

Best Practices for Item Identification

Objective

Provide a Product Lifecycle Management perspective on Item Identification by introducing commonly-used part and document identification elements. Many of these elements explicitly exist in a PLM system and are useable in searches and queries to locate items. Some PLM systems let you “Google” an item, offering significant advantages that call into question many traditional ideas on what a part or document number should include.

PDXpert PLM indexes the principal attributes of an item as you create and save it. Your free-form text search will return a ranked list of documents, parts or changes that are relevant to your target terms.

Summary Recommendation

In computer-based design and production systems, use a short, non-significant number for all documents and parts. Let the product structure manage the relationships of documents-to-documents, parts-to-parts, and parts-to-documents. Other item identification *elements* can be used to satisfy almost any users’ information or query needs.

Recommendation Basis

Based on years of providing public seminars to thousands of industry technicians, engineers and managers; 50+ on-site consulting engagements; and my own manufacturing company experience, I’ve personally observed the benefits of this recommendation.

The Problem

Attempting to make one numbering system address too many diverse needs perpetuates an ongoing emotional discussion and creates ingenious and inefficient workarounds as seen below:

- Production: The factory tries to manage work in process, account for accumulated cost, and track value added or rework status by adding digits, dashes or dots to part numbers.
- Hardware design: Engineers struggle with how to “name that file...” for new designs, eventually resorting to managing their files by embedding type, size or location information within the

document number scheme. The scheme then becomes unwieldy or confusing and others needing to collaborate or use the documents need to ask for the file name or number. Very unproductive. This becomes an attempt to create intelligent number scheme or “improve” on the current scheme.

- Software design: The software-engineering mnemonic file-naming conventions (which embedded in the code) typically conflict with standard item numbering conventions. As software programs become shared-use programs, are moved under configuration control, and into the BOM, the software needs to be re-identified with a consistent scheme. For the software engineer this initially appears to add complexity for them.
- Marketing/Sales: When products are sold using the part numbers as product identifiers, and when an internal, non-interchangeable change should result in a new part number, Marketing and Sales resist re-identification because the “customer knows the number!”
- Document control: Trying to manage or organize an efficient retrieval scheme with a variety of numbering styles and rules.
- Standards: The NIH factor when the “inventor” of your numbering system represents one department or discipline. When no one asks the basic questions – who are the real “users” of the number? Do our products use common parts? How are the products maintained, by whom, and for how long?

The Goal

An overall identification system consists of various elements that serve specific needs. These elements, when used in conjunction with others techniques, can provide a simple, flexible, yet very comprehensive product identification system.

The formal identifiers

These are the various *elements* that accomplish (sometimes competing) identification objectives:

- Model Identifier (or Catalog Number) provides a relatively stable product identifier for the customer. It should only change based on a MAJOR change to the product. How often does the Honda Accord change its name? How often does it actually have non-interchangeable changes?
- Serial Number tracks a specific item or product throughout its lifecycle, utilizing a number, date or production lot number.
- Document Number identifies and controls a document.

- Part Number identifies a unique, non-interchangeable finished physical part, although there may be hundreds just like it in the parts bin.
- Manufacturer Code identifies the design organization and/or the production facility. A company with 5 separate facilities should have 5 different Manufacturer Codes. *The objective is to identify the source company or your facility that produces the part.*
- Change Number manages a change and tracks the document, database, production & product implementation. A change may encompass many documents and parts to solve one problem.
- Revision records the history of document changes tracking the evolution of its content.
- Work Breakdown Structure (WBS) is a project cost accounting system that can be used to group a series of documents to a task. *Useful for R&D when much of the definition is conceptual and relies on a lot of reference data that is typically not formally identified.*
- Chart of Accounts typically identifies financial overhead accounts.
- Project (number or acronym) establishes the organization initially responsible for the due diligence of the design and all of its assets.

While the preceding are typically formally documented systems within a corporation, the following are...

