FORCAM™ FORCE

Version 5.10
Document Control
Product Description

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Product Description

Production Data Management (PDM) is a component of FORCAM FORCE™ Document Control, a tool for managing production-relevant documents.
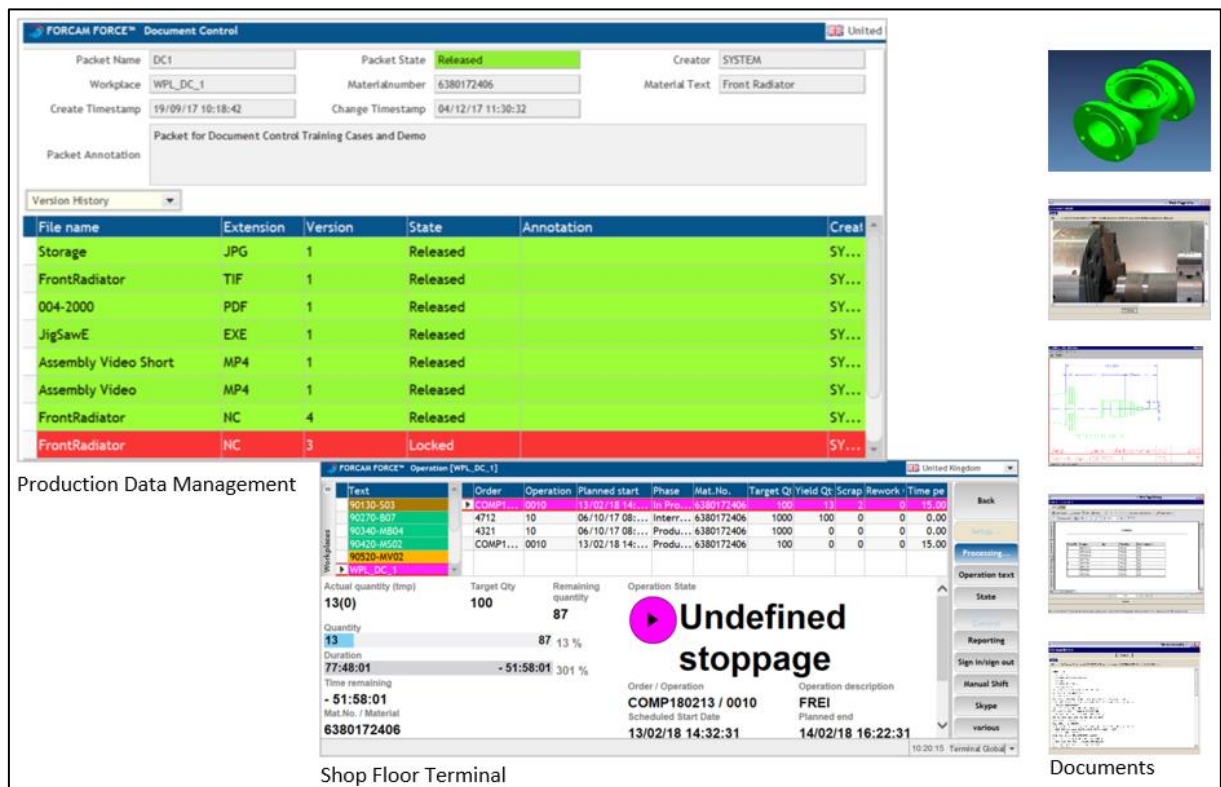
The storage of these documents, also called elements, takes place in packages (folders) with freely configurable key fields, typically **Workplace**, **Material Number** and, if necessary, **Operation**. The visualization is carried out with a browser or via special, customer-specific viewers.

Elements can be managed with or without versioning. Files that occur in several packages are only available once. Thus, all versions and variations of a file (e.g. by back-transfer from the machine) are known in all packages.

The basis of the PDM is the production database with the aim of clearly managing individual production-relevant documents such as instructions, data sheets, drawings, etc., and facilitating the search for them.

