VALOGIX®

Experience the power of value-based inventory planning

What is Service Parts Planning?

Explaining the concepts behind

VALOGIX® Parts Planner

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Foreword

In today's uncertain business climate, managers look for simple ways to reduce waste and improve profitability. New initiatives must be inexpensive, quick, and have a high return.

Service parts inventory management is a prime candidate. With many parts to manage and a lack of power tools, most companies with parts inventories have too many of the wrong parts. The result is unnecessary inventory expense, while still suffering service-limiting stock-outs.

Manual efforts to improve this situation fail, because of the time-intensive nature of the problem. A large number of parts, each with special considerations, quickly bog down someone trying to improve the parts purchases.

In the last five years, software products with scientific service parts planning capabilities have emerged. These powerful tools have proven successful at lowering inventory 20-40%, while *increasing* service levels. Until now, all of these software products targeted Fortune 500 companies. Besides being very expensive—costing hundreds of thousands of dollars or more—they are complex and require highly skilled planners to operate.

Valogix is a software company started in 2001 with the mission of bringing powerful enabling technology for spare parts planning to small and medium businesses. We are meeting the challenge of making effective forecasting, inventory planning, and the purchase of planning software available at low cost and with simple operational procedures.

This white paper describes our view of parts planning issues and how our **VALOGIX® Parts Planner** product satisfies these challenges.

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Table of Contents

1. Service Parts Planning Concepts

This section provides the concepts and terms needed to understand our parts planning approach.

Inventory management comes in three different flavors.

Many software suites come with "inventory management or inventory control" modules. These are not equivalent; they depend very much on the problem area they serve. Figure 1-1 shows there are three main classes of inventory management applications.

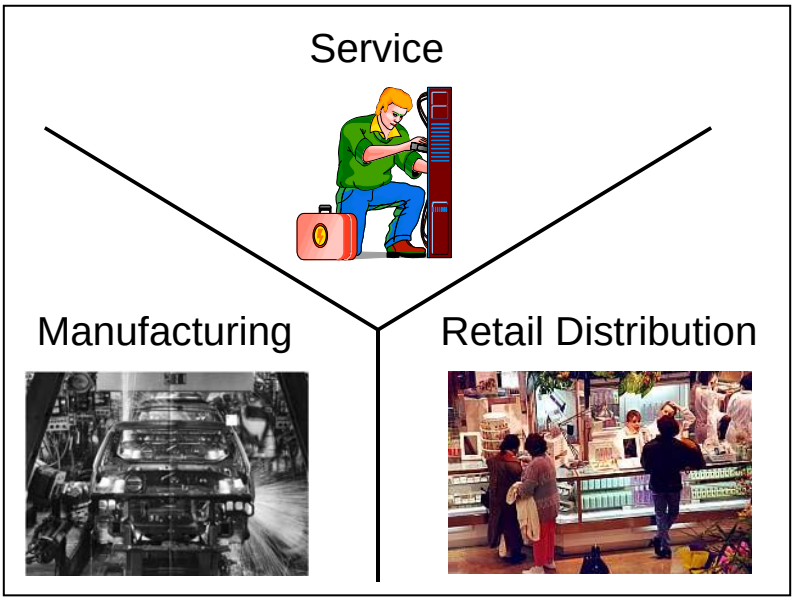

Fig. 1-1. Inventory management differs considerably in manufacturing, retail distribution, and service applications.

In all three cases, there is a common need to make sure materials or finished goods are in stock when needed. Each has uncertainties handled by specialized forecasting calculations.

Manufacturing

Manufacturers control the flow of materials to provide for smooth, uninterrupted flow along the production lines. Usually the lines produce a small number of items. Likewise, there tends to be a limited number of materials, but these must be obtained in large quantities. Techniques to reduce inventory with "just-in-time" deliveries include Material Requirements Planning (MRP) software, kanban-based "pull" systems, and advanced planning and scheduling (APS) software.

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APS systems plan both the production and the materials flow together, so that actual orders and forecasted customer demands are satisfied while maintaining a just-in-time inventory strategy.

