PLM ESSENTIALS

2. PART & BOM ATTRIBUTES

QR_

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2 PART AND BILL OF MATERIALS (BOM) ATTRIBUTES

At the heart of all complex engineering and associated manufacturing processes is Product Data Management (PDM) - the business function that organises, maintains and reports all product data.

PLM captures and tracks information on the individual parts, components and modules that constitute a finished product throughout its lifecycle, including changes made during development.

This includes part numbers, supplier details, CAD drawings and more, with everything stored in a database easily accessible to the likes of project managers, engineers, salespeople, purchasing and QA teams.

Efficient management of product data helps develop products quicker, get them to market faster, and push costs down.

ATTRIBUTES

THE CHARACTERISTICS OF PRODUCT PARTS

It's impossible to identify every part of a complex product without a good reference system. And by far the most efficient way to do this is with attributes.

Attributes can fall within the parts numbering system, by relating to a part design such as style, colour or variant. Or they can be a little more technical, from the size and shape of a part, to its serviceability. Attributes can also be used within the BOM, to specify the ways parts should be used.

To give you an idea of how to build an attributes system, we've put together a detailed case study of one we created for an electric vehicle manufacturer.

WHAT ARE ATTRIBUTES?

Attributes – also known as metadata – are the individual properties of any part used during the manufacturing process. They allow parts to be categorised, defined and identified.

When designing a product, attributes are assigned to part numbers to help describe the part. This is especially important where a non-significant part numbering system is being used, as the part number will provide no information about the characteristics of the part.

When used within the BoM, attributes define how, when, and where the parts are used.

Any new attributes need to be able to be integrated with ongoing projects but also need to be scalable for growth into different products.

WHO USES ATTRIBUTES?

Since part and BOM attributes are the key metadata holders that carry information about parts, departments affected by them include:

- **Engineering**
- **Purchasing**
- **Homologation**
- **R&D**
- **Suppliers**
- **Manufacturing/Production**
- **Logistics**
- **Styling/Concept**
- **Finance**
- **Quality**

PRE-ENGAGEMENT AT THE MANUFACTURER

Attributes currently captured by the manufacturer were related to:

- **The purchasing of parts**
- **The physical properties of the parts**
- **The BOM**

INDUSTRY EXAMPLES

Within the automotive industry, standard practice is for part attributes to be captured either within the part number itself when part of an intelligent part numbering system, or captured outside of the part number in an attribute field:

ATTRIBUTES USED WITHIN PART NUMBERING

- **Body Style**
- **Product Line**
- **Colour**
- **Variant**
- **Year of introduction**
- **Design Responsibility**
- **Change Level/Revision**
- **Production/Prototype Indicator**

ATTRIBUTES USED OUTSIDE PART NUMBERING

- **Unit of Measure**
- **Drive Side**
- **Handed**
- **Release State**
- **Part Family**
- **Trim Code**
- **Serviceability**
- **Authority to Purchase**
- **Old Part Number**
- **Material Type**
- **Mass & Area**
- **Vendor information**

DECISION CRITERIA FOR SELECTING AN ATTRIBUTES SYSTEM

- **Usefulness** - the attribute must be broad enough to be used by all, if not most parts
- **Interpretation accuracy** - the attribute must have a clear definition of its purpose
- **Error recovery** - errors in input should be reduced by having choices where possible, which will also aid with grouping
- **System agnostic** - it must be easy for the user to input the attribute
- **Minimise admin burden** - holding information within attributes should aim to reduce additional administration

The ideal system must:

- **Be able to be considered for use with all parts**
- **Have a clear purpose and reason for use**
- **Use choice lists as much as possible**
- **Allow users to input mandatory attributes with ease**
- **Have all information relevant to parts, reducing the need to store data elsewhere**

THE *ATTRIBUTES* SYSTEM SELECTED

For both the part and BOM attributes, QR_ defined a list of where the field will be situated, the type of input the field will be, who will be inputting the data, and when the data should be populated.

