

Smartplant P&ID – Smartplant Instrumentation Interface

as implemented by
CB&I Lummus – The Hague

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June 3, 2012



Overview

- Automated process of converting Smartplant P&ID exports to SPI import file includes process of keeping data aligned during project execution
- MS Access 2007 database with VB code
- Used on several projects :
 - Hoegh NICHE LNG FPSO (Pre-Feed)
 - Staatsolie Refinery Expansion (Feed)
 - Gassco Emden Project (Feed)

SP P&ID – SPI Interface

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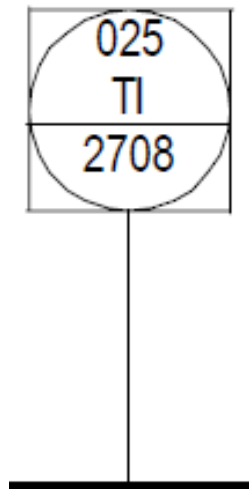
Interface begins with the definition of loop typicals.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Typical	Instr Type	Tag Service	Seq	Suffix	Location	System	IO	Soft Func	Keep PID Tag	Incl Line	Incl Settings	Skip Loop	Renum
2	A-01	AT		1		F	PCDA	AI	AI	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0
3	A-01	AE		0		F				<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0
4	A-02	AY		0		PCDA				<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
5	A-03	AT		2		F	PSD	AI	AI	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0
6	A-03	AE		1		F				<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0
7	A-04	MT		2		F	PCDA	AI	MI	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0
8	A-04	ME		1		F				<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0
9	A-05	UC		0		PCDA				<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
10	CAP1	HS	Cap reset	1		CCR	HIPPS	DI		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
11	EV1	ZSC		4		F	ESD	DI	ZLC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
12	EV1	ZSO		3		F	ESD	DI	ZLO	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
13	EV1	SV		2		F	ESD	DO		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
14	EV1	HS		5		PCDA				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
15	EV1	FV		1		F				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0
16	EV2	SV		2		F	ESD	DO		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
17	EV2	ZSO		3		F	ESD	DI	ZLO	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
18	EV2	ZSC		4		F	ESD	DI	ZLC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
19	EV2	ZT		5		F	ESD	AI		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	0
20	EV2	FV		1		F				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0
21	EV2	HS		6		PCDA				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0

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INTERGRAPH®



Based on the “loop typical” definition this simplified P&ID representation would be expanded to the following list of instrument tags:

Loop Name	Internal Loop	Tag Number	Instrument Type Desc
025-T-2708	1	025-TW -2708	Thermowell
025-T-2708	2	025-TE -2708	Rtd Element
025-T-2708	3	025-TT -2708	Temperature Transmitter

The interface utility adds Locations, Control Systems, I/O Types, Soft Functions, etc. as defined by the loop typical.

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	A	B	C	D
1	I_typical	Conn2P	Symbol_Name	Typical
2	AA	YES	\Instrumentation\System Functions\DCS\DCS Func Access in Prime Loc.sym	
3	AD	NO	\Instrumentation\System Functions\DCS\DCS Func Access in Prime Loc.sym	
4	ADA	NO	\Instrumentation\System Functions\DCS\DCS Func Access in Prime Loc.sym	A-02
5	AI	NO	\Instrumentation\System Functions\DCS\DCS Func Access in Prime Loc.sym	A-02
6	AI	YES	\Instrumentation\System Functions\DCS\DCS Func Access in Prime Loc.sym	A-01
7	AIC	NO	\Instrumentation\System Functions\DCS\DCS Func Access in Prime Loc.sym	
8	AT	YES	\Instrumentation\Off-Line\Single Function\Disc Single-Func Field Mounted.sym	A-02
9	AY	NO	\Instrumentation\System Functions\DCS\DCS Func Inaccess in Prime Loc.sym	
10	EV	YES	\Instrumentation\In-Line\Valves\2 Way Instrument\2 Way Generic Body.sym	
11	EV	YES	\Instrumentation\In-Line\Valves\2 Way Instrument\2 Way Bal.sym	EV3
12	EV	YES	\Instrumentation\In-Line\Valves\2 Way Instrument\2 Way Bal Closed.sym	EV3

Symbol mapping automatically couples a typical loop to instrument tags extracted from the P&ID. The program utilizes the symbol and the letter code to determine the appropriate typical. Example: \Instrument\System Functions\DCS\DCS Func Access in Prime Loc.sym with letter code “TI” is coupled to Typical T-03.

