Getting the Most Out of SmartPlant Instrumentation

Fluor's SmartPlant Implementation Initiative



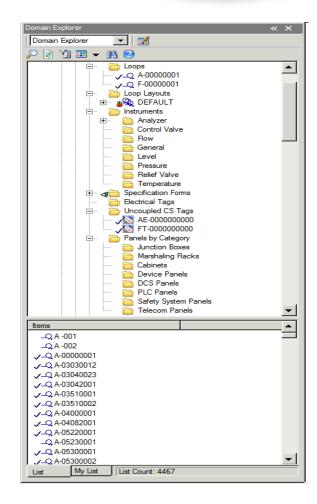
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By: John Dressel

Most Used SPI Modules

Instrument Index Module

- Add & Edit Tag Numbers
- Browse Component Table
- Create Index Reports
- Instrument Spec Module
 - Maintain Spec Libraries
 - Create Instrument Specs
- Instrument Wiring Module
 - Design Field Wiring Matrix
 - Generate Wiring Reports
 - Generate Loops & Segments



FLUOR_®

Process Module

- Handles multiple Process Cases
- Fluid properties lookup Tables
- Data entered by Tag or Line
- Unit of Measure conversion
- Copy data from other Tags
- Additional Physical Properties
- Base and Ambient Conditions
- 12 Levels of Alarm / Trip Settings
- Process Specific User Defined Fields
- Process Workflow Control
- Process datasheets with Revisions

	CASE 1						
Service:	Feed from V-8			Location	Line		
	Liquid		-	Line number:	4"-P-15	11.11H	
	Single phase			Line size:	4		In
			•				jn
Fluid name source:	User-defined		-	Line schedule:	80		
Fluid name:	Lean Feed						
			PROPE	BTIES			
Report flags:	Specific G	iravity 💌	Density		olecular Mass	-	
	@Minimu	um @Norm	al @Maxir	num Unit	*		
Volumetric flow:	25	30	32	m2/h		-	
Upstream pressure:	12	13	14	bar	• gage	-	
Temperature:	150	150	150	PC	- 190g0		
Viscosity:	0.1	0.1	0.1	CP	×		
Velocity:	0.936	1.12	1.2	m/s	•		
Density:	890	890	890	kg/m*	-		
Specific gravity:	0.891	0.891	0.891				
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- Calculation Module
 - Automatic results in Spec Sheets
 - Data Exchange with Process Data
 - Sizing Calculation of Control Valves
 - Sizing Calculation of Flow Elements
 - Sizing Calculation of Relief Valves
 - Thermowell ASME PTC 19.3 TW
 - Batch Calculations
 - Unit Conversion
 - Calculation Reports
 - Global Revisions

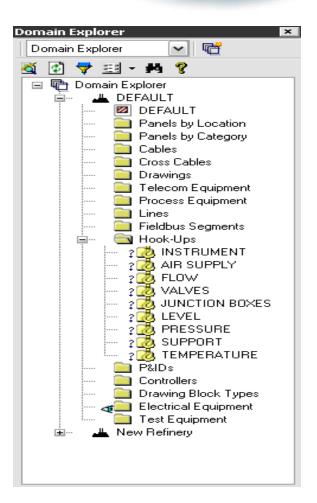
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- Documented Basis of Calculation

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Hook-Up Module

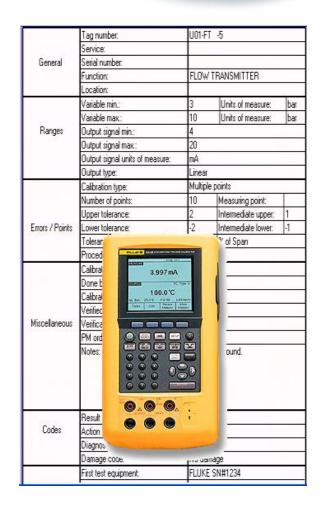
- Hook-up Seed files are Provided
- Hook-up Bill of Material Are Created
- Multiple Hook-ups can be assigned to each Tag
- Hook-ups can be grouped into categories
- Hoop-up Cad drawings can be generated in SPI
- Hook-ups can be associated to external drawings
- Bill of Material can be Exported to Material Management Programs



