



## **MATERIAL FORECASTING AND REPLENISHMENT**

The purpose of this section is to present how Harley-Davidson develops and communicates its material forecasts as well as to define Harley-Davidson's material replenishment process. Harley-Davidson defines material replenishment as the process used to reorder regularly stocked products. It includes identification of a need for material or components, communication of the need to the supplier, and fulfillment of the need by the supplier. This section does not focus on, but does briefly discuss, the ordering of products using discrete purchase orders with specific quantities and delivery/shipment dates. Rather, this section concentrates on material replenishment that involves placing releases against an existing Harley-Davidson blanket purchase order.

Use of the material replenishment process, as described in this section, is most prevalent within OE Purchasing where virtually all production materials and components are reordered using blanket purchase orders. MRO uses the material replenishment process for a limited number of commonly and frequently used products. Parts and Accessories (P&A) and General Merchandise (GM) utilize discrete purchase orders with specific quantities and dates. Currently, P&A and GM seldom, if ever, use a blanket purchase order to procure products.

This section has been divided into the following subject areas:

- Harley-Davidson's Just In Time Environment
- Requirements Forecasting and Communication
- Material Replenishment Process
- Communication of Shipment / Delivery Schedules

### **Harley-Davidson's Just In Time Environment**

Harley-Davidson operates in a Just-In-Time (JIT) environment that strives toward the goal of eliminating waste and solving problems throughout the supply chain. Many believe JIT is just about reducing inventory levels. Although inventory reduction is a highly regarded benefit, it is only a portion of the goals that can be realized. The real goal of JIT is to facilitate supply chain excellence.

Some of Harley-Davidson's specific JIT goals are:

- Reduction of inventory within the entire supply chain
- Greater flexibility of supply chain
- Improved product quality
- Reduction of overall costs within the supply chain
- Reduction in overall procurement lead time
- Reduction in delivery lead time for Harley-Davidson customers
- Improved competitive position in the market



By operating in a JIT environment, Harley-Davidson must rely heavily upon its suppliers to produce the right products, at the right quality level, delivered in the exact quantity precisely when they are needed, and in the manner Harley-Davidson requires them to be delivered. Failure to comply with these requirements can render an entire production line or facility inoperable.

To promote a successful JIT environment, Harley-Davidson begins in the supplier selection process by evaluating supplier's systems in regards to their ability to meet expectations, including the ability to meet quality, cost, and delivery expectations. Emphasis on Harley-Davidson's JIT philosophy also continues during the product development process. Harley-Davidson and the supplier work together simplify and standardize, as much as possible, the product and processes utilized to manufacture the product. This aids in reducing the overall lead time for the product. Harley-Davidson stresses that working on potential issues early in the product life cycle, minimizes the chance that suppliers will be unable to provide products when they are needed during the normal production cycle.

In order to drive efficiency into the replenishment process, Harley-Davidson does not perform part counts and quality inspections at their receiving dock. Harley-Davidson is dependent upon suppliers providing quality products in the exact quantity and on the exact date as detailed on the material release. Suppliers must follow all requirements as listed in this manual and as required in any other purchasing agreements such as the purchase order and the Master Supply Agreement (MSA).

### **Requirements Forecasting and Communication**

The focus of Harley-Davidson's JIT environment is providing an efficient supply chain that minimizes waste, increases flexibility, reduces inventory, and minimizes the overall lead time for material replenishment. To enable Harley-Davidson and their suppliers to achieve these goals, a great reliance is placed upon accurate and timely information. An important piece of that information is access to timely and accurate production forecasts.

### **Original Equipment Production Parts**

Harley-Davidson generates its material forecasts for OE parts using the Master Production Schedule (MPS) which is generated by the Operations Planning Department in conjunction with information provided by Marketing, Manufacturing, Finance, and Purchasing. The MPS must balance the plant's internal capabilities with external sales demand while producing products that assist us in meeting Harley-Davidson's financial goals.

Once generated, the MPS is then passed to Harley-Davidson's Material Requirements Planning (MRP) system to generate forecasts for each individual product. The forecasts generated provide information about demand for each part forecasted for a one-year period. Harley-Davidson communicates forecasted demand to suppliers via the EDI 830 Planning Schedule. The EDI 830 schedules show forecasted demand in daily quantities for up to 35 days and weekly quantities for up to 26 weeks. It also summarizes demand in a 16-week total and a 52-week total. The EDI 830 will indicate any past due shipments and the two most recent receipts. For suppliers who do



not receive their actual ship schedules via the EDI 862 Ship Schedule, the EDI 830 also serves as the actual ship schedule. The EDI 830 is currently sent to the suppliers once per week.

