



Engineering Analysis, Intelligent Solutions

# SMARTPLANT INSTRUMENTATION (SPI) THIN CLIENT CYBERSECURITY

Citrix Implementation

## ESL CONFIGURATION DATA

It's not Rocket Science!

- Prevent users from accessing
  - Internal setup
  - Admin module (main.exe)
  - SQL Server Management Studio
  - Oracle tools
- Encrypt ini files and schemas
- Avoid use of default passwords
- Best solutions are a combination of SPI Admin efforts and IT user account restrictions

# Associated Documents (intools.ini)

SmartPlant Instrumentation - PROMO\_A ( As-Built )

File Modules Edit Actions SmartPlant Tools Window Help

Close Generate R... EDE Index Specificat... Wiring Process Da... Calculation Loop Dwgs Hook-Ups Calibration Maintenance ODP Document ... Help

Domain Explorer

Browser Manager Browser View - New 0056,Diff. Pressure Instr.

Tag Number	Manufacturer	Model	P&ID No.	General Service	Notes:	Process Fluid	Max. Pressure	Oper. Pressure
P1 FT 0058	YOKOGAWA	EJX 110A-EMS-4G-93CDN/FU	PLX-PID-P1-0009	NATURAL GAS FROM P1-17	1. A permanent SS nameplate	Natural Gas (Methane)		616
P1 FT 0504	*	*	PLX-PID-P1-0001	NATURAL GAS PURGE TO F				
P1 FT 0001 A	YOKOGAWA	EJA 110A-EMS-4B-9C9N/FU	PLX-PID-P1-0004	P1-108-D ZINC OXIDE GUA 1. A permanent SS nameplate		Natural Gas		550
P1 FT 0001 B	YOKOGAWA	EJA 110A-EMS-4B-9C9N/FU	PLX-PID-P1-0004	P1-108-D ZINC OXIDE GUA 1. A permanent SS nameplate		Natural Gas		550
P1 FT 0001 C	YOKOGAWA	EJA 110A-EMS-4B-9C9N/FU	PLX-PID-P1-0004	P1-108-D ZINC OXIDE GUA 1. A permanent SS nameplate		Natural Gas		550
P1 FT 0001 D	*	*	PLX-PID-P1-0001	FEED GAS TO AMMONIA #:				
P1 FT 0002 A	*	*	PLX-PID-P1-0005	545# STEAM TO MIXED FE				
P1 FT 0002 B					rmanent SS nameplate	Steam		560
P1 FT 0002 C					rmanent SS nameplate	Air		510
P1 FT 0003 A					rmanent SS nameplate	Air		510
P1 FT 0003 B					rmanent SS nameplate	Air		520
P1 FT 0003 C					rmanent SS nameplate	Benfield		550
P1 FT 0005 A					rmanent SS nameplate	Benfield		550
P1 FT 0031					rmanent SS nameplate	Syn Gas (H2, N2)		340
P1 FT 0032					rmanent SS nameplate	Steam		565
P1 FT 0040					rmanent SS nameplate	Syn Gas (H2, N2)		390
P1 FT 0051					rmanent SS nameplate	Syn Gas (H2, N2)		390
P1 FT 0053					rmanent SS nameplate	Fuel Gas		60
P1 FT 0057					rmanent SS nameplate	Fuel Gas		60
P1 FT 0057 A								
P1 FT 0063 A								
P1 FT 0063 B								
P1 FT 0064								
P1 FT 0074								
P1 FT 0108								
P1 FT 0117								
P1 FT 0140								
P1 FT 0140 A								
P1 FT 0140 B								
P1 FT 0140 C								
P1 FT 0209								
P1 FT 0212								
P1 FT 0229								
P1 FT 0341								

