Materials Management Operations Guideline
AIAG PUBLICATIONS

An AIAG publication reflects a consensus of those concerned with its scope and provisions. An AIAG publication is intended as a guide to aid the manufacturer, the consumer, and the public. The existence of an AIAG publication does not in any respect preclude anyone from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the publication.

CAUTIONARY NOTICE

AIAG publications are subject to periodic review and users are cautioned to obtain the latest editions.

MAINTENANCE PROCEDURE

Recognizing that AIAG publication may not cover all circumstances, the AIAG has established a maintenance procedure. Please refer to the Maintenance Request Form at the back of this document to submit a request.

APPROVAL STATUS

This document was approved for publication by the AIAG Board of Directors on July 19, 1999.

Published by:

Automotive Industry Action Group
26200 Lahser Road, Suite 200
Southfield, MI 48034
Phone: (248) 358-3570 • Fax: (248) 358-3253

AIAG Copyright and Trademark Notice:

The contents of all published materials are copyrighted by the Automotive Industry Action Group unless otherwise indicated. Copyright is not claimed as to any part of an original work prepared by a U.S. or state government officer or employee as part of the person’s official duties. All right are preserved by the AIAG, and content may not be altered or disseminated, published, or transferred in part of such content. The information is not to be sold in part or whole to anyone with in your organization or to another company. Copyright infringement is a violation of federal law subject to criminal and civil penalties. The AIAG and THE AUTOMOTIVE INDUSTRY ACTION GROUP are registered service marks of the Automotive Industry Action Group.

1999 Automotive Industry Action Group
FOREWORD

This document provides recommended business practices for the materials management process within the reader’s facility and is intended to establish a common definition of materials practices to facilitate effective communication between trading partners.

Note: A self-assessment tool is currently under development for use as a basis for process improvement. It is meant to be used in conjunction with this guideline to develop your own materials organization or as a tool to develop individual suppliers.

Historically, automotive companies have established their materials processes without the benefit of an industry-accepted guideline. As a result, companies have developed materials systems that may not be as effective as they could be. Larger automotive companies have begun to establish supplier assessment programs for determining the effectiveness of their suppliers’ materials management systems. The most widely recognized example of this is Ford’s MS-9000 program.

The need for this type of document was identified in the Manufacturing Assembly Pilot (MAP) project (see section 2.0). The results of the MAP project prompted Ford to develop the MS-9000 documents, which, in conjunction with on-site supplier reviews, have been helping Ford suppliers improve their materials process over the past several years.

Without a common guideline, automotive suppliers are subjected to multiple supplier development programs. In response, the AIAG formed the Materials Systems Guideline Development Work Group in 1997 with the following mission:

- To establish a guideline that defines the elements of a robust materials system to manage the flow of productive materials and information for the North American automotive industry.

In this document, service is only handled as another customer requirement in a manufacturing operation. This team hopes that we can extend Ford’s positive results throughout the automotive supply chain by providing an industry-accepted guideline for materials.

Although this document supports the philosophy of lean manufacturing/material flow, it does not currently address practices specific to the lean manufacturing process.

---

1 For more information on EDI recommended practices, refer to the following AIAG publications: Supply Chain Recommended Business Practices for EDI Implementations for Requirements (Push) Based EDI (AIAG M-3 v2.0 2/98); Supply Chain Recommended Business Practices for EDI Implementation for Consumption (Pull) Based EDI (AIAG M-5 v1.0 3/98); and DELFOR EDIFACT Implementation Guidelines (AIAG E-7 v1.0 7/98).
ACKNOWLEDGMENTS

All members of the Materials Management Operations Guideline Work Group have contributed to the content of this document, which was initiated in 1997. Work Group members and the companies they represent include:

Candice Bennett  BASF Corporation
Ronna Cunningham  Rail Van, Inc.
Lisa DeVries  Johnson Controls, Inc.
David Griffiths  United Technologies Automotive
Mike Hessler  Andersen Consulting
Michael Howard  Ford Motor Company
Chet Harter  QAD
Donna LeFaive*  Trinary Systems, Inc.
Karl Mortensen  DaimlerChrysler Corporation
John Sakulich*  General Motors Corporation
David Schaap  CMI Competitive Solutions, Inc.
Hazan Sills  Leon Plastics, Inc.
Tim Trempert  Rail Van, Inc

* Co-chairs

The AIAG and this team would like to acknowledge Ford Motor Company’s extensive work on MS-9000, which was the basis for this document. We also acknowledge the companies that participated in the development of this document and thank them for their commitment of resources.