- Calibration Module
 - Traceable/Auditable Calibration history
 - Standard Default Profiles Provided
 - Multiple Profiles for Different Instrument Types
 - Point Calibration Errors Recorded
 - Snapshot of the calibration results
 - Built-in Calibration Certificate
 - Customizable Setting Form
 - Customizable Results Form

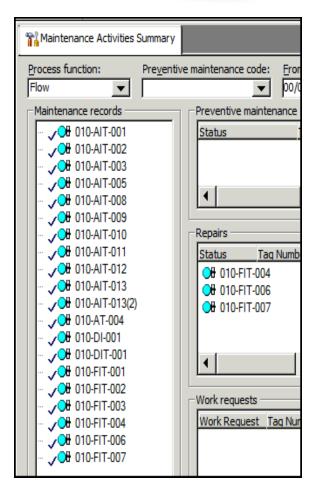
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- Interface to FLUKE Calibrators



Maintenance Module

- Breakdown Maintenance
 - Work Requests for Possible Repair required in the future
 - Repair Forms for Approved
 Repair with A Log of Activities
- Preventive Maintenance
 - Schedule Periodic Maintenance Activities
- Connect to Asset Management
 System using SAP



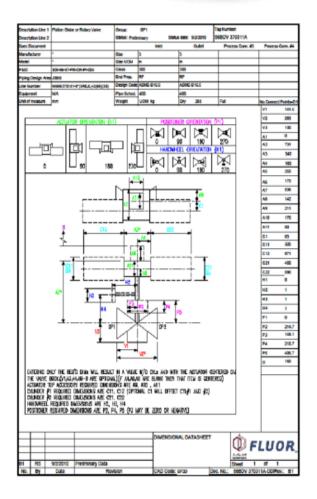


- DDP Module
 - Establishes 3D Dimensional Data
 - Built-in Group Libraries
 - End Class and Prep Defined
 - Index Module
 - Tag Number associated to Group
 - Manufacture and Model Numbers
 - Data Status
 - Preliminary
 - Design

FLUOR

Certified

- DDP Export Utility to SP3D



- Document Binder Module
 - Specification Binder Packages
 - General Document Binder
 Packages
 - External Files attached Binder Packages
 - Manage Revisions for Documents
 - Document Binder Uses
 - Requests for Quotes
 - Purchase Orders
 - Work Packages
 - Loop Folders

