

DeltaV™ SmartPlant Instrumentation Integration

This paper is intended for instrumentation and Distributed Control System (DCS) project engineering people. This group will gain an understanding of how to use the DeltaV–SPI interface and learn what kinds of savings this solution offers.

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Introduction

The SmartPlant Instrumentation (SPI), formerly known as INtools, software from Intergraph Corporation (<http://ppm.intergraph.com/products/engineering-and-schematics-product-family/smartplant-instrumentation>) is used by many engineering contractors and owner/operators for instrumentation design. Projects that use SPI in combination with the DeltaV™ (<http://www.emerson.com/en-us/automation/deltav/>) digital automation system will benefit from the data exchange interface that has been developed. This interface allows for the seamless exchange of I/O card and instrumentation information between the two databases.

During the project design stage, it is a common practice to take data from SPI to create the I/O and instrument data in the automation system. However, during the plant operation stage, changes may be first entered into the automation system's database and this data can be used to configure SPI. The DeltaV-SPI interface was designed to transfer data in either direction.

The DeltaV system has a bi-directional, file-mode transfer interface to SPI (formerly know as INtools), jointly developed by Emerson and Intergraph, and based on Intergraph's SmartPlant Enterprise modular architecture. This interface allows for the seamless exchange of I/O card and instrumentation information between the DeltaV system and SPI databases. The information that can be transferred spans both conventional I/O, including HART, and Fieldbus I/O systems. The SPI product has been enhanced to allow DeltaV definitions for I/O hardware objects, DeltaV terminology, and FOUNDATION Fieldbus device definitions to appear directly in SPI.

The DeltaV-SPI interface integration capability is built into the DeltaV system architecture, and is an inherent part of the DeltaV system media for each software release. Finally, Intergraph is an official partner in the Emerson Alliance Program, and Emerson is a member of Intergraph's SmartPlant Alliance Program, providing continued commitment to this interface by both parties.

The following diagram shows where the interface fits into the project workflow (some activities not shown).

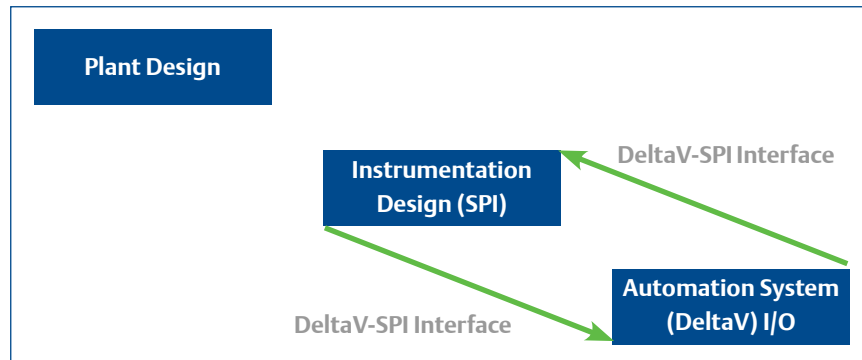


Figure 1 — Project workflow diagram.

Benefits of Using the DeltaV—SPI Interface

- Reduced DeltaV engineering hours: The DeltaV I/O configuration is exported from SPI and imported into the DeltaV system. This process eliminates the need to define the I/O from scratch on the DeltaV side. Typical savings of 10-15 % of DeltaV configuration time can be expected, depending on whether there is Fieldbus device content in the project.
- Reduced SPI database setup hours: DeltaV I/O components and FOUNDATION Fieldbus device definitions are imported into SPI saving hours of setup work.
- Standardizes the way that the DeltaV-related data is captured in SPI.
- Higher quality project deliverables because shared data is entered once. No data conversion or transfer errors caused by manual processes.
- Easier and faster to propagate scope changes from one database to the other.
- Reduced maintenance and operation costs: Easy to keep databases synchronized so that as-built documentation is current.

