



**PROFIBUS and PROFINET • North America**

# A PTO White Paper The Tool Calling Interface (TCI)



April 2007

# The Tool Calling Interface (TCI)

**Manfred Popp**

Head of ComDec, PI Competence Center, PI Test Lab

**Peter Wenzel**

PI (PROFIBUS &PROFINET International)

## **The current situation**

The practice of defining the functionality and communication parameters of PROFIBUS and PROFINET field devices in the form of a device description file has been proving its worth for many years. This enables static basic parameter settings for intelligent field devices to be specified during system engineering. The parameters defined by the engineer during the engineering procedure are then loaded from the PLC (IO controller or master) to the corresponding field device when the system boots up. There are some cases, however, in which device description files, although user-friendly, are not able to meet prevailing requirements. The process of creating and loading dynamic parameters to a field device made by a manufacturer other than the one responsible for producing the engineering tool (when parameterizing the monitoring zones of a laser scanner, for example) could be improved for the user. Previously, it was not possible to do this directly with the automation-system engineering tool, meaning that engineers had to use an additional, manufacturer-specific device engineering tool for each device type. The same problem arises when diagnosing field devices using manufacturer-specific diagnostics, as different

tools have to be switched to here, too. The requirements of systems operators' requirements are summarized here for clarity:

- Uniform interface for all device tools
- Simple and uniform configuration
- Parameterization must be able to be performed over network boundaries (routing)
- One tool to parameterize and diagnose all devices
- Option for centralized or distributed data storage
- No additional effort to establish communication

## **The solution**

Device tools are the solution to this issue. These tools perform user functions such as parameterization and diagnostics directly from the automation-system engineering tool. Device tools are based on a Tool Calling Interface (TCI) and can be integrated into Windows-based engineering tools very easily. Activating a device tool is as simple as installing a printer. Thanks to the great degree of freedom employed in realizing these tools, several field devices with different scopes of

function can be operated from the same device tool. With TCI, PI (PROFIBUS & PROFINET International) has developed a concept that includes a calling interface between the automation-system engineering tool and a device tool to be supplied by the manufacturer. A communication interface that facilitates communication with field devices even over network boundaries (routing) is also specified in the TCI concept. A device tool is easily called from the automation-system engineering tool by double-clicking a selected field device. Parameterizations and diagnostics can then be exchanged with the field device or a specified field-device family without having to exit the user interface of the automation-system engineering tool. Therefore, it is very useful if both the engineering tools and device tools used have a TCI.

The TCI concept defines the functional scope, supported communication services and the data-storage location. The engineering tool supplies the corresponding parameters as an XML file when the device tool is called. Once the device tool has started up, it runs as an .exe file and assumes control until shut down. The communication interface integrated in the engineering tool is operated from the device tool and enables the engineer to establish a connection between the device tool and a field device without any additional effort or any specialist knowledge of communications.

The manufacturer of the intelligent field device specifies the functionality of the device tool. The tool can be configured in such a way that it can even be used for different field devices. Due to the fact that data is stored in a uniform manner within an automation project, if a device is replaced, dynamic parameters can be reloaded to the new field device from a separate parameter server. Thanks to the freely available TCI specification, every

manufacturer can create a device tool that works autonomously and integrate it into any engineering tool. This approach has already been developed for the FDT (Field Device Tool) interface. PI then took the next step toward providing a simpler interface with a reduced functional scope. TCI has been specified for PROFIBUS and PROFINET applications and, therefore, supports their integrated communication channels. Proprietary solutions can be integrated on a company-specific basis.

The TCI specification has been developed in close collaboration with AIDA (Automatisierungsinitiative Deutscher Automobilhersteller – Automation Initiative of German Automobile Manufacturers). All the requirements of this important group of users

were agreed upon by PI experts and included in the specification. AIDA also expressed its desire that the TCI be introduced quickly and consistently. Various companies presented their first TCI applications at the SPS/IPC/Drives 2006.

### How TCI works

Figure 2 shows the structure of and interplay between an engineering tool and a TCI application by way of example. Dynamic parameterization and diagnosis of field devices are performed in the same

way, as described below.