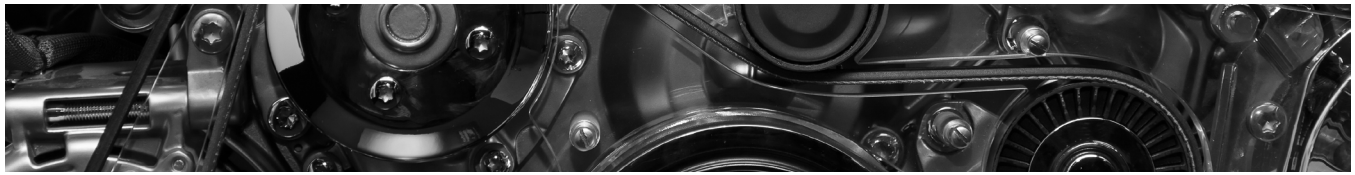
PART ATTRIBUTES

The following part attribute fields should be used to optimise the balance of capturing the attribute within the part number and within part metadata fields.

ATTRIBUTE NAME	WHERE	TYPE	WHO	WHEN
Rev*	PLM	(Calculated)	(System)	Creation
Description*	PLM & ERP	Choice/Manual	Engineer	Creation
U of M*	PLM	Choice [ea, kg, etc.]	Engineer	Creation
Estimated Mass	PLM	Manual	Engineer	Review
Calculated Mass	PLM	(Calculated)	(System - via CATIA)	BOM Sync
Measured Mass	PLM & ERP	Manual	Engineer/Warehouse	Release
Surface Area	PLM	(Calculated)	(System - via CATIA)	BOM Sync
CAD Revision	PLM	(Calculated)	(System - via CATIA)	BOM Sync
Chief Engineer*	PLM	Choice [list of chief engineers]	Engineer	Creation
Drive Side*	PLM	Choice [RHD, LHD, both]	Engineer	Creation
Handed*	PLM	Choice [LH, RH, both]	Engineer	Creation
Phase*	PLM	Choice [Concept, Prototype, Production, Geometry]	Engineer	Creation
State*	PLM	Choice [Preliminary, Review, Approved, Released, Obsolete]	Engineer	Creation
Initial Project* *(Project part was initially design for)*	PLM	Choice [list of projects]	Engineer	Creation
Alternative Part Number	PLM	Manual	Engineer/Purchasing	(any)
Authority To Purchase*	PLM	Choice [TRUE/FALSE]	Engineer/Purchasing	Review
Material	PLM	(Calculated)	(System - via CATIA)	BOM Sync
Colour Code	PLM	Manual/Choice [based on configuration management]	Engineer/Marketing	Review

ATTRIBUTE NAME	WHERE	TYPE	WHO	WHEN
Variance Code	PLM	Manual/Choice [based on configuration management]	Engineer/Marketing	Review
Scheduled MRD Date*	PLM	Manual	Engineer	Creation
Vendor ID	PLM	Choice [List of vendor IDs]	Engineer/Purchasing	Review
Vendor Name	PLM	Auto Populate [from choice of Vendor ID]	Engineer/Purchasing	Review
Piece Cost	PLM	Manual	Engineer/Purchasing	Review
Vendor Lead Time	PLM	Manual	Engineer/Purchasing	Review
Vendor Part Number	PLM	Manual	Engineer/Purchasing	Review
Serviceability*	PLM	Choice [TRUE/FALSE]	Engineer	Review
Serviceability Time Goal	ERP	Manual	Engineer	Review
Safety Critical*	PLM	Choice [TRUE/FALSE]	Engineer	Review
Homologation Part*	PLM	Choice [TRUE/FALSE]	Engineer	Review
Bin Location*	ERP	Manual	Purchasing/ Warehouse	Release
Old Part Number	PLM & ERP	Choice/Calculated	Engineer	Creation

*Mandatory Fields



REVISION

The revision attribute will capture part maturity and the revision of that maturity.

The attribute will contain two alphanumeric characters. Prototype parts will follow an alpha numbering system (i.e. AA, AB, AC…). Production parts will follow a numeric numbering system (i.e. 01, 02, 03…).