Details of the Interface

The diagram below provides an overview of the workflow that is supported by the interface:

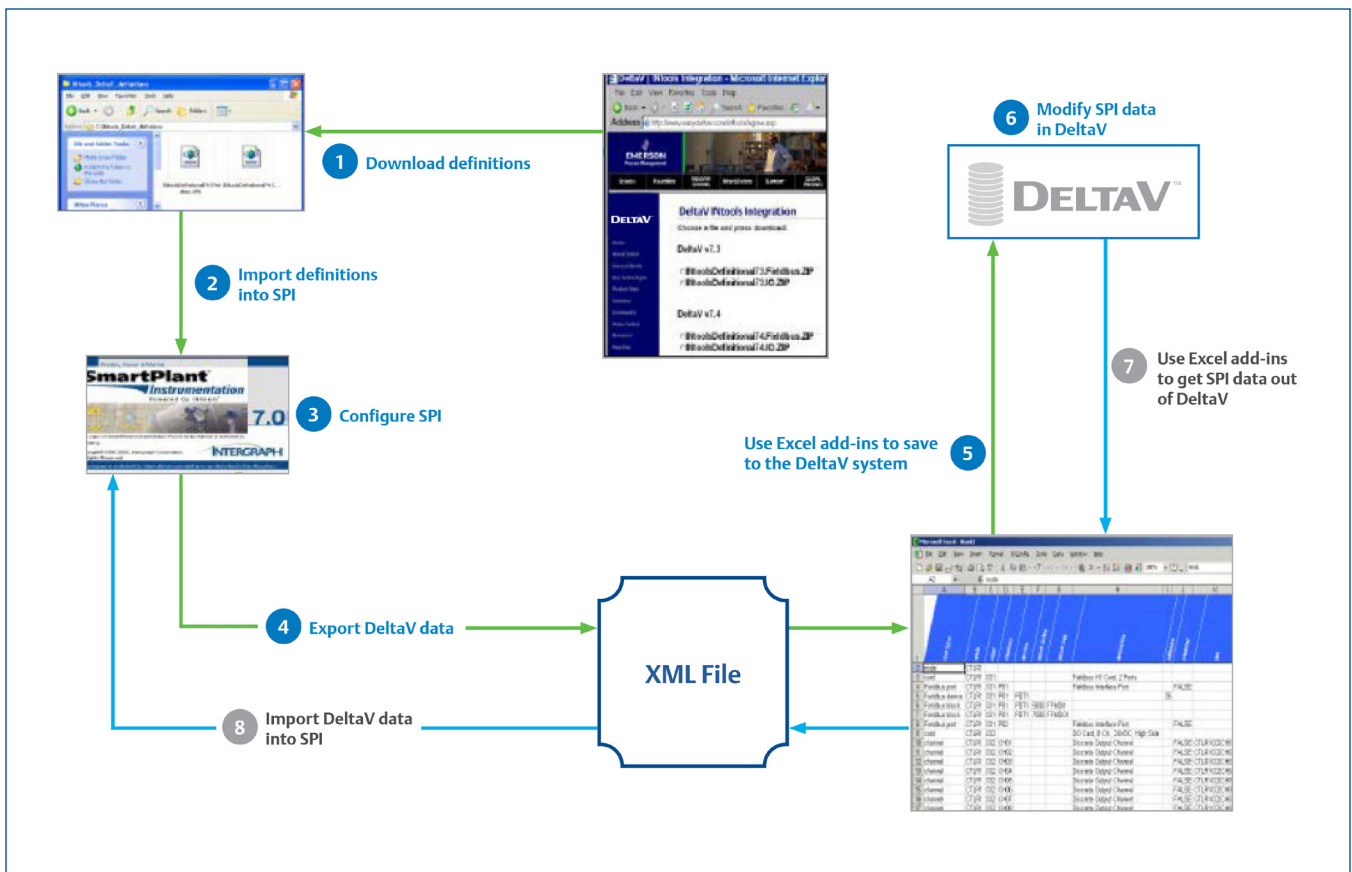
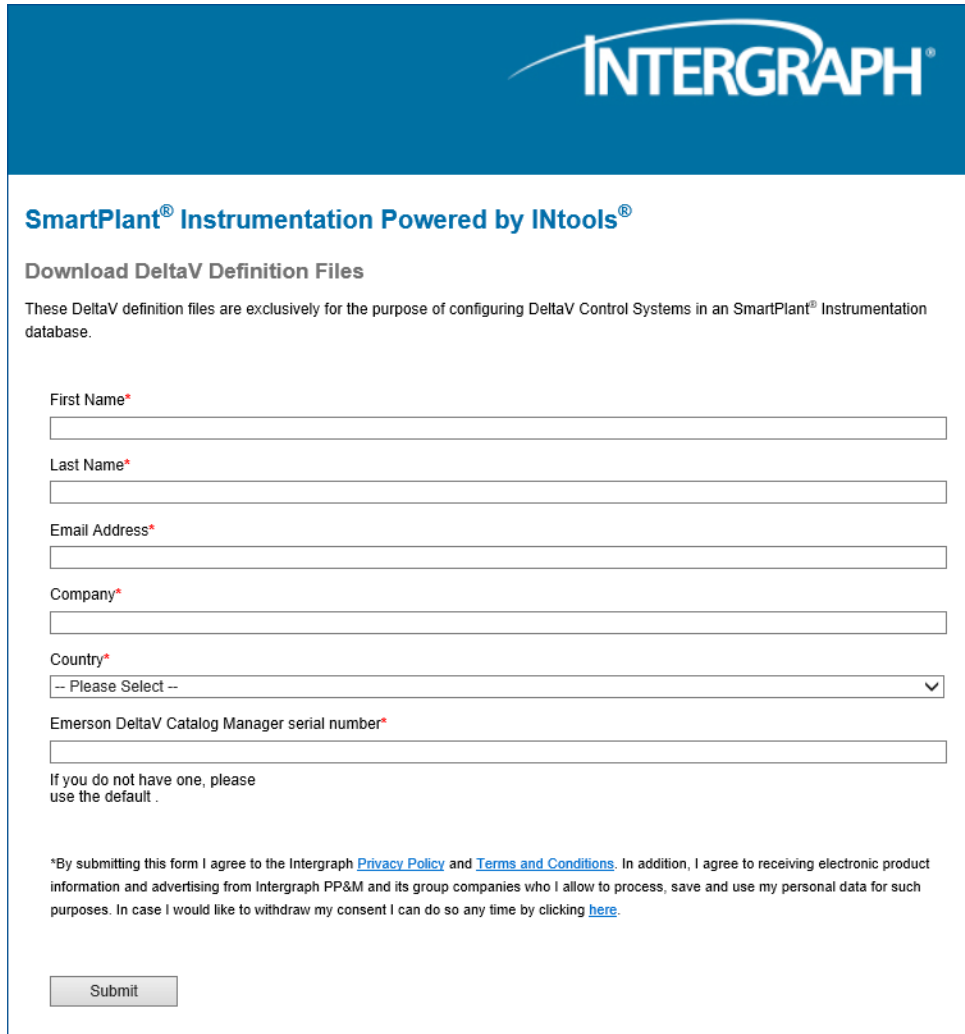


