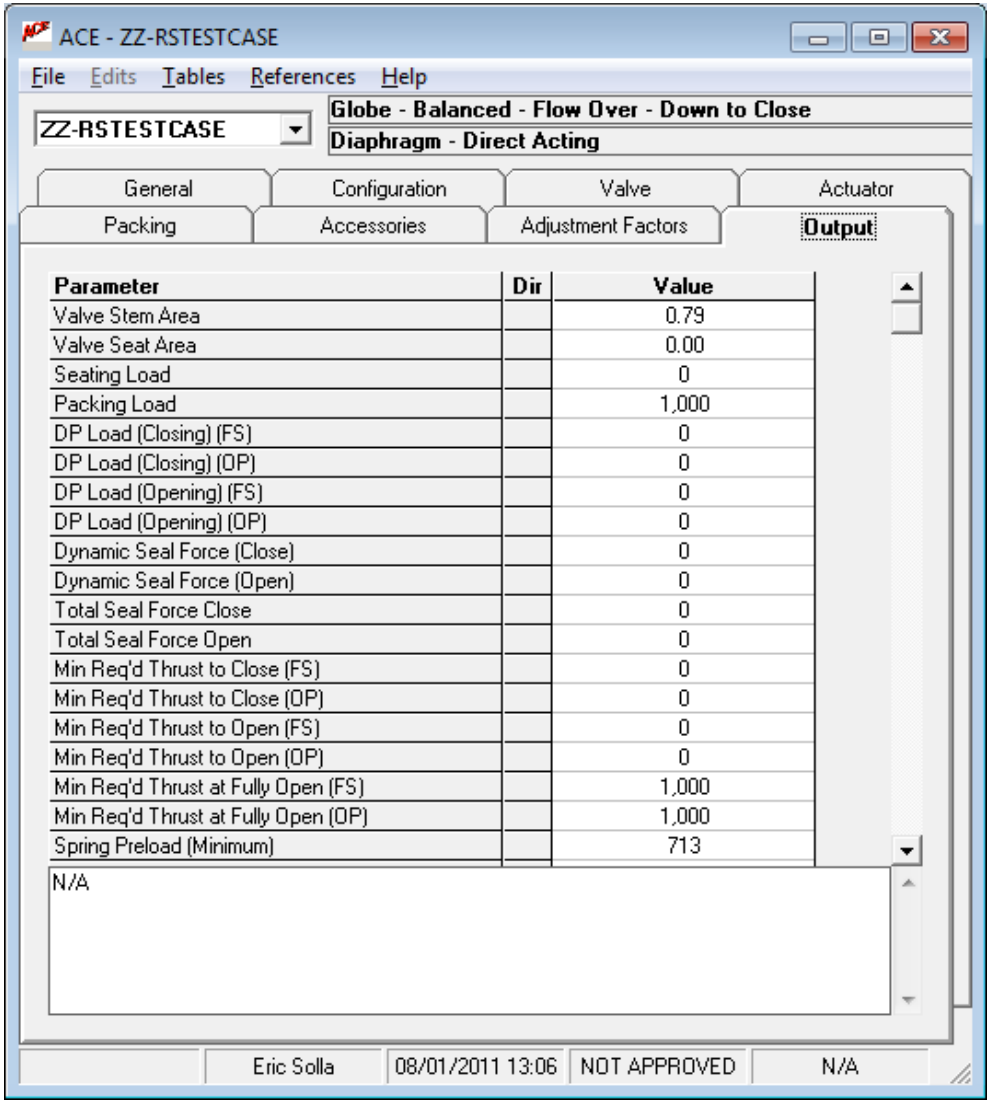
ACE Basics

- Other Inputs (Depending on Valve & Actuator Configuration)
  - Packing
  - Dynamic
  - Alt Dynamic
  - Alt Actuator
  - Coefficients