“Portions of this document were extracted from a document entitled MS-9000 and reproduced with the permission of Ford Motor Company.

Copyright *Ford Motor Company, 1995”
# TABLE OF CONTENTS

## AIAG PUBLICATIONS

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

## FOREWORD

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

## ACKNOWLEDGMENTS

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

## 1.0 INTRODUCTION

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
</tr>
</tbody>
</table>

  1.1 Document Content

## 2.0 MANUFACTURING ASSEMBLY PILOT (MAP)

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
</tr>
</tbody>
</table>

## 3.0 MATERIALS MODEL

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
</tr>
</tbody>
</table>

  *Figure 1. Materials Management Business Environment*

## 4.0 MATERIALS GUIDELINE

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
</tr>
</tbody>
</table>

  4.1 Management Responsibility

  4.2 Materials Management System

  4.3 Contract Review/Customer Interface

  4.4 Scheduling System

  4.5 Document Control

  4.6 Purchasing/Supplier Management

  4.9 Receiving, Shipping, and Transportation

  4.10 Inventory Optimization

  4.11 Inspection, Measurement, and Test

  4.12 Preventive and Corrective Action

  4.13 Handling, Storage, Packaging, Preservation, and Delivery

  4.14 Control of Material Records

  4.15 Continuous Improvement

  4.16 Training

  4.17 Statistical Techniques

## GLOSSARY

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
</tr>
</tbody>
</table>

## REFERENCES

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
</tr>
</tbody>
</table>

## SELF-ASSESSMENT

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
</tr>
</tbody>
</table>

## APPENDIX A - LEAN MANUFACTURING/LEAN MATERIAL FLOW

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
</tr>
</tbody>
</table>

## THE AIAG

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
</tr>
</tbody>
</table>

## MAINTENANCE REQUEST FORM

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>46</td>
</tr>
</tbody>
</table>
1.0 INTRODUCTION

The Materials Management Operations Guideline (MMOG) provides a comprehensive set of business procedures within the materials management function of an automotive manufacturing organization (see Figure 1 in Section 3.0). The MMOG is intended to apply to both operations and support organizations within all tiers of the automotive industry. Properly established policies and procedures will significantly add to the value of the entire supply chain through cost reduction and improved consumer satisfaction.

The Materials Management Operations Guideline:

- Establishes the essential components of a materials management system for suppliers of goods and services within the automotive industry.
- Provides an industry-accepted continuous improvement tool for self-assessment of the materials process.

The MMOG is designed to complement QS-9000 by detailing materials management requirements. For the purpose of completeness, there are some redundancies with QS-9000.

The purpose of this document is to assist in continuous improvement of information and material flow through the organization. As such, it should be available to all materials personnel and others who impact the materials management process. It is a benchmark of materials procedures and should be used to drive implementation of continuous improvement plans.

1.1 Document Content

Section 2.0 of the MMOG summarizes the findings of the AIAG Manufacturing Assembly Pilot (MAP) project. Published in 1997, the results of the MAP project indicated opportunities for savings. We recommend that the reader review the MAP findings in order to understand the basis for the MMOG.

Section 3.0 contains a materials model that provides an overview of the information and material flow within the organization and between trading partners in the automotive supply chain.

Section 4.0 focuses on recommended business practices. These practices cover the scope of the materials process as well as more general recommendations on topics such as Management Responsibility (4.1) and Training (4.15).

The document concludes with a glossary. A self-assessment tool will be included in the next version.

Throughout this document, “shall” indicates a situation where adherence to the procedure is critical to the materials management function while “should” expresses a recommendation.
2.0 MANUFACTURING ASSEMBLY PILOT (MAP)

Significant opportunities can be realized by coordinating material delivery requirements through the entire supply chain, from OEM to raw material suppliers. Based on this premise, the AIAG initiated a two-year project to study material and information flow within a four-tier seat assembly supply chain. The results of the Manufacturing Assembly Pilot (MAP) project were astounding. If the North American automotive industry were to broadly adopt the MAP recommendations, the industry could save at least one billion dollars per year ($71 per car), and increase its ability to respond to fluctuations in demand, reduce costs, and enhance global competitiveness.