The following services are available in Document Management:

- Executing external programs or URLs with parameters
- Manage packages, elements, and versions
- Create, modify, and delete packages and documents (elements) via remote-controlled third-party providers

Production Data Management

Shop Floor Terminal

Documents

Application and Data Flow
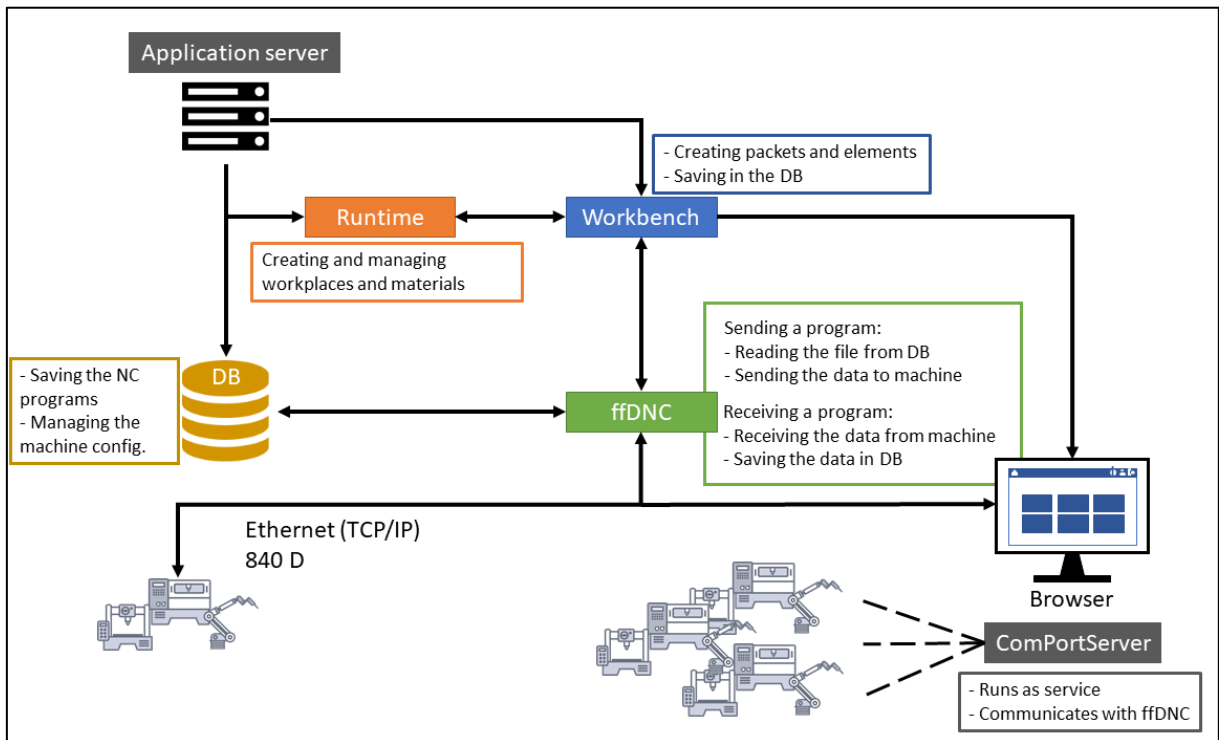
- In the **Workbench**, the browser-based configuration of the entire system is performed with direct access to all relevant functions.
- The **Runtime** processes the commands for managing Master Data (persistency and cache management). This would not be necessary for a pure PDM operation. However, it must still be used to maintain consistency with the other modules.
- The **ffDNC** makes it possible to read a file from the database and send data to a machine. The ffDNC is also able to receive files directly from a machine and store them in the database.