Associated Documents

Global path:  
C:\Windows\Temp

Tag number:  
P1 FT 0140 A

Document	Description	Location
dbprofilemanager.exe	DB Profile Manager	C:\Program Files (x86)\SmartPlant\I
dbsetup.exe	DBSetup	C:\Program Files (x86)\SmartPlant\I
import.exe	Import Module	C:\Program Files (x86)\SmartPlant\I
intools.ini	Configuration File	C:\Program Files (x86)\SmartPlant\I
main.exe	Admin Module	C:\Program Files (x86)\SmartPlant\I
intsetup.exe		
regedit.exe		
EXCEL.EXE		
WINWORD.EXE		
cmd.exe		

Associate...  
Dissociate...  
Open

intools.ini - Notepad

File Edit Format View Help

```
[DATABASE]
AUTOCOMMIT=0
COMMIT=100
CONTINUE=N
DATABASE=PROMO
DATABASEPASSWORD=
DBMS=MSS
DBPARM=CONNECTSTRING='DSN=PROMO;UID=SPI_DBAMN_PROMO;PWD=SPI_DBA',PBCATALOGOWNER='SPI_DBAMN_PROMO',DISABLEBIND=1
DSN=PROMO
LOCK=RU
LOGID=SPI_DBAMN_PROMO
LOGPASSWORD=SPI_DBA
MSS=2014
PROMPT=110
SECURITYSCHEMAPASSWORD=SPI_LOGIN_PWD
SERVERNAME=SVWDEVPROSPI01\SVWDEVPROSPI0101
STAYCONNECTED=1
```

Items

- P1 FE 0140
- P1 FT 0140 A
- P1 FT 0140 B
- P1 FT 0140 C
- P1 FV 0140
- P1 FY 0140
- P1 FY 0140 A
- P1 FY 0140 B
- P1 FY 0140 C



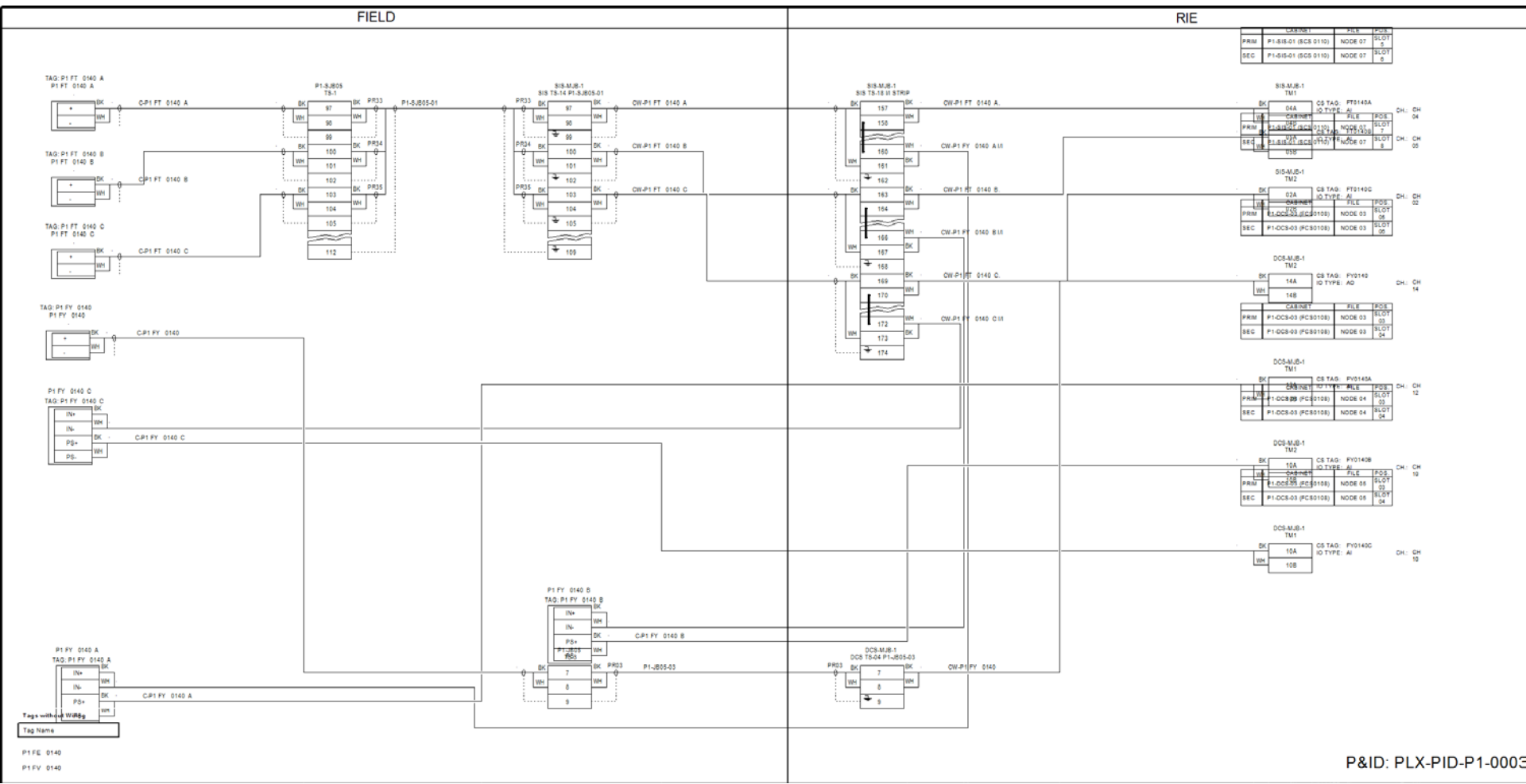
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# ESL CONFIGURATION DATA