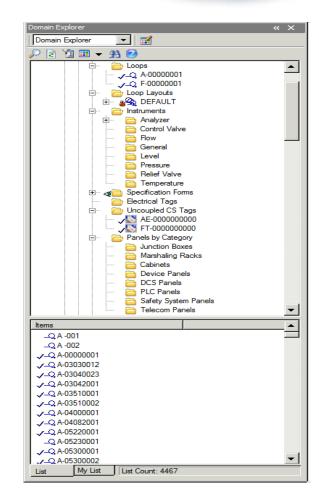


	1	Tag Number			47717-PCV -701					
GENERAL	2	Service			47717-T-0003 HYDRATE INHIB STRG TNK N2 SUPPLY					
		Line Type	P&ID	Number	2" AC2GAD AD162-47717-D-11636					
	4	Tightness Requirements								
		5 Fluid			NITROGEN					
	6	Flow Operating			0.6	Nm*lh				
			ax. Min.		2.5	Nm*lh	0.3	Nm ^{*/h}		
		Inlet Pressure M		ting	3.5	bar-g	3.5	bar-g		
	9	DP Valve Sizing O	perating		3.49	bar				
	10	DP Valve Sizing 1	fin. Max.		3.49	bar	3.49	bar		
	11	Shut-Off DP M	IX.		3.5	bar				
PROCESS	12	Temperature M			-29	*C	45	*C		
CONDITIONS		Spec. Gravity at Ba	ise Operat	ting						
		Molecular Mass			28					
		Viscosity at Base	Operat	ting				cP		
	16	% Flashing								
		Vapor Pressure	Critica	I Pressure		bar-a		bar-a		
	18									
			ax. Min.		-					
			m Size	Cv						
	21	Form or Type			PRESSURE	REDUCING				
	22	End Connections &	Rating		ASME 150#	RF				
BODY		Body Material			A216 WCB					
		Bonnet Type		- 14	STANDARD					
		Stem Material	Packin	g Material	316 55		N/A			
	26	Flow Action to	1							
	27	Lubricator	Iso. Va		N/A	1.	N/A			
	28		Ports	Characteristic		1		QUICK OPEN		
		Plug Material			316 SS					
TRIM		Seat Material			316 SS					
		Ball Material			N/A					
		2 Gasket Material Bushing Material			A14.00					
			100		316 SS		_			
		Model	Size		000010 011	0.01.011				
		Type			SPRING DV	PHRAGM				
		Pilot			N/A					
ACTUATOR /		Supply to Pilot			N/A YES		NO			
PILOT	38	Self Connection External Connection Diaphragm Material			1E0		NU			
1001					-					
	40	Spring Range Set Point			0.01 bar					
	42				u.vi bar					
	43									
		Filter Regulator			NO					
		Line Strainer			NO					
		Housing Vent								
ACCESSORIES		Internal Relief			-					
moussources		NACE Requirement			NO					
	40	rende requirementer								
	50				-					
	51	Manufacturer			<u> </u>					
	52	Model			-					
PURCHASE	53									
mermels		Price	litern N	umber	-					
		Serial Number								
iotes: See notes										
++	+				INSTRUME	INT SPECIFICAT	ION _			
D CK RL	+.	T 8/12/2011 Iss	ad Anne	d for Design	Brees	an Resultator	- F	LUOR		
0 CK RL B AA RL		RT 8/12/2011 issu			rress	ure Regulator				
D AA RL		RT 6/24/2011 Issu RT 6/18/2011 Issu					Sheet	1 of 2		
A AA 80										
A AA RL			Revision De		Form No. 28	Dec. No.:		I-DSH-05246-001		

Most Used SPI Functions

- Domain Explorer
- Browser Functions
 - Index Browse
 - Spec Browser
 - Custom Browser
- Duplicate Loops or Tags
- Save As Function
- Document Generation
- Spec Page and Form Editor
- Spec Templates

FLUOR

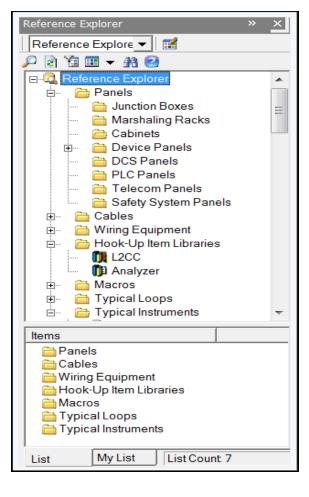


9

Reference Explorer

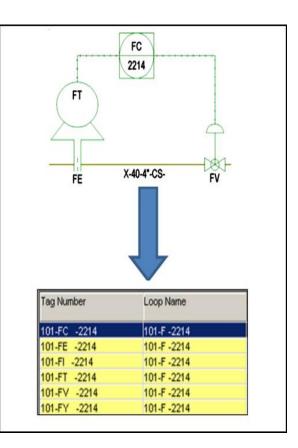
- Panel Definitions
- Cable Definitions
- Wiring Equipment Definitions
- Hook-Up Item Libraries
- Macro Definition

- Typical Loop Definitions
- Typical Instrument Definitions
- Reference Data Can be Used More Effectively On a Project



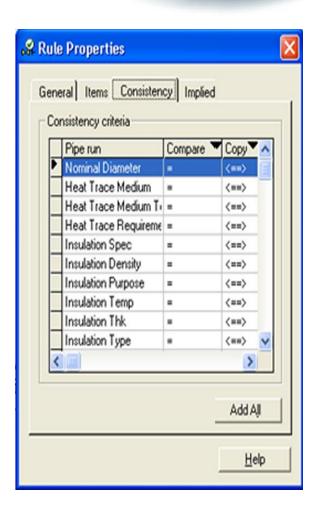
Macro Expansion

- Macros defined in the Reference Explorer contain all Tags in a Loop Typical Template
- Macros are attached to Carrier Tags (Usually a Transmitter)
- Creating the Carrier Tag creates the Complete Loop with all Tags
- Can be used with P&ID Integration to Facilitate Instrument Types
- Can be used as Loop Templates for Batch Loop creation



Rule Manager

- Launches Consistency Rules when SPI Entities are Changed
- Relation Rules Govern the Relationship between Two Entities
- Validation Rules apply to Single Components in the Database
- GUI Rules apply to Entity Properties
- Rule Governance Actions
 - Check or Copy data between Fields
 - Apply Data Consistency to Fields
 - Prevent errors or bad data entry

