



Is Your Part Numbering Scheme Costing You Millions?

Best Practices for Part Numbering

Introduction

Manufacturers of complicated electronic products must manage, track and store hundreds (if not thousands) of parts in their product development processes. And, according to an independent study by EMA Design Automation, every time a new part is added to a company's library, it can cost — in some cases — as much as \$15k in time and effort to qualify and rollout.

That's serious money. And that's why choosing the proper part numbering scheme to reference your parts is critical to your manufacturing success. Utilizing a part numbering scheme is a standardized and efficient way to identify and track parts in your manufacturing processes.

In Arena's fifteen years of working with manufacturers of all sizes, we've come across a variety of approaches to part numbering and learned a great deal about the current theories and best practices of part numbering.

We've gathered this information in our Part Numbering eBook, and hope it helps you determine an optimal part numbering scheme for your unique business needs.



Table of Contents

01

Part Numbering:
An Overview

02

**Intelligent Part
Numbering:**
The Advantages

03

**Intelligent Part
Numbering:**
The Disadvantages

04

**Non-Intelligent Part
Numbering:**
The Advantages

05

**Non-Intelligent Part
Numbering:**
The Disadvantages

06

**Considerations for
Choosing your Part
Numbering Scheme**

07

**Managing Part
Numbers In Your
Business**

08

**Stories from the
Real World**

09

**How Arena Handles
Part Numbering**

10

Conclusion

Part Numbering: An Overview

01

There are three major part numbering scheme approaches to choose from:

Non-Intelligent – This approach, also referred to as a ‘non-significant’ scheme, uses part numbers that do not provide any information about the part being represented. Non-intelligent part numbers are typically serial (pulled in numerical order), regardless of the type of part. Using this part numbering system, a resistor could be assigned part number 416782 — the actual definition and details of the part is then documented clearly outside of the part number.

Intelligent – This approach, sometimes referred to as a ‘significant’ scheme, uses part numbers with descriptive and informative details about the associated parts. With this type of scheme, a resistor part number may look something like RES-100-0003 — where “RES” stands for resistor, “100” is the resistance value in ohms and “0003” is a serialized suffix.

Semi Intelligent – This approach, seeks to create some identification, in this case Resistors are 30000-00, Integrated Circuits are 20000-00, and cables are 10000-00. This lets the reader know generally what the part is but not the details. Those are like the non-intelligent part number documented elsewhere. Such as the description, or parametric data fields related to the part.

If this is the first time you’re learning about these scheme options, it might be hard to understand the consequences of each approach. You may even ask yourself why anyone would opt for a non-intelligent scheme. But the truth is, each scheme offers its own set of values and challenges, you need to identify which scheme best aligns with your manufacturing processes — from how you train the people accessing and assigning numbers to how you manage information retrieval about parts used across your product lines.

Let’s explore some of the advantages and disadvantages of these two approaches.