It's not Rocket Science!

- ESL Configuration lost for 1,000's of loops
- Too much time had passed for potential database roll back
  - Work had continued
  - Some projects had been merged

# ESL Loop without cleanup





## Problem Statement

- ESL Configuration lost for 1,000's of loops
- Too much time had passed for potential database roll back
  - Work had continued
  - Some projects had been merged
- How can the loops be restored?
  - Option A: Manually rearrange loops
  - Option B: ?



# ESL Tables

- + [icon] PROMO\_A.ESL\_CONNECTOR\_POSITION
- + [icon] PROMO\_A.ESL\_DRAWING\_ATTRIBUTE
- + [icon] PROMO\_A.ESL\_DRAWING\_ENTITY
- + [icon] PROMO\_A.ESL\_DRAWING\_REDLINING
- + [icon] PROMO\_A.ESL\_EXTERNAL\_POSITION
- + [icon] PROMO\_A.ESL\_ITEM\_SYMBOL
- + [icon] PROMO A.ESL REPORTS
- + [icon] **PROMO\_A.ESL\_SETTING**
- + [icon] PROMO\_A.ESL\_SETTING\_ATTRIBUTE
- + [icon] PROMO\_A.ESL\_SETTING\_CONNECTOR\_POSITION
- + [icon] PROMO\_A.ESL\_SETTING\_DATA
- + [icon] PROMO\_A.ESL\_SETTING\_ENTITY
- + [icon] PROMO\_A.ESL\_SETTING\_EXTERNAL\_POSITION
- + [icon] PROMO\_A.ESL\_SETTING\_REDLINING
- + [icon] PROMO\_A.ESL\_SETTING\_SYMBOL\_POSITION
- + [icon] PROMO\_A.ESL\_SMARTTEXT
- + [icon] PROMO\_A.ESL\_SYMBOL\_POSITION

