Part Numbering Mayhem in a Fractured Supply Chain

A White Paper by Peter and Eric Green

Introduction

It used to be simple. You always purchased Widgets from Widget Company and so you used their part numbers as your internal part numbers.

When they moved production from Ohio to China delivery times increased but you compensated by stocking more Widgets so you could quickly respond to your customers needs. Then came the long total Covid shutdown of manufacturing in China, followed by the increasing hostility between the USA and China, Tariffs, and the current movement of Widget Company production to Vietnam, with final assembly in Mexico.

Now availability of Widgets from Widget Company has become highly problematic and you have to buy Widgets, as available, from several of Widget Company's competitors, all of which use their own part numbers, which are different from what you used to use.

Now you are confronted with part numbering mayhem, as you are receiving interchangeable but not identical parts from different suppliers with different part numbers, which can cause major problems in your manufacturing and distribution operations.

In this white paper we examine the part numbering issues that have arisen from fracturing of the supply chain and how to fix them.

Issues and Fixes

If you use the supplier part numbers for each Widget that you receive, you will have different part numbers for the same part. This creates mayhem with order picking, with Bills of Materials (BOMs) used to make your products or to make-up kits in your warehouse, and with the Materials Resource Planning algorithms used by your ERP systems.

The solution to this is to use your own internal part numbers and then maintain a conversion table from external supplier numbers to your own internal part numbers. The internal part numbers are then used when converting from Purchase Requisitions, in internal part numbers, to Purchase Orders sent to suppliers, in supplier part numbers.

Complexity arises when parts cannot be ordered in unit quantities. For example, Widgets can only be ordered from some suppliers in multi-unit packs. As a result, we also have to store a quantity translation for each part for each supplier. Thus, if we want to order 3 Widgets but they only come in packs of 4, we have to convert the purchase requisition for 3 widgets to an order for 4 widgets.

We see this complexity reflected in UPC/GTIN barcode labels on product packaging where different UPC/GTIN (Global Trade Identification Numbers) are used for packaging containing different numbers of each unit product.

Complexity also arises where products purchased from an alternate supplier are not identical to the original units they replace. They have the same geometric fit and perform the same function but might, for example, have a different temperature range or, if they are reels of wire, come with a different length of wire on the reel. We could assign a different part number for parts having a different temperature range or for each length but then we are back into the same problem of using different part numbers for what is essentially the same part.

When receiving parts, each part or container of parts will typically be labeled with the supplier's markings and part numbers. These supplier part numbers need to be translated into internal part numbers and the quantities translated from the quantity of external part numbers received to the quantity in internal part numbers.

This can be done manually by the receiving person but this is an error prone process but is best done by a material tracking system, such as BellHawk, which automates this translation process.

Special characteristics of the received products may also need to be captured at time of receipt, for example temperature range or length of wire on a spool. If these are a characteristic associated with a specific supplier's part number they can be stored in the part-number translation table and associated with the received products. Otherwise, they can be captured at time of receipt.

Parts, with the same internal part number, may have different characteristics, which limit their application in different situations. For example, a Widget with a high temperature rating may be required for a high temperature application. Also, a reel with 100 feet of wire is unsuitable for an application where I need 150 feet of continuous wire.

For this reason, we put a tracking barcode on each part, or container of parts (including reels, rolls, and spools) as they are received, and then track that container or part separately from all the other containers or parts with the same part number.

We then record the part number, quantity, and special characteristics in a containers table in the materials tracking database of a materials tracking system such as BellHawk. This includes tracking lot and serial numbers and expiration dates, where appropriate.

This enables interchangeable parts from different suppliers to have a common internal part number, but where needed, parts with different characteristics can be selected for a specific application. This includes selecting parts with the same lot number, for color matching and the like.

This also applies where interchangeable, but not identical parts, with different characteristics available from the same supplier.

With container-based tracking we can also track the supplier for each part of container of parts, and who the manufacturer was. This enables users of a materials tracking and traceability system like BellHawk to track product defects back to each specific supplier and manufacturer whose parts went into each defective unit.