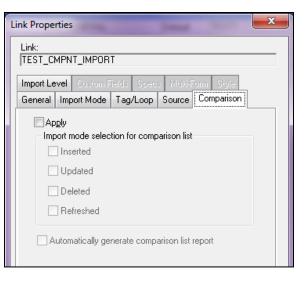


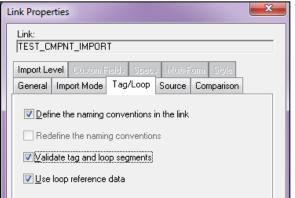
Import Utility

FLUOR

- Allows Data to be imported by Table or Module
- Can Append, Overwrite or Skip Populated Fields
- Source file can be Excel, Access, CSV, Text or Dbase
- Best use it to Export Tags Edit Data
 - Import Data back into SPI

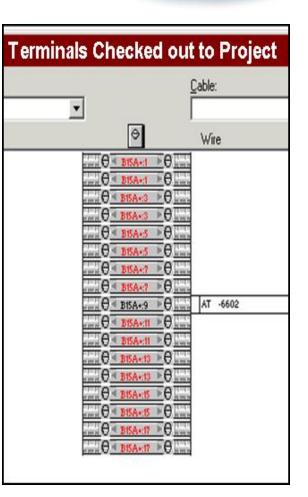
NOT TO BE USED FOR NEW TAGS!





- Merger Utility
- Two types of Merger
 - Database Merger
 - User to Merge two Databases together
 - Requires consistency in Primary Tables
 - Not very successful in large databases
 - Most people use "Data Migration"
 - Project Merger

- Used for Owner Operator Mode
- Projects are defined in the Database
- Entities are checked out to Projects
- Project data is Merged into As-Built



Symbol Editor

FLUOR

- Create Custom Symbols for Loops and Wiring Drawings
- Add SmartText to a Symbol File
- Assign an Item Type to a Symbol
- Add a Macro to a Symbol File
- Add Connection Points to Symbols
- Add Starting Points to a Symbol File for Placement
- Define new symbol Libraries for Telecommunications Elements

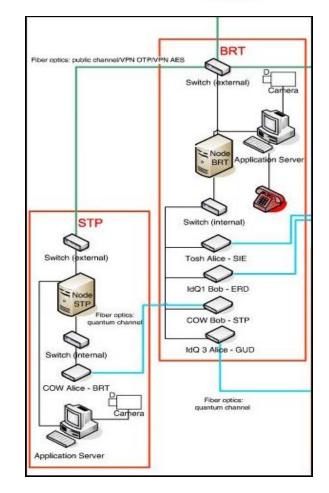
Creating new Symbols

Tools	Window Help	
Dor	nain Explorer	F7
Ref	erence Explorer	F8
Sele	ect Language	F6
Edit	: Translation Text	
Glo	bal Revisions	
Cha	anged Documents	
Inte	erfaces	•
Syn	nbol Editor	Ctrl+E
Use	er-Defined Macro Functions	л М
Dat	a Comparison Display Opti	ons

15

Telecom Functions

- Telecommunication Capabilities
 - Build and Index all Communication Devices
 - Fiber Optic and Network wiring definitions
- Spec and Symbols Library for Communication Devices
- Communications Wiring Systems
 - Uses Block Diagrams or Point to Point Diagrams
 - SmartPlant Instrumentations Cable
 Block Diagram needs enhancement



IS and FF Validation

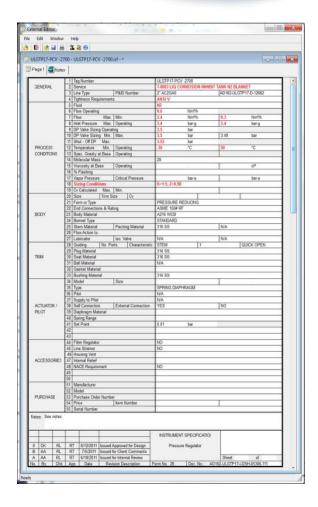
- Tags assigned to a segment or IS Loop
- Wired Tags not connected to a segment
- The number of instruments in a segment
- The number of devices on a given spur
- A spur length is exceeds the maximum
- Total cable length exceeds the maximum
- Less than two terminators in a segment
- Actual voltage at instrument

