



Version 5.10

Document Control

Product Description

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Author:	AEgilmez



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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.

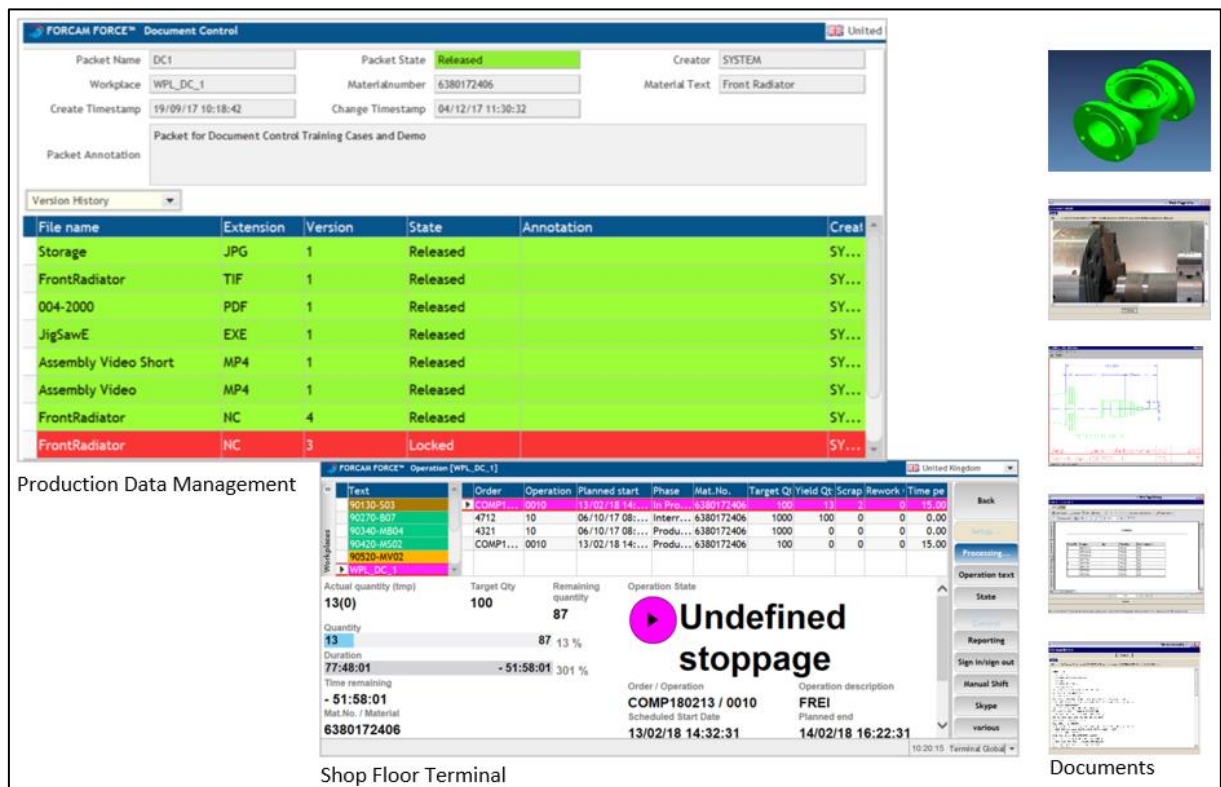
The storage of these documents, also called elements, takes place in packages (folders) with freely configurable key fields, typically **Workplace**, **Material Number** and, if necessary, **Operation**. The visualization is carried out with a browser or via special, customer-specific viewers.

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



The screenshot displays the FORCAM FORCE™ Document Control interface, which is divided into two main sections: Document Management and Production Data Management.

Document Management Section:

- Packet Information:** Packet Name: DC1, Packet State: Released, Creator: SYSTEM, Workplace: WPL_DC_1, Materialnumber: 6380172406, Material Text: Front Radiator, Create Timestamp: 19/09/17 10:18:42, Change Timestamp: 04/12/17 11:30:32.
- Version History Table:**

File name	Extension	Version	State	Annotation	Created
Storage	JPG	1	Released		SY...
FrontRadiator	TIF	1	Released		SY...
004-2000	PDF	1	Released		SY...
JigSawE	EXE	1	Released		SY...
Assembly Video Short	MP4	1	Released		SY...
Assembly Video	MP4	1	Released		SY...
FrontRadiator	NC	4	Released		SY...
FrontRadiator	NC	3	Locked		SY...