ACE Basics

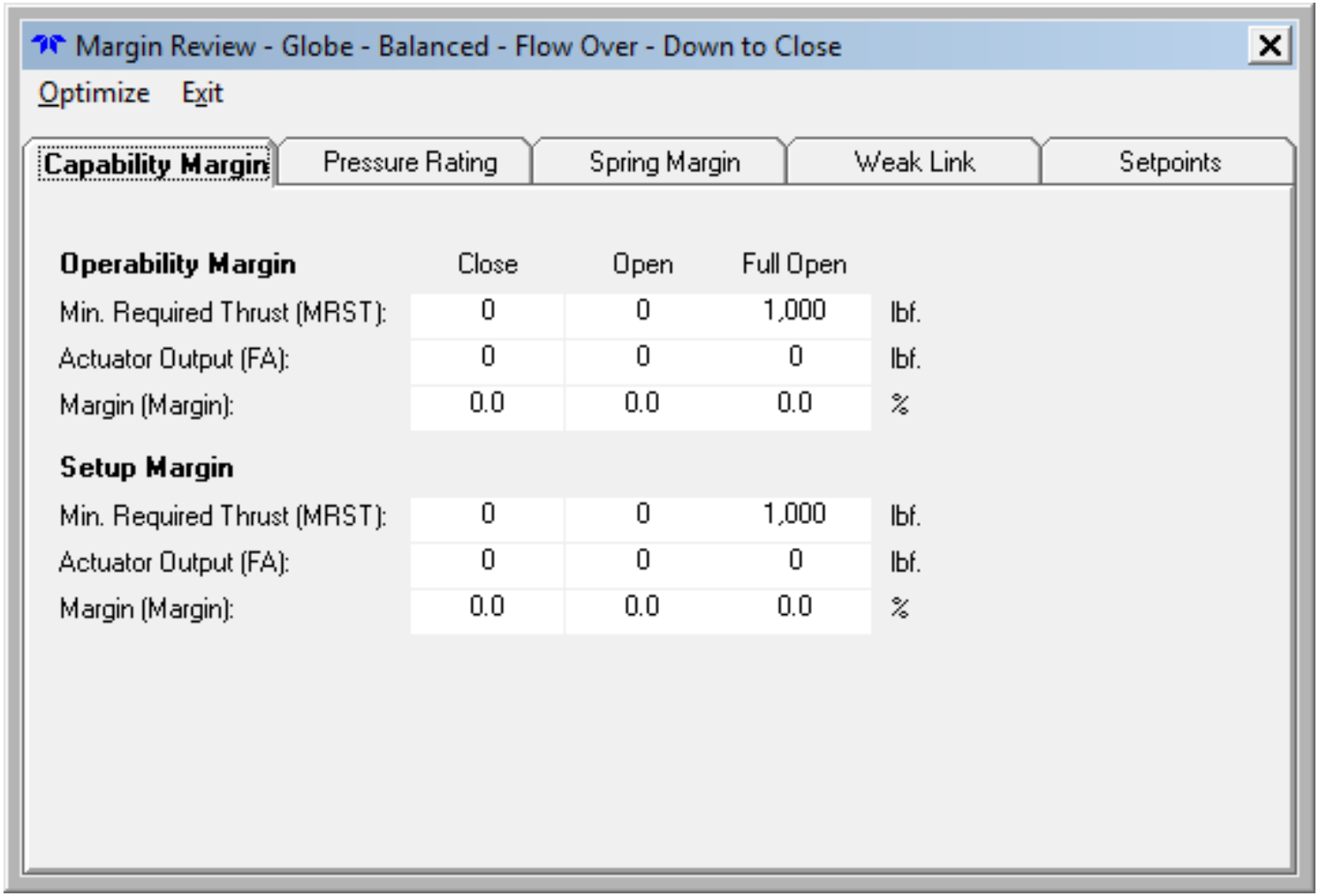
Outputs

- Rising Stem



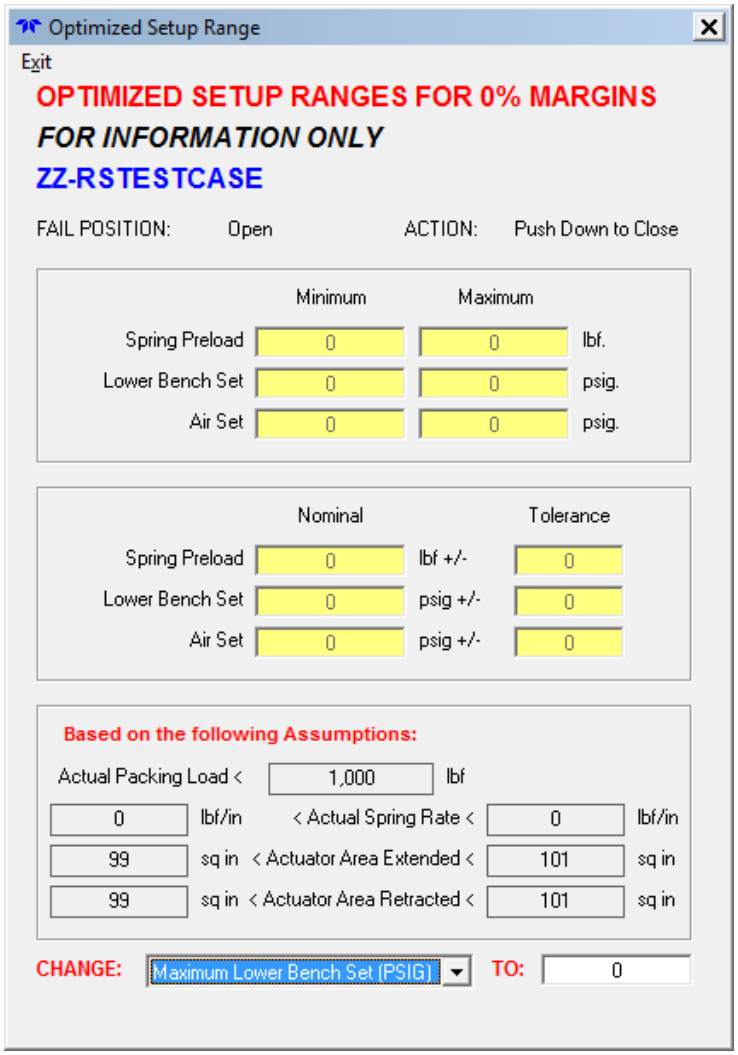
ACE Basics

Margin Review



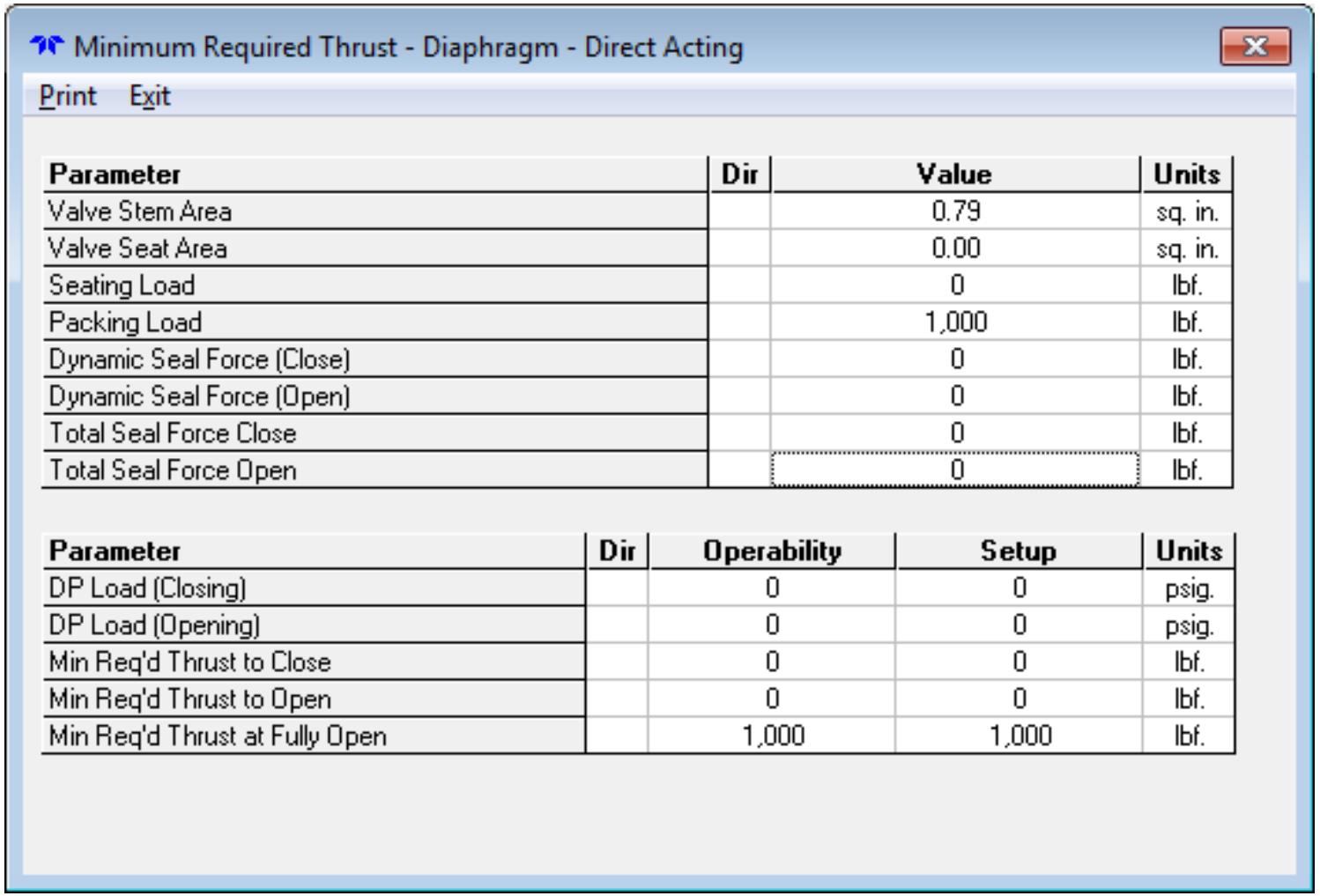
ACE Basics

Optimize Setup



ACE Basics

Minimum Required Thrust

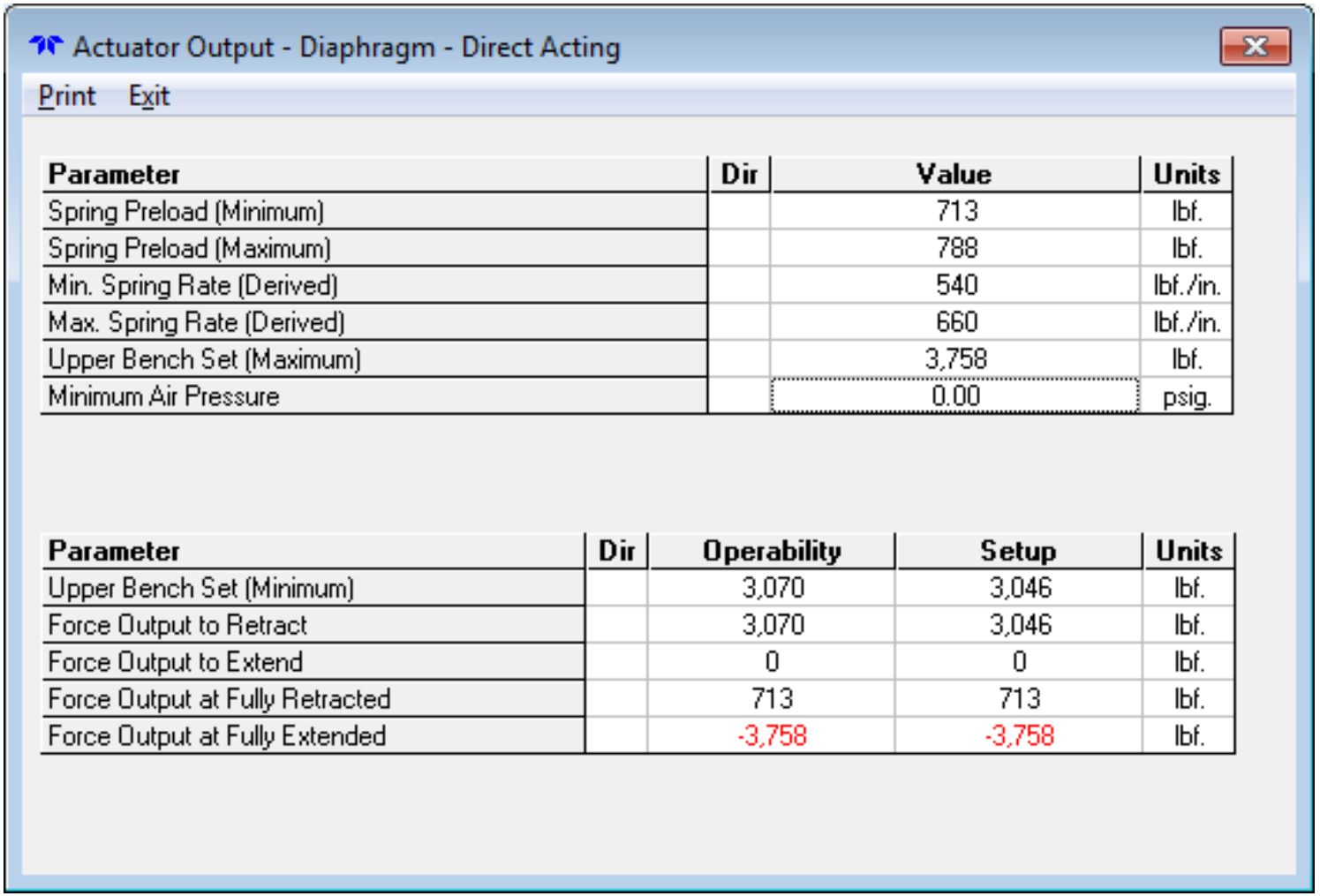


Parameter	Dir	Value	Units
Valve Stem Area		0.79	sq. in.
Valve Seat Area		0.00	sq. in.
Seating Load		0	lbf.
Packing Load		1,000	lbf.
Dynamic Seal Force (Close)		0	lbf.
Dynamic Seal Force (Open)		0	lbf.
Total Seal Force Close		0	lbf.
Total Seal Force Open		0	lbf.