- Total current exceeds the maximum
- Total capacitance exceeds maximum
- May use Global Parameters Instead

					eldation Summa	102				
				Val	idation			Status		
		Nut	ibei of instrume	nts in the seg	neri			Page 6		
			age al inchurse	rda				ALC		
			al Cable length					² 800		
		Tota	al current cons	mption			F	800		
		Tota	al capacitance				6	Page 1		
			gred instrume	ts that has not	theen connect	led to the Is.	ri. 1	an		
			nber of terminal					800		
			ther of devices					aco		
			ainun spur cab					Pass		
Intelo	able length									
Formula		Anal • LoA	Lnan) < 1							
Cab	le Type	Maximum Langth (1)	TotalLength			Cable Nam	•		Cable Longe	Status
Type A		Length [*] 1900	103	101-FT -152	13				1	Pass
- Merik		- 300	100	101#T -150 101#T -150					1	1.000
				HR - SEGME					100	
				101-FT -158	w)				1	
Voteor	t at instant	ent .								
		_	for the second		1.5	1.0	14.0	14.4	10.000	Part 1
	Device	-	Section Long	(Chw)	Section	Section Voltage (V	Dam Mt	Voltage at Instrument (V	Min Working Voltage M	24 Million
101.57	-1550		1.0	0.04	0.02	0 Vorage (v	0.24	23.76		Pass
-9141	-+900		1.0	4.00	0.02	0.24	848	4179	100	- 411
101 <i>F</i> T	-1961		1000	0.04	0.02	0.24	0.24	23.76	9.00	Pass
-#141	- 881		100.0	4.00	0.06	0.24				-
101 <i>F</i> T	-1552		1.0	0.04	0.02	0	0.24	23.76	9.00	Pass
			100.0	4.00	0.06	0.24	1			
Intelo	ournerst con	umption								
	Actual	mA]	P.4	[mA]	Status	÷				
60.00			190.00		Paul					
Intel	machance									
Total c	Arbeit	-		a luft	5 A					
	Actual	wF]		e [4F]	Status					
		wF]	Pua 200.00	e (#)	Status Pass					
5.45	Actual	WF]		e (+₽)						
5.45		WF]	200.00	*)#]		ett	Status			
35.45 Numbe	Actual		200.00	•[#]	Pass		Status			
25.45 Number 101.FT	Actual a of device -1950		200.00	• [vf]	Pass Total Instrum	Pass Pass	Status			
25.45 Number 101.FT 101.FT	Actual a. al. device -1550 -1551		200.00	•)#]	Pass Total Instrum 1	Pass Pass	Status			
25.45 Number 101.FT 101.FT	Actual a. al. device -1550 -1551		200.00	•]#]	Pass Total Instrum	Pass	Status			
25.45 Number 101.FT 101.FT	Actual a of device -1550 -1551 -1552	r#] 1.011.004 Spar Na	200.00 #ber	• [+F]	Pass Total instrum 1	Pass Pass	Status			
25.45 Number 101.FT 101.FT	Actual a of device -1550 -1551 -1552	off] LDM.IDM SpurNu dde lendth asai	atter	• [+F]	Pass Total Instrum 1 1	Pass Pass Pass				
25.45 Number 101.FT 101.FT 101.FT Maxim	Actual a of device -1950 -1951 -1952 with sport co	r#] 1.011.004 Spar Na	atter	• [vf]	Pass Total instrum 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Pass Pass Pass	-0	Status		
35.45 Number 101.FT 101.FT Maxim	Actual a of device -1950 -1952 -1952 -1952 -1952 -1950	off] LDM.IDM SpurNu dde lendth asai	atter	• (#)	Pass Total Instrum 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Pass Pass Pass Pass 90	etti Pa			
35.45 Number 101.FT 101.FT Maxim	Actual a of device -1950 -1952 -1952 -1952 -1952 -1950	off] LDM.IDM SpurNu dde lendth asai	atter	• [#]	Pass Total instrum 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Pass Pass Pass	-0			
35.45 Number 101.FT 101.FT Maxim	Actual -1550 -1551 -1552 -1552 -1550 -1550 -1551	4F) Spar Na Gel Imath, again Cable N	atter	• [4]	Pass Total Instrum 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Pass Pass Pass 90 90	Pa Pa			
35.45 Number 101.FT 101.FT Maxim	Actual -1550 -1551 -1552 -1552 -1550 -1550 -1551	off] LDM.IDM SpurNu dde lendth asai	atter	• [4 ⁴]	Pass Total Instrum 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Pass Pass Pass 90 90	Pa Pa	ii ii idations		
35.45 Number 101.FT 101.FT Maxim	Actual -1550 -1551 -1552 -1552 -1550 -1550 -1551	4F) Spar Na Gel Imath, again Cable N	atter	• [47]	Pass Total Instrum 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Pass Pass Pass 90 90 Fieldbur 5	Par Par Par Report	ii ii idations	=1 //	0.0
35.45 Number 101.FT 101.FT Maxim	Actual -1550 -1551 -1552 -1552 -1550 -1550 -1551	4F) Spar Na Gel Imath, again Cable N	atter	• [47]	Pass Total Instrum 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Pass Pass Pass S0 S0 Feldbur S	Par Par Par Report Report	in in Idations	FLU	OR
35.45 Number 101.FT 101.FT Maxim	Actual -1550 -1551 -1552 -1552 -1550 -1550 -1551	4F) Spar Na Gel Imath, again Cable N	atter	• [47]	Pass Total Instant 1 Code (7) 10 10 10 10 10 10 10 10 10 1	Pass Pass Pass 90 90 Fieldbur S	Pa Pa Pa Report Parent Va Report Parent S1 Incals Safe.	n n kdatione No		
25.45 Number 101.FT 101.FT	Actual -1550 -1551 -1552 -1552 -1550 -1550 -1551	4F) Spar Na Gel Imath, again Cable N	atter	• [4]	Pass Total Instant 1 Code (7) 10 10 10 10 10 10 10 10 10 1	Pass Pass Pass 90 90 Feldbur S <u>Stritts</u> Wide Paan	Pa Pa Pa Report Parent Va Report Parent S1 Incals Safe.	n Hations		OR.