The project identified six factors critical to the success of the initiative:

1. **Implement Process Improvements** — Technology alone is not enough to solve problems. Technology is an enabler, but before implementing new technology it is essential to evaluate and redesign processes. Look for opportunities to remove waste from the processes.

2. **Integrate EDI** — The true benefit of doing EDI is that the information can be loaded directly into a system without human intervention. If this opportunity is not embraced, additional costs will be driven into the supply chain. Integration eliminates re-keying and manual validation of data, thereby reducing errors and lead time and increasing productivity.

3. **Enlist Champions at the Executive Level** — One of the most common causes of failure in reengineering and system implementation/integration projects is the lack of executive level commitment. Without the correct level of commitment, even the most well-intended workers cannot implement change. Upper level management must be engaged and kept informed from start to finish.

4. **Have a Solid Implementation Plan** — There is no substitute for a well-designed plan. Lack of one can result in delays, cost overruns, and extreme frustration. This plan should include a vehicle for communicating progress back to upper level management in order to maintain upper level support.

5. **Ensure Customer/Supplier Communication and Training** — Communication between trading partners is critical. Customers and suppliers must clearly understand:
   - The business processes that drive the need for information flow (e.g., what to do with the data after receiving it)
   - EDI transaction set definitions, communication, usage, and expected timing
   - Customer policies and procedures that require supplier conformance
   - Supplier lead times for different products and classes of material
Time and cost of unplanned setups and changeovers

The agreed disaster recovery plan

With a basic understanding of these issues, customers and suppliers can begin working together to improve inter-and intra-company processes to take waste out of the system.

6. **Pass Down Full Planning Horizons** — The OEM planning horizon ranges from 20 to 52 weeks, depending on the OEM. Unfortunately, the full horizon of planning information rarely makes it to the bottom of the chain. First-and/or second-Tier suppliers regularly process only a portion of this full horizon, often 8 weeks or less.

The costs of truncated planning information are often invisible to top Tier suppliers because the problems may appear two tiers below. Long-term planning information is crucial to a supplier’s ability to purchase wisely. Without this information, fourth Tier suppliers can only guess their customer’s requirements. To minimize risk, they build inventories. When they have guessed wrong, they spend money on premium freight. These costs are passed up the chain. Passing full planning horizons to suppliers reduces such system costs.

For more information on the MAP Project, read the *AIAG Manufacturing Assembly Pilot (MAP) Project Final Report* (AIAG M-4 v1.0 2/97).
3.0 MATERIALS MODEL

While this document focuses on the materials activities within the four walls of the manufacturing facility, this model illustrates that these activities are not performed in a vacuum. The facility is in constant communication with its supply chain partners.

Before the regular order fulfillment process can begin, blanket purchase orders are issued to establish a contractual agreement between customer and supplier. Once the agreement is completed, customers communicate requirements electronically to the facility telling them what items are needed, how many, and when they are needed. These requirements are then loaded directly into the facility’s production system without manual intervention. Customer schedules may either be requirements (push) based or consumption (pull) based (e.g., electronic kanban, Release Authorization Number (RAN), Delivery Order Number (DON)).

In the release/order management process the information is analyzed for significant changes in demand or missing requirements. These changes are reviewed with the customer and inputs to the planning process are adjusted accordingly.
Customer requirements are then fed into the planning process and exploded via the bill of material to create buildable production and achievable supplier schedules. These requirements are transmitted to the supplier(s) in an electronic form, and ideally, integrated directly into their planning system(s). This process should take place within 24 hours of receiving the customer’s schedules.

Supplier Scheduling reviews the supplier requirements, monitors inbound shipments, and alerts the appropriate internal and external people of potential shortages. This function works with the suppliers and Production Scheduling to ensure uninterrupted production, helping the supplier to prioritize shipments if orders cannot be fully met.

The Receiving function accepts inbound shipments using the Advanced Ship Notice (ASN) from the supplier to add the newly received material to inventory and then promptly moves the materials to the appropriate location. Receiving also receives and routes empty returnable containers to the appropriate locations.

The raw, Work In Process (WIP), and finished goods inventory locations are laid out to facilitate First in, First Out (FIFO) movement of parts and visual inventory management. Process-relevant inventory transactions are recorded. Appropriate materials and empty containers are moved to identified points of use when required. Care is taken to maintain parts quality throughout the materials handling and storage operations (considering environment and shelf life constraints).