We can have bills of materials that do not depend on supplier part numbers. As a result of which, we can make materials purchasing decision and do production planning based on a common set of internal part numbers.

Imagine the mayhem if we had to do our inventory and production planning based on the seemingly-random time-varying availability of specific supplier parts from fractured supply chains. Instead, we can run our internal operations based on internal part numbers and constrain the part number mayhem to the materials purchasing process.

Choosing an Internal Part Numbering Scheme

You could continue to use the part numbers you have been using all along but this gets confusing if you have been using a specific supplier's part numbers as your internal part numbers for parts that may have many external part numbers. Also, if you have been following this practice for many parts from multiple suppliers you will probably have a real "hodge-podge" of part number formats.

It may be worthwhile, as you move into a world where each of your raw materials may come from multiple suppliers, to rationalize your part number structure.

We, the authors, are in favor of part numbers that are easy to recognize, such as WID100B for blue 100 mm widgets. These are easy for production and warehouse personnel to remember and recognize, thus helping prevent mistakes,

We are not in favor or numeric part numbers, such as 56423, or categorized numeric part numbers, such as 45.646.3443 which are hard to remember and can easily lead to mistakes.

Each easily recognizable internal part number can then be translated by your materials tracking system into a wide-range of different external part numbers, which may be hard to read accurately, let alone remember.

Another issue to address is part-number explosion in which organizations unnecessarily use a large number of internal part numbers. We had one client who was using a separate part number for every half-inch increment in the width of rolls of paper they used. We changed them over to use a single part number for all the rolls of a specific type of paper with the width of each individual roll recorded in the containers table based on the tracking barcode attached to the roll.

This was appropriate as they could use similar rolls of paper interchangeably, subject to the limitation that certain printing jobs required at least a specific width.

This also enabled the total inventory for all these paper rolls to be recorded in their ERP system in pounds against a single item master part number.

We see many instances where the internal part number set can be reduced to a manageable size by limiting the part numbers to interchangeable parts, through the use of characteristics and container-based tracking, even when these parts are not identical.

Commentary

One area where we get "push-back" against using common internal part numbers is that an organization's ERP or accounting systems does not have the capability of translating from external to internal part numbers, at time of receiving. Nor does it have the ability to individually track parts or containers of parts in some form of a containers table.

The answer to this is that ERP systems are basically accounting systems, which capture the value of inventory over time. They are not materials tracking systems.

To be able to effectively track parts from a variety of suppliers using common internal part numbers then you need to use a container-based material tracking system such as BellHawk, automatically exchanging inventory and accounts receivable data with your ERP system.

Also, specifying a good internal parts numbering scheme is as much an art as it is a science. This is an area where KnarrTek's experts can assists industrial clients, based on their many years of experience with a wide-range of industrial applications.

Authors

Peter Green

Dr. Peter Green serves as the Technical Director of KnarrTek Inc. Dr Green obtained his BSC (Hons) in Electrical Engineering and his Ph.D. Degrees in Electronics and Computer Science from Leeds University in England. Subsequently Dr. Green was a senior member of technical staff at Massachusetts Institute of Technology and a Professor of Computer Engineering at Worcester Polytechnic Institute.

Dr Green is a Systems Architect who is an expert in using real-time artificial intelligence methods to implement real-time Inventory Tracking and Operations Management systems for Industrial Organizations. He has led the implementation of over 100 such systems over the past decade. Dr Green also led the team which developed the BellHawk job and materials tracking software, the MilramX intelligent information integration software platform, and the KnarrOps EDS software platform.

Eric Green

Eric Green serves as the Director of Support of KnarrTek Inc. Eric Green obtained is bachelor's degree from UMASS Dartmouth in Operations Management and Management Information Systems. Eric has been a part of 40 plus implementations of operations management systems over his 8 years of experience in this field. This includes receiving, production, inventory management, shipping, order management, as well as integrations with a number of ERP systems and a range of different manufacturing equipment.

For further discussion, or to send comments, please contact peter.green@KnarrTek.com or eric.green@knarrTek.com.

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