Figure 2 — DeltaV—SPI workflow.

The first step is to prepare SPI for working with the DeltaV system. This involves importing the DeltaV object definitions and installing the DeltaV Catalog Manager license. SPI does not contain the DeltaV object definitions when shipped. These definitions must be downloaded from:

http://forms.intergraph.com/Download_DeltaV_Definition_Files



The screenshot shows a web form titled "SmartPlant® Instrumentation Powered by INtools®" with the sub-heading "Download DeltaV Definition Files". The form includes a disclaimer: "These DeltaV definition files are exclusively for the purpose of configuring DeltaV Control Systems in an SmartPlant® Instrumentation database." Below this are several input fields: "First Name*", "Last Name*", "Email Address*", "Company*", "Country*" (a dropdown menu currently showing "-- Please Select --"), and "Emerson DeltaV Catalog Manager serial number*". A note states: "If you do not have one, please use the default .". A disclaimer at the bottom reads: "*By submitting this form I agree to the Intergraph [Privacy Policy](#) and [Terms and Conditions](#). In addition, I agree to receiving electronic product information and advertising from Intergraph PP&M and its group companies who I allow to process, save and use my personal data for such purposes. In case I would like to withdraw my consent I can do so any time by clicking [here](#)." A "Submit" button is located at the bottom left of the form area.

Figure 3 – Form for downloading DeltaV definition files.

The DeltaV Catalog Manager license is required for acquiring these definitions and for importing/exporting the SPI data for DeltaV. One license is required for each SPI database that will exchange data with the DeltaV system. This license is not dependent on SPI database size and it is provided free of charge by Intergraph.



Figure 4 — *DeltaV definitional file download site.*

The definitions are updated by Emerson when new I/O objects are introduced into the DeltaV system. This allows the SPI library to be kept current with the latest DeltaV definitions. Once the definitions are imported, the DeltaV I/O card types will appear in the SPI Reference Explorer, as if they were standard SPI panels. The definitions for the I/O cards provides information such as card type, allowed channel types and terminal arrangements.

Another benefit of importing these definition files is that SPI will be setup with FOUNDATION Fieldbus device definitions. The files provide information such as manufacturer, model, revision and function blocks supported by a given device revision. Automatic population of this data is a big productivity improvement for SPI users versus defining all the information manually.

SPI is also setup to group information according to DeltaV controller names to improve the data transfer process.

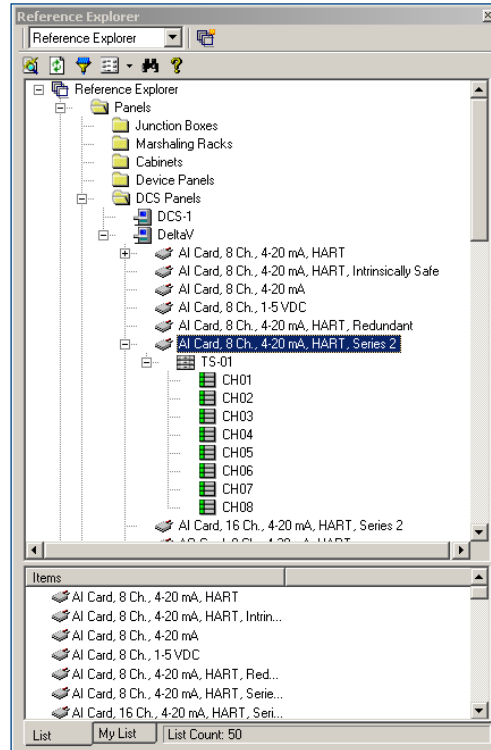


Figure 5 — DeltaV definitions loaded into SPI.

After the DeltaV definitions are imported, they can be used as if they are standard SPI database objects. The DeltaV I/O cards can be configured and the I/O channels can be bound to instrument tags. SPI will also allow the name of the DeltaV controller to be specified. If this controller does not exist in the DeltaV database then it will be created when the data is saved to the DeltaV system. SPI has detailed help in the topic Crucial Fields for the DeltaV-SPI Interface available on how to correctly configure the DeltaV items.

