

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.

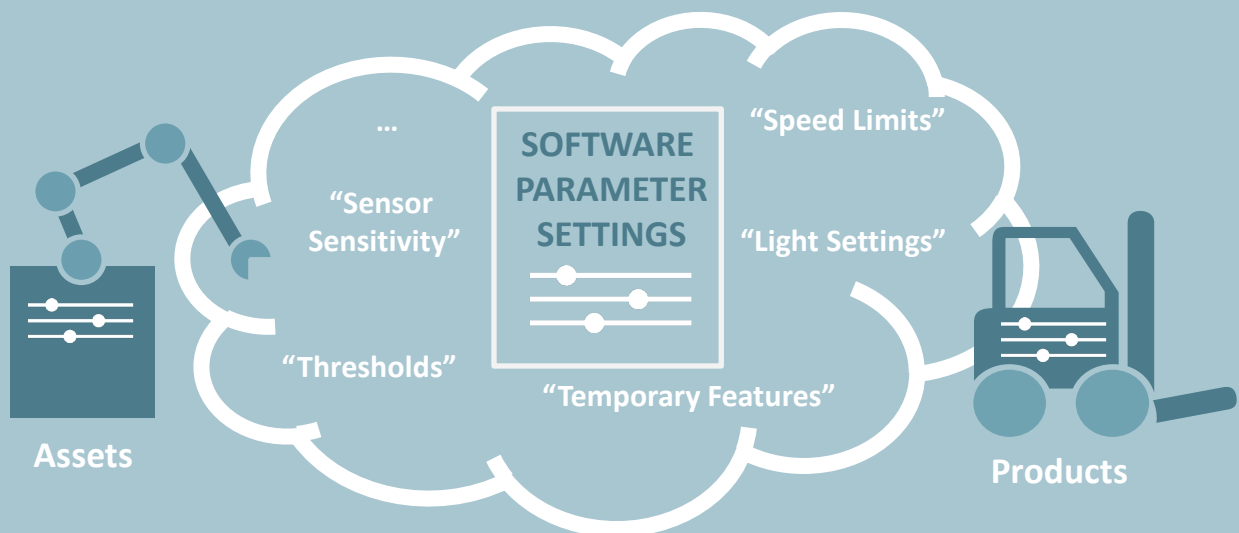
Embedded Software is key enabler for Digitalization and IIoT.

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

>>> CONTINUOUS ENRICHMENT OF FUNCTIONS AT OPERATIONS

>>> SPEED & QUALITY OF FLASH & PARAMETERIZATION EVENTS

Resulting Benefits:

REVENUE GROWTH OPPORTUNITIES AT NEW PRODUCT SALES & SERVICE BUSINESS

REDUCED NON-CONFORMANCE COSTS AND ENHANCED PRODUCT QUALITY

REDUCED OPERATING COSTS DURING PRODUCTION & SERVICE EVENTS

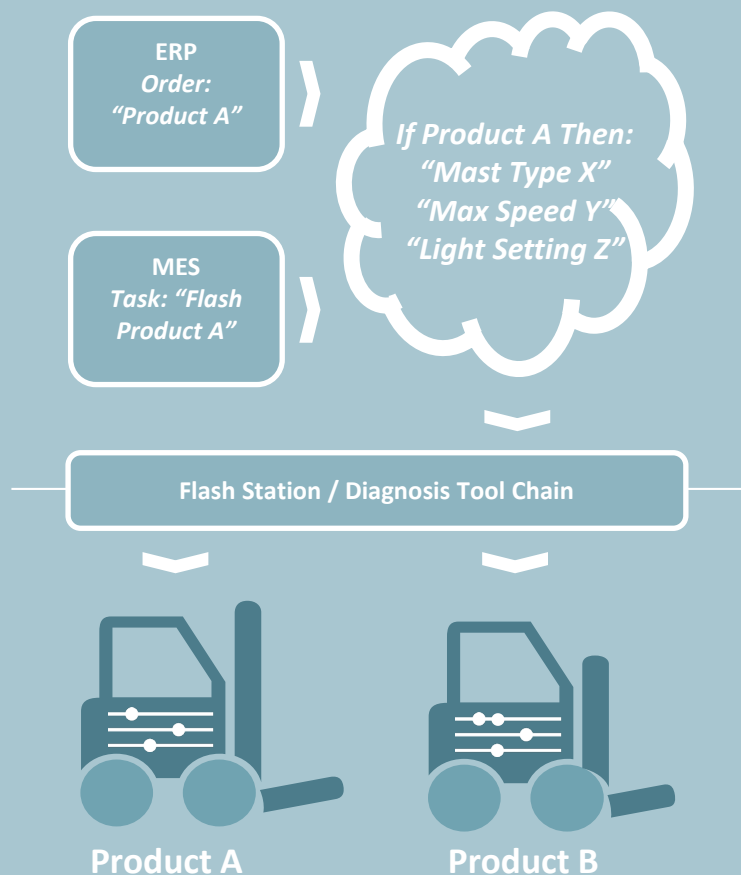
Scenario 1

“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.



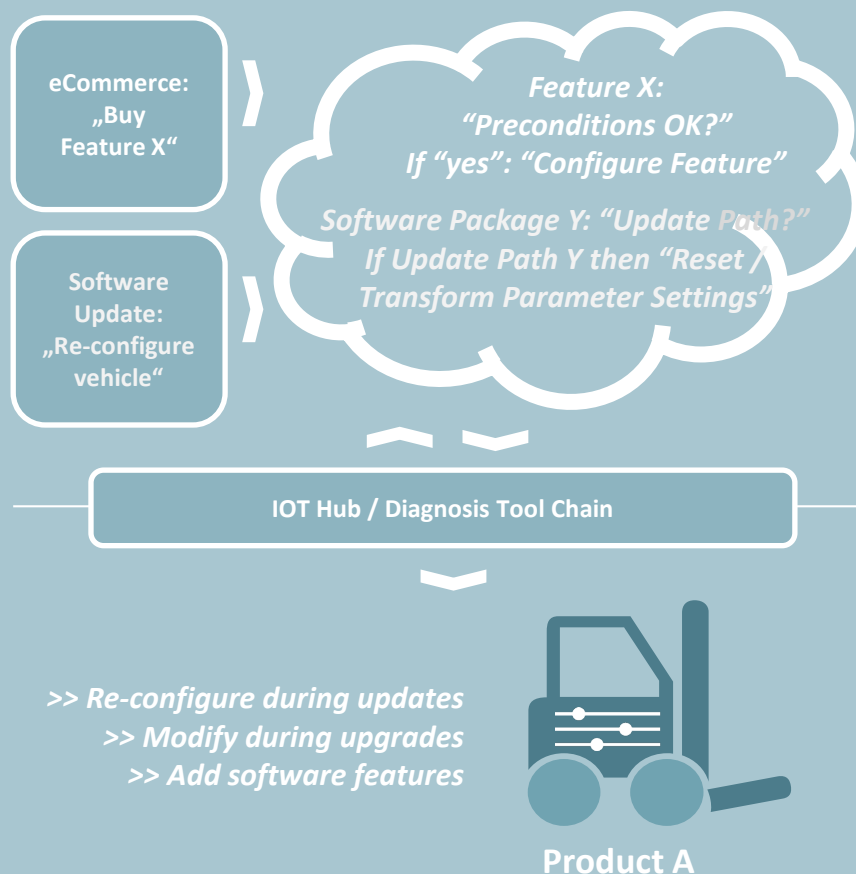
Scenario 2 "Configuration of Smart Products during Service Events"