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Interface User Menu:

ADMINISTRATION

- Setup
- Typicals
- Symbol Mapping
- Seat Leakage Mapping
- Failure Action Mapping
- Flow Meter Updates

IMPORTS

1 Import SPPID export
Process Unit:

Generate XL Export File

- 2 Assign typicals
- 3 Review Index
- 4 Generate Index Import File

CHECKS

5 Check SPI import

General

- Check P&ID dwg number
- Check Instrument Types
- Check Lines
- Check Commodity
- Check Control System
- Check IO Type
- Check Soft Functions

Data Sheets


- Fluid Name
- Check Design Pressures
- Check Design Temperatures
- Check Oper. Pressures
- Check Oper. Temperatures
- Check Sizes

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ADMINISTRATION

-
- 
-
-
-
-


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IMPORTS


1 Import SPPID export

Process Unit: 

Generate XL Export File

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CHECKS

5

Check SPI import

General

- Check P&ID dwg number
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Data Sheets

- Fluid Name
- Check Design Pressures
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- Check Oper. Pressures
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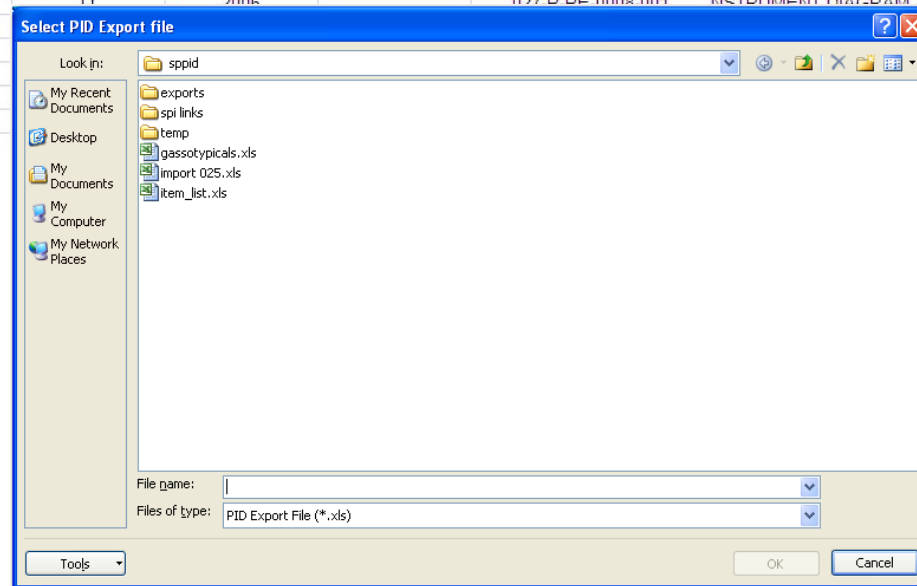
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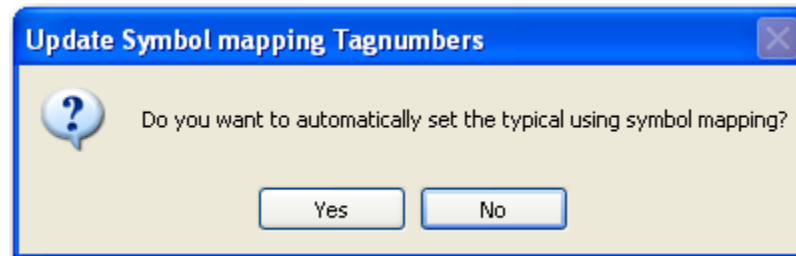
Import from pre-defined P&ID exports (Excel)