Layout List

Layout Configuration

Link Loop to Layout

Individual Loop Configuration

## ESL Data Details

LOOP ID

LAYOUT ID

ESL\_SETTING\_DATA\_ID

CABLE, CABLE\_SET, WIRE

PANEL, STRIP

```
SELECT *
FROM [PROMO].[PROMO_A].[ESL_SETTING_DATA]
WHERE ESL_SETTING_DATA_ID = 112915

SELECT *
FROM [PROMO].[PROMO_A].[ESL_CONNECTOR_POSITION]
WHERE ESL_SETTING_DATA_ID = 112915

SELECT *
FROM [PROMO].[PROMO_A].[ESL_EXTERNAL_POSITION]
WHERE ESL_SETTING_DATA_ID = 112915

SELECT *
FROM [PROMO].[PROMO_A].[ESL_SYMBOL_POSITION]
WHERE ESL_SETTING_DATA_ID = 112915
```

ID_1	ID_2	ID_3	LOOP_SET_ID	PROJ_ID	USER_NAME	PLANT_ID	AREA_ID	UNIT_ID	CHG_DATE	CHG_NUM	CHG_STATUS	SITE_ID	REPORTTYPE	RAD_POS	RAD_CONN_POS	RAD_OTHER_POS	ESL_SETTING_DATA_ID
76804			108393	1	MIKEA	20005	20091	20093	2016-07-18 00:00:00.000	0	W	2014	1	NULL	NULL	NULL	112915

ESL_CONNECTOR_POS_ID	ESL_SETTING_DATA_ID	ID_1	ID_2	ID_3	PLANT_ID	AREA_ID	UNIT_ID	SITE_ID	USER_NAME	CHG_DATE	CHG_NUM	CHG_STATUS	SHEETINDEX	ENTITY_TYPE	X1	Y1	X2	Y2	X3	Y3	X4	Y4	X5
1	112915	77020	77022	77024	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.897	0	W	0	Connector	0.050805	0.0997	0.166375	0.0997	0	0	0	0	0
2	112915	179872			20005	20091	20093	2014	DBA	2020-02-09 21:22:19.903	0	W	0	Connector	0.253495	0.0997	0.2813451	0.0997	0.2813451	0.0706697	0.3231952	0.0706697	0
3	112915	179873			20005	20091	20093	2014	DBA	2020-02-09 21:22:19.910	0	W	0	Connector	0.177805	0.0997	0.242065	0.0997	0	0	0	0	0
4	112915	179874			20005	20091	20093	2014	DBA	2020-02-09 21:22:19.917	0	W	0	Connector	0.253495	0.11802	0.3117732	0.11802	0.3117732	0.1041768	0.3700514	0.1041768	0
5	112915	179875			20005	20091	20093	2014	DBA	2020-02-09 21:22:19.923	0	W	0	Connector	0.253495	0.1429	0.3055694	0.1429	0.3055694	0.1350568	0.3696437	0.1350568	0
6	112915	179876			20005	20091	20093	2014	DBA	2020-02-09 21:22:19.927	0	W	0	Connector	0.253495	0.16576	0.3691036	0.16576	0	0	0	0	0
7	112915	179877			20005	20091	20093	2014	DBA	2020-02-09 21:22:19.937	0	W	0	Connector	0.050795	0.20129	0.152395	0.20129	0.152395	0.2166	0.165875	0.2166	0
8	112915	179878			20005	20091	20093	2014	DBA	2020-02-09 21:22:19.943	0	W	0	Connector	0.304805	0.1824	0.333375	0.1824	0.333375	0.1218201	0.253495	0.12182	0
9	112915	179879			20005	20091	20093	2014	DBA	2020-02-09 21:22:19.950	0	W	0	Connector	0.304805	0.1938	0.3322244	0.1938	0.3322244	0.1983908	0.3696437	0.1983908	0
10	112915	179880			20005	20091	20093	2014	DBA	2020-02-09 21:22:19.957	0	W	0	Connector	0.253495	0.2166	0.279395	0.2166	0.279395	0.1938	0.293375	0.1938	0
11	112915	179881			20005	20091	20093	2014	DBA	2020-02-09 21:22:19.963	0	W	0	Connector	0.050795	0.22034	0.146045	0.22034	0.146045	0.228	0.165875	0.228	0
12	112915	179882			20005	20091	20093	2014	DBA	2020-02-09 21:22:19.970	0	W	0	Connector	0.304805	0.2052	0.33655	0.2052	0.33655	0.1467	0.3696437	0.1467	0
13	112915	179883			20005	20091	20093	2014	DBA	2020-02-09 21:22:20.000	0	W	0	Connector	0.304805	0.2166	0.3429	0.2166	0.3429	0.2288295	0.3666732	0.2288295	0
14	112915	179884			20005	20091	20093	2014	DBA	2020-02-09 21:22:20.010	0	W	0	Connector	0.253495	0.228	0.28257	0.228	0.28257	0.2166	0.293375	0.2166	0
15	112915	179885			20005	20091	20093	2014	DBA	2020-02-09 21:22:20.017	0	W	0	Connector	0.050795	0.23939	0.101335	0.23939	0.101335	0.2394	0.165875	0.2394	0
16	112915	179886			20005	20091	20093	2014	DBA	2020-02-09 21:22:20.020	0	W	0	Connector	0.304805	0.228	0.339725	0.228	0.339725	0.16956	0.253495	0.16956	0
17	112915	179887			20005	20091	20093	2014	DBA	2020-02-09 21:22:20.027	0	W	0	Connector	0.304805	0.2394	0.3287391	0.2394	0.3287391	0.2364295	0.3666732	0.2364295	0
18	112915	179888			20005	20091	20093	2014	DBA	2020-02-09 21:22:20.033	0	W	0	Connector	0.253495	0.2394	0.293375	0.2394	0	0	0	0	0
19	112915	179889			20005	20091	20093	2014	DBA	2020-02-09 21:22:20.037	0	W	0	Connector	0.177305	0.2394	0.242065	0.2394	0	0	0	0	0

