Maintenance Systems:

RFID Applications to Service Parts Inventory Management (Part I)

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Perhaps one of the most promising areas for application of the EPCglobal Network and RFID technology involves service parts inventory management. Often associated with high value items such as critical components for aircraft or computers, service parts inventory management plays an important role in providing maintenance support once various machines leave the manufacturing facility and become operational in the field.

Though manufacturers have focused a great deal of emphasis on increasing reliability, there continues to be a need to stock service parts in the event of a product failure. To limit machine downtime, many suppliers have a policy that

guarantees extremely high service levels, making parts available almost all of the time. For example, leading companies like Caterpillar ship 99.7% of parts ordered within one day to virtually any area of the world where their equipment is in use.

From a practical standpoint, the information needed to do an accurate forecast is often unavailable. The EPCglobal Network along with RFID technology holds the promise of new ways to generate information for improving service parts forecasting. This is especially the case when there is a known installed base of machinery and formal maintenance agreements exist to provide service parts when machine failures occur.

CRITICAL BUSINESS ISSUES

Most businesses that deal in the service parts inventory management area face several important operational issues. These most commonly include:

— **High Inventory Cost, Low Service Level** - Without adequate information and mathematical models to predict failure rates, the turn rate for inventory is often low along with unacceptable service levels.

- High Scrap Rate Because of obsolescence – Especially in the computing industry, extremely short product life cycles make it risky to carry inventory.

- High transportation costs – Since service parts inventory often supports critical capital equipment, rush shipments sometimes occur to reduce downtime. This typically involves expensive airfreight.

These three issues typically produced downward pressure on operating margin for service parts providers. In addition, capital equipment buyers must pay higher prices for service parts because of systemic inefficiencies.

INVENTORY PLANNING

Safety stock for service parts is usually determined based on historical demand. In many cases, the forecast is simply the actual demand that occurred for the previous month. With this approach, it is nearly impossible to make trade-offs between cost and service.

Most would accept that traditional time-series methods for calculating forecast demand, and in turn optimal inventory levels, do not work for service parts

because the demand is "sparse." This means that demand is often zero for many periods. In this case, specialized models are needed to predict service parts demand and make important trade-offs. METRIC developed by the RAND Corporation and used by the Air Force, is an example of this type of advanced modeling capability.

RFID ENHANCEMENTS

Though there are few current applications of RFID in service parts inventory management, several opportunities exist to apply the technology.   These include:

    1. Monitoring – Perhaps the most important aspect of RFID related to service parts inventory management is the capability of monitoring the installed base and program usage within computer facilities or for capital equipment. Given the lack of information in these areas along with the high value of service parts, monitoring will almost certainly reduce the amount of service parts needed to achieve target service levels.

Assuming that critical components contain RFID tags, either applied externally or integrated into the electronics, there are two basic ways of monitoring the

installed base, intermittent or continuous. First, a technician could manually scan machines with an RFID reader to gain an accurate understanding of the installed base of components. This is essential information for projecting the number of probable failures for a span of time, thus improving the forecast. With a better forecast, the proper amount of inventory to meet a specific service level can be reserved.

A second way of monitoring involves a continuous scan of the installed base using readers that are permanently fixed in the customer's facility. Besides confirmation of the installed base, sensors could be added that would monitor such variables as electric current draw to determine the time of usage for a component and confirm it is operational.

Both methods, intermittent or continuous monitoring, allow the service parts supplier a means of linking directly to the customer with the longer-term prospect of gaining real-time information about critical components. The EPCglobal Network and its ability to organize serial numbers to achieve unique identification will serve an important role in enabling this link so that specific information can be gathered for an individual component.

2. <u>Repair Operations</u> – Beyond ability to gather information about the installed base and program usage, the EPCglobal Network and RFID technology also has potential to redefine repair operations in terms of productivity. Often customers return high value, non-functional components to a central facility for repair. After the repair work is completed, these components then re-enter the inventory of service parts for future use.

Attaching a RFID tag to each component before shipping to a central repair facility would greatly improve the process of tracking. There are anecdotal accounts where considerable productivity can be achieved from knowing the precise location of high value components moving through the supply chain and within repair facilities.

An unexplored area, the application of RFID to service parts inventory management represents a new opportunity to enhance productivity advances for both business and military applications. With a basic technology like RFID and the EPCglobal Network, the only limitation is the ingenuity of engineers and managers who must deal with day-to-day management of service parts inventory. Leading companies such as Boeing are beginning to implement

RFID for service parts inventory management. Within ten years, the application

of RFID in this area will become common practice.