Intelligent Part Numbering: The Advantages

02



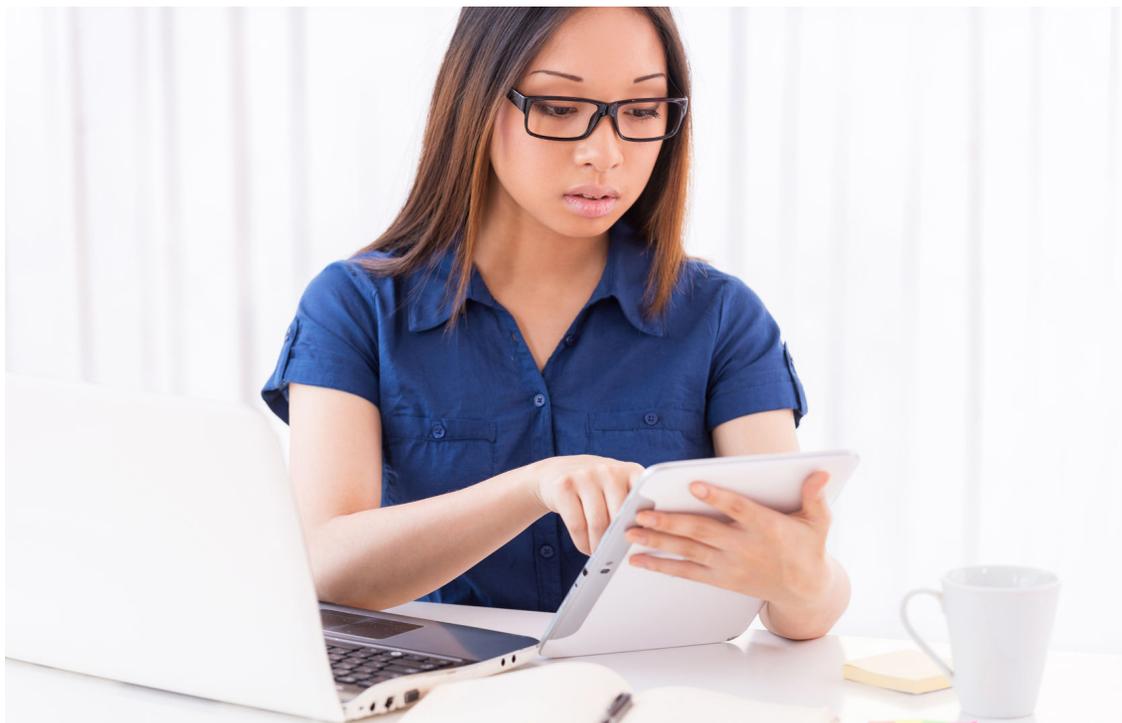
Because intelligent part numbers impart meaning about the category, source or intended use of the part, it's easy for manufacturers to see the efficiencies that come with adopting this approach.

Some benefits to an intelligent numbering scheme include:

Better search efficiency: With intelligent numbering, you can group similar parts in your design documentation and spreadsheets and more easily sort and search among them. You can also locate physical parts on the stockroom floor more efficiently, since it's easy to see where all the resistors are when they are all labeled with a part number starting with "RES."

Fewer errors: Because intelligent numbers specify part details, they provide a frame of reference for each part and make it easy to find when the searcher doesn't have any information other than the part number. For example, an engineer/technician can quickly verify whether a part meets general functional requirements by referencing the intelligent part number.

Improved processes: The data contained in significant part numbers may allow your team to move parts through your corporate processes more efficiently. Because parts in a class are all handled the same way, change routings, review processes and manufacturing steps can be predefined for part number classes or categories. When a new part of a particular type arrives, it is more apparent how that part fits into the overall design plan.



Intelligent Part Numbering: The Disadvantages

03

While there are many benefits to using an intelligent part numbering scheme, there are also shortcomings. For this type of system to work well in an organization, employees must be familiar with all of the different kinds of parts. Such a scheme also demands ongoing attention and can introduce delays in your processes.

Training: Because each intelligent part number has meaning, ill-defined parts can have a big, negative impact. Whoever assigns part numbers must be well trained in placing parts in the correct group, and be able to identify when an incorrectly classified part is being misused because of the information implied by the part number.

Knowledge required: Often on the shop floor there isn't enough knowledge of the part and variants to be able to correctly decipher the intelligent number scheme. Essentially, the intelligent part number is useful to a small subset of users such as the engineers that work with these parts regularly, and documentation control. So most users will just treat the intelligent number as unintelligent. Worse, partially trained individuals may incorrectly interpret the part number and use the part incorrectly

Ongoing maintenance: If you introduce a new part that does not fit into your current scheme, you may need to re-evaluate your entire scheme and define a new part type. All employees who use the system must understand and maintain the logic of the part numbering system, and part group sizes must be planned in advance. For example, if all the significant digits in a string (0-9) have been used and you need to introduce an 11th part type into that group, what do you do? Determine upfront how you can avoid this conundrum and when a change is required, then be willing to spend time updating the system and training people on the changes.

Process inefficiencies: Because assigning or pulling an intelligent part number may require time and discussion, a single person or group can become a bottleneck. And because intelligent part numbers are easily susceptible to descriptive clutter, they can be very confusing, hard to read and difficult to remember.