	A	B	C	D	E	F	G	H	I
1	pid_tag	prefix	m_var	i_type	number	suffix	pid	pid_descr	line_number
2	027-AIC-1280	027	A	IC	1280		027-P-PE-0001-001	NSTRUMENT DIAGRAM - CO	
3	027-EV-2301	027	E	V	2301		027-P-PE-0002-001	NSTRUMENT DIAGRAM - CO	GN-027-0-2117
4	027-EV-2302	027	E	V	2302		027-P-PE-0003-001	NSTRUMENT DIAGRAM - CO	GN-027-0-2118
5	027-EV-2303	027	E	V	2303		027-P-PE-0004-001	NSTRUMENT DIAGRAM - CO	GN-027-0-2119
6	027-FO-2001	027	F	O	2001		027-P-PE-0002-001	NSTRUMENT DIAGRAM - CO	GN-027-0-2102
7	027-FO-2002	027	F	O	2002		027-P-PE-0003-001	NSTRUMENT DIAGRAM - CO	GN-027-0-2104
8	027-FO-2003	027	F	O	2003		027-P-PE-0004-001	NSTRUMENT DIAGRAM - CO	GN-027-0-2106
9	027-FO-2004	027	F	O	2004		027-P-PE-0001-001	NSTRUMENT DIAGRAM - CO	GN-027-0-2114
10	027-FO-2005	027	F	O	2005		027-P-PE-0008-001	NSTRUMENT DIAGRAM - CO	GN-027-0-2110
11	027-FO-2006	027	F	O	2006		027-P-PE-0008-001	NSTRUMENT DIAGRAM - CO	GN-027-0-2111
12	027-FO-2007	027	F						GN-027-0-2112
13	027-FQI-2008	027	F						
14	027-FQI-2009	027	F						
15	027-FQI-2010	027	F						
16	027-HS-2031	027	H						
17	027-HS-2032	027	H						

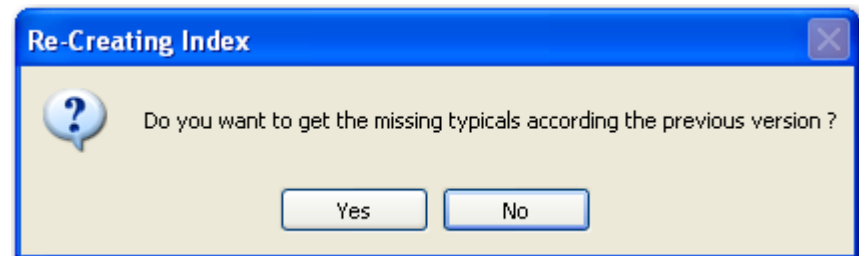


A standard workflow is applied to each import:

- Step 1: Assign typicals using symbol mapping



- If empty rows assign using previous version



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Step 2: Index opens to manually assign remaining typical.

