

## **P&PM's Device Parameter Manager**

**Customizing Smart Products & Assets  
by Software Variant Coding**

## **Embedded Software drives innovation speed and customer recognition of products & assets.**

Software enables diverse features that make products and assets significantly more valuable. Without embedded software, a product is rarely competitive.

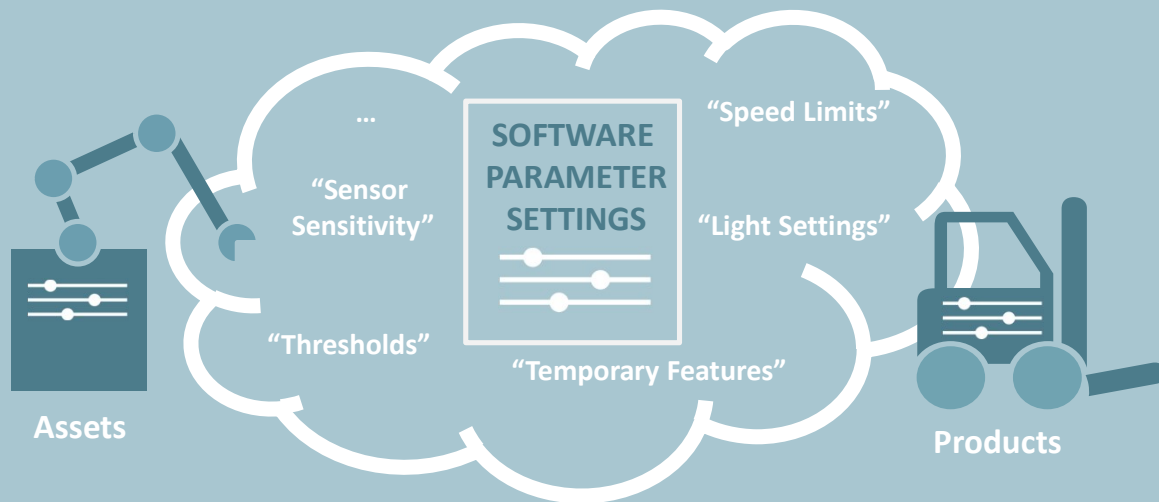
Embedded Software is key enabler for Digitalization and IIoT.

With the increased complexity of software functions, the ability to configure software variants becomes a critical capability: Managing software variants along Engineering, Production and Service assures product quality and opens opportunities to sell additional functions as “Software as a Product”.

**Products & assets are more and more customized via software parameter. Managing software parameter becomes a critical capability to enable mass customization, product quality and operation performance.**

## Software Variant Coding enables the mass customization of smart products & assets.

The parameterization of software functions offers diverse opportunities that depend on the usage of products and assets. Products can be configured according to specific customer needs – at Production but also during Aftersales. Assets can be configured per mission or even ad hoc per operation enabling industry 4.0 manufacturing scenarios.