Retail distribution

Retail distribution handles finished goods that the retailers think will sell. There are usually a very large number of different products, particularly with distinctions such as size, color, and style. Demand can be reasonably steady, as with food and hardware or highly seasonal, as with clothes. For steady demand items, retailers tend to set an order point and order quantity. For example, whenever the number of an item in stock goes below 3, order 12 more. A technique called Distribution Resource Planning (DRP) was developed in the early 1970's for the retail environment. It combines field-level demands to determine demand at regional and central warehouses.

For seasonal items, retailers usually buy the items from suppliers before the season, and there is seldom a chance for replenishing stocks mid-season if the item is a big seller. Experienced fashion buyers earn their salaries by predicting what items will sell in what quantities in a region and even by store.

Aftermarket Service

Service covers the maintenance and repair of equipment and machinery. For example, automobiles need routine oil changes and tune-ups as well as repair after accidents or a mechanical failure. Service actions depend upon replacement parts for worn or broken components. Unlike just-in-time manufacturing parts, service parts must be stocked "just-in-case" they are needed. Like retail distribution items, there tend to be a large number of different service parts needed to cover support of many different types of equipment produced over many years. Moreover, these parts are needed in very low quantities. For example, a major car manufacturer reported that over 90% of their service parts have usage rates of less than one unit per month. Special forecasting algorithms can predict service parts requirements based on past history of part usage.

This white paper describes special decision support software required to forecast service parts demand and to maintain adequate, but not excessive inventories of service parts.

Service parts planning divides into aftermarket service and MRO

The term “aftermarket service” applies to the activity of maintaining or enhancing equipment or machinery used by a *different* organization. “MRO” refers to the same kind of activity, but accomplished by the *same* organization as the one using the equipment. Figure two shows a breakdown of these two categories.

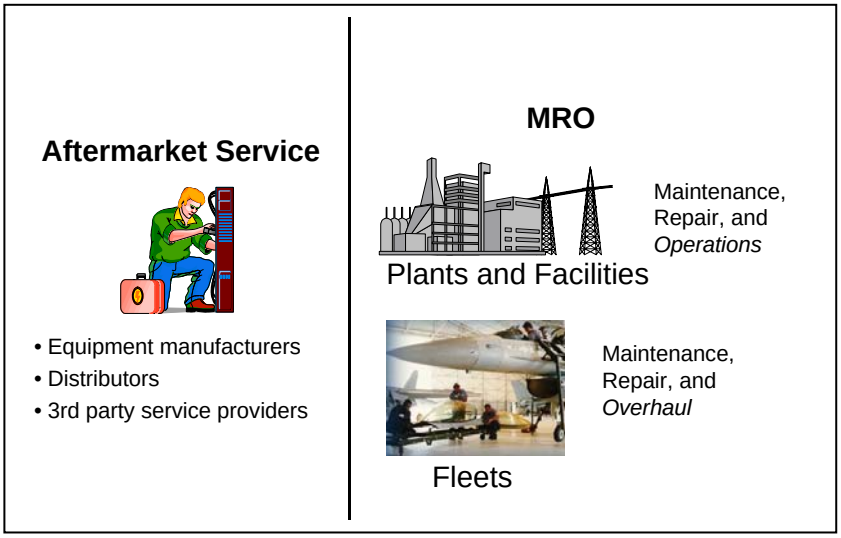

Fig. 1-2.

Aftermarket service

Aftermarket service can be performed by the organization selling the equipment to the end user (manufacturer or distributors or retail outlet), or by 3rd party service providers. For example, a Ford car can be serviced by a local Ford dealer or by a local garage or by a franchised muffler, brake, or tire center. In any case, the service organization tries to keep commonly needed parts on hand, while making sure parts with little demand can be obtained quickly when needed from an off-site location.

Another class of organization involved with aftermarket parts is the parts distributor. This company sells parts to individuals and service organizations, rather than performing the service that uses the parts.

MRO

The “MRO” acronym has two different spell-outs, depending on the situation. Organizations like electricity utilities and manufacturers with large, complex plants need to keep the facilities in good repair. This activity is called “Maintenance, Repair, and Operations.” Organizations with fleets of transportation equipment (planes, railroad cars, trucks, or automobiles) need “Maintenance, Repair, and Overhaul” service to keep this equipment in good working order. Common usage refers to the parts used for MRO as “spare parts,” rather than “service parts.”