Production builds to schedule and packages the parts in customer-specific containers. Parts and/or containers are marked appropriately to ensure error-proof movement of parts.

Shipping uses the ship schedule, shipment window, and load makeup instructions sent by the customer to assemble end items for shipment. They apply customer-specific labels (if not already applied at production). The labels are scanned to create the appropriate paperwork (bill of lading, packing slip, master bill of lading, customs paperwork, etc.). Upon conveyance departure, the shipment information is transmitted electronically to the customer via an Advanced Ship Notice (ASN) to let the customer know what material is in route to their facility.

This materials model clearly illustrates the interdependent nature of the automotive industry. As a result, timely and accurate communication throughout the entire supply chain is imperative. In addition, proper management of this information within the four walls of the manufacturing facility is equally critical to business success. The recommendations made in this document will facilitate continuous process improvements.
4.0 MATERIALS GUIDELINE

4.1 Management Responsibility

a. The facility shall have a management structure that recognizes the importance of and places appropriate emphasis on the materials processes. That structure shall include assignment of responsibility for the establishment, implementation, and effective operation of the materials system. Regularly scheduled management meetings are recommended.

b. A process shall be in place to ensure that adequate resources are assigned to the materials organization.

c. Management shall define and document a materials policy, including objectives, an implementation time table, and a firm commitment to understand and meet customer needs. Management shall ensure that the materials policy is understood, implemented, and maintained throughout the organization.

d. The facility shall display easily understood objectives and priorities to be used by managers and employees to efficiently empower/direct/support material operations.

e. Clearly defined job descriptions and/or work instructions shall be maintained for all personnel involved in the materials processes. To ensure complete management of the material process:
   - All appropriate material tasks will be assigned to employee job descriptions.
   - Key tasks will have employee back-ups designated to manage workflow when the primary employee is not available.

f. An up-to-date listing of contact personnel, including management, shall be provided on request to the customer and/or maintained on the customer's system. The listing must include contact information supporting the entire scheduled operating hours of the customer. The facility should require similar contact information from its customers and suppliers.

g. The facility's Materials organization shall formally participate in, and sign off on, the organization's Advanced Product Quality Planning (APQP).\(^1\)

h. The science of ergonomics shall be use to ensure safe and efficient employee operations. Key measurables relative to a facility's Materials organization shall be defined, tracked,

---
\(^1\) For more information on APQP, refer to the following publication: *Advanced Product Quality Planning & Control Plan* (APQP) (APQP-2 Second printing 2/95)
Materials Management Operations Guideline

and displayed for all employees to see. They shall be correlated with customer expectations and reviewed with senior management on a routine basis.

i. Management shall be committed to a quality work environment. This environment should be facilitated by workplace organization including:
   - an efficient material delivery system
   - a trash removal system
   - 5S (Sort, Straighten, Sweep, Standardize, Sustain)
   - visual management

j. Management shall provide adequate resources to meet training objectives.

k. Management shall establish required knowledge/skill levels for all materials functions.

l. Management shall routinely verify that training objectives are met.

m. Management shall provide sufficient resources to ensure continuous improvement of systems, processes, and equipment.

4.2 Materials Management System

a. The facility shall establish, document, and maintain an organized materials management system as a means of ensuring the customer receives the right quantity of the right type of product in the right container at the right time every time.

b. The facility shall maintain and effectively implement documented procedures based on the facility’s stated materials management policy. These procedures shall be readily available and easily understood. The facility shall ensure that changes to these procedures are reflected in the documentation (e.g., within 30 days).

c. The facility shall possess a current material flow diagram for the facility. The diagram and other appropriate tools shall be used to optimize the flow of material through the operation, and actions shall be taken to continuously improve the layout of the facility to support optimization.

d. The facility shall have a process to ensure compliance with all applicable safety and environmental regulations, including those concerning handling, recycling, or disposing of hazardous materials. Appropriate certificates or letters of compliance should be available to prove conformity with these regulations.
4.3 Contract Review/Customer Interface

a. The facility shall have a process to ensure that any potential problems that could impact the customer schedule are communicated as soon as they are identified. The facility shall inform customers immediately of any requirement information that appears erroneous.