Imagine, for instance, trying to recall whether a part number was intended to specify length then gauge, or the opposite. Does 'R-12-06' mean the part is a 12-gauge or that it is half an inch? And is 'R-12-06' harder to remember than a simple number like '120023'? Small misinterpretations can have unpredictable consequences, and are more likely to arise when there are inconsistencies across different types of parts.

Small design modifications can also cause confusion. When the time comes to modify an intelligently named part — whether it's adding in a new description to the part number that wasn't necessary before, or modifying the specs of a part — the change can invalidate or conflict with the part numbers that already exist.

It's hard to know just how descriptive to get when creating intelligent numbers —almost no one gets it completely right the first time around. And each time you need to add a new parameter to your numbering scheme, you will have to go back and update the numbers for all affiliated parts, dramatically decreasing the sustainability of your system.

Non-intelligent Part Numbering: The Advantages

04



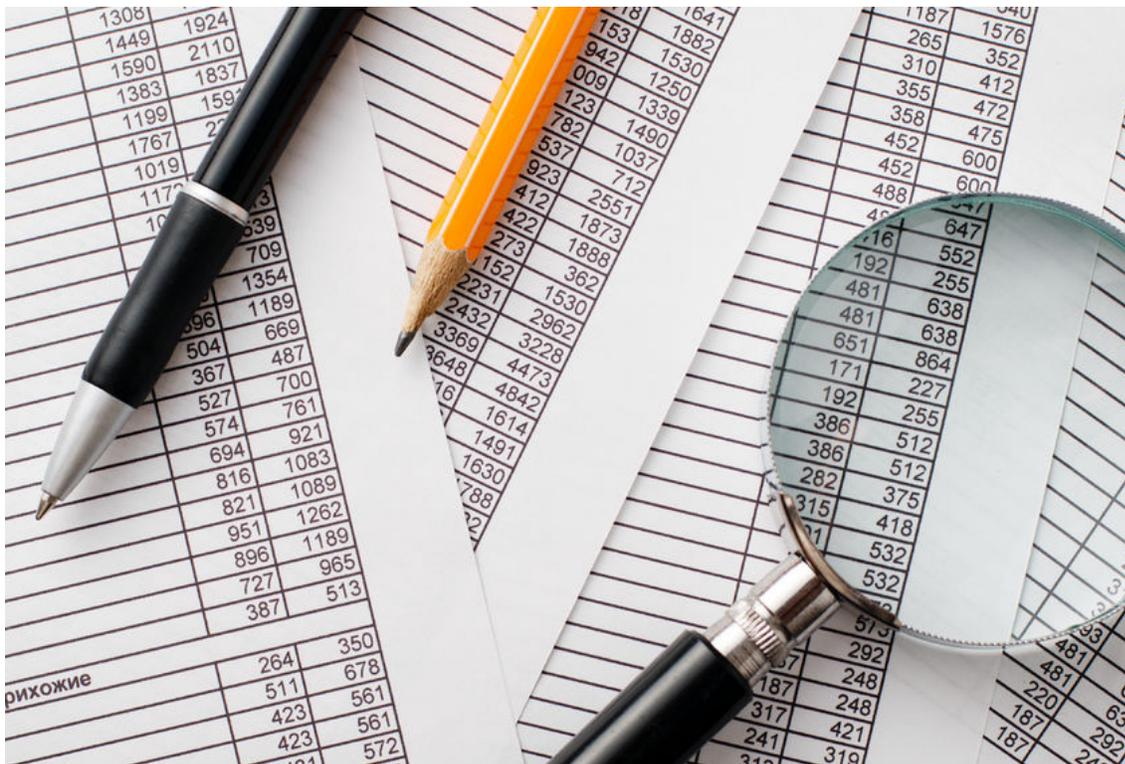
Using a non-intelligent scheme involves significantly less initial planning, since part numbers are not tied to meaningful data. You don't need to educate your full supply chain about what each number signifies and you can ramp new employees quickly without relying too heavily on any one person to maintain the system. Here are a few more benefits to non-intelligent numbering schemes:

Time savings: It takes very little time to pull a sequential number for an item, so assigning a part number can happen fast. You do not have to know anything about the part to give it a non-intelligent number. Intelligent part numbering often requires the number assignment to go through a specific person or department that knows all rules and variants of the part numbering rules. This can slow down part number assignment significantly — which in turn can delay long lead part ordering and delay completion of documentation for new product introductions.