ESL_EXTERNAL_POS_ID	ESL_SETTING_DATA_ID	PLANT_ID	AREA_ID	UNIT_ID	SITE_ID	USER_NAME	CHG_DATE	CHG_NUM	CHG_STATUS	ENTITY_TYPE	XPOSITION	YPOSITION	SHEETINDEX	GENERATE_MODE	ESL_SETTING_EXTERNAL_POS_ID	OBJECT_UID
1	112915	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.887	0	W	TAGLIST	0.01831	0.067	1	0	NULL	24CE4836-3EFB-4EC2-8786-89E271F55FA5

ESL_SYMBOL_POS_ID	ESL_SETTING_DATA_ID	D_1	ID_2	ID_3	PLANT_ID	AREA_ID	UNIT_ID	SITE_ID	USER_NAME	CHG_DATE	CHG_NUM	CHG_STATUS	XPOSITION	YPOSITION	SYMBOL_PATH	SHEETINDEX	ENTITY_TYPE	PARENT_ID	ORDER_ID	WIRE_GROUP_ID	GENERATE
1	112915	76816	76818	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.797	0	W	0.04508	0.23939	1	1	SYMBOL	0	0	0	0
2	112915	76856	76858	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.807	0	W	0.04508	0.22034	1	1	SYMBOL	0	0	0	0
3	112915	76886	76888	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.810	0	W	0.04508	0.20129	1	1	SYMBOL	0	0	0	0
4	112915	77010	77012	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.817	0	W	0.04509	0.0997	1	1	SYMBOL	0	0	0	0
5	112915	76914	76916	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.820	0	W	0.24778	0.17336	1	1	SYMBOL	0	0	0	0
6	112915	76981	76983	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.827	0	W	0.24778	0.12562	1	1	SYMBOL	0	0	0	0
7	112915	76949	76951	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.830	0	W	0.24778	0.1505	1	1	SYMBOL	0	0	0	0
8	112915	23066	28445	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.837	0	W	0.17159	0.2394	1	1	SYMBOL	0	0	0	0
9	112915	37590	37594	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.843	0	W	0.17209	0.0997	1	1	SYMBOL	0	0	0	0
10	112915	67092	31311	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.847	0	W	0.24778	0.2394	1	1	SYMBOL	0	0	0	0
11	112915	67090	41480	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.857	0	W	0.24778	0.0997	1	1	SYMBOL	0	0	0	0
12	112915	67092	33538	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.860	0	W	0.29909	0.2394	1	1	SYMBOL	0	0	0	0
13	112915	67090	85128	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.863	0	W	0.37482	0.16576	1	1	SYMBOL	0	0	0	0
14	112915	67090	85453	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.867	0	W	0.37536	0.13507	1	1	SYMBOL	0	0	0	0
15	112915	67090	85782	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.870	0	W	0.37577	0.10418	1	1	SYMBOL	0	0	0	0
16	112915	67092	76420	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.873	0	W	0.37239	0.23643	1	1	SYMBOL	0	0	0	0
17	112915	67092	76527	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.877	0	W	0.37536	0.19839	1	1	SYMBOL	0	0	0	0
18	112915	67090	85235	0	20005	20091	20093	2014	DBA	2020-02-09 21:22:19.880	0	W	0.32891	0.07067	1	1	SYMBOL	0	0	0	0