Production Data Management

PDM Types

The following figure shows the origin and definitions of the PDM types:
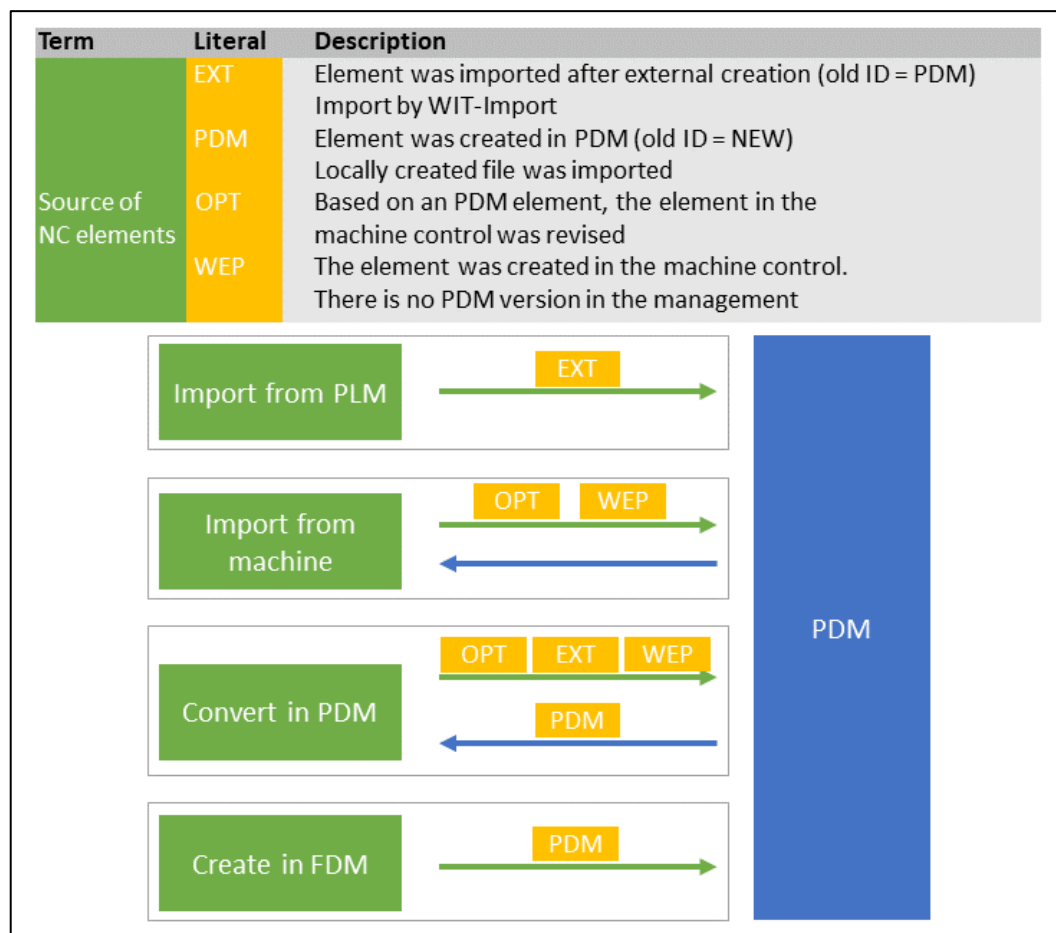
- The source of the NC element is divided into categories:
  - **EXT**: Element was imported after external creation (ID = FDM).
  - **PDM**: Element was created in FDM and imported into FDM by the user (ID = NEW).
  - **OPT**: Based on an FDM element, the element in the machine control was revised.
  - **WEP**: The element was created in the machine control. There is no FDM element in the FDM management.
- **Type** defines the function type of the element.
- **File extension** is the extension of the file stored in the element.
- **Status** is the status of the element.

NC Types

NC types are freely definable file groupings that are defined and written to via file extensions and later serve as triggers and for package delivery.
Existing file types can be linked to file extensions. An NC type thus corresponds to a collection object of file extensions.

The type ensures that only files that are NC programs are transferred (if configured). Example: Type NCP for NC program. However, there can be different file extensions for each NC control, such as .ncw, .mpf, .spf, .h, etc.

Defined NC types play an important role in the NC configuration when defining elements that can be transferred to a machine. A file grouping can be declared as a recipe and is relevant for recipe management that is integrated in the PDM. Elements declared as recipes cannot be transferred to the controller as NC elements.

Packages

Packages can be created, configured, and searched. Package links can be used to define search keys with different parameters for the search of a PDM package in order to simplify the package search in the Shop Floor Terminal at the machine and to make it more efficient.

A package consists of a header with parameters and any number of elements. The header is not fixed but can be customized via the package header configuration.

PDM is delivered with a standard configuration that meets common customer requirements. There are key fields that can be used to link the workplace/operation to a package.

