

# Optimizing SmartPlant Instrumentation Resources

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SmartPlant<sup>®</sup>

Implementation Team



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**INTERGRAPH**

# Optimizing Manpower Utilization



- ◆ Current Engineering and Design industries are faced with a critical manpower shortage
- ◆ The manpower shortage has also resulted in a technology gap for experienced Engineers and Designers
- ◆ SPI offers a way to reduce man-hours but only when it is used in such a way as to optimize manpower
- ◆ The Question “How much time can will SPI save me?” must be answered “None!”
- ◆ The Work Processes determine if SPI and other software are being Optimized for Manpower Utilization

# Optimization Opportunities



## Incorporate new techniques in your Work Practices for better Manpower Utilization

**Automation** saves time by reducing the number of hours it takes to perform a task

**Work Sharing** saves money by reducing the total cost per hour to perform a task

**Specialization** saves time by optimizing the use of skilled specialists to perform complex tasks

**Simplification** saves time by using “out of the box” reports and SPI project deliverables

**Integration** saves time by sharing data and allowing data to move electronically between applications

# Automation Opportunities



- ◆ **SPI can facilitate Automated tasks for both Engineering Construction and Owner Operator companies**
- ◆ **SPI can be used as a simple data repository and loop generator or it can be used as an "Automation Tool"**
- ◆ **Automation reduces the amount of manual manipulation required to perform given SPI tasks**
- ◆ **The degree of Automation in SPI is defined by the Following:**
  - **Work Processes that include Automation**
  - **Users trained to use SPI Automation functions**
  - **Project requirements and schedule**



# Primary Automation Function



## ◆ Instrument Type Profile Table

- Wiring Presets include Control System Tag Auto-create
  - Panel Name
  - Cable Name
  - Connection Type
- Specsheet Name
  - Default Data
  - Multi-Item Form
- Dimensional Data Group
- Primary Hookup
- I/O Type
- Location
- Loop Creation and Process Data Workflow

The screenshot shows a software dialog box titled "Tag Number Profile ( FT - D/P TYPE FLOW TRANSMITTER )". The dialog is organized into several sections with checkboxes and dropdown menus:

- Wiring and I/O profile:**
  - Control system
  - Automatically create CS tag
  - Wiring
  - Panel name: DEFAULT FIELD DEVICE 2-WIRE
  - Cable name: 1P#20 BK,WH I/S
  - Connection type: 2 In a row
- Hook-up profile:**
  - Hook-up
  - Include in BOM
  - HU type: FLOW
  - Hook-up: FLOW INSTR. BELOW RUN - LIQUI
- Specification profile:**
  - Specification
  - Spec name: Diff. Pressure Instr. (flow)
  - Copy data from: D/P XMTR TYPE 1
- System I/O type profile:**
  - System I/O type AI
- Location profile:**
  - Location: Field
- Dimensional data profile:**
  - Dimensional data
  - Group name: All groups
- Miscellaneous defaults:**
  - Skip loop creation
  - Process Data workflow: process data required

At the bottom of the dialog are buttons for "OK", "Cancel", "Copy From...", "Function Block...", and "Help".



Index

# Index Automation Functions



- ◆ **New Tag Instrument Type Profile Data expansion**
- ◆ **Duplicating data from Tag to Tag or Loop to Loop**
- ◆ **Batch creation of Loops from Loop Patterns**
- ◆ **Browse Automation**
  - **Spec Sheet generate from Profile**
  - **Process data generate from Profile**
  - **Control Systems Tag Create**
  - **Device Wiring Create**
  - **Report Generation from View**
  - **Copy and Paste Buffer**

INtools - DEMO - [Browse - DEFAULT STYLE]

File Module Actions Options Tools Window Help

Seq.	Tag Number	Instrument Type	Number	Prefix	System I/O	Type	Status
1	101-ALARM-001	ALARM SIGNAL	001	101	DI		
10	101-PC -001	PERSONAL COMPUTE	1001	101			
2	101-TELE -001	TELEPHONE	001	101			
11	101-PC -002	PERSONAL COMPUTE	1002	101			
3	101-TELE -002	TELEPHONE	002	101			
12	101-PC -003	PERSONAL COMPUTE	1003	101			
4	101-TELE -003	TELEPHONE	003	101			
13	101-PC -004	PERSONAL COMPUTE	1004	101			
5	101-TELE -004	TELEPHONE	004	101			
1	101-FE -100	D/P TYPE FLOW ELEM	100	101			N
2	101-FT -100	D/P TYPE FLOW TRAN	100	101	AI		N
4	101-FV -100	CONTROL VALVE	100	101			N