The informal identifiers

These supplemental “hooks” allow users to find items through informal associations:

- *Title* of a document provides the functional definition of the item represented in the drawing or specification.
- *Document Size* identifies the physical locations of the media, in modern systems this incorporates the media type.
- *Part Description* cryptic or highly abbreviated list of the physical characteristics of the object. This is useful for parts picking and inspection.
- *Document Type* is a unique term that describes the purpose and content of the document. This

PDXpert PLM offers out-of-the-box attribute lists that can be modified and extended by the system administrator. Since accepted values are always at your users’ fingertips, no system rules need to be memorized. As a result, it’s easy to consistently implement these suggestions utilizing a combination of Document Types, Part Types, Title text templates and built-in other attributes.

also provides the user a quick association to the rules for a specific type of document. (A fabricated detail drawing is always released, but a work instruction may not be.)

- *Part Type* is a unique term that describes the source or method of the physical object, such as distinguishing a fabricated part from a purchased part.
- *Author* is the person most knowledgeable or responsible for the object and its documentation.
- *Library* may be a server directory or a physical room, and sometimes can be very informal. Some items (marketing literature or master chips) are occasionally handled separately under formal system controls, and can become an element of the overall Identification System.

Therefore: Best Practice

Develop an Identification System using a combination of individual elements that build a complete story relative to your products. An Identification System utilizes one **key** element which is the controlling number and may include the owning authority, along with additional reference elements that when used together provide the complete identification of the item. In PLM systems and some ERP systems any user can query by most of the elements. For example, the key is highlighted:

- Documents: **Document Number and Owing Authority***, Title, Revision, Author, Project and Document Type.
 - Parts: **Part Number and Owing Authority*** (Manufacturer Code), Description, and Part Type.
 - Serialized Items: Part Number and Serial Number, Project, Title; or Model & Serial.
- * The owning authority (Manufacturer Code) is used to insure that potentially duplicate identifiers are handled independently by the software. *One of your suppliers may also have an item numbered 123 4567.*
- Processes: Use the same identification scheme as a document. *Including processes in your PLM system allows them to be flagged when the product item(s) are revised.*

Combining identifying elements

Additionally, by combining elements such as

- the model identifier and part number, you can cross-reference other “As Designed” BOMs that have or can be delivered to meet the market specifications at an interchangeable level even though individual assemblies (BOMs) may contain lower level differences that do not affect the model level usage. *For example, mid-year modifi-*

cations do not re-identify a Honda Accord.

- But using the model and its serial number you can link back to the production part number to see its specific “As Built” BOM record. *From that BOM you can then link to individual documents that describe the options or changes to the Honda dealer’s service personal.*
- Using a Manufacturers Code and Part Number can tell you where the design authority (source) is, and which facility manufactured the item. This information along with serialization records helps identify sources of design or process problems when problem reports come from your field or customer service organizations. *Problem products from multiple facilities point to a design problem, problem products from one of multiple facilities point to a process problem.*
- Document numbers when combined with either Work Breakdown System numbers, or a Chart of Accounts number, allow documents to be grouped for “engineering” convenience during conceptual design and/or problem investigation. *It is logical during design to prefer to include all documents relative to one item, as “pages” of the item document set. But this is does not properly support downstream production and support efforts.*

PDXpert PLM can include items which do not come under traditional design change control (such as marketing sales literature and vendor websites). These items can be linked to controlled items in the product structure, and associated files can be saved in the central data Library.

Recommendations

1. Utilize non-significant numbers in conjunction with Document Types and Part Types. This forms the “key” elements of your Identification System.
 - 5 – 7 digits
 - Use an odd number of digits, easier to remember or “chunk”.
2. Develop definitive Rules of Interchangeability, based on the Product Specifications, and utilized them for each change request. These rules must drive a part number change, a Product Specification change or a revision change based on the Rules; not organizational preferences.
3. All departments must utilize elements of the Identification System to solve their problems, even if that means changing some current procedures and software, including Publications, Marketing, Manufacturing, Software ... etc.
4. Apply to all documents, and “inventory” all documents in your PLM system, released or un-

released, this leverages the linkages inherent in the system, and aids others in locating relevant data now and in the future.

Putting the Plan in place

Although many companies still do not have computer access throughout their production facilities, we’ll assume you’ll be adopting a PLM solution.