Parameter	Dir	Operability	Setup	Units
DP Load (Closing)		0	0	psig.
DP Load (Opening)		0	0	psig.
Min Req'd Thrust to Close		0	0	lbf.
Min Req'd Thrust to Open		0	0	lbf.
Min Req'd Thrust at Fully Open		1,000	1,000	lbf.

ACE Basics

Actuator Output



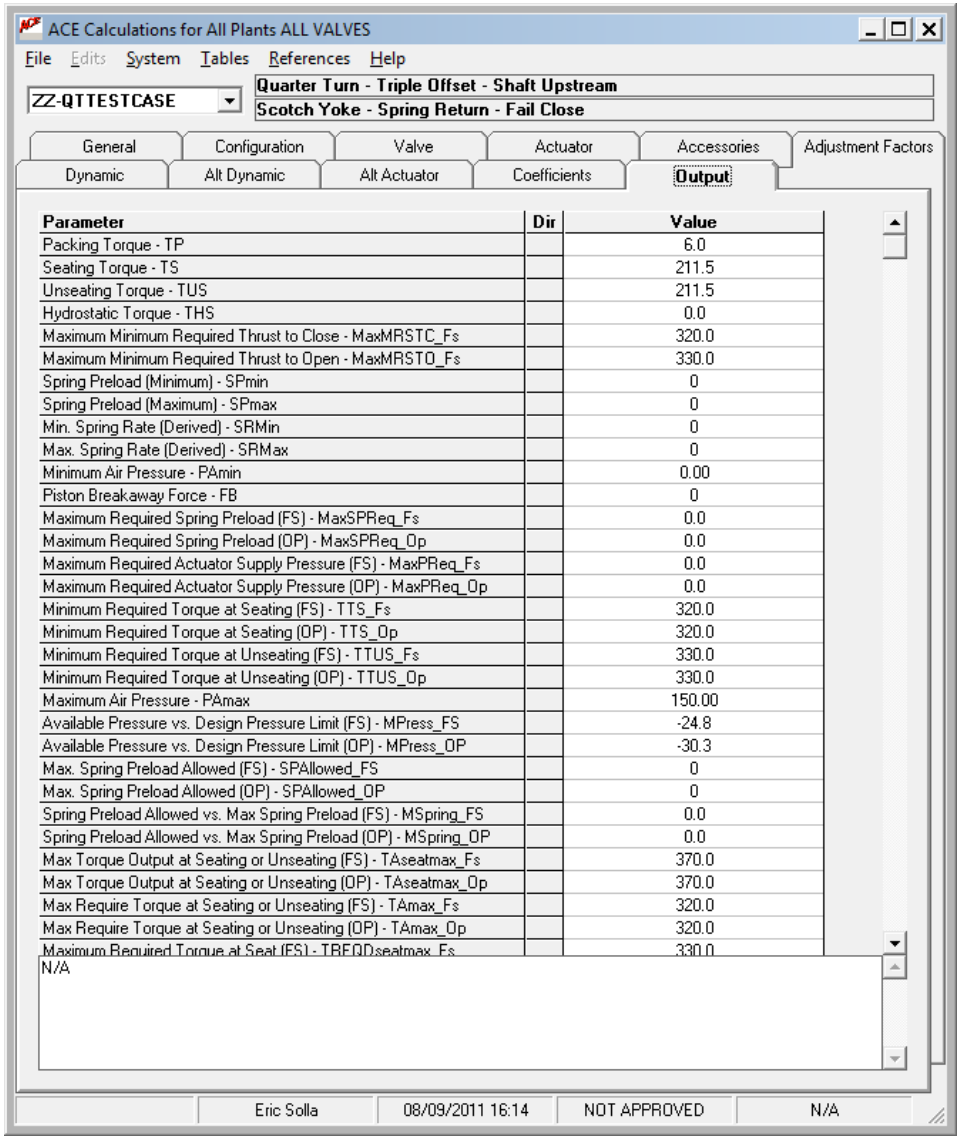
Parameter	Dir	Value	Units
Spring Preload (Minimum)		713	lbf.
Spring Preload (Maximum)		788	lbf.
Min. Spring Rate (Derived)		540	lbf./in.
Max. Spring Rate (Derived)		660	lbf./in.
Upper Bench Set (Maximum)		3,758	lbf.
Minimum Air Pressure		0.00	psig.