Little training needed: If new employees join your organization, they will only require minimal training in order to learn how to define a part number.

No single point of failure: With non-intelligent part numbering, you can have multiple people pulling part numbers, and your company can continue to run efficiently if someone is out sick or leaves the company.

Simple maintenance: It is easy to maintain a non-intelligent scheme, since as it's essentially a sequential list.



Non-intelligent Part Numbering: The Disadvantages

Using a non-intelligent part numbering scheme isn't error-proof, and mistakes can happen especially if data entry is involved. Here are a few more reasons why managing similar parts with a non-intelligent scheme can be difficult:

More time intensive to manage numbers: Without common prefixes, you may need to track additional metadata to define your parts and use that information to group or search among parts. You may even require a business system in order to search for parts based on description, name, size or another relevant attribute.

Part Numbering Strategies		
	Intelligent	Non-Intelligent
Advantages	Better Search Efficiency Fewer Errors Improved Processes	Time Savings Little Training Needed No Single Point of Failure Simple Maintenance
Disadvantages	Training Knowledge Required Ongoing Maintenance Process Inefficiencies	More Time Intensive to Manage Numbers

Considerations for Choosing your Part Numbering Scheme

06

Now that we've walked through the advantages and disadvantages of both part numbering schemes, let's consider how your organization will use and manage these part numbers. After all, it can be difficult to switch from one part number system to another, especially if your team is already familiar and comfortable with an existing system.

If you are just getting started with part numbering and need to decide how to structure your part number system, consider the following questions:

- What will you use part numbers for within your organization? Get feedback from your team (engineering, operations, supply chain, purchasing) and consider their suggestions on how to structure the system.
- Does the part number need to carry data with it in order to enable other business practices?
- In general, engineering and design teams tend to prefer intelligent part numbering schemes because the descriptive names can help them identify parts more quickly. On the other hand, your operations department may prefer the efficiency and universality of non-intelligent numbering schemes.
- Will part numbers be handed off to suppliers or contract manufacturers, or perhaps across different business systems? If so, does that other business system have data type and size restrictions? It's worthwhile to consider the needs and requirements of members outside your immediate organization.
- How do your business operations influence your part numbering needs? An original equipment manufacturer (OEM) that creates its own part numbers has entirely different business needs than a company downstream in the supply chain.
- Will your current system support your part numbering needs? Can you maintain your part number system with your existing tool or will your part number system be more effective by bringing another system into the mix?
- Some automated processes are very particular about the formatting of a part number, such as the number of characters in the part numbering string, when integrating to other business systems. If this is the case, your part numbering format must be consistent and uniform in order to make sure integrations between your business systems don't break down.

Many manufacturing circles today still hold on to the belief that intelligent part numbering schemes are better at managing parts than non-intelligent schemes, but this is starting to change. More manufacturers today are finding the effort to maintain descriptive-dependent part numbers not worth the assumed benefit, and are instead turning to automated tools to generate serial part numbers.

Managing Part Numbers in Your Business



In order to implement a numbering scheme successfully, you must establish good processes for generating part numbers and use a system that is well equipped to manage part numbers.

Whether you use an intelligent or non-intelligent part numbering scheme, it is important to make sure you do not duplicate part numbers. Using the exact same part number for two entirely different parts can cause serious problems such as delays on the manufacturing line, confusion over the bill of materials (BOM) record and incorrect part ordering — all problems that ultimately impact your bottom line.

While using the same part number for two different parts seems like an obvious pitfall to avoid, it can happen when more than one person has the authority to create a part number.

To avoid duplication issues like this, manufacturers have found a variety of ways to manage their part numbering systems. Note: some are more effective than others.

Paper log record – This is a quick and easy way to generate a part number. With this method, one person is in charge of assigning part numbers to help prevent duplicate part number creation. However, relying on a single person to generate all the part numbers may create a bottleneck and a single point of failure in your manufacturing process.