External Spec Editor Program

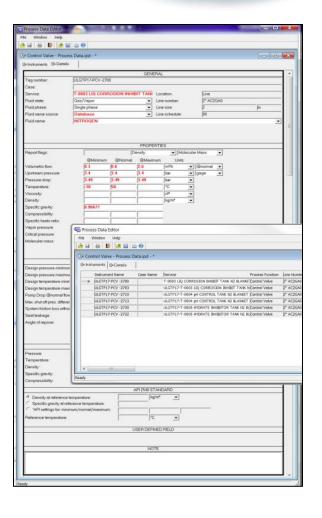
- Stand Alone Editor for SPI Spec Forms
- Export Import Process data as .isf file
- Allows Editing of all Spec Data in the Body of the Spec Form
- Changes are Marked on the Screen
- Drop Down Windows match those in SmartPlant Instrumentation
- Changes can only be Imported back to Source Spec Form in SmartPlant Instrumentation
- Full Printing Capabilities for Instrument Spec Sheets





External Editor for Process

- Stand Alone Editor for Process Data
- Export Import Process data as .ipd file
- Allows Editing of all Process Data
- Has Detailed and Browser View for Editing Process Data
- Changes are Marked on the Screen
- Drop Down Windows match those in SmartPlant Instrumentation
- Changes can only be Imported back to Source Tag in SmartPlant Instrumentation
- Full Printing Capabilities for Process
 Data Sheets



Additional Seldom Used SPI Functions

- Language Options
- Preloading and Auto Wiring
- Interfaces to Vendor Software
- Global Revisions
- Unit Of Measure Editing
- Data Comparison Options
- Report Title Block Management
- Cable Routing and Drumming
- Numerous Available Reports
- And Many More . . .

FLUOR

Tools Window Help Domain Explorer Reference Explorer Select Language... Edit Translation Text... Global Revisions... Changed Documents... Interfaces Symbol Editor User-Defined Macro Functions... Data Comparison Display Options... Block - Instrument Type Assignment... Default General Blocks... Update Paths for Existing Drawings Show Last Generated Drawing Clear Temporary Data Define External Macro Source... Dissociate Blocks from Instruments...



- Only a Limited Number of SPI Modules and Functions are Being Used Effectively by Most Users
- To Get the Most Out of SPI Users Must Take Advantage of the Full Capabilities of the Software

Questions?