## Results

- ESL Data was recovered for nearly 10,000 loops
- The following cases were found and reconciled:
  - Reconnect loop to layout
  - Reconnect loop to layout and restore missing records
  - Reconcile project data to as-built for items that have been merged during the time lapse

# ESL Tables

- + [icon] PROMO\_A.ESL\_CONNECTOR\_POSITION
- + [icon] PROMO\_A.ESL\_DRAWING\_ATTRIBUTE
- + [icon] PROMO\_A.ESL\_DRAWING\_ENTITY
- + [icon] PROMO\_A.ESL\_DRAWING\_REDLINING
- + [icon] PROMO\_A.ESL\_EXTERNAL\_POSITION
- + [icon] PROMO\_A.ESL\_ITEM\_SYMBOL
- + [icon] PROMO A.ESL REPORTS
- + [icon] **PROMO\_A.ESL\_SETTING**
- + [icon] PROMO\_A.ESL\_SETTING\_ATTRIBUTE
- + [icon] PROMO\_A.ESL\_SETTING\_CONNECTOR\_POSITION
- + [icon] PROMO\_A.ESL\_SETTING\_DATA
- + [icon] PROMO\_A.ESL\_SETTING\_ENTITY
- + [icon] PROMO\_A.ESL\_SETTING\_EXTERNAL\_POSITION
- + [icon] PROMO\_A.ESL\_SETTING\_REDLINING
- + [icon] PROMO\_A.ESL\_SETTING\_SYMBOL\_POSITION
- + [icon] PROMO\_A.ESL\_SMARTTEXT
- + [icon] PROMO\_A.ESL\_SYMBOL\_POSITION

Layout List

Layout Configuration

Link Loop to Layout

Individual Loop Configuration

# ESL Layout Settings

LOOP\_SET\_ID = LAYOUT ID

```
SELECT *
FROM [PROMO].[PROMO_A].[ESL_SETTING]
WHERE LOOP_SET_ID = 108393
```

```
SELECT *
FROM [PROMO].[PROMO_A].[ESL_SETTING_CONNECTOR_POSITION]
WHERE LOOP_SET_ID = 108393
```

```
SELECT *
FROM [PROMO].[PROMO_A].[ESL_SETTING_EXTERNAL_POSITION]
WHERE LOOP_SET_ID = 108393
```