### *Opportunities:*

>>> MASS CUSTOMIZATION OF SMART PRODUCTS & ASSETS

### *Resulting Benefits:*

**REVENUE GROWTH OPPORTUNITIES  
AT NEW PRODUCT SALES & SERVICE BUSINESS**

>>> CONTINUOUS ENRICHMENT OF FUNCTIONS AT OPERATIONS

**REDUCED NON-CONFORMANCE COSTS  
AND ENHANCED PRODUCT QUALITY**

>>> SPEED & QUALITY OF FLASH & PARAMETERIZATION EVENTS

**REDUCED OPERATING COSTS  
DURING PRODUCTION & SERVICE EVENTS**

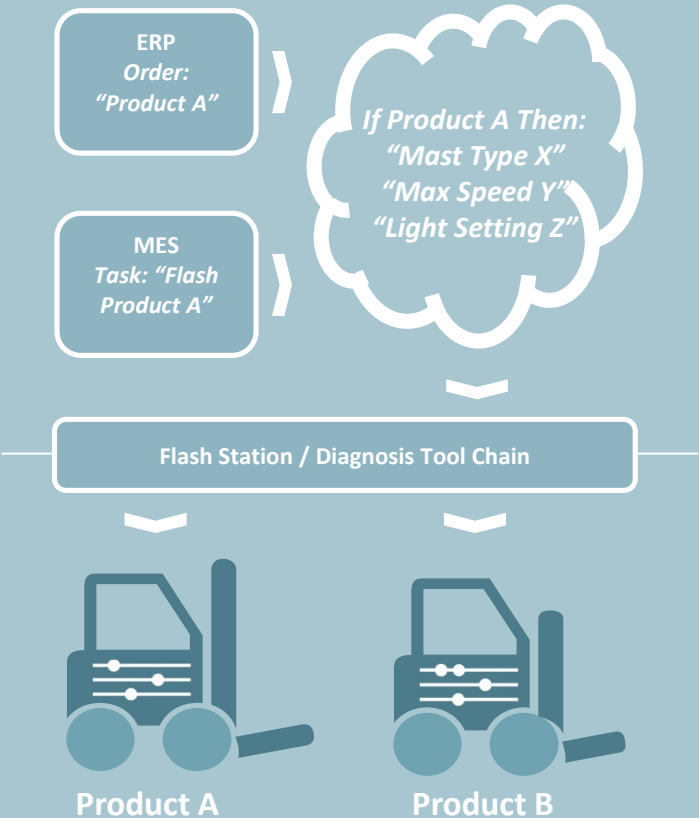
# Scenario 1

## “Configuration of smart products during Production events”

Mass customization of device settings for lot size one.

P&PMs Device Parameter Manager provides Offline Engineering capabilities to configure valid parameter settings based on industry standards like ODX and links them to the overall product variant model of an ERP system.

During operations, the logic is used to provide parameter settings to flash stations at the shopfloor so that the product settings are configured according to the customer order.



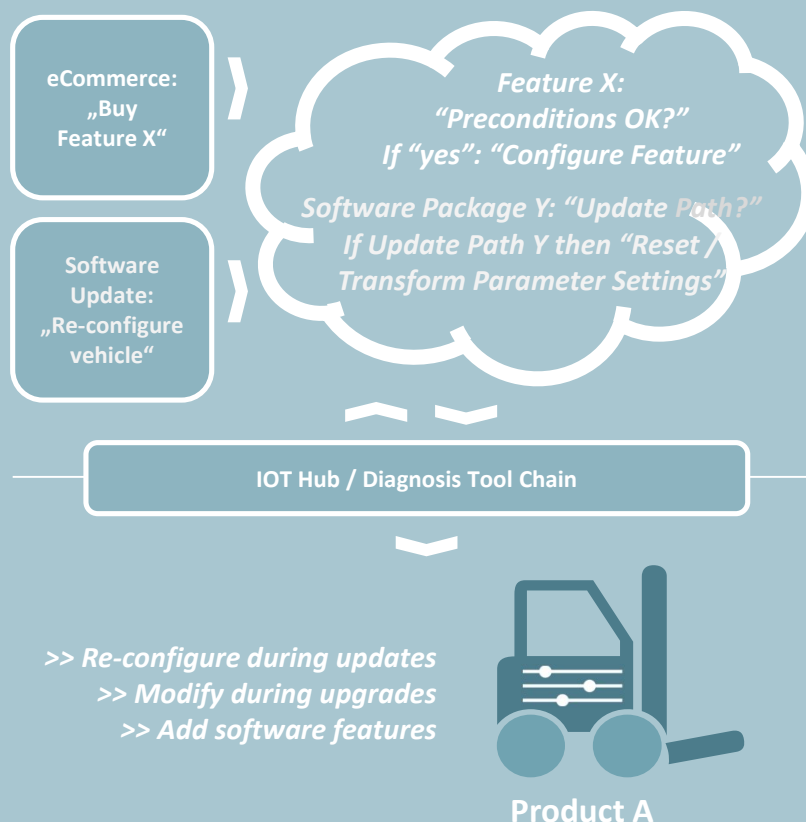
## Scenario 2 "Configuration of Smart Products during Service Events"

Leverage the opportunities of parameter settings to sell additional software features during aftersales.

Based on the Offline Engineering capabilities of P&PMs Device Parameter Manager valid check rules and settings of parameters are defined.