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Inventory management objectives

These different types of organizations have somewhat different objectives in their service parts management. In aftermarket service, the primary objective is to fix broken equipment quickly to maintain the customer's confidence for future sales (and continuing service sales). This requires having the parts in stock for the service action.

For MRO and some aftermarket service situations with stringent service level agreements, the primary objective is to make sure all critical (also called “essential”) parts needed for the end equipment to operate are on hand. Other parts can be backordered if necessary. For example, a CAT scanner might be sold with a service level agreement to fix any problem within 4 hours so the hospital using it can continue to serve patients. A fuse may be essential for operating the equipment, but the plastic cap on a control box may crack with no loss in function. Hence, the fuse must be stocked locally to assure the 4-hour repair time limit.

Finally, the objective with aftermarket parts distributors is to make sure they maximize profitability of the parts sold. Thus, out-of-stock items, leading to lost sales, should either have a low margin or a low demand.

Multi-location planning adds complexity.

Single location situation

In the simple case, there is a single stocking location (stockroom or warehouse) supporting the service organization, as shown in Figure 1-3.

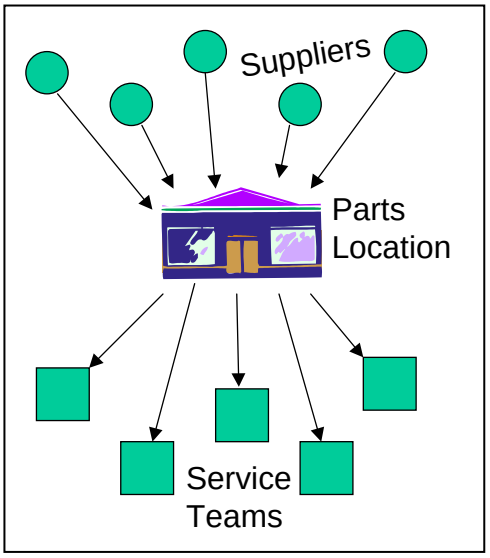


Fig. 1-3. In the simple case, there is only one service parts stocking location.

A planner (perhaps the owner or a manager) at this location determines what parts to stock in what quantities and places orders with suppliers to obtain the parts. Service teams then requisition the parts they need from the stockroom or warehouse.

Most single-location service organizations work with a reorder point/reorder quantity inventory management scheme. When current inventory dips below the reorder point, they place an order for the amount set by the reorder quantity. With no tools to set these numbers, they tend to be static. Over time the lack of connection between the order points and order quantities with current usage patterns leads to two problems:
(1) Parts with declining usage are over-stocked. Much more capital is tied up in those parts inventories than needed, and many of the parts will become obsolete.
(2) Parts with increasing usage are under-stocked. Stock-outs are common, leading to delays in service.

Multi-echelon planning

Organizations with large service operations work with multiple levels of supply. Central sites purchase and stock most of the parts. Slow-moving and less important parts can be sent quickly to field sites when needed, while fast-moving parts are stored in the field to enable most service actions to proceed without delay. In many cases, a second level of warehousing occurs on a regional basis, as shown in Figure 1-4.

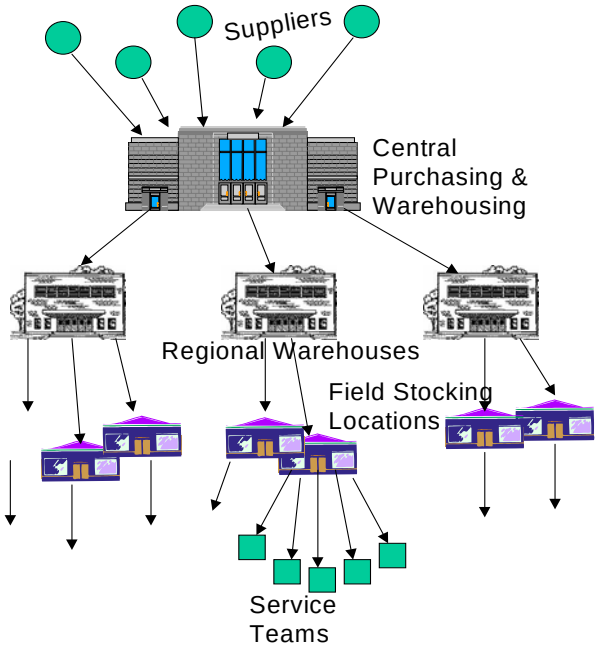


Fig. 1-4. This example 3-level service parts supply chain illustrates how large organizations combine central and local parts stocking.