id	import	skip	version	Typical	detail_nr	unit_nu	pid_tag	lp_pref	lp_nun	lp_meas	prefix	i_type	numb	suffix	pid
46898	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	A-01		025	025-AI-2001	025	2001	A	025	AI	2001		025-P-PE-0002-001
46899	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	A-01		025	025-AI-2002	025	2002	A	025	AI	2002		025-P-PE-0012-001
46900	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	A-01		025	025-AI-2652	025	2652	A	025	AI	2652		025-P-PE-0010-001
46901	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	A-01		025	025-AI-2653	025	2653	A	025	AI	2653		025-P-PE-0010-001
46902	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	A-01		025	025-AI-2752	025	2752	A	025	AI	2752		025-P-PE-0010-002
46903	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	A-01		025	025-AI-2753	025	2753	A	025	AI	2753		025-P-PE-0010-002
46904	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	A-01		025	025-AI-2852	025	2852	A	025	AI	2852		025-P-PE-0010-003
46905	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	A-01		025	025-AI-2853	025	2853	A	025	AI	2853		025-P-PE-0010-003
46906	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	A-05		025	025-AIC-0412	025	0412	A	025	AIC	0412		025-P-PE-0013-001
46907	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	A-05		025	025-AIC-2002	025	2002	A	025	AIC	2002		025-P-PE-0008-001
46908	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	A-02		025	025-AY-2002	025	2002	A	025	AY	2002		025-P-PE-0008-001
46909	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	EV5	EV5	025	025-EV-2301	025	2301	E	025	EV	2301		025-P-PE-0002-001
46910	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	EV3	EV3	025	025-EV-2302	025	2302	E	025	EV	2302		025-P-PE-0007-001
46911	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	EV3	EV3	025	025-EV-2303	025	2303	E	025	EV	2303		025-P-PE-0012-001
46912	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	EV3	EV3	025	025-EV-2305	025	2305	E	025	EV	2305		025-P-PE-0002-001
46913	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	EV3	EV3	025	025-EV-2306	025	2306	E	025	EV	2306		025-P-PE-0019-001
46914	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	EV3	EV3	025	025-EV-2309	025	2309	E	025	EV	2309		025-P-PE-0020-001
46915	<input checked="" type="checkbox"/>	<input type="checkbox"/>	469	EV3	EV3	025	025-EV-2310	025	2310	E	025	EV	2310		025-P-PE-0020-001

After assignment is done, program creates:

- Import file (to be used by standard SPI import module)
- Internal check table which:
 - Looks at current data in SPI and compares with current file.
 - Identifies tags which are in SPI but no longer on P&ID. These are listed for reference if they have process data, spec sheets or wiring attached. Note: Program will not delete any tags in SPI, advice is to always do this manually .

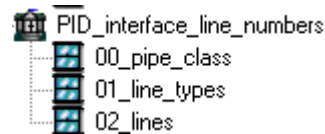
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Step 3: Import fields (sequential import)

- Line numbers (Pipe class, Line types, Lines)



- Instrument Index Module import

Define Tag Name Structure - IMPORT_INDEX

Source Table Column List			Name Convention				
Name	Type	Length	No.	Source Name	Start	Len.	Tag Segment
cmpnt_func_type	char	40	1	'525'	1	3	Unit
cmpnt_func_type	char	6	2	tag_type	1	5	Instrument Type
cmpnt_loc_desc	char	40	3	number	1	4	Tag Number
cmpnt_loc_name	char	40	4	tag_suffix	1	2	Tag Number
cmpnt_sys_io_ty	char	40					
cmpnt_sys_io_ty	char	10					
connect_to_proc	char	255					

Source

Name	Type	Length	
cmpnt_func_type_desc	char	40	
cmpnt_func_type_name	char	6	
cmpnt_loc_desc	char	40	
cmpnt_loc_name	locid		char 38
cmpnt_sys_io_type_desc	loop_meas		char 255
cmpnt_sys_io_type_name	loop_num		char 255
connect_to_process	loop_prefix		char 255
control_sys	number		char 255
des_press_max	old_id		long
des_press_min	pd_workflow		long
des_temp_max	pid		char 255
des_temp_min	pid_descr		char 255
detail_nr	pid_tag		char 255
equip_descr	pidimport		number
equip_name	pipe_class		char 255
failure_action	prefix		char 50
h	press_oper		char 255
hh	proc_func_name		char 20
hhh	renumber		long
hhhh	seq		long
id	seat_leakage		char 25
import_note	service		char 255
instr_conn	skip		number
intl_type	soft_alarm		char 255
itypid	soft_function		char 50
l	sp_id		char 255
line_number	symbol_name		char 255
line_size1	t_l_type_id		char 255
ll	tag_suffix		char 255
lll	tag_type		char 255
llll	temp_oper		char 255
location	tso_class		char 50
	typical		char 255
	unit		char 255
	valve_inlet_size		char 255
	valve_outlet_size		char 255
	valve_size		char 255

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Step 4: Delete, Rename ...