During service events, the logic is used for different aspects:

- >> Check of preconditions based on parameter settings
- >> Retrieval of valid parameter settings and delivery to downstream events



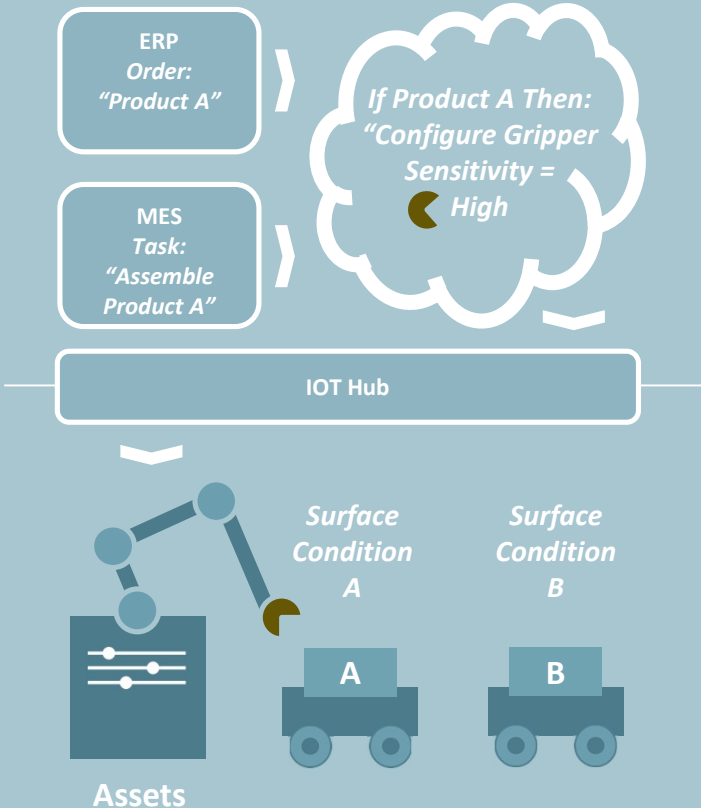
# Scenario 3

## “Asset Configuration during Production Events”

Configuration of machine settings to enable mass customizations and industry 4.0 scenarios.

P&PMs Device Parameter Manager provides Offline Engineering capabilities to configure valid machine settings and links them to other business logic (product variant model etc.).

During operations, the logic is used to provide machine settings to a connectivity layer so that the machine settings are adjusted for the specific operation needs.



## DEFINE YOUR PARAMETER OPTIONS

Define parameter options via standardized libraries  
Export & import parameter to/from device software

## SOFTWARE FUNCTION / VARIANT CODING

Manage device settings across the lifecycle and configure valid functions for Production & Service offsite



## RULE & CONSTRAINT MANAGEMENT

Manage rules & constraints for updates / retrofits to enhance quality and speed of operations during flash events as well as re-parameterizations

## DIGITAL TWIN OF DIAGNOSTIC DATA

Use Digital Twins for restore, carry over and simulations of software & parameter settings

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### Capabilities

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**“CRACK”**  
READ & IMPORT  
DEVICE PARAMETERS