Parameter	Dir	Operability	Setup	Units
Upper Bench Set (Minimum)		3,070	3,046	lbf.
Force Output to Retract		3,070	3,046	lbf.
Force Output to Extend		0	0	lbf.
Force Output at Fully Retracted		713	713	lbf.
Force Output at Fully Extended		-3,758	-3,758	lbf.

ACE Basics

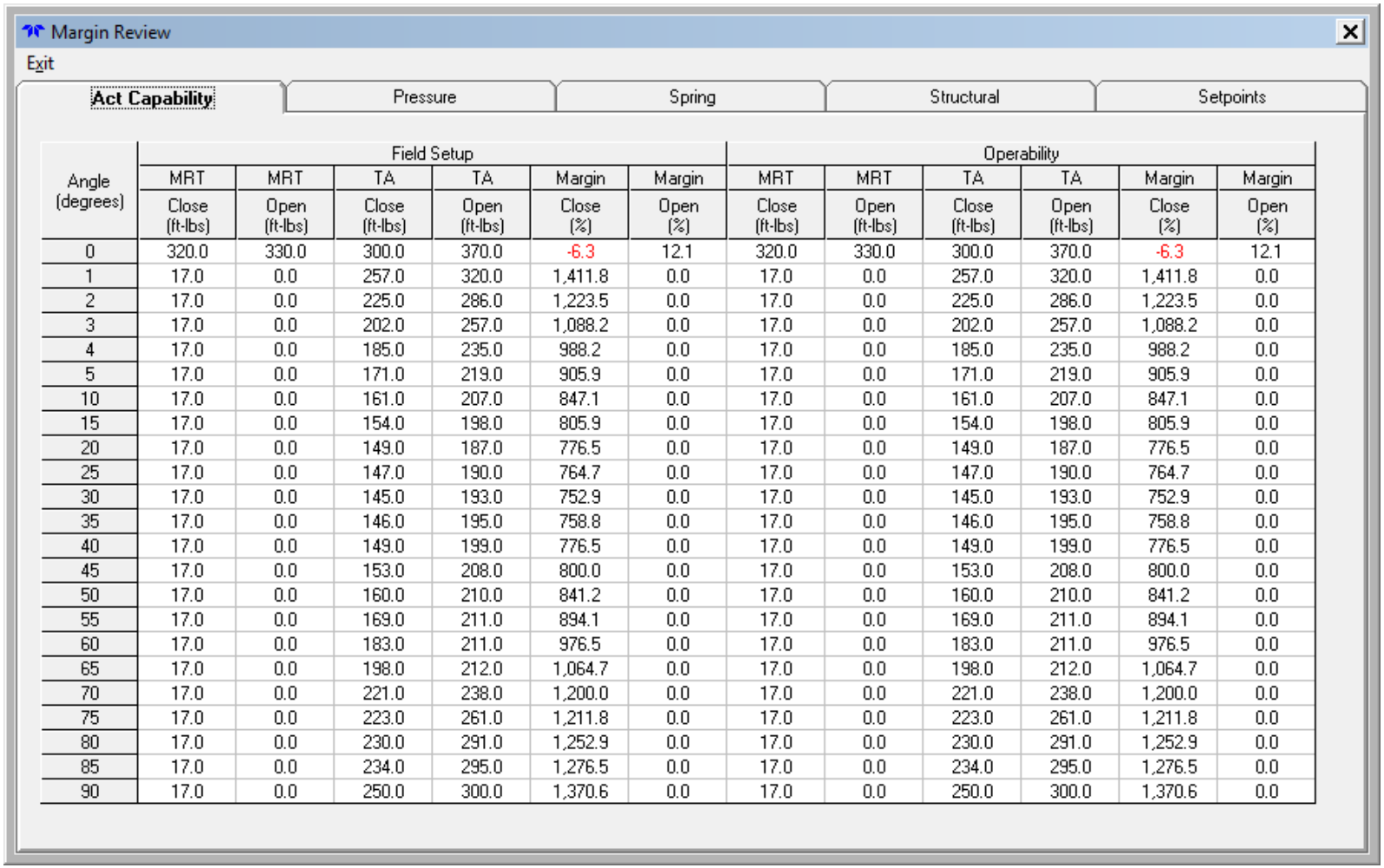
Outputs

- Quarter Turn



ACE Basics

Margin Review



Angle (degrees)	Field Setup						Operability					
	MRT Close (ft-lbs)	MRT Open (ft-lbs)	TA Close (ft-lbs)	TA Open (ft-lbs)	Margin Close (%)	Margin Open (%)	MRT Close (ft-lbs)	MRT Open (ft-lbs)	TA Close (ft-lbs)	TA Open (ft-lbs)	Margin Close (%)	Margin Open (%)
0	320.0	330.0	300.0	370.0	-6.3	12.1	320.0	330.0	300.0	370.0	-6.3	12.1
1	17.0	0.0	257.0	320.0	1,411.8	0.0	17.0	0.0	257.0	320.0	1,411.8	0.0
2	17.0	0.0	225.0	286.0	1,223.5	0.0	17.0	0.0	225.0	286.0	1,223.5	0.0
3	17.0	0.0	202.0	257.0	1,088.2	0.0	17.0	0.0	202.0	257.0	1,088.2	0.0
4	17.0	0.0	185.0	235.0	988.2	0.0	17.0	0.0	185.0	235.0	988.2	0.0
5	17.0	0.0	171.0	219.0	905.9	0.0	17.0	0.0	171.0	219.0	905.9	0.0
10	17.0	0.0	161.0	207.0	847.1	0.0	17.0	0.0	161.0	207.0	847.1	0.0
15	17.0	0.0	154.0	198.0	805.9	0.0	17.0	0.0	154.0	198.0	805.9	0.0
20	17.0	0.0	149.0	187.0	776.5	0.0	17.0	0.0	149.0	187.0	776.5	0.0
25	17.0	0.0	147.0	190.0	764.7	0.0	17.0	0.0	147.0	190.0	764.7	0.0
30	17.0	0.0	145.0	193.0	752.9	0.0	17.0	0.0	145.0	193.0	752.9	0.0
35	17.0	0.0	146.0	195.0	758.8	0.0	17.0	0.0	146.0	195.0	758.8	0.0
40	17.0	0.0	149.0	199.0	776.5	0.0	17.0	0.0	149.0	199.0	776.5	0.0
45	17.0	0.0	153.0	208.0	800.0	0.0	17.0	0.0	153.0	208.0	800.0	0.0
50	17.0	0.0	160.0	210.0	841.2	0.0	17.0	0.0	160.0	210.0	841.2	0.0
55	17.0	0.0	169.0	211.0	894.1	0.0	17.0	0.0	169.0	211.0	894.1	0.0
60	17.0	0.0	183.0	211.0	976.5	0.0	17.0	0.0	183.0	211.0	976.5	0.0
65	17.0	0.0	198.0	212.0	1,064.7	0.0	17.0	0.0	198.0	212.0	1,064.7	0.0
70	17.0	0.0	221.0	238.0	1,200.0	0.0	17.0	0.0	221.0	238.0	1,200.0	0.0
75	17.0	0.0	223.0	261.0	1,211.8	0.0	17.0	0.0	223.0	261.0	1,211.8	0.0
80	17.0	0.0	230.0	291.0	1,252.9	0.0	17.0	0.0	230.0	291.0	1,252.9	0.0
85	17.0	0.0	234.0	295.0	1,276.5	0.0	17.0	0.0	234.0	295.0	1,276.5	0.0
90	17.0	0.0	250.0	300.0	1,370.6	0.0	17.0	0.0	250.0	300.0	1,370.6	0.0