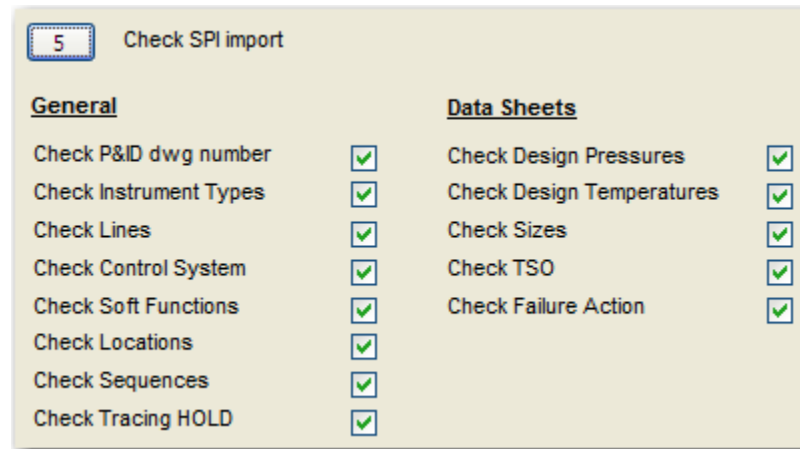
Set action required for tag records

Select actions to perform for SPI tagnumbers, select a tagnumber for re-rag, or select Delete / Approve

SPI Tag Number	Action	SPI P&ID	PD	Secondary Data	
				Spec Sheet	Wiring
025-EV-2304	<input type="button" value="v"/>	025-P-PE-0014-002	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
025-FO-2008	<input type="button" value="v"/>	025-P-PE-0014-001	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
025-HS-2037	<input type="button" value="v"/>	025-P-PE-0014-001	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
025-HS-2038	<input type="button" value="v"/>	025-P-PE-0014-001	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
025-HS-2218	<input type="button" value="v"/>	025-P-PE-0014-001	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
025-HS-2304	<input type="button" value="v"/>	025-P-PE-0014-002	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
025-HS-2401C	<input type="button" value="v"/>	025-P-PE-0002-001	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
025-HS-2401O	<input type="button" value="v"/>	025-P-PE-0002-001	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
025-HS-2401S	<input type="button" value="v"/>	025-P-PE-0002-001	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
025-HV-2218	<input type="button" value="v"/>	025-P-PE-0014-001	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
025-PDT-2019	<input type="button" value="v"/>	025-P-PE-0014-002	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
025-PI-2035	<input type="button" value="v"/>	025-P-PE-0014-002	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
025-PT-2666B	<input type="button" value="v"/>	025-P-PE-0019-002	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
025-SV-2218	<input type="button" value="v"/>	025-P-PE-0014-001	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
025-SV-2304A	<input type="button" value="v"/>	025-P-PE-0014-002	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Shows reference to Process Datasheet, Specification Datasheet, and Wiring found in SPI.

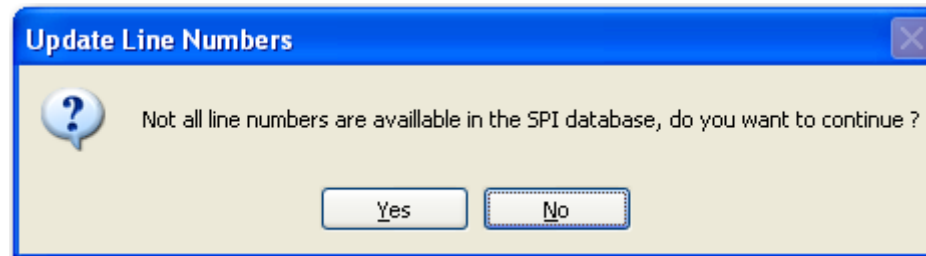
Step 5: Check data after SPI import file has been created.