To install a TCI application in an engineering tool, the manufacturer must supply a TCI application with a GSD file (General Station Description), a PID file (Program Interface Description) and a device tool with an installation program.

The GSD file contains the ID for the field device(s) referenced. The PID describes the main functions that the device tool can be used

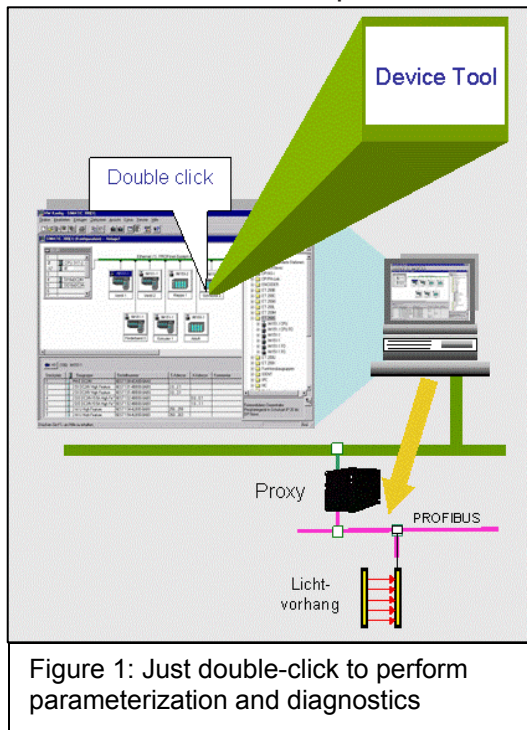


Figure 1: Just double-click to perform parameterization and diagnostics

to perform. The device tool contains the user program, which can be used to perform parameterization and, possibly, diagnostics. Once the device tool has been installed, all the

call and assumes control of the user program. If several field devices of the same type are to be parameterized, for example, the device tool can do this in just one step. To set up communication with the field device it uses the field-device reference to establish a connection to the selected field device via the communication server integrated in the engineering tool and performs the required parameterization/diagnostic work. The device tool stores the data for loaded dynamic parameters in a separate file within the automation object managed by the engineering tool. The device tool has sole responsibility for organizing and interpreting this data. Once these activities have been completed, the device tool deletes the TPF (5) and releases the resources. The engineering tool then resumes control.

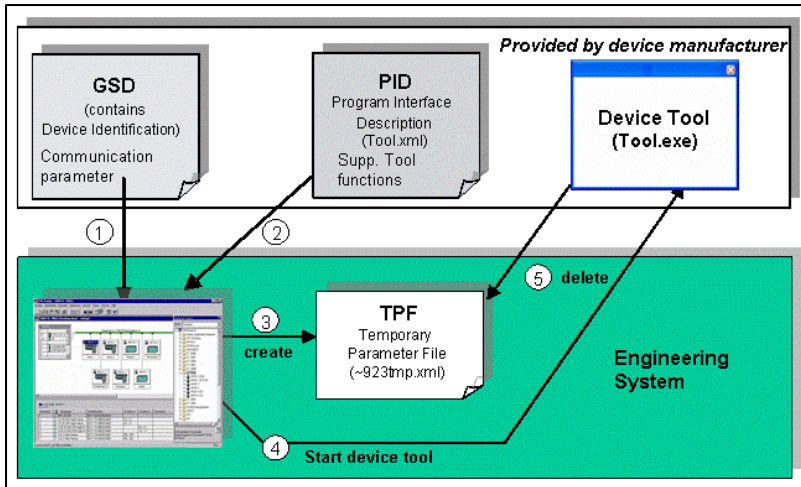


Figure 2: The TCI has a universal structure.

conditions for using the device tool are met.

The automation-system engineering system can use the device ID contained in the GSD file (1) to determine the parameter file (PID) (2) supplied by the manufacturer. The engineering tool uses the information in this file to create a temporary parameter file (TPF) (3) and call the device tool referenced (4). The device tool interprets the TPF file transferred during the

### Conclusion

The TCI specification is available and can be easily implemented by any field-device manufacturer. PI held its first developer workshop for interested users on March 14 in Karlsruhe, Germany. Further workshops on TCI will be carried out shortly. You will find the dates published on [www.profinet.com](http://www.profinet.com).