   **Note:** The automotive business is very dynamic, and reaction times are frequently very short. Customers can often take alternative actions to minimize the results of supply problems, but lead time is critical.

b. The facility shall not dispose of nor rework tooling for past models or inactive parts without proper authorization by all affected customers.

c. The facility shall use interactive inventory management systems where they are available from the customer (e.g. DaimlerChrysler’s SMART, Ford’s DDL, internet applications).

d. The facility shall have a process for ensuring that quantity-shipped disagreements with the customer are detected and reconciled in a timely manner.

e. Where returnable containers are used, the facility and trading partners shall work together to ensure that the number of returnable containers is adequate to support the material flow requirements (including pipeline and buffer).

f. Where returnable containers are required, alternate packaging should be agreed upon by the facility and the trading partner. There should also be a process to notify the customer when alternative packaging is being used.

4.4 Scheduling System

The facility shall receive requirement planning information and shipping schedules electronically, when available from the customer. This information shall be processed directly into the facility's planning and scheduling systems to avoid manual transference of data between systems.

a. The facility shall receive requirement planning information and shipping schedules electronically, when available from the customer. This information shall be processed directly into the facility’s planning and scheduling systems to avoid manual transference of data between systems.

   **Note:** This includes pre-production, production, and service parts.
b. The facility's scheduling system shall be based on customer requirements, and scheduling parameters must be maintained to correlate with the customer's ship requirements. Important considerations may include:

- inventory levels (optimal Work In Process and minimal finished)
- supplier constraints
- cumulative quantity (cum) information
- standard pack
- scrap rate
- lead time
- impact on transportation mode
- manpower and equipment resources
- customer order method (kanban or cum-based)

c. The facility shall perform a comparison of its resources and the customer's requirement projections at a minimum of once per week. A process shall be in place that ensures prompt communication to the designated customer contact of any resource shortfalls, by part number, that could affect customer operations.

**Note:** A major goal of the scheduling system shall be to review customer requirements far enough in advance to detect potential problems in meeting those customer requirements. This process must occur in a timeframe that allows for corrective action and minimizes the impact to the customer. Generally, if the information is available, a planning horizon of at least 6 months should be reviewed.

d. The scheduling system shall ensure that sufficient material is available to cover final customer orders during part balance out/build out.

e. The scheduling system shall have the flexibility to ensure that Production Part Approval Process (PPAP) requirements are available in a timely manner to support customer changeovers/launches.

---

**Note:** AIAG recommends that your customers use EDI communication and follow AIAG guidelines. (See Reference Section)²

² For more information, refer to the current versions of the following AIAG publications: *Supply Chain Recommended Business Practices for EDI Implementations for Requirements (push) Based EDI (AIAG M-3); Supply Chain Recommended Business Practices for EDI Implementation for Consumption (Pull) Based EDI (AIAG M-5); and DELFOR EDIFACT Implementation Guidelines (AIAG E-7); Manufacturing Assembly Pilot (MAP) Project Final Report (AIAG M-4); Implementation Guidelines (AIAG EG-8)*
f. Facilities shall take the initiative to minimize total system obsolescence exposure. A process for recording and maintaining high-point material authorizations shall exist for obsolescence claims purposes. Functional build material shall always be available in a timely manner for running change parts, where required by the customer.

g. The schedule should be stated as a repetitive schedule (part number and production quantity by date), with no work order required. The scheduling system shall support pull systems such as kanban.

Note: One advantage of kanban is to automatically offset losses or gains.

h. The facility should set the timing of the Material Requirements Planning System (MRP) process to coincide with the receipt of the majority of customer requirements. Production performance-to-schedule shall be measured and included in the scheduling process.

4.5 Document Control

a. Documents and data related to the materials activities shall be reviewed and approved by authorized personnel prior to issue or revision. A master list or equivalent document-control procedure shall be established in order to preclude the use of invalid and/or obsolete documents. This control shall ensure that:

- Pertinent issues of appropriate documents are available at all locations where required.
- Invalid/obsolete documents are promptly removed from all points of issue or use, or otherwise ensured against unintended use.
- Obsolete documents retained for any reason are suitably identified.

4.6 Purchasing/Supplier Management

a. The facility shall transmit requirements data electronically to its subcontractors, including Logistics Providers.³

b. The frequency and the planning horizon of requirements transmission must be adequate for the commodity produced, account for the lead times associated with purchased parts and materials, and adhere to a known specified timetable.

c. The facility and the supplier shall establish electronic communication to communicate shipment notification information from the supplier to the facility.