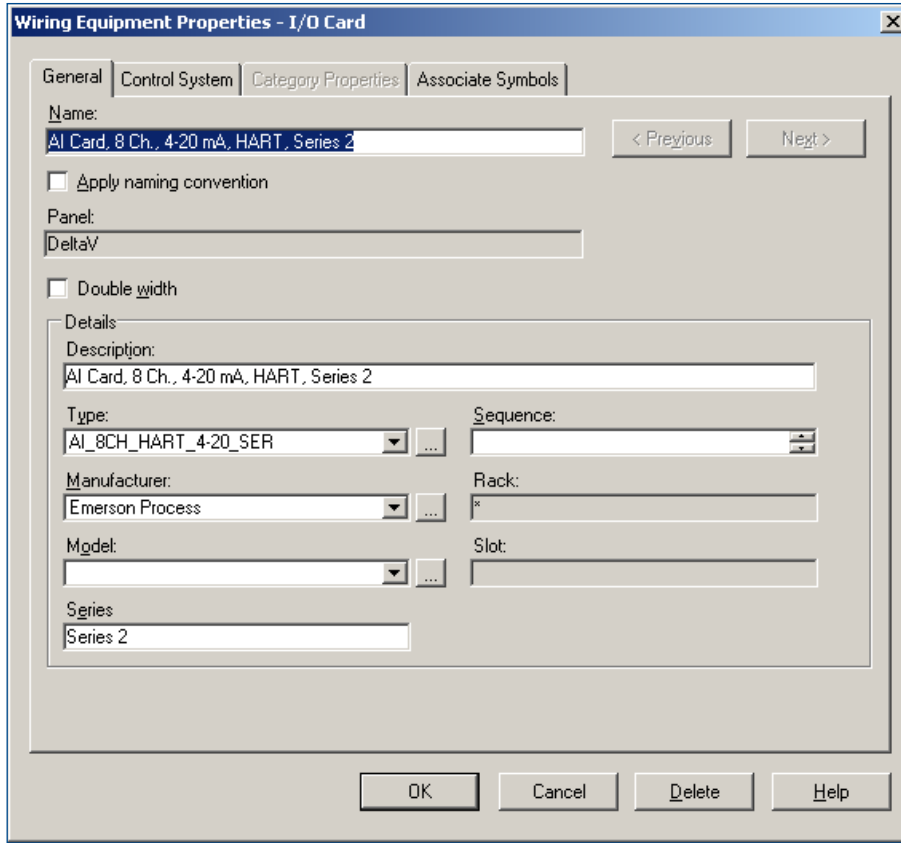


Figure 6 — A DeltaV I/O card being configured in SPI.