ACE Basics

Minimum Required Torque

Minimum Required Torque

Exit

Constant Results | **Angle Dependant Results** | Choking

Angle (degrees)	Hydrodynamic Torque		Bearing Torque				Eccentricity		Min Required Torque			
	TD	TD	TB FS	TB FS	TB Op	TB Op	TE	TE	MRST FS	MRST FS	MRST Op	MRST Op
	Close (ft-lbs)	Open (ft-lbs)	Close (ft-lbs)	Open (ft-lbs)	Close (ft-lbs)	Open (ft-lbs)	Close (ft-lbs)	Open (ft-lbs)	Close (ft-lbs)	Open (ft-lbs)	Close (ft-lbs)	Open (ft-lbs)
0	0.00	0.00	13.3	13.3	13.3	13.3	23.6	23.6	320.0	330.0	320.0	330.0
1	-1.19	1.19	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
2	-2.38	2.38	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
3	-3.56	3.56	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
4	-4.75	4.75	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
5	-5.94	5.94	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
10	-11.68	11.68	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
15	-18.02	18.02	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
20	-21.38	21.38	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
25	-29.11	29.11	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
30	-41.38	41.38	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
35	-54.05	54.05	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
40	-75.83	75.83	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
45	-106.52	106.52	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
50	-145.33	145.33	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
55	-205.92	205.92	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
60	-279.97	279.97	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
65	-382.14	382.14	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
70	-524.30	524.30	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
75	-684.49	684.49	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
80	-724.68	724.68	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
85	-643.50	643.50	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0
90	-425.25	425.25	11.0	11.0	11.0	11.0	23.6	23.6	17.0	0.0	17.0	0.0