If not already utilizing non-significant, non-intelligent numbers (the descriptions are provided below) develop a plan to move to one. Political timing is critical, watch for mergers or acquisition, plans to bring in a new ERP system, Sarbanes Oxley issues, or new management – being prepared is mandatory, the right time will present itself. Document the intelligence currently imbedded in your numbering systems, build tables or spreadsheets that show all the possible values for each digit. Identify the evolution that could/has happened in each of these columns of data. *This could easily become a simple spreadsheet with a field for each digit and corresponding fields for English word equivalents and one of the “elements”.*

This will provide the basis for developing a strong set of requirements for the next automation software application that deals with numbers (e.g., the PLM system or ERP configurator) before the implementation schedule forces you to retain your current system, good or bad.

As your network grows, that database could become an interim network based cross-reference tool by searching the English equivalents even though you may still be utilizing the legacy numbering system. This reduces training and potential errors.

You are now in a position to change to a non-significant system without a large fear factor.

The expected objections

The typical response to any suggestion to change a numbering system is – “NO!” But as shown above almost every company has one or more of these issues that they continually work around. The workarounds typically don’t show up in overall productivity reports until production ramps up and someone starts to fall behind struggling with one or more of the workarounds.

PDXpert PLM can be a significant aid in the transition to a new identification scheme. At your own pace, you can create new non-significant identifiers for existing items and assign the previously-identified items as “sources” for the new items. You’re able to maintain your old designs with the old identifiers while creating equivalent new structures with the replacements. The cross-references are maintained right on the affected items.

Identification System Taboos

- Do not include revision data in the number.
- Do not indicate document size in the number.
- Do not include any project nomenclature in the number. Marketing can change the name, and it should be considered part of the document title or project code. (Would you want an item with “Mercedes” in the identifier showing up on your delivery to BMW?)
- Do not use the same number on different document types. An assembly and its schematic are separate unique documents; the structure will unite them.
- Do not define a document by its creating application. For example, a document made up of CAD drawings, word-processed text and spreadsheet tables is not three documents. It’s either a specification with drawing or a drawing with notes.

Types of Identifiers

Identifiers – Significant & Otherwise

Basically, significant numbers are a crutch for conveying information to users. As more manufacturing systems (ERP) get rewritten to relational or object oriented databases, and more engineering departments implement PLM systems, I hear fewer arguments for semi-significant numbering systems. The basic reason is that knowledge previously represented alpha-numerically is now available by including selected “elements” on screen and in reports. The critical message here is that the knowledge is available in the users’ primary work environment. Accordingly, it is recognized that “information” is a critical issue throughout the product lifecycle, and that a well designed and implemented identification system conveys the associated information.

Significant numbering systems work well for manufacturers of commodity items, where there tend to be few variables with many values and a long product life. Consider ball bearings and resistors, but not integrated circuit chips.

A major problem with significant numbering systems is the variable length typically associated with them. While it may seem simple to correctly choose the number of digits for any subset of the number, technology evolution forces change in the subset to adequately describe the technology. Also as you try to apply the system to electrical, vs. mechanical, software or documents, you struggle to maintain pattern recognition.

In complex environments, individual subsets serve multiple purposes, depending on the item. A troubling aspect of significant numbers is the need

PDXpert PLM will allow you to continue using your current “significant” or “semi-significant” item numbering. In a “semi-significant” environment, you can create an unlimited number of identifier sequences, each of which can be (1) common to a group of part and document types, or (2) assigned to one specific type. **PDXpert** sequences permit you to configure rules for category-based prefixes, alphanumeric sequences, and tabulation suffixes. Fully significant schemes generally require human intelligence to determine the appropriate identifier, and **PDXpert** allows you to specify the part and document types that require manual assignments. You can even intermix these schemes!

to document and publish the scheme, requiring security control.

Semi-significant numbering systems are common for document and part numbering. They represent the best trade-off between too many digits in the number and a reasonable amount of information. The most common system uses the first three characters to represent an object category such as purchased components, test procedures, assembly drawings or reference documents.

Non-significant numbering systems can and do work well for many companies. The basic human trait at work is the 80/20 rule. It doesn’t seem to matter whether the object is an airplane or a mouse, people identify with the critical objects, and separate those into the very good and the not so good (the upper 10% and the lower 10%).

Non-significant numbering systems work best in products with large numbers of parts or objects, and a high degree of common usage.

About the Author

G. “Bart” Bartuli has actively promoted Configuration and Business Management best practices as the basis for PLM system development and implementations. He has worked as a Certified CM practitioner, consultant, product architect, project manager and educator for more than 30 years.

About PDXpert PLM

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