Production Data Management Section:

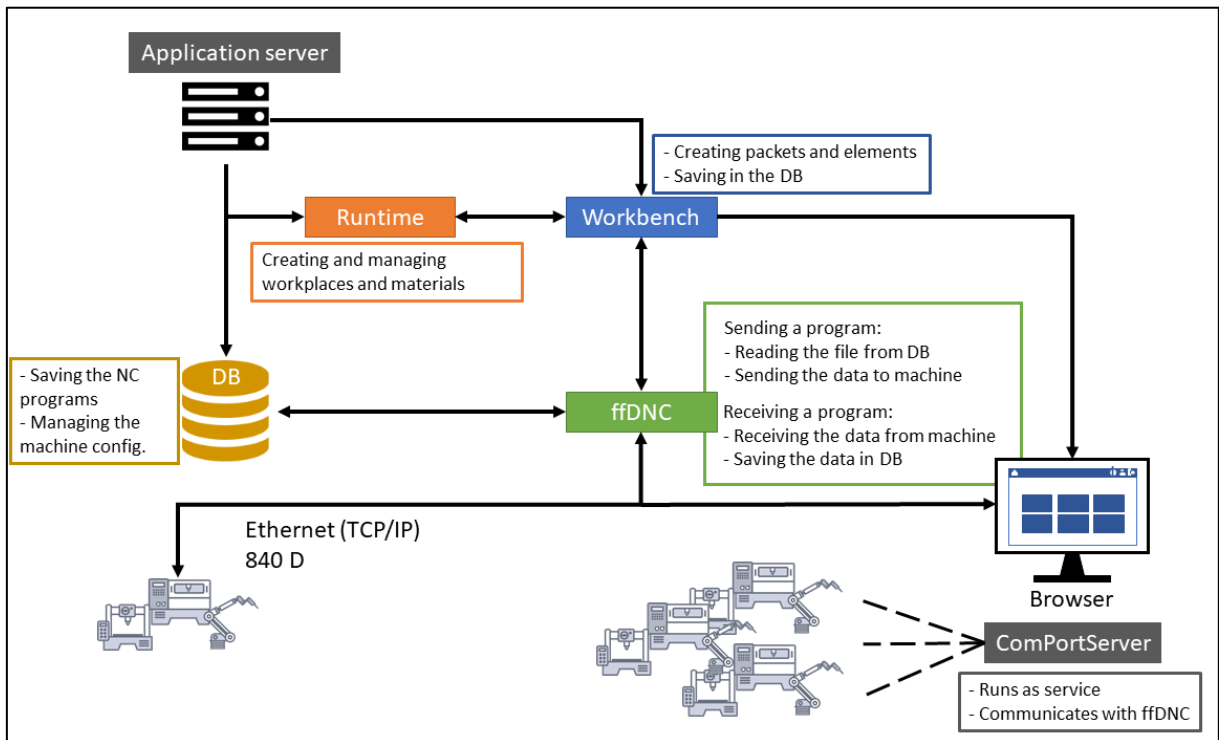
- Order / Operation Table:**

Order	Operation	Planned start	Phase	Mat.No.	Target Ql	Yield Ql	Scrap	Rework	Time pe
COMP1...	0010	13/02/18 14:32:31	Produ...	6380172406	1000	100	0	0	0.00
COMP1...	0010	13/02/18 14:32:31	Produ...	6380172406	1000	0	0	0	0.00
COMP1...	0010	13/02/18 14:32:31	Produ...	6380172406	100	0	0	0	15.00

- Operation State:** Undefined stoppage
- Actual quantity (Imp):** 13(0)
- Target Qty:** 100
- Remaining quantity:** 87
- Quantity:** 13
- Duration:** 77:48:01
- Time remaining:** - 51:58:01
- Mat.No. / Material:** 6380172406
- Operation description:** COMP180213 / 0010
- Scheduled Start Date:** 13/02/18 14:32:31
- Planned end:** 14/02/18 16:22:31

The interface also includes a sidebar with various icons and a bottom status bar showing 'Shop Floor Terminal' and '10:20:15 Terminal Global'.