Clear the buffer    Clear the current field

Ready    Plant: New Refinery    Area: Crude Area    Unit: Crude unit 1    9/5/02 04:26 pm





# Spec Sheet Automation Functions



Associate an External Title Box to Spec Sheets

New Tag Spec Sheet Profile Data expansion

Create and Copy from Template data

Batch Report Generation

Batch save as Excel

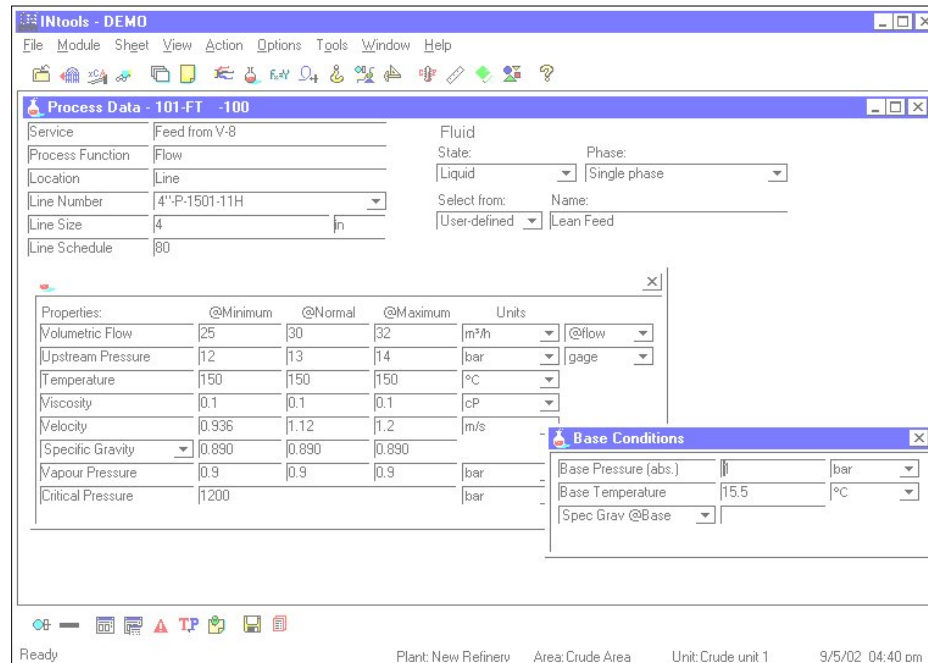
Global Revisions

GENERAL		1 Tag Number	101-FT -100
		2 Service	Feed from V-6
		3 Location	P&ID No. 4"-P-1501-11H 100-PID01-001
		4 Function	Indicating Flow transmitter
		5 Mounting	2" PIPE
		6 Area Classification	CLASS 1, DIVISION 2, GROUPS C&D
		7	
		8	
		9 Fluid	Lean Feed
		10 Process Conn. Oper.	1/2" NPT
		11 Process Conn. Oper. V	1/2" NPT
		12 Process Conn. Oper. V	1/2" NPT
		13	
		14	
		15 Instrument Range	25-625 mmH2O 4°C
		16 Calibration Range	0 - 36 Am <sup>3</sup> /h
		17 Precision	Suppressed 500% of span
		18 Precision	500% of span
UNIT		21 Process Flanges Material	Hastelloy C
		22 Wetted O-Rings Material	Viton
		23 Fill Fluid	Silicon Oil
		24 Bolts	Housing Cadmium Plated Carbon steel Aluminum
		25 Paint	Epoxy
		26 Process Conn. Oper.	1/2" NPT
		27 Process Conn. Oper. V	1/2" NPT
		28 Process Conn. Oper. V	1/2" NPT
		29 Rating	N/A
		30 Diaphragm Material	N/A
		31 Upper Housing Material	N/A
		32 Lower Housing Material	N/A
DIAPHRAGM		33 Fluid	N/A
		34 Process Conn. Oper.	N/A
		35 Process Conn. Oper. V	N/A
		36 Flushing Connection	N/A
		37	
		38	
		39 Integral Meter	Yes
		40 Integral Meter Scale	Yes
		41 Bistatic Testing	No
		42 Flushing	No
OPTIONS		44 Certification	No
		45	
		46	
		47	
		48	
		49	
		50	
PURCHASE		52 Purchase Order Number	T-R-ESP-002/68
		53 Price	Item Number 1095 \$ 2
		54 Serial Number	
Notes: 1. Instrument to be supplied with SS Tag and calibration sheet.			
		INSTRUMENT SPECIFICATION	
		Diff. Pressure Instr. (flow)	
		INTERGRAPH	
		Process • Power • Offshore	
0	MS	11/22/98	For bids
No.	By	Date	Revision
			Code: 56 Dwg. No.: 101-21-133452 Sheet 1 of 1 Rev.: 0