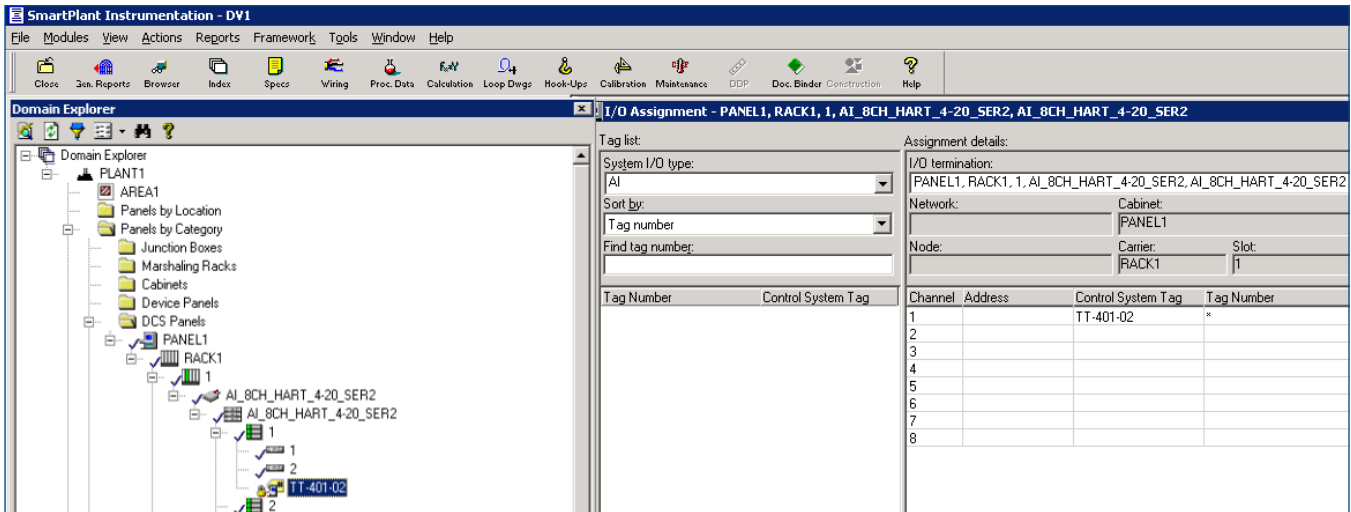


Figure 7 — I/O Assignment to DeltaV card/channel in SPI.

From one menu in SPI all the relevant data from the various SPI configuration modules will be collected and exported into one file. The data for each DeltaV controller is exported in a separate file.

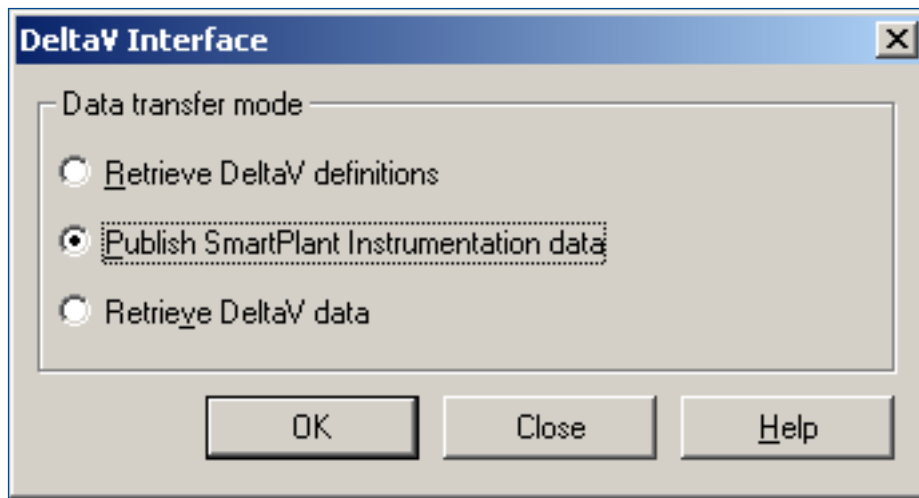


Figure 8 — Exporting SPI data to the DeltaV system.

An Excel add-in is provided with the standard DeltaV installation to process the SPI data. This add-in can load an .XML file export from SPI and save the data to the DeltaV database. The add-in detects and highlights errors in the data. It also compares the data in the spreadsheet to data that may already exist in the DeltaV database and highlights the differences. The user can preview the data and even compare the data to corresponding entries in the database. Finally, a log file for each data transfer is created as a detailed record of the data exchanged between SPI and the DeltaV system.

In the DeltaV v10.3 and later releases, this Excel add-in is also used to transfer data from the DeltaV system to SPI. An example Excel worksheet, with the add-ins enabled and populated with data from SPI, is shown below in Figure 9.