Excel spreadsheet or Access database – These tools allow for quick part number generation, but make it difficult to keep data under control due to the limited lock and security restrictions. The variety of number formats in Excel may also confuse your numbering scheme and make it difficult to keep your part number structure consistent, especially if your scheme incorporates symbols such as dashes.

Business tools – There are tools that support part numbering needs without the pitfalls of methods mentioned above.

Assembly Number: 20-0001								
Assembly Name: EveryRoad GPS, Shippable, US Model 300								
Assembly Revision: B								
Approval Date: 24-Jul-10								
BOM Level	Part Number	Part Name	Revision	Quantity	Unit of Measure	Procurement Type	Reference Designators	BOM Notes
1	20-0002	EveryRoad GPS Car Navigation Unit - Model 300	B	1	each	MTS		Base Product only , No packaging
2	20-0003	EveryRoad, Front Bezel Assembly	A	1	each	OTS		
3	40-0011	LCD	A	1	each	OTS		
3	50-0012	EveryRoad, Front Bezel	B	1	each	MTS		
3	50-0080	Gasket, Screen, 3.5in	A	1	each	MTS		
2	20-0004	EveryRoad, Rear Assembly	B	1	each	MTS		
3	20-0015	EveryRoad, PCBA, Model 300	B	1	each	MTS		
4	40-0035	EveryRoad, Circuit Board	A	1	each	MTS		
4	40-0038	GPS Micro controller	A	1	each	OTS		
4	40-0039	USB Connector	A	1	each	OTS	U2	
4	40-0041	0.1uF Ceramic Chip Capacitor	A	5	each	OTS	J4	
4	40-0042	10k Resistor	A	8	each	OTS	C15, C6, C10-12	
4	40-0043	1k Resistor	A	4	each	OTS	R1, R5, R11, R12, R14, R16, R23, R24	

Managing BOM and Part Numbering in Excel

Managing Part Numbers in Your Business



Bill of materials software: Several BOM software products allow you to generate either intelligent or non-intelligent part numbering schemes. And because there are minimal restrictions on formatting your part numbering system, part numbers can contain letters, delimiters, spaces, hyphens and other characters.

With a BOM management system like Arena PLM, you can share your product data with suppliers and contract manufacturers and give them access to part numbers with supporting detailed data including suppliers and manufacturer part numbers. This helps prevent duplicate part numbers and allows for a more robust way to group parts, since parts can be defined for a category and sub-category.

Often, manufacturers find that the tools they used when starting out, such as a paper log or Excel spreadsheet, are not robust enough to scale as they grow, and they opt to move to a BOM management solution that will enable them to more efficiently manage part numbering. The transition from Excel to BOM software is easy — and many BOM systems are equipped to accept part numbers from an Excel spreadsheet into the system.

Basic Indented Bill of Materials in Arena PLM: Collapsed

Arena PLM | Everyroad GPS UM - 57 | Settings Print Heidi Walker Help

Dashboard | Items | Requests | Changes | Suppliers | Supplier Items | Files | Projects | Quality | Reports

Search: Items for All Items where Item Number is Go Advanced

Item #150-0001 **In Production** 0 1 0

GPS, EveryRoad US Model 300, Shippable

Revision: »B - In Production | Effective as of 2011/02/15 05:15:39 PM

Specs | **Bill of Materials** | Where Used | Sourcing | Costing | Files | Compliance | Revisions | Notifications | Supplier Access | Projects | Quality

Indented | Sourcing | Flat | Purchasing | Sharing | Custom | Redline | Compare | Lookup Show Costs