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



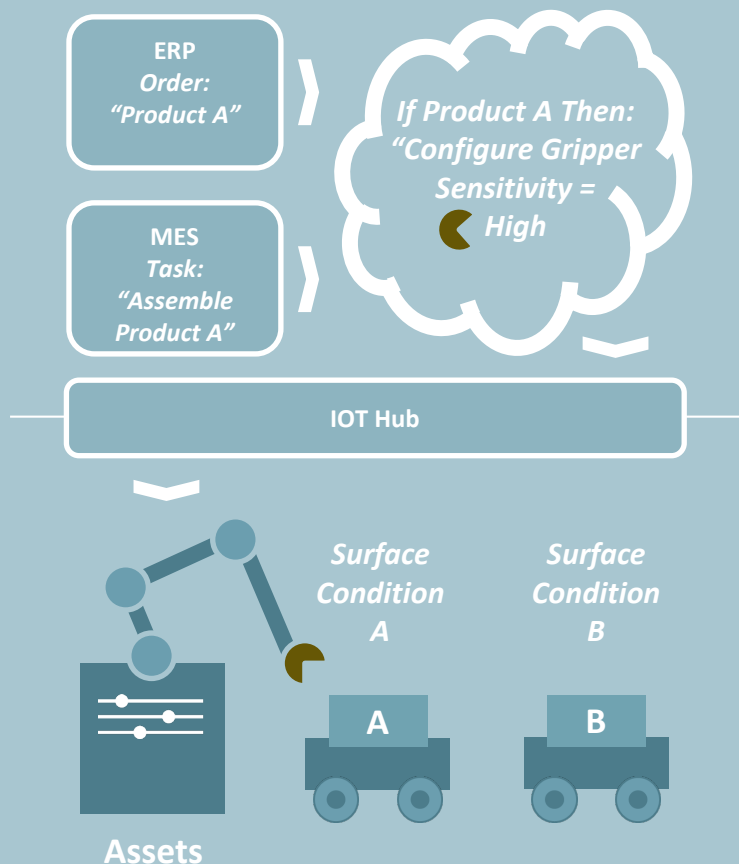
Scenario 3

“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

Capabilities

“CRACK”
READ & IMPORT
DEVICE PARAMETERS

“MANAGE”
PARAMETER LIFECYCLE
REPOSITORY

“CONFIGURE”
FUNCTION
BUILDING & LIBRARIES

“INTEGRATE”
OPERATIONS OF
PLM / ERP / IoT

“AUTOMATE”
RULE BASED
FUNCTION SETTINGS

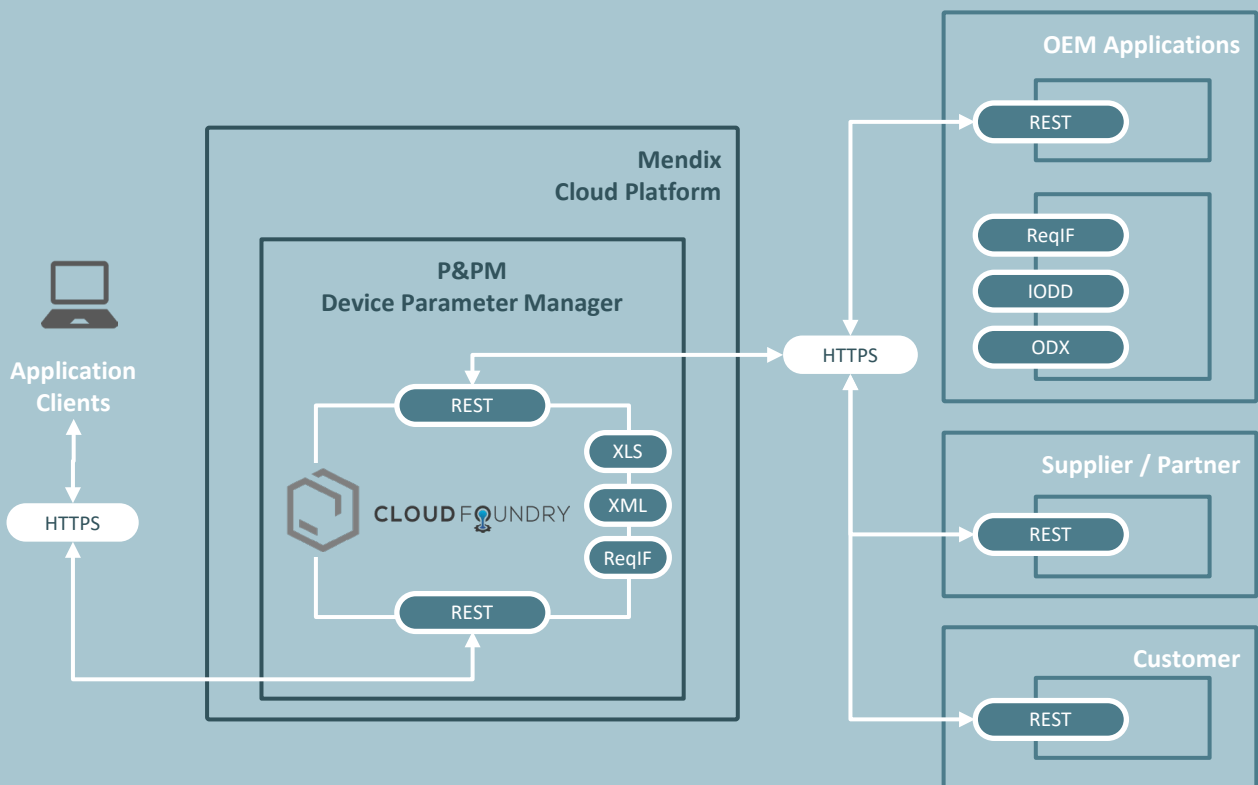
“EXCHANGE”
DEPLOY SETTINGS TO
RETRIEVING EVENTS

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

Import complex parameter data of diverse data types

Data Structure

Data Structure in Format YYYYMMDD [DateYYYYMMDD]
Byte Size: 24

Title	Byte Size	Byte Position - Bit Length	Data Field Element - Bit Length
4 digit Year [DataFieldDateYYYY]		1 [1] - 32	
Unsigned Integer 32 [UINT32]			Data Type Physical UINT32 [0 - 4294967295] Data Type Raw UINT32 [32]
2 digit Month [DataFieldDateDD]		9 [1] - 32	
Day based on Unsigned Integer 32 [UINT32_day]			Data Type Physical UINT32 [1 - 31] Data Type Raw UINT32 [32]
2 digit Month [DataFieldDateMM]		5 [1] - 32	
Month based on Unsigned Integer 32 [UINT32_month]			Data Type Physical UINT32 [1 - 12] Data Type Raw UINT32 [32]

Parameter Diagnostic Identifiers (DIDs)

[0x06] front_light_color Schema
Front Light Color Schema front light color schema