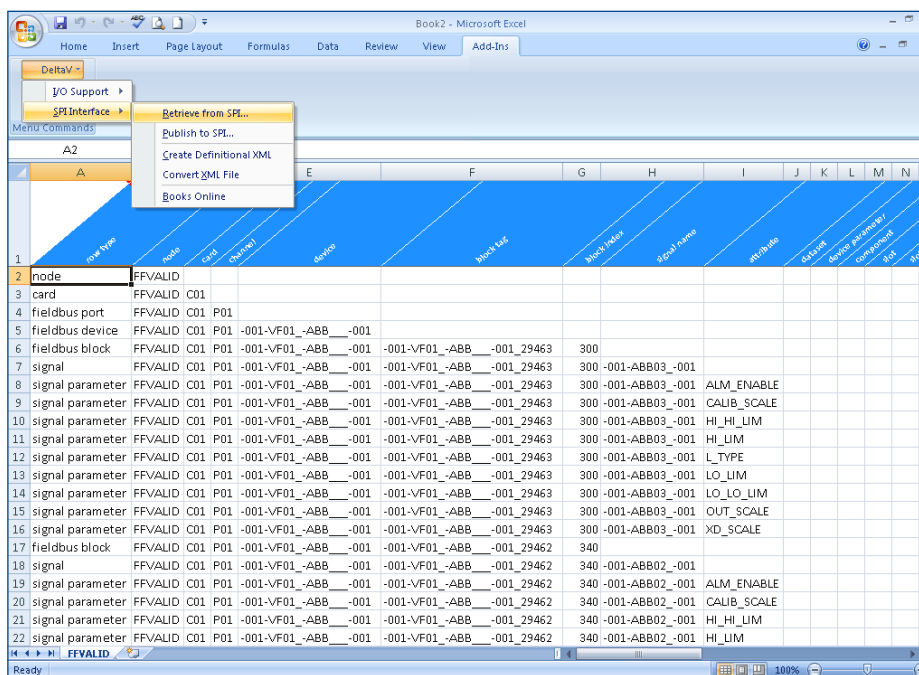


Figure 9 — SPI add-in for the DeltaV system.

As mentioned, when configuration changes are made in the DeltaV system, the data can be published from the DeltaV database to an .XML file using the the Excel add-ins supplied with each DeltaV system. The DeltaV data contained in the .XML file can be retrieved in SPI using the DeltaV Interface menu in the SPI. Inside the SPI application, the data from the DeltaV system can be reconciled with the data already in the SPI database using the To Do List functionality in SPI. The To Do List gives the SPI user control of “if” and “when” the data in SPI should be updated with the changed/added data from DeltaV. Figure 10 below shows an example of the SPI To Do List.

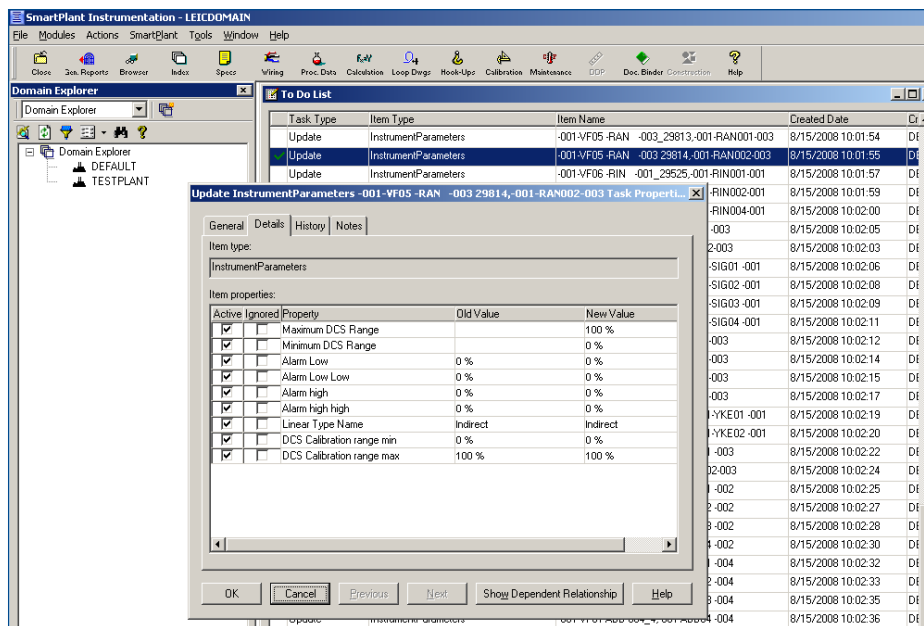


Figure 10 — SPI To Do List.