Advantages of this “multi-echelon” service parts supply chain include:

- Consolidating inventory reduces the quantity required
- Consolidating purchasing gives greater leverage to obtain discounts from suppliers

However, multi-echelon planning brings considerable complication. How much of a particular part should be stocked at each location? How should we support transfers of parts from one field location to another? If a part is on short supply, how should we allocate it down from the central warehouse to field locations?

Service parts have an important life cycle

Figure 1-5 shows the important milestones in a part’s life cycle. This section examines how those milestones impact parts planning.

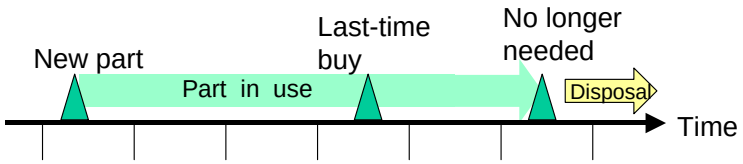


Fig. 1-5. The part life cycle has a high impact on inventory planning.

New part

New parts usually show up when a new demand is recorded by the transaction processing system. With no history of usage, there is no data to create an automatic forecast. Someone must decide how to project a usage forecast for at least a few months. After a few months of experience, usage history should guide an automatic forecast.

Part in use

The period that the part is active and stocked can be very long—perhaps ten to fifty years! Usually there is a ramp up in usage as more equipment using the part enters the field. Then, as the equipment ages and more modern parts supersede this one, usage of the part declines. Usage trends change over time—sometimes rather rapidly—so it is important that part ordering strategies recognize these changes.

Last-time buy

While well into the active period, the part supplier may notify the service organization that the part is being discontinued. The supplier then indicates the last date that the part can be ordered. This stimulates an analysis to decide how to handle the problem. Is there an alternate supplier? Can parts be cannibalized from other equipment going out of service? Is repair of failed parts a sufficient source? If all else fails, the service organization has to order a large number of last-time-buy parts to satisfy anticipated needs for the rest of the period the part will be needed.

Obsolescent date

There are two ways a part can become obsolete. There may be an engineering change to the equipment that uses the part, so that another part supersedes this one on a given date. The other possibility is that all the equipment using this part either goes out of service or goes off vendor support as of a given date. Obsolete inventory represents wasted investment. By tracking when there is an excess of parts or when parts are likely to become obsolete, steps can be taken to avoid over-ordering to sell parts while they still have some worth.

Tracking repairs complicates planning.

Expensive parts may be much cheaper to repair than to throw away and buy new. However, repair adds complications that are important to recognize and deal with:

- Repaired parts may have a separate item code (sometimes called the “stock keeping unit) to distinguish from the corresponding new part.
- Need to track how many failed parts are in inventory that could be sent to a repair center.
- Meet demands with repairs first, only ordering more expensive new parts when no repairable failed parts are available.
- If demand is low and we have many failed units in stock, wait to repair them until they will be needed.
- Some failed parts will be too broken to fix, so we need to consider a yield rate with our repair orders. For example, if we have a 90% yield rate, then we will have to send 10 parts out for repair, on average, to get back 9 good ones.

These repair concerns are difficult to handle manually, so it is important for a parts planning software product to handle them automatically.

2. Valogix Solutions

There are a number of modern service parts planning software packages available on the market. Designed for use by very large companies, they cost hundreds of thousands of dollars. They are both too expensive to be cost effective and overly complex for small and medium businesses.

Valogix is a software company started in 2001 with the mission of providing intelligent parts forecasting and planning software to small and medium businesses. The founders' team has a combined experience base of over 100+ years in service parts planning algorithms and software. Primary objectives are to provide decision support software products that result in the following:

- Owners, service managers, and others not particularly experienced in inventory management should obtain excellent results with little training.
- Inventory planning and order placement should require little time from the user.
- The results should minimize inventory investment while satisfying the user's service objectives.
- Cost of purchase and operation of Valogix software is much lower than other products on the market.