**“MANAGE”**  
PARAMETER LIFECYCLE  
REPOSITORY

**“CONFIGURE”**  
FUNCTION  
BUILDING & LIBRARIES

**“INTEGRATE”**  
OPERATIONS OF  
PLM / ERP / IoT

**“AUTOMATE”**  
RULE BASED  
FUNCTION SETTINGS

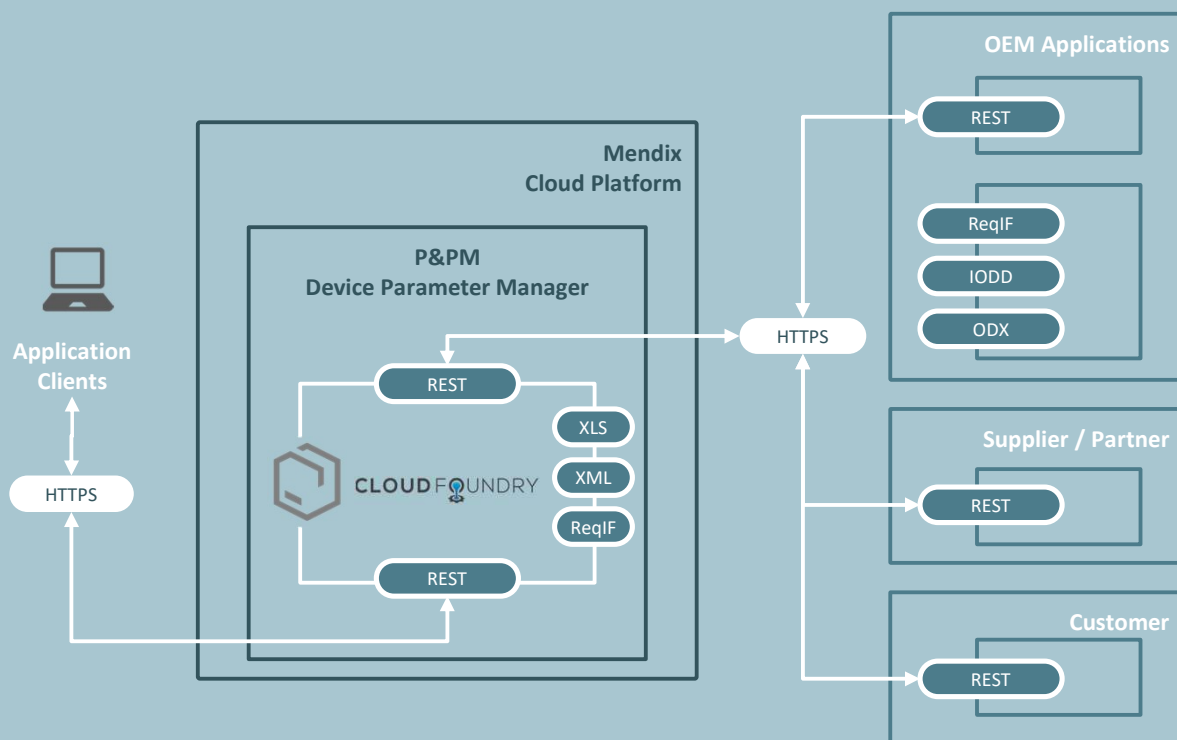
**“EXCHANGE”**  
DEPLOY SETTINGS TO  
RETRIEVING EVENTS

# Leverage parameter data of devices and manage software variants centrally via cloud services - integrated to your operations.

P&PM's Device Parameter Manager enables customers to configure software functions of different complexities, ranging from an I/O Link sensor to ODX based vehicle parameters.

Via its cloud services, configured settings can be provided to multiple downstream events during Production and Service.

P&PM's Device Status Code Manager is available as SaaS – Software as a Service – powered by Mendix. It is based on a micro-service architecture with web-based user interfaces using REST and OData APIs. Running on cloud native components, customers can leverage full potentials for diverse integration scenarios.





# Offline Engineering of Software Functions based on native device parameter data

The screenshot shows the 'Device Parameter Management' interface. On the left is a navigation menu with options like Overview, Parameter, Parameter Sets, and Parameter Management Settings. The main area displays a 'Parameter & Feature Model Tree (Root)' with sections for 'IoT Communication Settings', 'IoT Data Exchange Process Data', and 'IoT Data Exchange DTC'. Each section contains parameter cards with labels like 'Mandatory', 'Optional', and 'Frequency'. Some parameters have associated values, such as 'Code\_Warning\_Frequency' set to 24 and 'Code\_Error\_Frequency' set to 12.

Configurations: Applied

Versions / Values

<b>Code_Warning_Frequency</b>	24	Integer
<b>Code_Error_Frequency</b>	12	Integer

Link configured Parameter Settings to a Feature Tree

The screenshot shows a 'Field' configuration interface. It includes three sliders: 'Byte Position' (range 0-16), 'Bit Position' (range 0-16), and 'Bit Length' (range 0-17). Each slider has a numerical input field and a circular handle.