Application and Data Flow

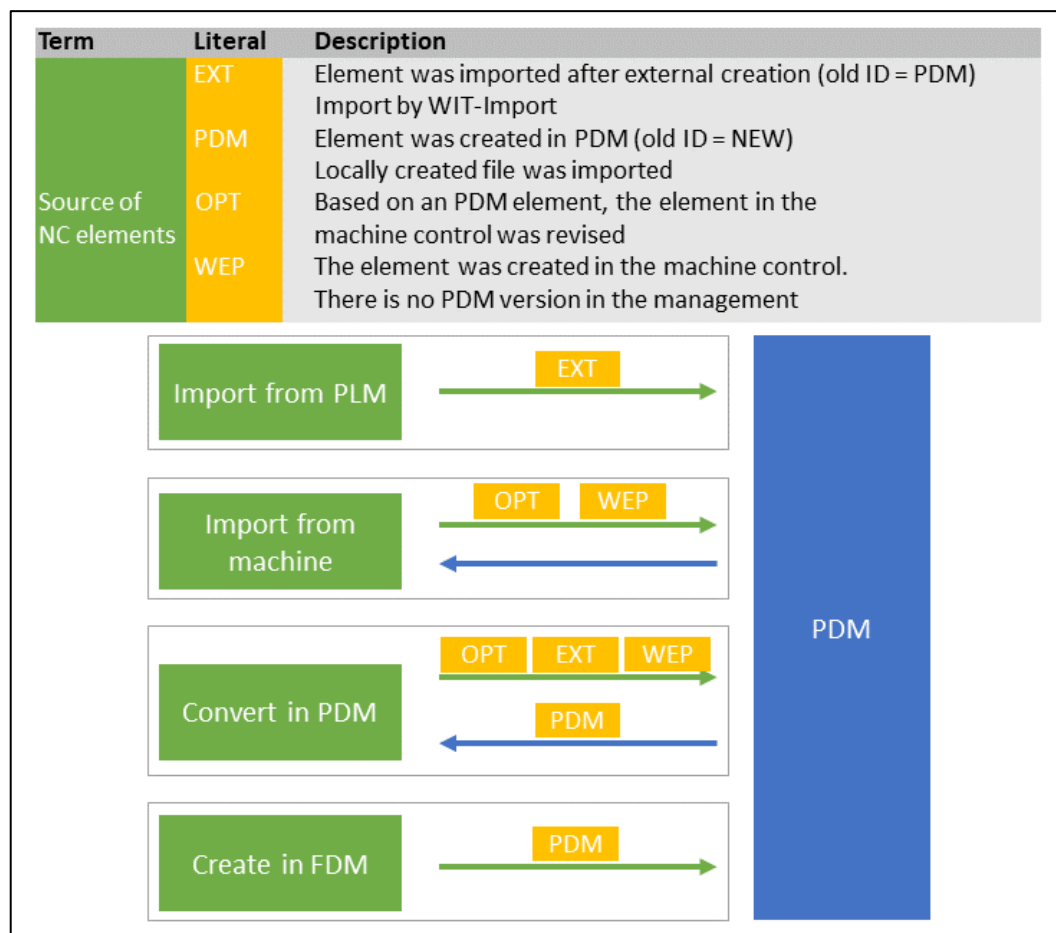


- In the **Workbench**, the browser-based configuration of the entire system is performed with direct access to all relevant functions.
- The **Runtime** processes the commands for managing Master Data (persistency and cache management). This would not be necessary for a pure PDM operation. However, 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.