VALOGIX Parts Planner SE plans for a single stocking location.

VALOGIX Parts Planner SE provides the forecasting, inventory planning, and ordering support necessary for a single parts stocking location. By limiting to a single location, Valogix was able to maximize simplicity of operation. It is particularly easy for managers and other personnel to use on an intermittent and relatively unskilled basis.

Valogix supports multi-echelon supply networks.

VALOGIX® *MultiLink* plans multi-level/multi-location networks for larger companies who have complex parts distribution networks. Covering a more complex situation, it is used primarily by people who spend a considerable amount of their time planning parts.

In some cases both products will be useful. For example, a tire company may use VALOGIX Multi*Link* for deciding how to stock aftermarket tires in its distribution network, while individual franchise dealers will use VALOGIX Parts Planner to decide what to keep in stock at their stores.

3. Decision Support by VALOGIX Parts Planner

VALOGIX Parts Planner approach

VALOGIX Parts Planner uses relational data base and operations research technologies to plan accurately, while minimizing the burden on you. It has five major components, as shown in Figure 3-1.

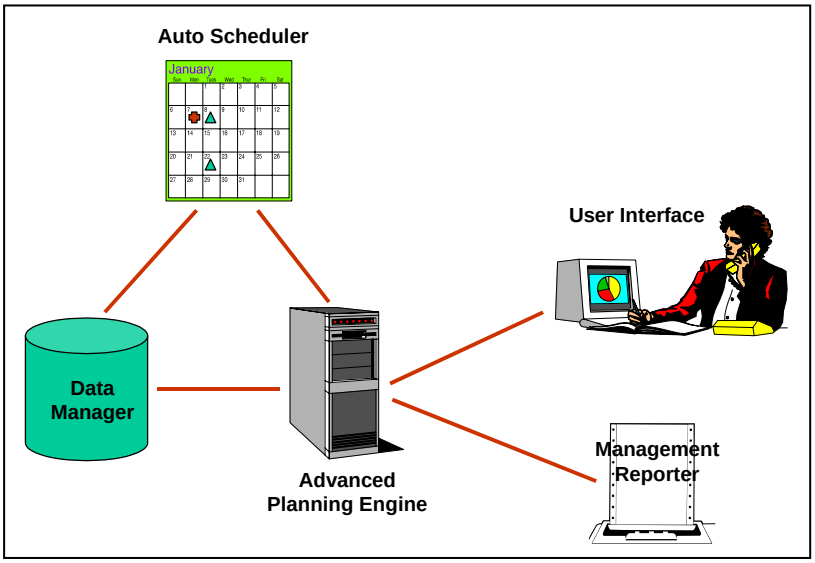


Fig. 3-1 VALOGIX Parts Planner's five major components combine to help you plan your parts effectively and easily.

Advanced Planning Engine

The heart of VALOGIX Parts Planner is the VALOGIX® Accurate Planning Engine. Based on historical parts usage, it forecasts expected demand for each part, by month. Then it computes "service quantities" that guide ordering recommendations. Given the latest inventory positions, it calculates recommended replenishment orders for the parts that are getting low. While undertaking these calculations, it picks out special situations to alert the planners.

Finally, it forecasts time-phased plans for orders in the future, enabling predictions of cash outlays for inventory.

Data Manager

VALOGIX Parts Planner's internal Data Manager organizes the information needed by the Valogix Accurate Planning Engine in relational data base format. This information consists of part, vendor, part usage,

and inventory status data obtained from your company's transaction systems. Data Manager also organizes the Valogix Accurate Planning Engine's results, including forecasts, service quantities, ordering recommendations, and alerts.

To help set up the transaction processing system interfaces, Valogix has pre-programmed them for some popular enterprise systems aimed at the small and medium business market.