Bundle Parameter together to a Set and Configure their Values

The screenshot shows the 'Parameter Sets Configured & Configurable (of Parameter Set)' interface. It displays a grid of parameter sets for 'Fleet\_Reporting\_Settings'. The grid is organized into three columns: 'Fleet\_Rep\_Settings\_Standard', 'Fleet\_Rep\_Settings\_Advanced', and 'Fleet\_Rep\_Settings\_Off'. Each cell in the grid contains a parameter card with a version number and a value, such as 'Fleet\_Reporting\_Unlock' (Version 1, In Work) with values 'true', 'true', and 'false' respectively.

### PARAMETER DATA IMPORT

ODX

IODD

### PARAMETER LIFECYCLE REPOSITORY

DATA DEFINITIONS

LIFECYCLE MANAGEMENT

### SETTINGS EXCHANGE

SUPPLY CHAIN

PRODUCTION

SERVICE

IOT

### FUNCTION BUILDING & LIBRARIES

FUNCTION BUILDER

SETTING BUILDER

TYPE PLATES

RETROFIT PACKAGES

CHECK REPORTS

INDUSTRIALIZATION

### RULE ENGINE

CONDITIONS

TRANSFORMATIONS

Core Services

### OPERATIONS INTEGRATION

REQUIREMENTS MANAGEMENT

SOURCE MANAGEMENT

...

#### PLM / ERP INTEGRATION

MASTER DATA

ORDER MGMT

CHANGE MGMT

VARIANT MODEL

### DIGITAL TWIN

STATE MACHINE

AS BUILT / MAINTAIN

Mission

Active management of SOFTWARE VARIANTS to configure smart devices of products and assets across the product lifecycle – integrated to operations

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Cap-abilities

Definition of parameterizations for devices via central libraries  
Import of device parameter (based on ODX, IODD or other) and storage in the cloud via a centralized repository  
Definition / configuration of Software Functions and their defined settings (“variant coding”)  
Linking of functions to business logic to configure devices during Production & Service events (for e.g.: variant logic / production order)  
Definition of rules for conditions & transformations of parameters (preconditions, dependencies, transformations)

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Use Cases

Requirements Engineering: Definition of parameterization requirements  
Software Engineering: Retrieval of parameterization definitions  
Offline Engineering of software functions of products and assets by defining parameter settings for Production, Service and Aftersales events  
Software Variant Coding Events at Testing, Production, Service & Aftersales - delivery of valid parameterizations to downstream events  
Configuration of products (vehicles etc.) and assets (machines, sensors etc.)  
Analytics: Analyze dependencies and risk profiles

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Stakeholder

System Engineer / Architect and Requirements Engineer  
Diagnosis / Application Engineers as well as Product Managers  
Production Engineers and Operations Manager  
Service Engineers (Retrofit Design) as well as Service Technicians

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Tech-nology

Micro-service based architecture with web-based user interface  
Open Integration via REST APIs  
Runs on Cloud Platform with Cloud Foundry Runtime  
Our application is powered by Mendix  
Available as SaaS – Software as a Service

## About P&PM

P&PM designs and implements solutions to manage Software within your Products & Assets along their lifecycle.

P&PM was founded by experienced consultants in 2012 leveraging knowledge both from diverse operations transformation and application implementation projects especially within the Engineering and Service domain.

P&PM is a silver partner in the SAP PartnerEdge program.  
P&PM is a partner in the Mendix ISV program.



**P&PM is a special expertise consultancy  
in the area of PLM – Product Lifecycle Management.**

**P&PM supports you in transitioning your operations  
to manage the growing complexity  
of software in your products along the  
value chain and product lifecycle.**

P&PM - Product Lifecycle & Program Manufactory

**[www.p-and.pm.com](http://www.p-and.pm.com)  
[info@p-and-pm.com](mailto:info@p-and-pm.com)**

**P&PM Solutions & Consulting GmbH**  
Zum Eulenbroicher Auel 19  
D-51503 Rösrath  
Germany

**P&PM**  
Solutions & Consulting

[www.p-and-pm.com](http://www.p-and-pm.com)  
[info@p-and-pm.com](mailto:info@p-and-pm.com)

P&PM Solutions & Consulting GmbH  
Zum Eulenbroicher Auel 19  
D-51503 Rösrath  
Germany