While the Capitol Drive, Pilgrim Road, Tomahawk, and York production facilities generate their MRP schedules calculating net requirements, Kansas City's MRP requirements indicate gross requirements. Net requirement MRP utilizes on-hand inventory balances, scheduled receipts, and lead times along with forecasted daily usage to calculate planned requirements. Gross requirement MRP calculates planned requirements based upon forecasted daily usage only. Use of gross requirement MRP is most prevalent in organizations, such as Harley-Davidson's Kansas City facility, that operate in a pull system replenishment environment. More information regarding push and pull replenishment environments will be presented later in this section.

### **P&A and GM Products**

Harley-Davidson generates its future material requirements for P&A and GM products using the forecasts provided by the Product Category Managers within their respective organizations. Currently P&A, and soon GM, loads this forecasted demand into the Distribution Requirements Planning (DRP) system to assist in generating planned requisitions for product. Planned requisitions are generated based upon net requirements. As explained previously, net requirements uses on-hand inventory balances, scheduled receipts, and lead times along with forecasted demand to calculate planned requirements. Buyers then will convert the planned requisitions, as required, into discrete purchase orders. As there is currently no formal method of communicating long-term product plans to suppliers, P&A and GM Purchasing will use a variety of methods. Suppliers are encouraged to contact their appropriate purchasing representative if they are unclear as to future product demand for the products they supply to Harley-Davidson P&A and GM.

### **MRO Products**

Harley-Davidson generates its future material requirements for MRO products using forecasts that are generated by Purchasing and Maintenance. This forecasted demand is generated using the previous year's usage and estimating the change due to the upcoming year's business activity. As there is currently no formal method of communicating long-term product plans to suppliers, MRO Purchasing will use a variety of methods. Suppliers are encouraged to contact their appropriate purchasing representative if they are unclear as to future product demand for MRO products that they supply to Harley-Davidson.

### **Material Replenishment Process**

As mentioned at the beginning of this section, Harley-Davidson defines material replenishment as the process used to reorder regularly stocked products. There are two major categories of material replenishment processes used at Harley-Davidson to develop actual material ship schedules for a supplier, those based upon a "push" material replenishment process and those based upon a "pull" material replenishment process. Each individual Harley-Davidson location or business organization uses the replenishment process (push, pull, or a combination of the two)



that makes the best business sense for their particular organization. Suppliers are responsible for understanding the replenishment process for each Harley-Davidson location to which they supply products.

### **Push Material Replenishment Process**

The push material replenishment process is based upon the ordering of material as a result of Harley-Davidson's planned production schedules or planned sales forecasts. It develops planned materials requirements by utilizing on-hand inventory balances, scheduled receipts, and lead times along with forecasted daily usage, or forecasted sales for P&A and GM, to generate planned orders or planned requisitions. Purchasing or materials representatives review these planned requisitions to determine whether they should be approved as is or whether they should be revised or deleted. Once approved, requisitions are turned into material releases against an existing blanket purchase order or a new purchase order is issued.

### **Pull Material Replenishment Process**

The pull material replenishment process is based upon the ordering of material as a result of the material being consumed by Harley-Davidson or, in the case of P&A and GM, sold to a dealer or merchant. The timing of the placement of the replenishment order is dependent upon a number of criteria including required lot sizes, container quantities, scheduled pick-up days, supplier location, and inventory valuation. Typically, items with higher inventory valuation are replenished on a daily basis.

Harley-Davidson uses different "pull" mechanisms to indicate a need for material to be replenished. The following methods are used at Harley-Davidson to indicate material has been consumed and thus needs to be replenished:

- Min-Max Stocking Levels
- Automatic Backflush
- Material Trigger Cards
- Empty Carts, Racks, or Containers
- Supplier Managed Inventory

#### Min-Max Stocking Levels

The use of min-max stocking levels is a relatively easy material replenishment process to employ. It basically involves reordering material when the actual usage causes the on-hand inventory balance to fall below the minimum acceptable planned stocking level. A release is then scheduled to replenish the material. The minimum stocking level is developed with consideration being given to the procurement lead time for the item. Enough material is ordered to bring the on-hand inventory nearest to the maximum acceptable planned inventory stocking level without going over. Harley-Davidson uses this process extensively in the MRO and P&A environment for items reordered using a pull material replenishment process.