Contains 7 first-level Items, 60 line Items, 60 unique Items Expand All

#	Item Number	Item Name	Category	Phase	Wkg Mods	Where Used	Files	Rqmts	Qty	BOM Notes
1	060-0001 rev A	Packaging	Packaging	In Prod					1 each	
2	079-0001 rev A	Power Supply, US	Battery/Charger	In Prod					1 each	
3	079-0003 rev A	Power Adapter, USB to Car	Battery/Charger	In Prod					1 each	To be included in both the EU and US models
4	088-0003 rev A	Cable, USB A/A, Black	Cable	In Prod					1 each	
5	089-0006 rev A	Tape, Hook & Loop (Velcro), Black, 2" wide	Tape	In Prod					2 inch	To be applied to GPS by customer
6	090-0003 rev A	Documentation Package, Everyroad Model 300/500	Subassembly	In Prod					1 each	
7	100-0001 rev B	Assembly, GPS, EveryRoad Car Navigation Unit - Model 300	Product Assembly	In Prod					1 each	

Add to BOM | Add to Change | Acquest | Assign to Category

Managing Your BOM with Arena PLM BOMControl

Stories from the Real World

08

In our work with hundreds of manufacturers over the past decade, we've come to find that hearing real stories from real manufacturers is the best way to get a sense of what might work best for you and your organization. Below are several first-hand accounts of experiences with part numbering schemes, courtesy of your manufacturing peers.

One manager, involved in a merger between two companies with different part numbering schemes, decided that an intelligent scheme would help best ease the transition.

“ Luckily, the database system was capable of utilizing both [schemes], but training became the key to being able to adapt workers, buyers, accounting, sales, etc... As people in the organization were trained to work with both systems in their respective areas, they began to see more advantages of the intelligent system. The ability to search, identify, expand, and build upon the foundation of the intelligent system allowed it to be more efficient.”

The truth is, you never know what may happen in business, so choosing a nimble part numbering scheme is always a smart idea. Here is another take on why it is important to think long-term when choosing a scheme.

“ Over many years, part numbers can be duplicated for other parts thus corrupting long term databases (and confusing long term customers) so master product naming systems must be aware of older but still live parts and their naming. Sounds simple. Mix in the M&A activity, and part lists that are out-of-context with supplier or industry, and things get very messy.”

Despite the benefits of an intelligent part numbering scheme, we've heard several frustrations with the downsides of intelligent schemes.

“ I have run into numbering intelligence that ended up being wrong for the part, but it had already been shared. Correcting the number would have [unwanted] rippling effects.”

Some even feel that intelligent schemes are obsolete in today's automated world.

“ Most part numbering methods grew from the need to interject more information in a small area or field, giving the user the ability to file and locate parts quickly in a non-computer based world. Not so much of a problem today.”

“ We have too much experience with intelligent numbering systems to think they are a good approach to part numbering. Don't put intelligence in the number; use other fields to capture parameters to reflect the information you deem necessary regarding the item. Otherwise you WILL go down that rabbit hole.”

Because no one scheme can address all the issues that arise when managing part numbers, some manufacturers recommend hybrid schemes in order to get the best of both worlds.

Stories from the Real World (Cont.)

“ I think the answer lies in semi-intelligent numbering. Have high-level categories to indicate commodity, and some basic technical tenets. The rest should be included in the description. It is still good to look at a part number starting with 53—and know it’s a cable.”

The right solution ultimately depends on the company itself — its unique size, market, supply chain and operational processes.

“ In our complex world of global design, manufacturing, and business coupled with the constant change of business acquisitions and mergers, no one system will be the final answer. It’s a question of optimizing the system for what is known, some of the unknowns, but mostly for the situation at hand.”

There is no one-size-fits-all approach to part numbering, so Arena offers tools that are flexible enough to handle whatever part numbering system you choose. Whether you’re just getting started or are migrating from an existing management system, we can help you manage part numbers as part of your larger product lifecycle management solution.

7 number formats				Add Number Format	
#	Name	Field Name	Field Type	Field Details	Commands
01	Assembly 150-0001-001 <i>This number format has been used.</i>	Assembly Type	Pre-Defined Code List	4 Values	Edit, Deactivate
			Delimiter	","	Delete
		Sequence	Auto-Generated Sequence	####	Add Field
			Delimiter	","	Delete
		Major Rev Code	Free Text	max length: 3 characters	Delete
02	Discrete Components 084-0071-001	Commodity Code	Pre-Defined Code List	9 Values	Edit, Delete, Deactivate, Add Field
			Delimiter	","	Delete
		sequence	Auto-Generated Sequence	####	Add Field
			Delimiter	","	Delete
		Major Rev Code	Free Text	max length: 3 characters	Delete
03	Documents 180-0001-001	Part Type	Pre-Defined Code List	8 Values	Edit, Delete, Activate, Add Field
			Delimiter	","	Delete
		Sequence	Auto-Generated Sequence	####	Add Field

Your Arena PLM Administrator can create Number Formats to apply to various item types, creating a standard for your part numbering scheme.