Types of Data Exchanged

- The interface for use with DeltaV v10.3 and SPI v2007 SP6 supports bi-directional transfer (DeltaV \longleftrightarrow SPI) of configuration data for:
 - DeltaV controllers
 - I/O card types and binding to DeltaV controller
 - I/O channel types
 - Control system tags device signal tag (DSTs) and binding to I/O channels
 - Fieldbus device tags and properties
 - Fieldbus device function block tags
 - Instrument signal data (ranges, engineering units, alarm limits)
 - HART device properties (manufacturer, type, revision, device tag)
- The interface for use with DeltaV v11.3 and SPI v2009 SP3 adds data transfer of CHARMS configuration data from SPI to DeltaV (in addition to the bi-directional transfer functionality provided in DeltaV v10.3).
- The interface for use with DeltaV v12.3 and SPI v2009 SP4 supports bi-directional transfer (DeltaV \longleftrightarrow SPI) of CHARMS configuration data.

NOTE: Neither LS CHARMS or the smart logic solver SLS1508 are supported by the DeltaV-SPI interface.

- In more detail, publishing data from SPI creates and configures the following data:
 - For Controllers, create the node with:
 - Name
 - Description
 - Redundancy (Redundant or Simplex)
 - For DeltaV Classic I/O Cards, create the card with:
 - Slot position (Card number in rack)
 - Type and Series (e.g. AO 8CH HART 2-20 SER2)
 - Redundancy (Redundant or Simplex)
 - For DeltaV Classic I/O Channels, create the channel with:
 - Type (Definition)
 - Enabled (True or False)
 - DST (Tag name)
 - Description
 - For DeltaV Fieldbus I/O Cards, create the card with:
 - Slot position (Card number in rack)
 - Series (Series 1 or Series 2)
 - Redundancy (Redundant or Simplex)
 - Description
 - For DeltaV Fieldbus Ports, create the port (segment) with:
 - Enabled (True or False)
 - Description
 - For Devices, create the device with:
 - Device manufacturer
 - Device type
 - For HART Devices, create the device with:
 - Manufacturer
 - Type (i.e. HART device)
 - Revision (Device revision)
 - Device tag (Tag name)

- For Fieldbus Devices, create the device with:
 - Port number
 - Device tag (Tag name)
 - Address
 - Description
 - Manufacturer
 - Type (i.e. Fieldbus device)
 - Revision
 - Backup Link Master (True or False)
 - PlantWeb Alerts Enabled (True or False)
- For Fieldbus Function Blocks, create the FF function block with:
 - Tag (Block tag name)
 - Block index
 - Description
- For Signals, create the instrument signal with:
 - Enabled (True or False)
 - Description
- For Signal Parameters, creates the following instrument signal parameters
 - Signal name
 - Value
 - EU 0 (0% of scale)
 - EU 100 (100% of scale)
 - Engineering unit
- For CHARM I/O Cards (DeltaV v11 and later), create:
 - Name
 - Description
 - Enable Primary Cascade Port
- For DeltaV CHARM, create the CHARM with:
 - Slot position (CHARM name in rack e.g. CHM2-06)
 - Type (e.g. AO 4-20 mA HART CHARM)
 - CHARM Functionality
 - Description
 - Enabled (True or False)
 - DST (Tag name)
 - HART Long Tag
 - Cabling ID (Retrieve from SPI only)

Minimum Software and Licensing Requirements

Capabilities	Minimum Software Requirements for DeltaV	Minimum Software Requirements for SPI
Bi-directional interface (excluding CHARMS)	DeltaV v10.3	SPI v2007 SP6 or later
Uni-directional interface for CHARMS	DeltaV v11.3	SPI v2009 SP3 or later
Bi-directional interface capabilities (including CHARMS)	DeltaV v12.3	SPI v2009 SP4 or later

DeltaV add-ins

- SPI Excel add-ins are supplied with the standard DeltaV software media pack.
- OPC Excel add-in is not required.
- Excel 2003 SP3 (Excel 2007 SP1 also supported).
- One 'DeltaV Catalog Manager' license per SPI database.

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