³ For more information, refer to the current versions of the following AIAG publications: Supply Chain Recommended Business Practices for EDI Implementations for Requirements (push) Based EDI (AIAG M-3); Supply Chain Recommended Business Practices for EDI Implementation for Consumption (Pull) Based EDI (AIAG M-5); and DELFOR EDIFACT Implementation Guidelines (AIAG E-7); Manufacturing Assembly Pilot (MAP) Project Final Report (AIAG M-4); Implementation Guidelines (AIAG EG-8)
Materials Management Operations
Guideline

Note: Some programs may be exempted from this requirement (such as Pay-on-Production).

d. The facility shall have a process to ensure adequate performance levels and continuous improvement of the supplier’s performance. Summarized information regarding the delivery and quality performance of suppliers shall be provided on at least an annual basis to the activity responsible for their selection.

4.7 Control of Customer-Supplied Product

a. The supplier shall establish and maintain documented procedures for the control of verification, storage and maintenance of customer-supplied product provided for incorporation into the supplier or for related activities. Any such product that is lost, damaged or is otherwise unsuitable for use shall be recorded and reported to the customer.

4.8 Material Identification, Traceability, and Engineering Changes

4.8.1 Material Identification

a. The facility shall have a system to ensure that all containers or loads shipped are labeled to customer expectations.

b. The facility shall have a process to correctly identify all parts in the facility.

c. The facility shall have a process to ensure adequate control of in-process labeling. In-process product must be adequately differentiated. Where appropriate, use bar-coding to identify and trace material.

d. There shall be a process/method in place to ensure inventory is labeled accurately and identified easily, especially similar items whose slight differences are not easily discernible.

4.8.2 Traceability

a. Where traceability is required, a system that supports lot and serial traceability shall be in place. This should include genealogy to the level required by regulation and/or the customer.

b. There shall be a process for controlling partial lots. The process shall provide for the segregation of partial lots from other production and ensure that they are correctly accounted for in the material record and identified appropriately.

4.8.3 Engineering Changes

a. The facility shall manage engineering revision level changes with documented procedures for customer, supplier, and internal changes.
b. The facility shall have a process to ensure all affected parties are aware of engineering changes.

   **Note:** Consider use of a process sign-off sheet with Bill of Material (BOM) review, verification of requirement(s) dates, notification to suppliers, scheduling, shipping, etc.

c. The facility shall have a process for ensuring that inbound materials have adequate revision controls (e.g., First in, First Out (FIFO), lot numbering, adequate labeling).

d. The facility shall use a process to obtain written customer authorization for deviation whenever the product or process is different from that currently approved through PPAP. The supplier shall also ensure compliance with the original or superseding specifications and requirements when the deviation expires.

e. The facility shall review proposed engineering changes to evaluate the impact on manufacturing, delivery, and material flow and communicate feasibility of the changes to the all affected parties (including the customer).

### 4.9 Receiving, Shipping, and Transportation

#### 4.9.1 Receiving

a. The facility shall have a process to ensure that goods or services received have required documentation. Each receiving transaction shall be uniquely identified to support problem resolution (e.g., supplier / shipment identification number [SID]).

b. Where incoming material is not accompanied by an electronic record of shipment content, such as an Advanced Shipment Notice (ASN), the facility shall have a receiving checking/verification process sufficient to ensure that the data entered in the receiving system match the information on shipping documents.

   **Note:** The automotive industry strongly recommends the implementation of electronic communication (EDI) of shipment information between tiers of the supply chain.

c. The facility shall have a detailed process in place for resolving receiving discrepancies and freight damage.

d. The facility shall establish and use layout and visual controls to assist the receiving processes. Processes may include quality control checks, quantity verification, movement of material to storage locations, and carrier on-time performance.

e. When material is received by authorized third parties, receiving policies should be communicated to the third party, and their performance should be monitored to ensure compliance.
f. The facility shall ensure that returns and adjustments are entered into the receiving system in a timely manner by authorized individuals.

g. There should be a process to ensure received materials are moved promptly from the receiving areas to assigned storage/line feed locations.

h. There should be a scheduled receiving window process used to optimize dock operations.