- ◆ New Tag Profile Process Data expansion
- ◆ Propagation of data from Lines or other Tags
- ◆ Unit Conversion
- ◆ Global Revisions
- ◆ Data Exchange
  - Spec Sheets
  - Calculations
  - External Editor
  - Legacy Systems
  - Simulators
- ◆ Base Conditions



The screenshot shows the INtools - DEMO software interface. The main window is titled "Process Data - 101-FT - 100". It contains several input fields and a table of properties.

**Process Data - 101-FT - 100**

Service	Feed from V-9	Fluid	
Process Function	Flow	State:	Liquid
Location	Line	Phase:	Single phase
Line Number	4"P-P:1501-11H	Select from:	User-defined
Line Size	4	Name:	Lean Feed
Line Schedule	80		

**Properties:**

	@Minimum	@Normal	@Maximum	Units
Volumetric Flow	25	30	32	m <sup>3</sup> /h
Upstream Pressure	12	13	14	bar
Temperature	150	150	150	°C
Viscosity	0.1	0.1	0.1	cP
Velocity	0.936	1.12	1.2	m/s
Specific Gravity	0.890	0.890	0.890	
Vapour Pressure	0.9	0.9	0.9	bar
Critical Pressure	1200			bar

**Base Conditions**

Base Pressure (abs.)	11	bar
Base Temperature	15.5	°C
Spec Grav @Base		

Ready Plant: New Refinery Area: Crude Area Unit: Crude unit 1 9/5/02 04:40 am





- ◆ Automatic results population of Spec Sheets
- ◆ Batch Calculations for CV, PSV, FE and TW
- ◆ Unit Conversion
- ◆ Global Revisions
- ◆ Data Exchange
  - Spec Sheets
  - Process

**Body Type**

Calculation method: ISA

Flow coefficient: Cv

Noise calculation method: Masoneilan

Body type: Single Seat Globe

	@Minimum	@Normal	@Maximum
Critical flow factor ( F <sub>l</sub> , C <sub>f</sub> ):	0.86	0.86	0.86
Pressure drop ratio factor ( X <sub>t</sub> ):	0.6213	0.6213	0.6213