The following key fields are typically used:
- Workplace (or workplace group)
- Material
- Operation

The Package Status reflects the current status of a package and is freely configurable. The most common statuses are **Released**, **Locked**, and **Inactive**.

Elements

Elements are components of packages. An element is the logical representation of a file, consisting of its contents and other additional information (e.g. creator, last modification, etc.).
Any number of elements can be created for each package. They can be configured, searched, edited and linked to other packages. This linking of elements to other packages facilitates the maintenance of documents, since they do not have to be stored several times.

The element state reflects the current status of an element. The default states of FORCAM FORCE™ are **Released**, **Locked**, **In Progress**, and **New**. The statuses can be extended by further, individually definable statuses at any time.

PDM Configurations

DNC Machine Configuration

The DNC Machine Configuration provides several options for configuring communication with a machine. In addition, serial and other connections can be configured as well as request programs. Request programs are NC programs with meta information that can trigger the transfer or retransfer of one or more files. Depending on the selection, the available settings change. The picture shows an example of a plug-in for machine communication.

Send and Receive Data

There are different ways to send and receive files. Files can be sent to and received from a machine (or NC control) via ffDNC. Sending and receiving is possible in the areas that list files, such as packet search and packet tree search. In addition to the Workbench method, files can also be sent and received directly via configured buttons on the Shop Floor Terminal.

PDM Logs

The PDM can create logs to record detailed information.

The following logs are available:

- PDM User Log:
  Log of all changes to packages/elements for a user within the specified time period
- NC Log and NC Control Log:
  Log of all DNC file transfers from/to NC controls within the specified time period
- NC Control Status Monitor:
  Displays the status of file transfers and communication with NC controls. Starting or stopping NC control communication, changing the log level and sending or receiving a help file to or from the NC control can also be done here.

Delta Export

Delta Export is used to store files on an external system according to a defined structure. Once the configuration is complete, the files are exported for the first time and then automatically exported each time the package is changed. All necessary settings are stored in configuration pages.

The file export can be restarted at any time. The configuration of the delta export and the automatic export process remain unchanged. Restarting the export deletes all existing exported data and exports the current data status from the database to the file system.

Document Control in Shop Floor Terminal

Files can be displayed in an external viewer via configured buttons in the Shop Floor Terminal. It is also possible to send or receive files to or from a machine via configured buttons. Files can be pure display files (instructions, drawings, clamping sketches etc.) or NC programs.

Scope of Functions

FORCAM FORCE™ Document Control provides the following features:

- General
    - Management of packages, elements, and versions
    - Executing external programs or URLs
    - Third party remote control
    - Creation of electronic production folders with different elements
    - Customer-specific configurable scope of information on packages and elements
    - Definition of own statuses and possible status transitions
    - Request of any information at certain status transitions
    - Logs/recording of detailed information
    - Linking of documents
- Workbench:
    - Search for elements and packages
    - Manage elements and packages (create, delete, etc.)
    - Configurable package header
    - Flexible assignment of packages
    - Creating workplaces and materials
    - WIT-Import configuration and General Settings
    - Display of transmission logs
    - Configuration of the machine status
    - Monitoring the ffDNC application
    - Versioning
- Shop Floor Terminal:
    - Display of files in an external viewer (e.g. data sheets, instructions, drawings, clamping sketches, NC programs, etc.)
    - Send files to or receive files from machine
    - Display the machine status
- Possible plug-ins for Document Control:
    - ComPortServer
    - FANUC
    - FileHandler
    - FilerHandlerServer
    - FTP plug-in
    - Legacy plug-in
    - MOXA plug-in
    - Mazak Communication Server

Annex

Abbreviations and Terms

Abbreviation/Term	Description
DNC	Direct Numerical Control
EXT	External Element
PDM	Production Data Management
NC Program	Program for controlling an NC system. An NC program is transferred to the NC system for execution using a data carrier.
OPT	Optimized: Identifier for a file that is saved under the same file name after optimization
PLM	Product Lifecycle Management
WEP	Wired Equivalent Privacy: IEEE standard safety protocol for wireless 802.11-networks
WIT	Work Item types: A WIT defines the data fields, workflow, and work-item form for a work-item that is tracked in a team project.