LOOP_SET_ID	PROJ_ID	USER_NAME	LOOP_SET_NAME	LOOP_SET_DESC	PLANT_ID	AREA_ID	UNIT_ID	CHG_DATE	CHG_NUM	CHG_STATUS	SITE_ID	NUM_OF_POINTS	PAPER_SIZE	CONNECTORTYPE	TEMPLATEFILE	TEMPLATESYMBOL
108393	1	BENM	KNC - 3 ISOLATOR	DCS ANALOG INPUT LOOP	20005	20091	20093	2016-07-28 11:39:06.737	0	W	2014	NULL	NULL	1	C:\SPI Drawing Data\KNC-DCS-LOOP.sma	C:\Program Files (x86)\SmartPit

ESL_CONNECTOR_POS_ID	LOOP_SET_ID	PLANT_ID	AREA_ID	UNIT_ID	SITE_ID	USER_NAME	CHG_DATE	CHG_NUM	CHG_STATUS	ROW_1	ROW_2	COLUMN_1	COLUMN_2	LINE_1	LINE_2	X1	Y1	X2	Y2	X3	Y3	X4	Y4
1	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.867	0	W	7	3	0	1	1	4	0.158755	0.10605	0.0644501	0.10605	0.0644501	0.14715	0.095255	0.14715
2	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.877	0	W	4	1	0	1	1	10	0.037445	0.17864	0.082545	0.17864	0.082545	0.1938	0.095255	0.1938
3	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.887	0	W	5	2	0	1	1	1	0.040005	0.09017	0.158755	0.09017	0	0	0	0
4	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.893	0	W	2	8	2	6	1	1	0.252735	0.09017	0.349255	0.09017	0	0	0	0
5	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.900	0	W	2	2	1	2	1	1	0.170185	0.09017	0.241305	0.09017	0	0	0	0
6	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.907	0	W	5	3	1	1	3	2	0.106685	0.12055	0.1397	0.12055	0.1397	0.15475	0.106685	0.15475
7	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.917	0	W	5	3	1	1	2	5	0.106685	0.12815	0.13335	0.12815	0.13335	0.14335	0.106685	0.14335
8	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.923	0	W	6	3	0	1	1	1	0.038105	0.15855	0.095255	0.15855	0	0	0	0

ESL_EXTERNAL_POS_ID	LOOP_SET_ID	PLANT_ID	AREA_ID	UNIT_ID	SITE_ID	USER_NAME	CHG_DATE	CHG_NUM	CHG_STATUS	ENTITY_TYPE	XPOSITION	YPOSITION	SHEETINDEX	GENERATE_MODE
1	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.857	0	W	TAGLIST	0.01831	0.067	1	0

ESL_SYMBOL_POS_ID	LOOP_SET_ID	PLANT_ID	AREA_ID	UNIT_ID	SITE_ID	USER_NAME	CHG_DATE	CHG_NUM	CHG_STATUS	ROW_1	COLUMN_1	LINE_1	XPOSITION	YPOSITION	SHEETINDEX	GENERATE_MODE	SYMBOL_PATH
1	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.747	0	W	1	0	0	0.03315	0.23939	1	0	NULL
2	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.750	0	W	2	0	0	0.03315	0.21924	1	0	NULL
3	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.753	0	W	3	0	0	0.03315	0.20019	1	0	NULL
4	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.757	0	W	4	0	0	0.03173	0.17864	1	0	NULL
5	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.760	0	W	5	0	0	0.03429	0.09017	1	0	NULL
6	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.767	0	W	6	0	0	0.03239	0.15855	1	0	NULL
7	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.767	0	W	7	0	0	0.16447	0.10605	1	0	NULL
8	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.773	0	W	8	0	0	0.24702	0.17401	1	0	NULL
9	108393	20005	20091	20093	2014	BENM	2016-08-15 15:35:39.777	0	W	9	0	0	0.24702	0.15257	1	0	NULL