Calculate pressure drop ratio factor

Valve style modifier ( F<sub>d</sub> ): 1

Relative capacity ( C<sub>v</sub>/d<sup>2</sup> ): 12.3

Number of flow passages: 1

Valve size: 2 in

Outlet pipe diameter: 3.826 in Default

OK Cancel Help

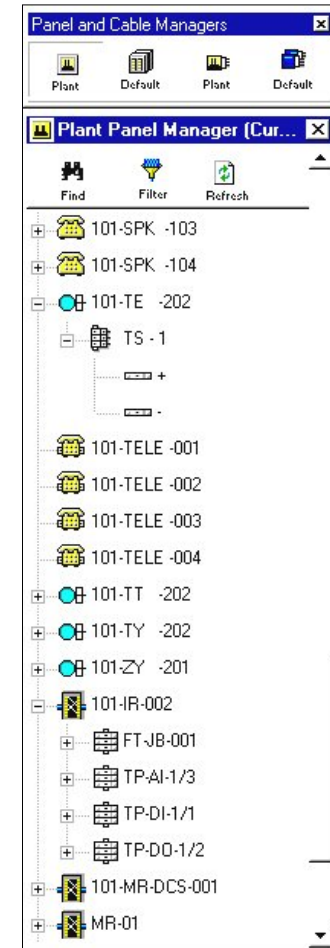


Wiring

# Wiring Automation Functions

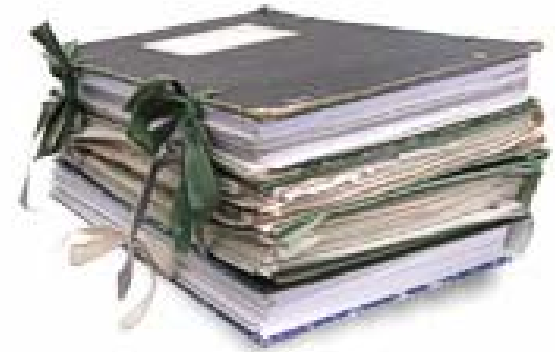


- ◆ Use Default Panels and Cables
- ◆ Duplicate Panels and Cables
- ◆ Auto-Wiring Routing Utility
- ◆ Junction Box Pre-assignment
- ◆ Automatic Cross Wiring
- ◆ Cable Router and Spooler
- ◆ Automatic Cable Schedule
- ◆ Global Revisions





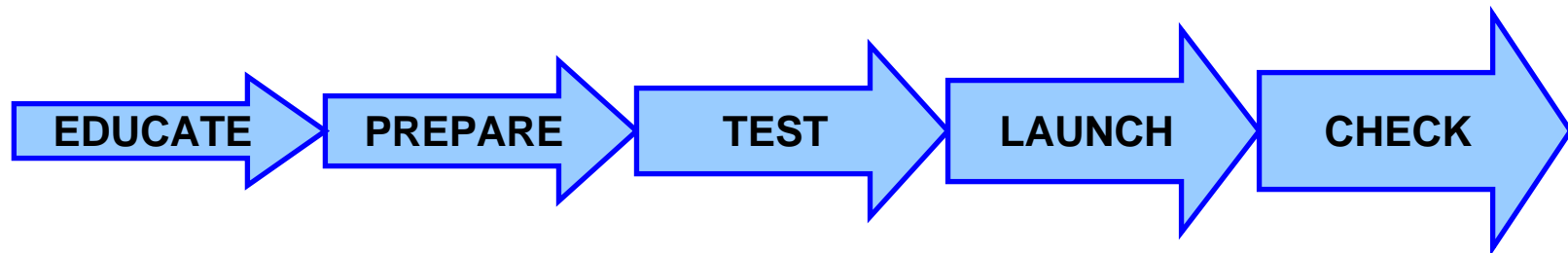
- ◆ Automatic Report forms for all browse Views
- ◆ Global Revisions for Deliverable Documents
- ◆ Batch Printing of most common reports
- ◆ Enhanced Reports for Loops and Wiring Drawings
- ◆ All Reports Export ODBC or DXF
- ◆ Automatic Drawing Generation in:
  - Enhanced SmartLoop
  - AutoCAD
  - Microstation



# Sequence of Automation



- ◆ **Educate** users for the Automation Function you wish to use
- ◆ **Prepare** the rule base or trigger data before launching the Automation Function
- ◆ **Test** the Automation Function to see if you are getting expected results
- ◆ **Launch** the Automation Function on the complete task
- ◆ **Check** the results of the Automation Function carefully



# Do Not Misuse Automation

- ◆ **Match the tool to the task. Select the Automation Function carefully.**
- ◆ **Clean bad data from the rule base or bad trigger data from the database.**
- ◆ **Validate data before and after running an Automated Function.**
- ◆ **Don't try and do too much with one Automated Function.**
- ◆ **Know the limits of automation and do not try to do complex tasks with Automated Functions**

If the only tool you know how to use is a hammer; everything look like a nail.