4.9.2 Shipping

a. The facility shall have a process to ensure complete and accurate data content of all ASNs. Scanning the shipping label is a recommended way of generating ASN information (the scan should reconcile against the customer’s shipping requirements).

b. The shipment process shall ensure that each ASN is transmitted as of conveyance departure.

c. The facility shall use a process to ensure that outgoing shipments comply with applicable regulations and customer requirements.

d. An area for the preparation of paperwork and electronic transmissions shall be placed in a location conducive to efficient operations. All shipment paperwork (e.g. packing slips, bills of lading, customs declarations) shall be prepared to the customer's and/or government standards.

e. The facility shall ship to customer requirements. Differences must be resolved with the appropriate customer contact prior to normal shipment time if the shipment requirement cannot be met.

f. The facility shall ensure that when expendable packaging is used in place of the assigned returnable container, the expendable container contains the same standard pack quantity and is of like size, where practical.

g. The facility shall have a process to ensure that the contents of each shipped container are correctly identified on the applied customer specific label(s). If measuring equipment is used, see 4.11.

h. There should be a scheduled shipping window process used to optimize dock operations.

4.9.3 Transportation

a. The transportation function shall supply the scheduling function with information on inbound transportation modes and associated transit times (lead time required).

b. Responsibility for supplier transportation costs and management shall be documented at the time that suppliers are contracted.
c. The supplier should be able to provide the weight, volume, and configuration of the shipment to the carrier or Lead Logistics Provider (LLP) as needed.

d. Transportation planning (e.g., carrier, mode, special equipment, etc.) shall be included in the complete product life cycle from design to production. Carrier/LLP involvement should occur as early as possible in the planning process.

e. Inbound parts/material should be tracked from time of shipment through receipt to allow for early detection and notification of material shortages.

f. Empty conveyances (both inbound and outbound) should be managed on a daily basis to ensure that FIFO is occurring to minimize-detention and demurrage-related charges.

g. Opportunities should be explored during the design phase that will allow for inbound conveyances to be reloaded with outbound product (round trip opportunities).

h. The shipping process shall ensure that the facility complies with customer transportation routings (carrier and mode), and governmental regulatory requirements.

i. The facility shall notify the outbound carrier of shipping specifications in a timely manner. Carrier equipment shall be handled in an expeditious manner in order to ensure that availability is maximized. Appropriate equipment, such as bracing and air bags, shall be used where necessary to ensure that the product is delivered to the customer damage-free.

4.10 Inventory Optimization

a. There shall be systems in place that facilitate access to and management of all levels of inventory – finished goods, raw materials, and all levels of Work In Process (WIP). This should include inventory being stored/processed at off-site facilities.

b. The facility shall incorporate both volume/mix flexibility and product changeover requirements into its advanced quality planning, as appropriate for the commodity manufactured. The facility shall take actions to improve manufacturing flexibility with each new product launch.

c. The facility shall track the flexibility and responsiveness of their production process.

   Note: The automotive industry recommends using a measurement such as manufacturing cycle time or an industry-specific equivalent. The facility shall take actions to continuously improve the measure over time.

d. The facility shall strive for an inventory level that supports visual management.

e. The facility shall have a process to ensure the appropriate identification of all unusable or damaged material (scrap, returns, rejections, etc.). Storage or holding areas shall be clearly marked and easily distinguishable.
f. The facility shall use adequate warehouse controls on all facility-level storage areas. Storage areas shall use written procedures that ensure good record integrity practices, stock rotation, and identification of stock segregation areas.

g. The facility shall possess a current material flow diagram. Physical inventory flow shall be designed to support FIFO where applicable, facilitate accurate tracking, and minimize transportation costs.

h. The facility shall have proper practices and controls in place (including cycle counting) to ensure accurate perpetual inventory numbers (by location). The long-term goal should be to eliminate the requirement for physical counting of inventories.

j. The facility shall have a process to ensure that physical inventory counts, if performed, are accurately reflected in inventory records.

k. The facility shall have a process that ensures Bill of Material (BOM) records are maintained and accurate and that BOM deviations are recorded and reflected accurately in the perpetual inventory records.

l. Where assigned inventory locations exist, they shall be accurately labeled with labels that are easy to locate, understand and update.

m. The facility shall have one integrated system encompassing both perpetual inventory and associated financial functions (i.e., “one set of books”) to ensure that inventory transactions and balances are accounted for properly.