<u>General</u>		<u>Data Sheets</u>	
Check P&ID dwg number	<input checked="" type="checkbox"/>	Check Design Pressures	<input checked="" type="checkbox"/>
Check Instrument Types	<input checked="" type="checkbox"/>	Check Design Temperatures	<input checked="" type="checkbox"/>
Check Lines	<input checked="" type="checkbox"/>	Check Sizes	<input checked="" type="checkbox"/>
Check Control System	<input checked="" type="checkbox"/>	Check TSO	<input checked="" type="checkbox"/>
Check Soft Functions	<input checked="" type="checkbox"/>	Check Failure Action	<input checked="" type="checkbox"/>
Check Locations	<input checked="" type="checkbox"/>		
Check Sequences	<input checked="" type="checkbox"/>		
Check Tracing HOLD	<input checked="" type="checkbox"/>		

Checking Option will extract check file (instrument index) from the P&ID (per unit) and compares it with the import file.

Workflow includes required user actions to assure that required results are obtained.



The data check provides comparison of P&ID and line numbers between import file and existing values in SPI.

Tag Number	P&ID	Line Number P&ID	Line Number SPI	Specsheet exists	Update
025-AT-2002	025-P-PE-0012-001		30"-GN-025-0-2215-DC10A-0	<input type="radio"/>	<input checked="" type="checkbox"/>
025-AE-2002	025-P-PE-0012-001		30"-GN-025-0-2215-DC10A-0	<input type="radio"/>	<input checked="" type="checkbox"/>
025-FT-2602	025-P-PE-0006-001		30"-GN-025-1-2154-EC10A-0	<input type="radio"/>	<input checked="" type="checkbox"/>
025-FT-2702	025-P-PE-0006-002		30"-GN-025-2-2154-EC10A-0	<input type="radio"/>	<input checked="" type="checkbox"/>
025-LT-2602	025-P-PE-0003-001		2"	<input type="radio"/>	<input checked="" type="checkbox"/>
025-LT-2605	025-P-PE-0004-001		2"	<input type="radio"/>	<input checked="" type="checkbox"/>
025-LT-2606	025-P-PE-0004-001		2"	<input type="radio"/>	<input checked="" type="checkbox"/>
025-LT-2702	025-P-PE-0003-002		2"	<input type="radio"/>	<input checked="" type="checkbox"/>
025-LT-2705	025-P-PE-0004-002		2"	<input type="radio"/>	<input checked="" type="checkbox"/>
025-LT-2706	025-P-PE-0004-002		2"	<input type="radio"/>	<input checked="" type="checkbox"/>
025-PDT-2001	025-P-PE-0007-001	2"-GN-025-0-2171-DC10A-0	30"-GN-025-0-2171-DC10A-0	<input type="radio"/>	<input checked="" type="checkbox"/>

- Shows reference to specification sheet.
- User can indicate if program is allowed to update.

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Comparison is made of the Instrument Type as interpreted by the utility (symbol + letter code) with the instrument type as it exists in SPI.

Tags for which update Instrument Type can be done (same process function)

Tag Number	P&ID	Type P&ID	Type SPI	Update SPI
025-AT-2001	025-P-PE-0002-001	AT Analyser	AT H2S Analyser	✓
025-AT-2002	025-P-PE-0012-001	AT Analyser	AT H2S Analyser	✓
025-AT-2652	025-P-PE-0010-001	AT Analyser	AT H2S Analyser	✓
025-AT-2653	025-P-PE-0010-001	AT Analyser	AT H2S Analyser	✓
025-AT-2752	025-P-PE-0010-002	AT Analyser	AT H2S Analyser	✓
025-AT-2753	025-P-PE-0010-002	AT Analyser	AT H2S Analyser	✓
025-AT-2852	025-P-PE-0010-003	AT Analyser	AT H2S Analyser	✓
025-AT-2853	025-P-PE-0010-003	AT Analyser	AT H2S Analyser	✓
025-FE-2651	025-P-PE-0009-001	FE Flow Element Not Defined	FE Orifice Assembly	✓
025-FE-2751	025-P-PE-0009-001	FE Flow Element Not Defined	FE Orifice Assembly	✓
025-FE-2851	025-P-PE-0009-001	FE Flow Element Not Defined	FE Orifice Assembly	✓
025-FT-2005	025-P-PE-0008-001	FT Differential Pressure Flow Transmi	FT Ultrasonic Flow Meter	✓
025-FT-2006	025-P-PE-0008-001	FT Differential Pressure Flow Transmi	FT Ultrasonic Flow Meter	✓
025-FT-2602	025-P-PE-0006-001	FT Flow Transmitter Not Defined	FT Ultrasonic Flow Meter	✓
025-FT-2702	025-P-PE-0006-002	FT Flow Transmitter Not Defined	FT Ultrasonic Flow Meter	✓
025-LT-2602	025-P-PE-0003-001	LT Level Meter Not Defined	LT Radar Level Transmitter	✓
025-LT-2605	025-P-PE-0004-001	LT Level Meter Not Defined	LT Radar Level Transmitter	✓
025-LT-2606	025-P-PE-0004-001	LT Level Meter Not Defined	LT Radar Level Transmitter	✓