Auto Scheduler

The Auto Scheduler organizes the batch runs needed to communicate data between your company transaction systems and the Data Manager and to perform the VALOGIX Accurate Planning Engine computations. These runs perform extensive logic and may take many minutes to complete. Rather than make you manually invoke processes and wait for the results, the Auto Scheduler lets you set up the timing of each run for periods (such as overnight) when you don't want to use the personal computer for other work. You have substantial flexibility in setting up your practices of which batch runs to execute when.

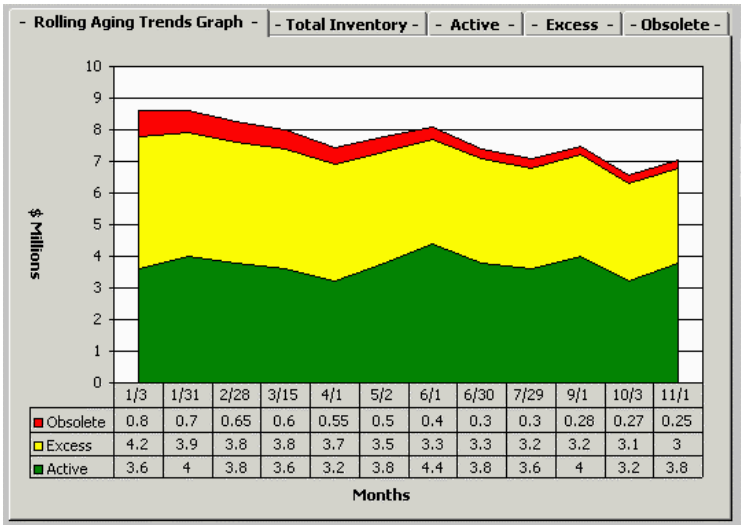
User Interface

The VALOGIX Parts Planner User Interface gives you the visibility you need, while minimizing the work you need to do. It gives you a list of "alerts" requiring your attention, so you don't have to wade through a listing of every part to find problems, like the poor fellow in Figure 3-2.

Fig. 3-2 You should not have to wade through stacks of part listings to find the problems needing your attention!

Management Reports

VALOGIX Parts Planner gives you management reports indicating your success in managing the entire parts inventory. Figure 3-3 shows an example: the "Inventory Aging" report in graphic form.



	1/3	1/31	2/28	3/15	4/1	5/2	6/1	6/30	7/29	9/1	10/3	11/1
Obsolete	0.8	0.7	0.65	0.6	0.55	0.5	0.4	0.3	0.3	0.28	0.27	0.25
Excess	4.2	3.9	3.8	3.8	3.7	3.5	3.3	3.3	3.2	3.2	3.1	3
Active	3.6	4	3.8	3.6	3.2	3.8	4.4	3.8	3.6	4	3.2	3.8

Fig. 3-3 Inventory Aging Graph

This graph shows the inventory value of active parts in green, "excess" (for example, amount beyond a one-year supply) in yellow, and obsolete (no demand over the last year) parts in red. Over time, the VALOGIX Parts Planner tool and management attention should help you decrease the excess and obsolete quantities. You can get lists of active, excess, and obsolete parts by clicking on their tabs at the top right. The lists help you engage in a campaign to eliminate these parts.

How You Plan with VALOGIX Parts Planner

Once the software has been installed and the data base initialized, you work with the system in a monthly update cycle and a more frequent order planning activity as shown in Figure 3-4.

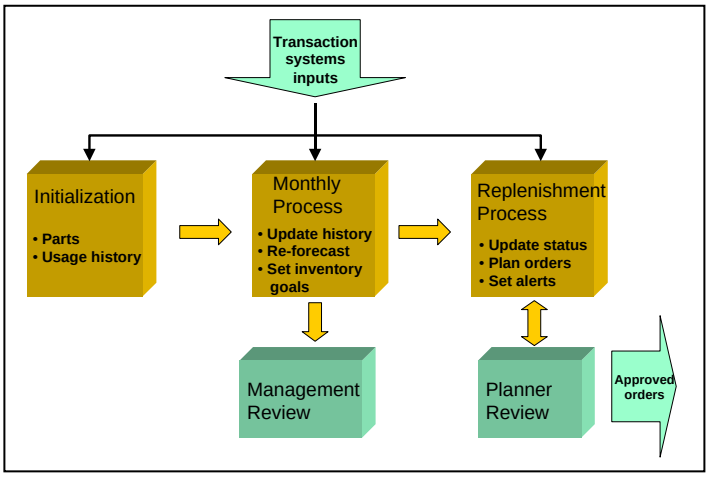


Fig. 3-4 Most work with VALOGIX Parts Planner occurs in a monthly update cycle and the periodic replenishment (ordering) activity.