LOOP_SET_ID	PROJ_ID	SITE_ID	CHG_NUM	PLANT_ID	AREA_ID	UNIT_ID	USER_NAME	CHG_STATUS	CHG_DATE	MACRO_TYPE	ITEM_TYPE	MACRO_ID	FILTER_ID	LABEL	XAXIS	YAXIS	FONT_NAME	FONT_SIZE	FONT_COLOR	BOLD	ITALIC	HORIZ	VERTIC	ORIG
108393	1	2014	0	20005	20091	20093	DBA	W	2020-02-09 21:22:20.250	LABEL	LOOP	927	0	P&ID: 0.36972	0.06887	ARIAL	0.003175	0	0	0	0	0	0	0
108393	1	2014	0	20005	20091	20093	DBA	W	2020-02-09 21:22:20.260	MACRO	LOOP	927	0	PLX...	0.38247	0.06887	ARIAL	0.003175	0	0	0	0	0	0

LOOP_SET_ID	PROJ_ID	SITE_ID	CHG_NUM	PLANT_ID	AREA_ID	UNIT_ID	USER_NAME	CHG_STATUS	CHG_DATE	MACRO_TYPE	ITEM_TYPE	MACRO_ID	FILTER_ID	LABEL	XAXIS	YAXIS	FONT_NAME	FONT_SIZE	FONT_COLOR	BOLD	ITALIC	HORIZ	VERTIC	ORIG
108393	1	2014	0	20005	20091	20093	DBA	W	2020-02-09 21:22:20.137	RCABLESET	RCABLESET	220	0	PR33	0.01007	0.00206	ARIAL NARROW	0.0014	0	0	0	0	1	
108393	1	2014	0	20005	20091	20093	DBA	W	2020-02-09 21:22:20.147	LCABLESET	LCABLESET	220	0	PR33	-0.014...	0.00202	ARIAL NARROW	0.0014	0	0	0	0	1	
108393	1	2014	0	20005	20091	20093	DBA	W	2020-02-09 21:22:20.080	PANEL	PANEL	1017	0	P1 F...	-9E-05	0.00602	ARIAL NARROW	0.0014	0	0	0	1	1	
108393	1	2014	0	20005	20091	20093	DBA	W	2020-02-09 21:22:20.087	STRIP	STRIP	1138	0		0.0003	0.00415	ARIAL NARROW	0.0014	0	0	0	1		
108393	1	2014	0	20005	20091	20093	DBA	W	2020-02-09 21:22:20.130	RCABLE	RCABLE	189	0	P1 S...	0.02384	0.0003	ARIAL NARROW	0.0014	0	0	0	1		
108393	1	2014	0	20005	20091	20093	DBA	W	2020-02-09 21:22:20.143	RWIRE	RWIRE	1840	0	BK	0.00629	0.00046	ARIAL NARROW	0.0014	0	0	0	2		
108393	1	2014	0	20005	20091	20093	DBA	W	2020-02-09 21:22:20.153	LWIRE	LWIRE	1840	0	BK	-0.006...	0.00016	ARIAL NARROW	0.0014	0	0	0	2		
108393	1	2014	0	20005	20091	20093	DBA	W	2020-02-09 21:22:20.070	CMPNT	CMPNT	367	0	TAG...	-0.007...	0.00805	ARIAL NARROW	0.0014	0	0	0	1		
108393	1	2014	0	20005	20091	20093	DBA	W	2020-02-09 21:22:20.097	LCMPNT	LCMPNT	367	0	TAG...	-0.006...	0.011	ARIAL NARROW	0.0014	0	0	0	1		
108393	1	2014	0	20005	20091	20093	BENM	W	2016-08-15 15:14:17.913	ROPC	ROPC	0	0	She...	0.02315	-0.000...	ARIAL NARROW	0.0014	0	0	0	1		

## Conclusion

- ESL Data can be analyzed and recovered in some cases
- ESL Layout ID = LOOP\_SET\_ID
- Individual Loop Config ID = ESL\_SETTING\_DATA\_ID
- Same technology can be used to monitor ESL\_SETTING tables to keep layouts secure

# Q&A / Discussion