This attribute will be merged as part of the part number when released from the Product Lifestyle Management (PLM) system to the Enterprise Resource Planning (ERP) system.

COLOUR AND VARIANCE CODE

These codes are devised based upon the configuration management and are defined from the Product Definition and subsequent Feature Definition documents created by the business.

The Colour Code should be defined not as the colour to be applied, but grouped for the colour configurable parts. For example, if the steering wheel trim and seating trim must be the same colour, they would be grouped by colour code 0124, these parts would then both have the colour code 0124.

Then, based upon the Product and Feature Definition documents, the actual colours which can be used for all 0124 parts will be set.

BOM ATTRIBUTES

The following BOM attribute fields will sit within the PLM to define the structure of the BOM.

ATTRIBUTE NAME	WHERE	TYPE	WHO	WHEN
Level*	PLM	(Calculated)	(System - via CATIA)	Creation
Qty*	PLM	Manual	Engineer	Creation
Purchase Type*	PLM	Choice [Assembled, Phantom, Geometry, Purchased, Included, Tooling, Prototype, Sub-Purchased, Service]	Engineer/ Programme/ Purchasing	Creation/Review
Variant Code	PLM	Manual/Choice [based on configuration management]	Engineer/ Programme	Review
Effective In Date	PLM	Manual	Engineer/ Programme	Review
Effective Out Date	PLM	Manual	Engineer/ Programme	Review
Build Sequence	PLM	Manual	Engineer/ Programme	Review

The Build Sequence attribute groups together assemblies being built together at a set stage. These can then be used to export a build model grouped by build sequence to aid with validation, clash-check and Digital Pre-Assembly (DPA).

JUSTIFICATION & EVIDENCE FOR THE NEW SYSTEM

Using the denoted part attributes enabled the manufacturer to use their PLM system as 'one true source' of data, where all part information is captured.

Capturing the state of the product (Prototype or Production) is important as it avoids prototype parts being placed on production vehicles. Housing this attribute combined with the revision enables shorter part numbering but easily distinguishable parts.

As a R&D company, the manufacturer makes many more prototype revisions than production revisions. Accordingly, two alpha characters for prototype revisions allows for up to 676 revisions of prototype parts, and two numeric characters for production parts allows for up to 99 production revisions.

All fields captured here can be used for a different variety of parts, whether the part is a physical component, an assembly, or even a geometry part.

For attributes that can have their values grouped together, choices have been created to make sure that a structured option drop-down can be chosen. This gives the ability to group and search for parts based on the attribute.

All but a couple of mandatory attributes are choice or calculated fields, making the completion of the attribute as easy as possible for end users.

RISKS OF THE NEW SYSTEM

Capturing the attributes outside of the part numbering system could lead to a risk of a part being misidentified.

This has been mitigated by capturing all the relevant attributes required for the identification of a physical part within the part numbering system.

Everything else has been captured within an attribute field which can be interpreted through a system.

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ABOUT QUICK RELEASE_

Quick Release_ is the leading Product Lifecycle Management consultancy. QR_ has 350+ professionals across three continents working alongside some of the largest, most innovative and prestigious vehicle manufacturers, aerospace technologists and Tier 1 suppliers.

Our mission is to enhance competitive advantage by bringing products to market faster and more efficiently. We do this by improving product data quality and flow through every part of a business from concept to manufacture, working with senior management teams to tackle the biggest blockers of productivity; we release engineers to focus on the product, not the data.

Leveraging bespoke tools, methodologies and benchmarking, our professionals offer the full spectrum of PLM services designed to guide start-ups through the unknown unknowns, take businesses looking to scale to the next level, and facilitate transformation in established manufacturing and technology OEMs. Read more: Why does PDM matter?

ARE YOU ALL CLEAR ON ATTRIBUTES?

If you'd like to know more about part or BOM attributes systems, or any other aspect of PDM, we'd love to hear from you.

QR_ have advised on and implemented part and BOM attributes for EV start-ups, specialist, volume, and commercial vehicle manufacturers.

Our SMEs would love to hear your part and BOM attribute headaches and explore quick, unobtrusive solutions that deliver lasting, whole-business value.

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