# Work Sharing Opportunities



## Improved Work Sharing will increase efficiency and productivity

- ◆ **High Value Resources**
  - Extending SPI access to low cost centers using terminal server technology can reduce need for some expensive local manpower
- ◆ **Around to clock operations**
  - Global Work Sharing allows 24-7 utilization of hardware and software resources
- ◆ **Extend utilization of SPI experts**
  - Allow experts to access SPI in from different locations to optimize highly trained talent
- ◆ **Bring more resources to a project**
  - Involve Vendors and Service companies in your work processes with Work Sharing



# Work Sharing High Value Resources



- ◆ **High Value Work Centers**
- ◆ **Main Automation Contractors**
- ◆ **Clients access for approval cycle**
- ◆ **Expert Resources for specialized tasks**
- ◆ **Support Centers for technical assistance**
- ◆ **Equipment Vendors for sizing and selection**
- ◆ **Spread Projects across multiple EPC companies**
- ◆ **Collaboration across disciplines and departments**

# Work Sharing Around the Clock



- ◆ **Operations extend to 24 hours a day**
- ◆ **Better hardware utilization**
- ◆ **Better use of Licenses**
- ◆ **Shorten Schedules**
- ◆ **Faster Response**
- ◆ **Offset Overtime**



# Work Sharing with Experts



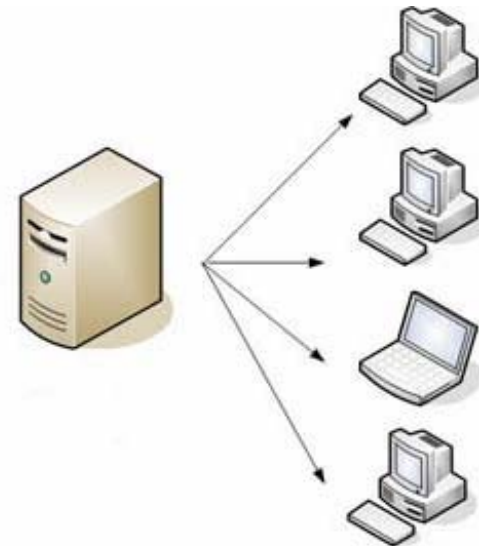
- ◆ **Allow your Specialized Users to work across several projects**
- ◆ **Use Vendor Experts**
- ◆ **Share Super Users**
- ◆ **Hosting Services**
- ◆ **MAC Options**
- ◆ **Integrators**



# Work Sharing Resources



- ◆ **WEB Terminal Server Technology**
- ◆ **Connect using WAN & LAN**
- ◆ **SmartPlant Foundation**
- ◆ **Use Remote Access**
- ◆ **Import / Export**
- ◆ **SPI Modules**



# Specialization Opportunities



Using Specialized Users can improve SPI data quality and increase productivity

- ◆ **Creating Specialists** - Train selected users in specialized tasks to allow them to be knowledge resources
- ◆ **Existing Specialists** - Collaborate with existing experts using net meetings and forums better utilize their abilities
- ◆ **Outside Specialists** - Use outside experts from vendors or service companies to fill gaps in resources



# Make Your Own Specialists

- ◆ **Create SPI Administration Specialists for configuring and implementing SPI**
- ◆ **Create SPI Specialists to train and support other SPI users**
- ◆ **Create Specialists for SPI modules and tasks that are not day to day activities**
- ◆ **Create SPI Specialists for tasks that are Complex or Require special knowledge**
- ◆ **Create Specialists to use Interfaces with Legacy Systems or External Applications**
- ◆ **Create IT Specialists that are familiar with installing and operating SPI, Oracle, MS SQL, Citrix**
- ◆ **Create Specialists for other SmartPlant Application interfaces and work processes**



# Using Existing Specialists



- ◆ **Within most companies you have people who have particular talents that can be applied to SPI related tasks**
  - Users with Excel or Access knowledge can assist with custom reports and deliverables
  - Specialty Engineers that work with only Control Valves or other Engineered items can use SPI directly to do their engineering
  - Process Engineers can use SPI to enter their process data directly into the SPI database for Control System
  - Material Managers can use the SPI Hookup module to control instrument material requirements and do Material Takeoffs
  - 3D PDS Designers can use the SPI DDP module to facilitate the loading of instrument inline data into the 3D model
  - Project Schedulers can access the SPI database to define work packages and cost systems to track progress