#### Automatic Backflush

Harley-Davidson refers to the automatic backflush method as the systematic accumulation of material usage based upon the actual motorcycles produced or, in the case of P&A and GM, products shipped. Once the material usage is calculated, material is ordered based upon this usage calculation. Accumulation of material usage continues until the order is ready to be



released to the suppliers. Timing of the request for material is dependent upon required lot sizes, container quantities, and/or scheduled pick-up days. Currently, this replenishment process is used only by OE Purchasing and only to a lesser degree.

### Material Trigger Cards

Harley-Davidson may also use material trigger cards to identify a need for material replenishment. Both this replenishment method and the next method, the use of empty containers, are essentially Kanban systems. Kanban systems are based upon use of visual signals to identify a need for material replenishment. Harley-Davidson's Kansas City facility uses material trigger cards as the primary means to identifying consumption of production materials. To initiate the process, a bar-coded material trigger card is attached to all incoming containers of material or components. Upon use of the first piece from the container, the trigger card is removed and the bar code is scanned. This indicates that the material in the container needs to be replenished. Accumulation of material usage, via the scanned trigger cards, continues until the order is ready to be released to the suppliers. Timing of the request for material is dependent upon required lot sizes, container quantities, and/or scheduled pick-up days.

### Empty Carts, Racks, or Containers

Harley-Davidson has been using this material replenishment process for many years with some of their local suppliers. It is often referred to within Harley-Davidson as the "Materials As Needed" or MAN system. This process involves the replenishment of material based upon the return of an empty cart, rack, or container. Harley-Davidson uses this replenishment process as its primary method of ordering parts from other internal Harley-Davidson departments.

This replenishment process works well for local suppliers where the transportation lead time is minimal. The short transportation time allows for a more efficient flow of containers throughout the supply chain. Because of the heavy reliance on the carts, racks, or containers to the flow of required materials, it is critical that all containers be promptly processed both at Harley-Davidson and the supplier. Only material and components originally assigned to a specific container may be put into that container.

### Supplier Managed Inventory

In some cases Harley-Davidson replenishes material using on-site supplier representatives to determine requirements. In addition to their other responsibilities within Harley-Davidson, the supplier representative is responsible for managing the inventory of their products within the Harley-Davidson site they reside. Harley-Davidson does not dictate the means by which a supplier must manage the inventory. Rather, they give guidelines in regards to inventory planning goals and objectives. The supplier and Harley-Davidson will reach a consensus in regards to the planned replenishment process that the supplier will utilize.

### **Communication of Shipment / Delivery Schedules**

Once a need for material has been identified, whether using a push material replenishment process or a pull material replenishment process, the next step is to communicate that need to the supplier. For requirements generated using a push material replenishment process, the scheduled



material releases are issued against existing blanket purchase orders and transmitted electronically to suppliers via the EDI 830 Planning Schedule with Release Capabilities, for those suppliers not using the EDI 862 Ship Schedule. Materials or components that do not utilize blanket purchase orders will be conveyed to suppliers electronically via the EDI 850 Purchase Order.

Requirements generated using a pull material replenishment process are issued against their blanket purchase orders and transmitted electronically to suppliers via the EDI 862 Ship Schedule. The EDI 862 Ship Schedule lists the specific quantity and date the supplier must ship product to Harley-Davidson.

Suppliers must ship in the exact quantity and on the day as directed. Because of the JIT environment in which Harley-Davidson operates, failure to ship on schedule and in the right amount could render an entire production line or facility inoperable. **It is the supplier's responsibility to immediately notify the appropriate Harley-Davidson purchasing or materials representative of any inability to meet the transmitted ship schedule.** Suppliers must send an EDI 856 Advance Ship Notice for all shipments sent to Harley-Davidson.

Harley-Davidson currently issues some material releases and receives some shipments without using electronic commerce (EC) due to a supplier's non-compliance to Harley-Davidson's EC requirements. Suppliers must understand that non-compliance to Harley-Davidson's EC requirements will soon no longer be tolerated. Suppliers should refer to the "Electronic Commerce" section of this manual for further clarification regarding Harley-Davidson's EC requirements.