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Comparison is made of P&ID process data (Design Temperature and Design Pressure).

Tag Numbe	P&ID	Design Temp. deg C Min/Max		SPI Design Temp. deg C Min/Max		PD Sheet Exists	Update SPI
025-FV-2005A	025-P-PE-0008-001	-30	50	-30	50	<input checked="" type="radio"/>	<input type="checkbox"/>
025-FV-2005B	025-P-PE-0008-001	-30	50	-30	50	<input checked="" type="radio"/>	<input type="checkbox"/>
025-FV-2006A	025-P-PE-0008-001	-30	50	-30	50	<input checked="" type="radio"/>	<input type="checkbox"/>
025-FV-2006B	025-P-PE-0008-001	-30	50	-30	50	<input checked="" type="radio"/>	<input type="checkbox"/>
025-FV-2602A	025-P-PE-0002-001					<input checked="" type="radio"/>	<input type="checkbox"/>
025-FV-2602B	025-P-PE-0002-001					<input checked="" type="radio"/>	<input checked="" type="checkbox"/>
025-FV-2651	025-P-PE-0002-001				134	<input checked="" type="radio"/>	<input type="checkbox"/>
025-FV-2702A	025-P-PE-0012-001				80	<input checked="" type="radio"/>	<input type="checkbox"/>
	025-AT-2001				134	<input checked="" type="radio"/>	<input type="checkbox"/>
	025-AT-2002				80	<input checked="" type="radio"/>	<input type="checkbox"/>

ADDITIONAL PROPERTIES			
Design pressure minimum:	<input type="text"/>	bar	gage
Design pressure maximum:	50	bar	gage
Design temperature minimum:	<input type="text"/>	°C	
Design temperature maximum:	250		
Entrained gas:	<input type="text"/>	%	
Angle of repose:	<input type="text"/>	°	
Required range:	From: 0	To: 36	m ³ /h @flow
Limits on press.drop across flowmeter:	<input type="text"/>	mmH2O	4°C
Corrosive:	<input type="text"/>	No	
Erosive:	<input type="text"/>	No	
Toxic:	<input type="text"/>	No	
Colored:	<input type="text"/>		
Transparent:	<input type="text"/>		
Build-up tendency:	<input type="text"/>		

Step 6: Mapping options provide a method to convert P&ID values to SPI standard values.

Seat Leakage Mapping

P&ID	SPI
BTS	ANSI VI (TSO)
TSO	ANSI V

Failure Action Mapping

P&ID	SPI
FC	Close
FLO	Last
FLC	Last
FL	Last
FO	Open

ADDITIONAL PROPERTIES				
Design pressure min:		bar-g	Corrosive:	No
Design pressure max:	16.5	bar-g	Erosive:	No
Design temperature min:	-20	°C	Toxic:	No
Design temperature max:	120	°C	Failure action:	Close
Pump drop @normal flow:		bar	Handwheel:	No
Max. shut-off pres. difference:	16.5	bar		
System friction loss without C.V.:		bar		
Seat leakage:	ANSI IV (standard)			
Angle of repose:		°		

Thank You!