ACE Basics

Actuator Output

Actuator Output

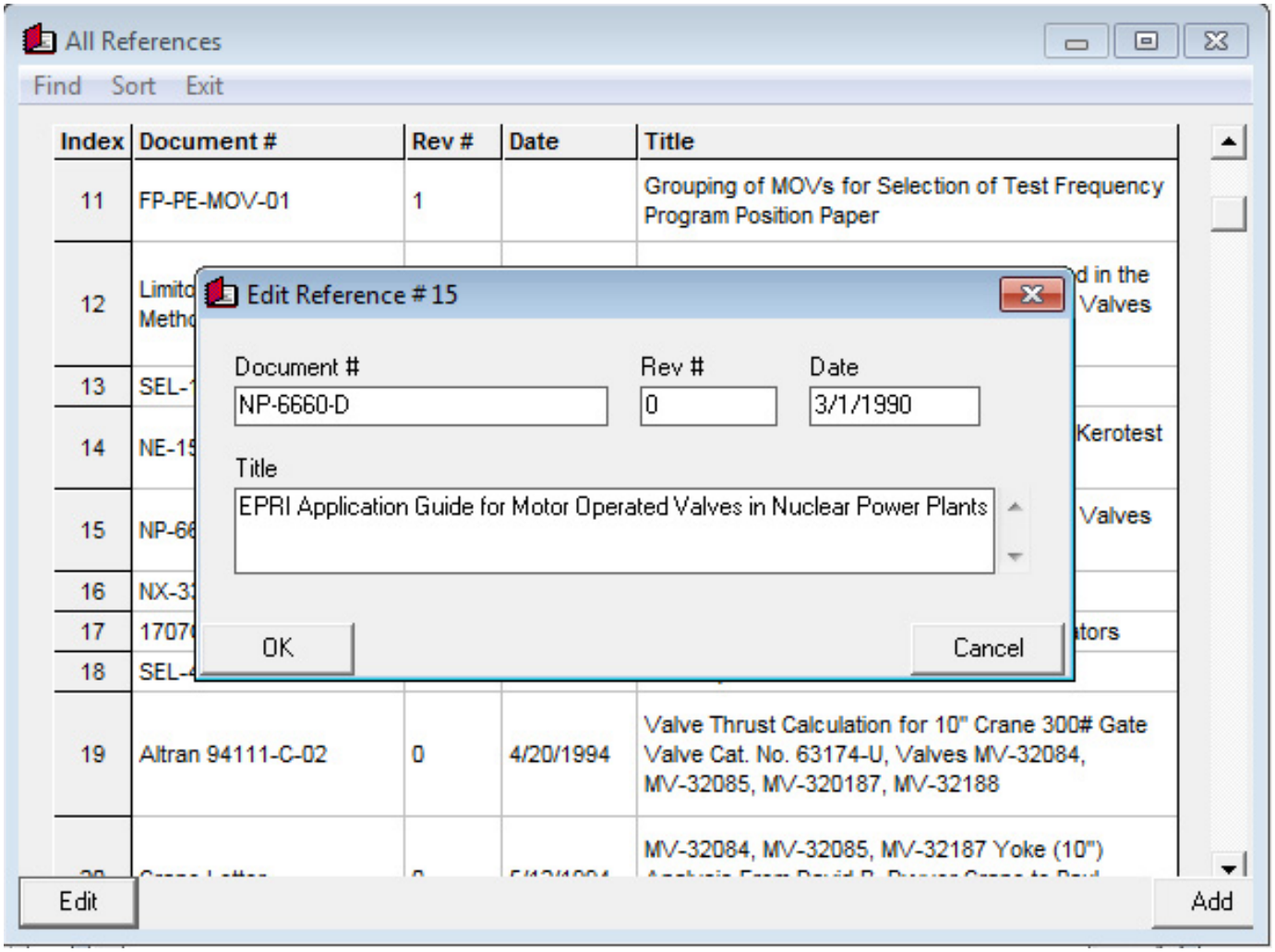
Exit

Constant Results | **Angle Dependant Results**

Angle (degrees)	Field Setup							Operability						
	TA Close (ft-lbs)	TA Open (ft-lbs)	TA Max Close (ft-lbs)	TA Max Open (ft-lbs)	PReq Close (psig)	PReq Open (psig)	SPReq (lbf)	TA Close (ft-lbs)	TA Open (ft-lbs)	TA Max Close (ft-lbs)	TA Max Open (ft-lbs)	PReq Close (psig)	PReq Open (psig)	SPReq (lbf)
0	300.0	370.0	300.0	370.0	0.0	0.0	0.0	300.0	370.0	300.0	370.0	0.0	0.0	0.0
1	257.0	320.0	257.0	320.0	0.0	0.0	0.0	257.0	320.0	257.0	320.0	0.0	0.0	0.0
2	225.0	286.0	225.0	286.0	0.0	0.0	0.0	225.0	286.0	225.0	286.0	0.0	0.0	0.0
3	202.0	257.0	202.0	257.0	0.0	0.0	0.0	202.0	257.0	202.0	257.0	0.0	0.0	0.0
4	185.0	235.0	185.0	235.0	0.0	0.0	0.0	185.0	235.0	185.0	235.0	0.0	0.0	0.0
5	171.0	219.0	171.0	219.0	0.0	0.0	0.0	171.0	219.0	171.0	219.0	0.0	0.0	0.0
10	161.0	207.0	161.0	207.0	0.0	0.0	0.0	161.0	207.0	161.0	207.0	0.0	0.0	0.0
15	154.0	198.0	154.0	198.0	0.0	0.0	0.0	154.0	198.0	154.0	198.0	0.0	0.0	0.0
20	149.0	187.0	149.0	187.0	0.0	0.0	0.0	149.0	187.0	149.0	187.0	0.0	0.0	0.0
25	147.0	190.0	147.0	190.0	0.0	0.0	0.0	147.0	190.0	147.0	190.0	0.0	0.0	0.0
30	145.0	193.0	145.0	193.0	0.0	0.0	0.0	145.0	193.0	145.0	193.0	0.0	0.0	0.0
35	146.0	195.0	146.0	195.0	0.0	0.0	0.0	146.0	195.0	146.0	195.0	0.0	0.0	0.0
40	149.0	199.0	149.0	199.0	0.0	0.0	0.0	149.0	199.0	149.0	199.0	0.0	0.0	0.0
45	153.0	208.0	153.0	208.0	0.0	0.0	0.0	153.0	208.0	153.0	208.0	0.0	0.0	0.0
50	160.0	210.0	160.0	210.0	0.0	0.0	0.0	160.0	210.0	160.0	210.0	0.0	0.0	0.0
55	169.0	211.0	169.0	211.0	0.0	0.0	0.0	169.0	211.0	169.0	211.0	0.0	0.0	0.0
60	183.0	211.0	183.0	211.0	0.0	0.0	0.0	183.0	211.0	183.0	211.0	0.0	0.0	0.0
65	198.0	212.0	198.0	212.0	0.0	0.0	0.0	198.0	212.0	198.0	212.0	0.0	0.0	0.0
70	221.0	238.0	221.0	238.0	0.0	0.0	0.0	221.0	238.0	221.0	238.0	0.0	0.0	0.0
75	223.0	261.0	223.0	261.0	0.0	0.0	0.0	223.0	261.0	223.0	261.0	0.0	0.0	0.0
80	230.0	291.0	230.0	291.0	0.0	0.0	0.0	230.0	291.0	230.0	291.0	0.0	0.0	0.0
85	234.0	295.0	234.0	295.0	0.0	0.0	0.0	234.0	295.0	234.0	295.0	0.0	0.0	0.0
90	250.0	300.0	250.0	300.0	0.0	0.0	0.0	250.0	300.0	250.0	300.0	0.0	0.0	0.0

ACE Basics

References



ACE Tools

- Export to Excel – provides the capability to export any input or output parameters for a user defined valve selection to an Excel spreadsheet