Initialization

After you install the VALOGIX Parts Planner software, you need to initialize the data base of parts and history of parts usage. This is done by creating interface files in a format we supply, based on information you have today in planning spreadsheets or in your transaction systems.

Monthly update cycle

The monthly cycle starts by extending history information with an update of parts usage from the previous month. Then it updates the forecast, based on this new history. Finally, it re-calculates the ideal inventory levels, known as stocking quantities. All of these computations are automated batch processes involving the Data Manager and Advanced Planning Engine.

The data needed to update history one month must be available from the company's transaction systems in the right format. Generally there will be automatic integrations with your company transaction systems to collect their data. These monthly updates usually occur some time early in the next month.

Order planning activity

The order planning activity can occur at any desired frequency between daily and monthly. Ordinarily it happens either daily, weekly, or every two weeks. Updating part status, generating alerts, and planning part orders are automated batch processes. Once these processes execute (usually overnight), you or your planners interact with the system to resolve alerts and to decide actual order quantities. At your command, the system exports your approved orders in another batch process.

Management review

From time to time, the local operations manager or owner and perhaps the CFO or accountant will want to see what is happening to the service parts inventory over time. Questions include:

- Is our inventory going up or down over time?
- Do we have "dead" stock (excess and obsolete) to dispose of?
- Are we continuing to improve our parts inventory management so that we get closer to the ideal level?

Management-oriented reports such as the one shown in Figure 3-3 help determine how the inventory improvements are proceeding.

VALOGIX Parts Planner's operation minimizes planning effort.

Here are some of the ways VALOGIX Parts Planner saves planning effort:

Automatic assembly of the planning data

The data manager batch processes take care of putting all the new information on history and status into a form immediately useful for the automated planning. This is much easier than handling the Excel spreadsheets typically used by planners. Spreadsheets require manual manipulations to compile the new data with the old. Being a very error prone operation, many hours go into checking the data and then coming out with the ordering numbers.

Pointing out problem situations needing attention

The alert lists help you focus attention on those special part situations (spike in demand, stock-outs, etc.) that deserve your attention. You should find out if a demand spike is a true indicator of rapidly increasing usage, or a one-time need to satisfy an equipment installation or upgrade program. How can you obtain parts quickly to resolve a stock-out or backorder situation? Double clicking on the part number gives you all of the information about the part, so it is easy for you to research the reasons for the alert. Without such alerts, it is extremely difficult to look through a listing of all parts and make sure you are encountering all the ones that deserve your attention. Moreover, lack of a tool like VALOGIX Parts Planner makes it difficult for you to get sufficient background on the part to make an intelligent decision of what to do with the problem situation.