# Using Outside SPI Specialist



- ◆ **Using external resources can fill gaps in in-house capabilities**
  - Use vendor or suppliers to do sizing calculations and selection of engineering commodities
  - Use Main Automation Contractors to specify, load, configure the DCS and SIS control systems
  - Use Mechanical Equipment Vendors to populate instrument spec sheets for instruments provided with their equipment
  - Use Owner Operator representatives to assist in populating Operations and Maintenance data in the SPI database
  - Use external IT suppliers to host and maintain the SPI Oracle, MS SQL and Citrix servers
  - Use Intergraph or OSI to provide merging and data migration services

# Simplification Opportunities

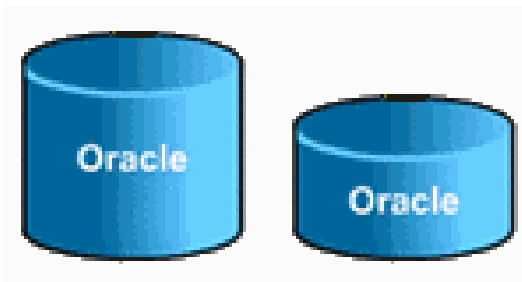


## Streamlining your work methods can give better utilization of SPI resources

- ◆ **Data Reduction** – Careful evaluation of required data can reduce size and content of SPI database
- ◆ **Streamline Deliverables** – The generation of deliverables can be very time consuming and inefficient
- ◆ **Simplify Work Processes** – Work Process need to address the capabilities of the tool to be effective
- ◆ **Minimize Staffing** – Efficient use of personnel can optimize the use of SPI

# Simplify Data Reduction

- ◆ **Do not fill all data fields in all tables**
  - Use only required data
  - Simplify the content of fields
  - Don't use "--" or "n/a" to show empty data fields
  - Give meaning to data (don't use "Yes" / "No" data)
- ◆ **Do not repeat data from one table in another**
- ◆ **Do not create complex or lengthy naming conventions**
- ◆ **Keep User Defined fields and tables to a minimum**



# Simplify Deliverables



- ◆ **Use electronic deliverables instead of paper**
  - **Spreadsheets instead of printed indexes**
  - **ODBC files can replace most paper documents**
  - **Acrobat PDF files can replace paper Spec sheets**
- ◆ **Use SPI “Out of the Box” reports**
  - **Don’t create custom reports to emulate existing documents**
- ◆ **Use Enhanced Loops instead of CAD loops**
- ◆ **Don’t try to create complex loops in SPI**
- ◆ **Allow construction and client access to database so they can generate their own documents**

# Simplify Work Processes



- ◆ Don't try to use manual work processes with SPI
- ◆ Include other disciplines in your SPI work processes
- ◆ Look at how SPI operates to develop effective Work Processes
  - Use the proper module to load and edit data specific to that module
  - Leave data in it's parent table for reports and deliverables
  - Provide for Parallel work processes instead of Sequential schedule driven work processes
  - **Make Automation part of the work process!**



# Simplify SPI Staffing



- ◆ **Use of Super Users can reduce the required number of inexperienced personnel**
- ◆ **Work Share the SPI user base across multiple offices for minimal staffing costs and numbers**
- ◆ **Use SPI Automation functions for mass loading of data and redundant tasks**
- ◆ **Allow SPI Specialists to work across several projects to optimize their abilities**
- ◆ **Rely on external SPI Experts to offset reduced staffing levels**

# Integration Opportunities



## Integrating SPI to other applications will extend the capabilities of the tool

- ◆ **SmartPlant Foundation** – Integration with SPF can optimize the utilization of SPI data across other Intergraph products
- ◆ **Vendor Applications** – Integration to vendor control valve sizing and DCS configuration software will maximize the SPI data
- ◆ **External Editor** – Using the SPI External Editor can allow mechanical vendors load some of your Spec data for you
- ◆ **PDS 3D model database** – The SPI DDP module will integrate the SPI inline sizing data with the 3D model
- ◆ **SmartPlant P&ID and Electrical** – The built-in SP P&ID and SPEL interfaces allow data transfer if your work processes are designed to utilize the shared data
- ◆ **Import Export** – The ability to import and export data to and from other applications will extend your Integration capabilities



## ASCII stupid question

## Get a stupid ANSI



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