Creating an Item Number << Back Cancel

083-####-001

Number Format	Discrete Components
Commodity Code	083 (Inductor) ▾
sequence	#### (This number will be auto-generated.)
Major Rev Code	001

Create Number >

Your Arena PLM Users can use the part numbering wizard to quickly create item numbers for your parts based on your previously created Number Formats.

How Arena Handles Part Numbering



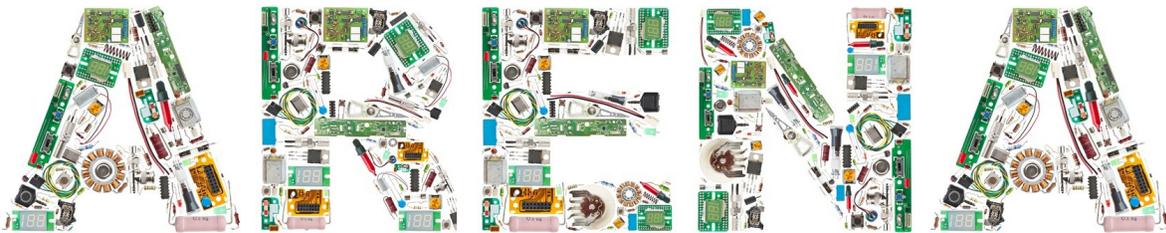
Manufacturing a product is multi-faceted: engineering changes occur, parts become obsolete, compliance requirements change, suppliers run out of stock and markets evolve. With all this activity, manufacturers need a systematic way to track, organize and share product information. And that's where Arena comes into play.

Arena PLM BOMControl

BOMControl, a cloud-based solution for bill of materials (BOM) and change management, bridges the gap between design, engineering and manufacturing with a controlled, centralized way to manage changes to product data. With up-to-the-minute accurate product information that can be accessed anytime, and from anywhere in the world, BOMControl reduces scrap, speeds time to market and makes it easy to include strategic partners, suppliers and contract manufacturers in the product development process.

BOMControl is flexible enough to support all different types of part numbering schemes. You can transfer your existing part numbering scheme or establish a new one when you get started. Part numbering schemes in BOMControl can be defined for a category or sub-category and can use formats as basic as a sequential series of numbers and as complex as a series of meaningful fields. Part numbers can contain letters and numbers and can be formatted with delimiters, spaces, hyphens and other characters.

BOMControl integrates with other systems like computer aided design (CAD), electronic design automation (EDA), product data management (PDM) and enterprise resource planning (ERP). You can minimize data entry errors by connecting BOMControl to the other tools you're using and pushing part numbers between them automatically.



Conclusion

10

As you have seen, selecting a part numbering scheme is truly one of the key strategic decisions a manufacturer must make. We hope this overview has given you some food for thought, and that you'll join the Arena community in our ongoing conversations about part numbering and other manufacturing best practices.

About Arena

Arena pioneered cloud-based PLM, Arena's suite of PLM and supply chain solutions enable engineering, manufacturing and their extended supply chains to speed prototyping, reduce scrap, streamline their supply chain, improve margins, and collapse time to market. Based in Foster City, Calif., Arena's PLM applications simplify bill of materials (BOM) and change management for organizations of all sizes, and the company has been ranked as a Top 10 PLM provider and Top 5 Supplier Collaboration solution. Arena also holds a spot on National Association for Business Resources' "San Francisco's Best & Brightest Companies to Work For" List for 2014.

Find out how Arena can help you achieve success and take your company from chaos to calm. Sign up for a demo at www.arenasolutions.com/plm-demo