Optimizing the inventory levels

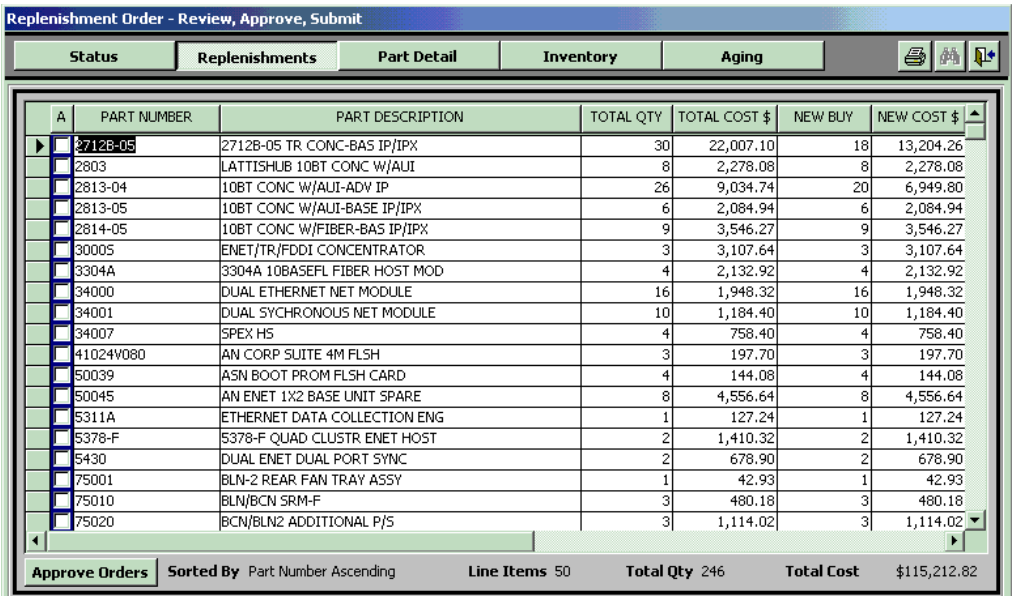
The Valogix Accurate Planning Engine computes forecasts, stocking quantities, and order quantities with sophisticated business rules developed from years of experience with service parts operations in many industries. These rules account for more factors than you could consider with manual planning and result in "just enough" inventory for each part.

Reviewing planned orders

The system calculates optimal planned orders. Then it lets you review the orders and make manual changes to the quantities, followed by export of the approved list to an Excel spreadsheet or your purchasing system.

As shown in Figure 3-5, you can change the order quantity for any of the planned orders, and then approve all or a subset of the orders for export.

This could be done by a spreadsheet, but the approach here is much easier and quicker for you to work through.



A	PART NUMBER	PART DESCRIPTION	TOTAL QTY	TOTAL COST $	NEW BUY	NEW COST $
	2712B-05	2712B-05 TR CONC-BAS IP/IPX	30	22,007.10	18	13,204.26
	2803	LATTISHUB 10BT CONC W/AUI	8	2,278.08	8	2,278.08
	2813-04	10BT CONC W/AUI-ADV IP	26	9,034.74	20	6,949.80
	2813-05	10BT CONC W/AUI-BASE IP/IPX	6	2,084.94	6	2,084.94
	2814-05	10BT CONC W/FIBER-BAS IP/IPX	9	3,546.27	9	3,546.27
	30005	ENET/TR/FDDI CONCENTRATOR	3	3,107.64	3	3,107.64
	3304A	3304A 10BASEFL FIBER HOST MOD	4	2,132.92	4	2,132.92
	34000	DUAL ETHERNET NET MODULE	16	1,948.32	16	1,948.32
	34001	DUAL SYCHRONOUS NET MODULE	10	1,184.40	10	1,184.40
	34007	SPEX HS	4	758.40	4	758.40
	41024W080	AN CORP SUITE 4M FLSH	3	197.70	3	197.70
	50039	ASN BOOT PROM FLSH CARD	4	144.08	4	144.08
	50045	AN ENET 1X2 BASE UNIT SPARE	8	4,556.64	8	4,556.64
	5311A	ETHERNET DATA COLLECTION ENG	1	127.24	1	127.24
	5378-F	5378-F QUAD CLUSTR ENET HOST	2	1,410.32	2	1,410.32
	5430	DUAL ENET DUAL PORT SYNC	2	678.90	2	678.90
	75001	BLN-2 REAR FAN TRAY ASSY	1	42.93	1	42.93
	75010	BLN/BCN SRM-F	3	480.18	3	480.18
	75020	BCN/BLN2 ADDITIONAL P/S	3	1,114.02	3	1,114.02

Figure 3-5. The VALOGIX Parts Planner replenishment display lets you modify system-planned orders and then approve them for export.

4. Modern Parts Planning with VALOGIX Parts Planner

In summary, VALOGIX Parts Planner is the *only* product that has this set of capabilities:

- Scientific parts planning based on part usage histories
- Results of 20-40% reduction in inventory levels while maintaining or improving service objectives
- Inexpensive pricing, so that a relatively small organization can take advantage of it
- Easy to use; no professional inventory planner required
- Minimal integration issues with transaction systems, especially for systems using Valogix pre-programmed interfaces
- Developed and sold by experience professionals with over 150 years combined experience in service parts and logistics.

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