[0x05] front_light_brightness
Front Light Brightness front light brightness

Qualified Parameter Sets

- Front Light Setting - Asia
Setting for Front Light Setting - Asia
- Front Light Setting - EU
Setting for Front Light Setting - EU
- Front Light Setting - Other
Setting for Front Light Setting - Other

Bundle Parameter into Functions

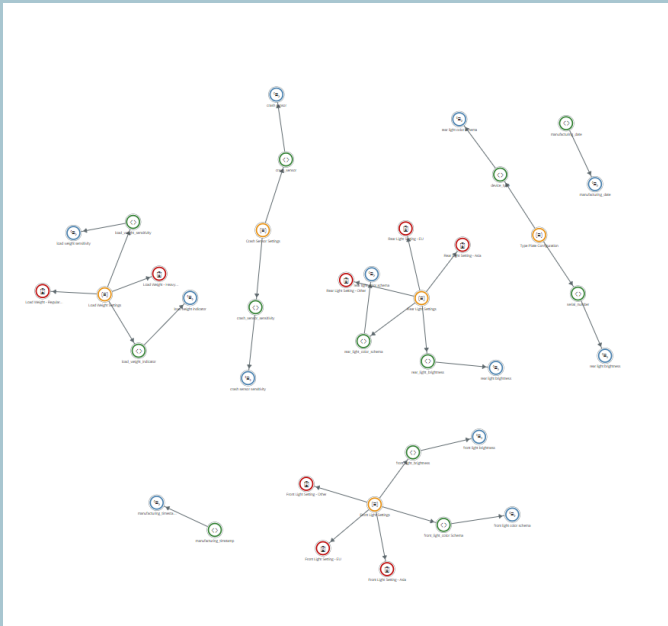
Qualified Parameter Set Detail: Front Light Setting - Asia
Setting for Front Light Setting - Asia

Qualified Parameter Set | Parameter Values | Technicals

Title: Front Light Setting - Asia
Description: Setting for Front Light Setting - Asia
Parameter Set: Front Light Settings

Parameter Values

- <> [0x06] front_light_color Schema: 4 [0x02]
Front Light Color Schema
- <> [0x05] front_light_brightness: 4 [0x04]
Front Light Brightness



Configure settings of Functions Link to other data

View dependencies via graph mode

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

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)

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

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

Technology

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's office in Rösrath, near Cologne, Germany

**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

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