ACE Software

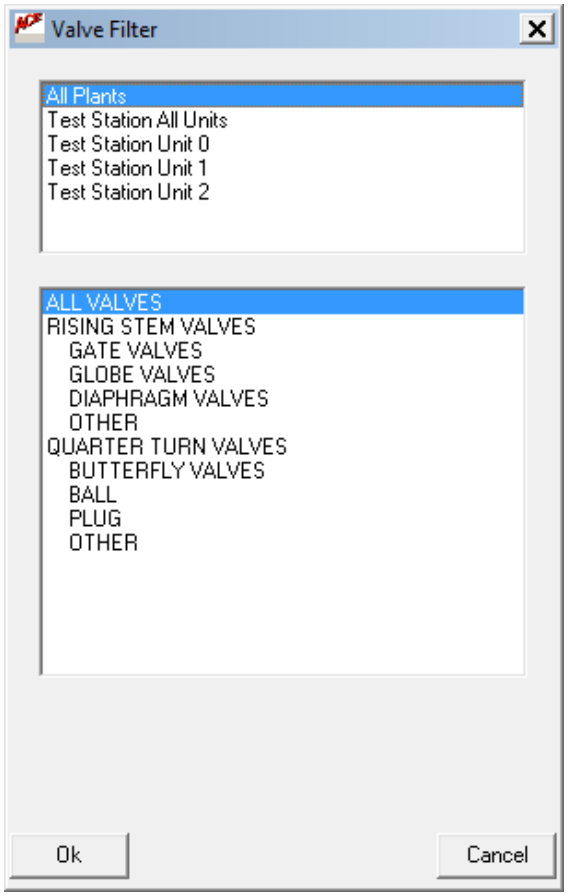
ACE, ACEDP & ACETest Version 4.1

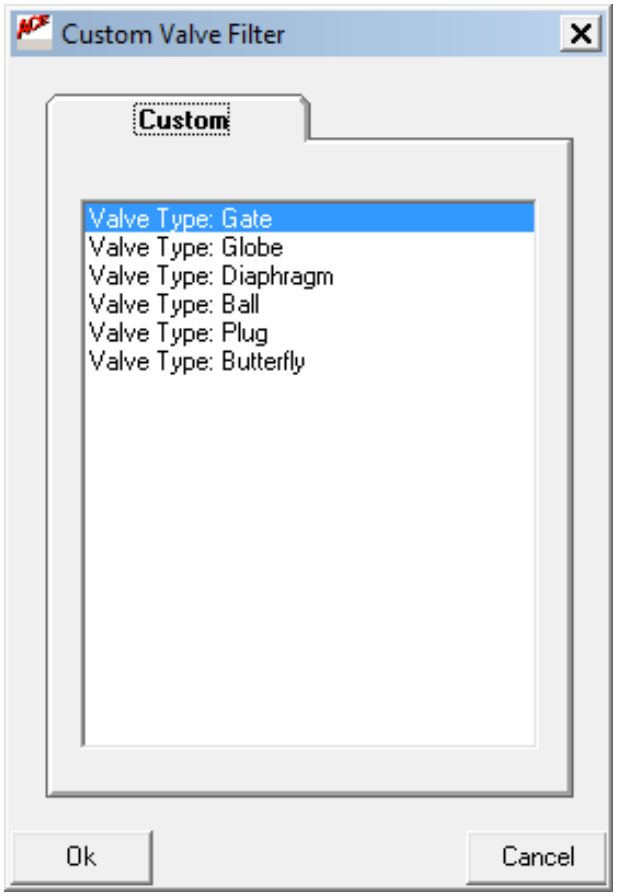
- **SQL Compatible**

ACE Software

ACE, ACEDP & ACETest Version 4.1

- **Custom Filters Added (Similar to Midas)**

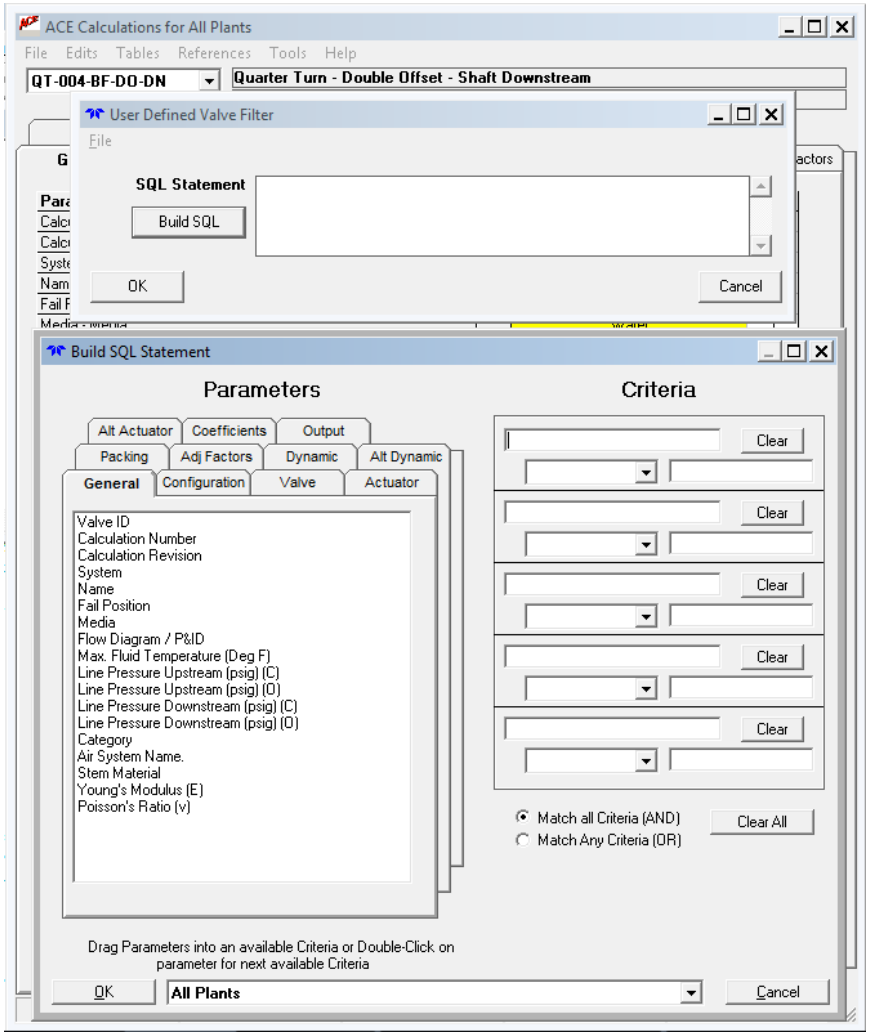




ACE Software

ACE, ACEDP & ACETest Version 4.1

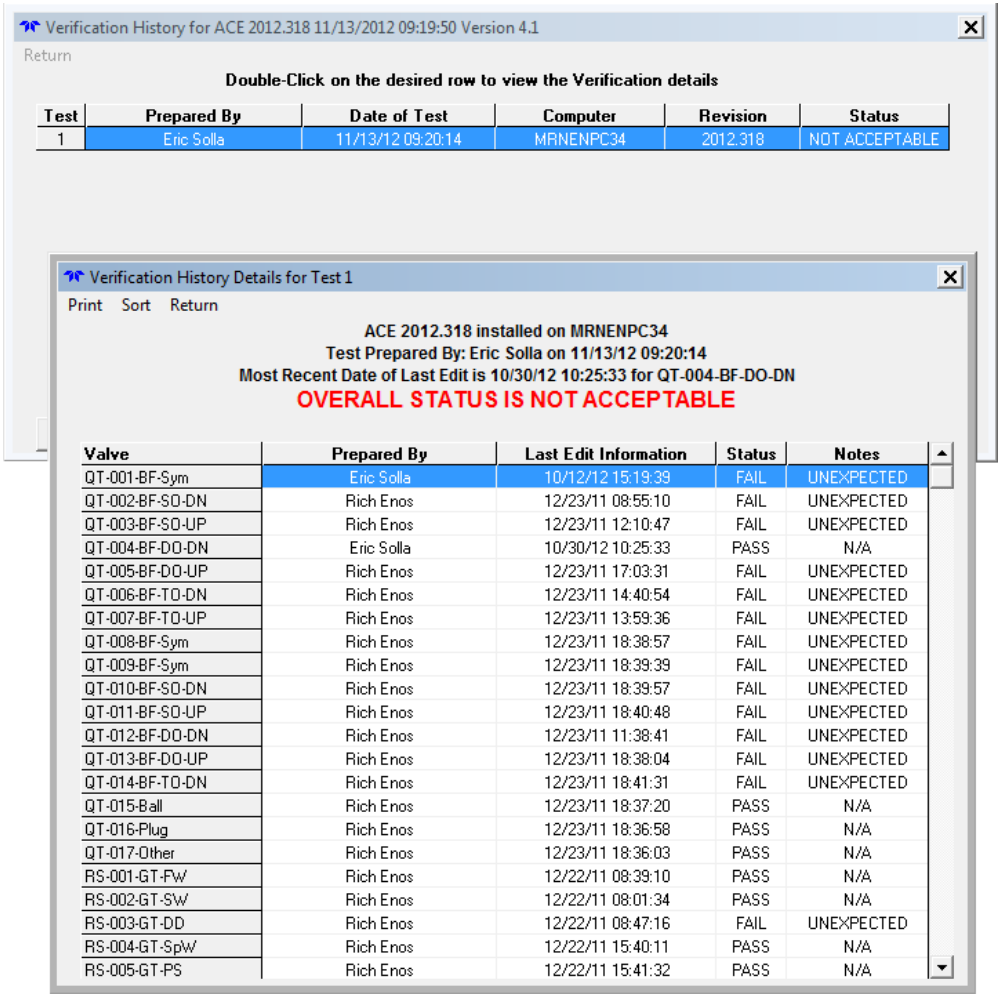
- **User Defined Filter Added (Similar to Midas)**