Edit Packet

Packet State
Released

Packet Name
QA_JG04

Material Number
100000001

Material Text

Packet Annotation

Create Timestamp
Feb 28, 2019 9:28 AM

Responsible

Change Timestamp
Mar 4, 2019 10:03 AM

User Field 01
0010

Elements

Show max. Version

	Element State	Linked Packets Cou	Element-ID	Version	File Name	File Extensi	Source	NC Type	File S
	Released	4	4	1	OP Log wpl 2	PDF	FDM	PDF	
	Locked	4	5	1	OP Log wpl 3	PDF	FDM	PDF	

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.

Dnc machine configuration		
NC Controller Selection m90390 + -		
Dnc machine configuration	Identifier	Value
Plugin for NC Controller Communication	▼ Dnc machine configuration	
General configuration of a serial interface	DNC Instance	Default ▼
Extended configuration of the serial communic	Machine log level	INFO ▼
Configuration for the receive of request progra	Upload timeout for data	50
Configuration of the response program for a re	Download timeout for data	50
	Activating/deactivating machine	<input type="checkbox"/>
	Activating/deactivating auto receive-mode	<input type="checkbox"/>
	Activate/deactivate auto delete mode	<input type="checkbox"/>
	Plug in for communication with machine	▼
	Configuration for the receive of request programs	<input type="checkbox"/>
	Configuration of the response program for a request program	<input type="checkbox"/>
	► Configuration of the database parameter	

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.

FDM User Log		Search Results			
User	<input type="text"/>	User	User Action	Time	Packet
User Action	<input type="text"/>	879164366	DNC send finished su	Jun 14, 2019 11:11 AI	QAJGLINE1A
Time	06/07/19 00:00 <input type="text"/> 06/14/19 23:59 <input type="text"/>	879164366	DNC send started	Jun 14, 2019 11:11 AI	QAJGLINE1A
Workplace	<input type="text"/>	879164366	DNC send finished su	Jun 14, 2019 11:11 AI	QAJGLINE1A
Program Name	<input type="text"/>	879164366	DNC send started	Jun 14, 2019 11:11 AI	QAJGLINE1A
		879164366	DNC send finished su	Jun 14, 2019 11:11 AI	QAJGLINE1A
		879164366	DNC send started	Jun 14, 2019 11:11 AI	QAJGLINE1A

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.

Delta Export	Configuration										
Configuration Pages	<div> <div>Name <input type="text"/></div> <div>FTP activated <input type="text" value="No"/></div> </div> <div> <div>Host name <input type="text"/></div> <div>Username <input type="text"/></div> </div> <div> <div>Mode <input type="text" value="Emergency mode"/></div> </div>										
<div> <div>Add configuration</div> <div>Delete All Configurations</div> </div>	<div>Directory structure</div> <table border="1"> <thead> <tr> <th>Assigned Fields</th> <th>Available Fields</th> </tr> </thead> <tbody> <tr> <td>Creator</td> <td>Change Timestamp</td> </tr> <tr> <td>Editor</td> <td>Create Timestamp</td> </tr> <tr> <td>Material Number</td> <td>Edit State</td> </tr> <tr> <td></td> <td>Max. version</td> </tr> </tbody> </table>	Assigned Fields	Available Fields	Creator	Change Timestamp	Editor	Create Timestamp	Material Number	Edit State		Max. version
Assigned Fields	Available Fields										
Creator	Change Timestamp										
Editor	Create Timestamp										
Material Number	Edit State										
	Max. version										

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.

FORCAM FORCE™ Document Control

United States
FORCAM FORCE

Packet Name: QA_JG04
Packet State: Released
Creator: JGANDHI

Workplace: WPL_STD_NC_001
Material Number: 100000001
Material Text:

Create Timestamp: 2/28/19 10:28:39 AM
Change Timestamp: 3/4/19 11:03:46 AM

Packet Annotation:

Show max. Version:
Transfer mode: Max. version

File name	Extension	Version	State	Annotation	Cr
OS Log WPL 2	TXT	1	Locked		JG4
OS Log WPL 3	TXT	1	Released		JG4
rcv	TXT	2	Released		SY
OP Log wpl 2	PDF	1	Released		JG4
OP Log wpl 3	PDF	1	Locked		JG4
OS Log WPL	TXT	1	Released		JG4

View Element File

Send to machine

Receive from machine

Send NC program with sequence

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.