ACE Software

ACE, ACEDP & ACETest Version 4.1

- **Verify Software**

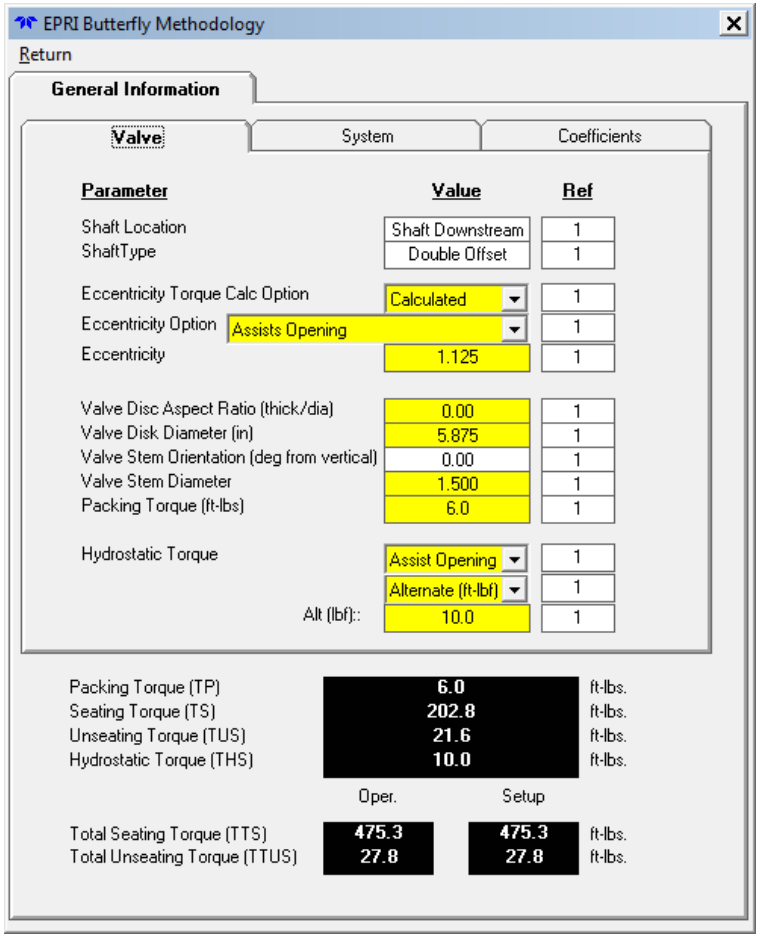


ACE Software

ACE Version 4.1

EPRI Butterfly Methodology

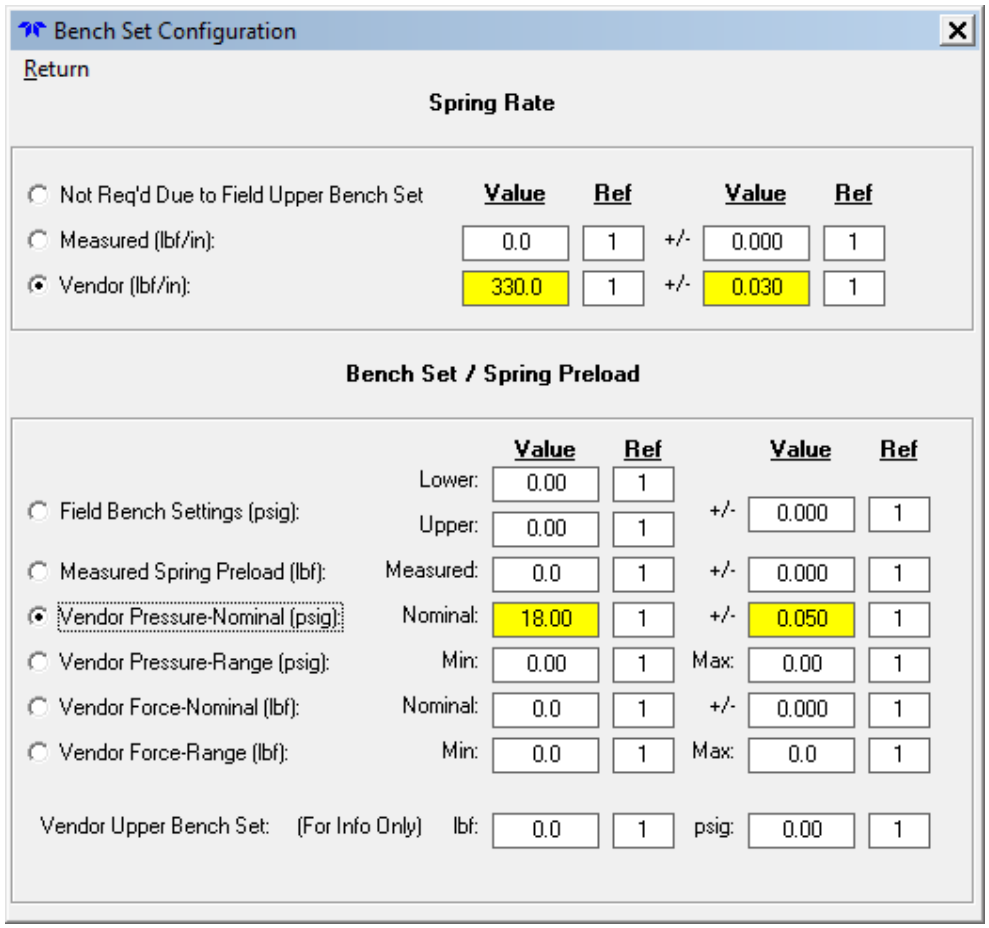
- Added Compressible Fluids
- Added Custom Form



ACE Software

ACE Version 4.1
Bench Set Configuration

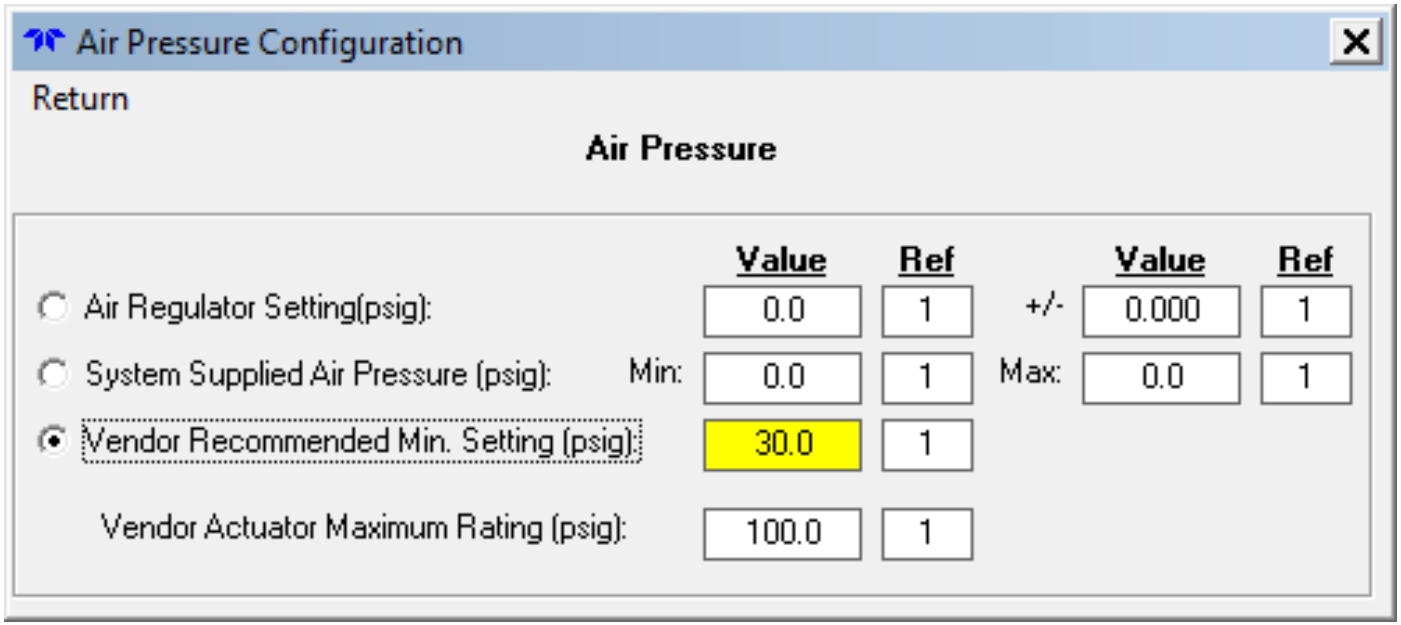
- **Added Custom Form**



ACE Software

ACE Version 4.1
Air Pressure Configuration

- **Added Custom Form**



Thank you

USER FEEDBACK?