n. The facility should have a process to continually adjust inventory buffers based on demand variability, desired customer service levels, and process capabilities.

o. The facility shall have a system to handle Maintenance, Repair and Other (MRO) inventory.

p. Error reduction methods (e.g., visual controls, bar coding, elimination of manual entry, etc.) should be in place to ensure accurate part storage and movement and accurate inventory transaction processing.

q. The facility shall have a process that ensures defective/obsolete material is contained, segregated, and disposed of properly.

r. The facility shall have a process to safeguard easily damaged or theft-sensitive items.

s. The facility shall have a process in place to accurately “balance out” inventories based on engineering changes and programs that are being phased out.
4.11 Inspection, Measurement, and Test

a. The facility shall have a process to calibrate, on a routine basis, all shipment quantity-determination equipment to an acceptable accuracy level, as defined by the customer. The calibration shall take place to a recognized standard.

b. The facility shall have a process to clearly indicate the inspection status and date on all shipment quantity-determination equipment.

4.12 Preventive and Corrective Action

a. The facility shall have a system to ensure the effective resolution of supply discrepancies without cost penalties to the customer.

b. The facility shall react immediately to problems identified by the customer.

c. The facility shall use a problem solving method to determine root cause(s) and prevent recurrence of materials problems.

d. The facility shall have a contingency plan for the handling of emergency situations (such as computer system failures, telephone line outages, etc.). The process must ensure the ability to meet customer part requirements as well as the communication of the emergency to the customer. The process shall be validated on a regular basis.

4.13 Handling, Storage, Packaging, Preservation, and Delivery

Note regarding Element 4.13, Handling, Storage, Packaging, Preservation, and Delivery:

a. The Quality System Requirements manual, QS-9000, covers the fundamental requirements (at a very basic level) for a quality system in the areas of handling, storage, packaging, preservation and delivery. The base requirements can be found in the QS-9000 manual, Element 4.15. This (MLOG) document adds another level of requirements above and beyond these very basic requirements.

4.13.1 Handling

a. The facility shall have an identified process in place to control the handling of containers and dunnage. The controls shall emphasize the avoidance of damage to the containers and dunnage. The controls shall also systematically ensure that returnable containers and dunnage are returned in a timely manner and in an acceptable condition.

4.13.2 Storage

a. When the facility is using external warehousing or storage locations, the same level of material and records control shall be applied. (See section 4.10 Inventory Optimization).
b. There shall be adequate assigned space provided for material storage.

4.13.3 Packaging

a. The facility shall make all shipments in standard pack quantities unless expressly authorized by the customer.

b. The facility shall have a process to ensure that packaging data are accurate and physically verified at least once per calendar year.

c. When the facility is responsible for packaging, preliminary packaging data shall be provided in a timely manner to allow the customer to perform up-front planning. Preliminary packaging data provided to the customer shall be updated to confirmed levels as soon as the part is formally released.

d. For inbound material, the facility should consider using returnable, reusable, or recyclable containers/dunnage wherever practical. The facility should encourage the use of recycled materials in incremental dunnage and packaging purchases.

e. Packaging design, including part size and weight, should be considered during the design phase to ensure that, where possible, the containerization plan allows for maximum utilization of the transportation conveyance.

f. The facility shall ensure that when expendable packaging is used in place of the assigned returnable container, the expendable container contains the same standard pack quantity, is of like size, and is acceptable to the customer, where possible.

g. The facility should make all shipments in assigned containers (includes tryout and pilot programs) in order for the customer to validate the container use in their material system.

h. Customer specific packaging should be integrated into the manufacturing process.

4.14 Control of Material Records

a. The facility shall maintain and use accurate records of in-process, finished goods, purchased parts, and raw material inventory available. This information shall serve as the basis for the facility's materials management system.

b. The facility shall have an effective program for ensuring record integrity.

   Note: Key elements include settlement of inventory transactions by the end of each production period, bill of material review, cycle counting, etc.

c. The facility shall archive material records (e.g., bills of lading) for the appropriate length of time. These records must be retrievable and readable (refer to ISO 9001, section 4.16).

d. The facility shall have a process to record and input off-line data in a timely manner.
4.15 Continuous Improvement

a. The facility shall evaluate the capability of all important materials management processes through self-assessment. The facility shall have a scheduled plan for the areas to be reviewed.

b. The facility shall maintain records that show assessments have been implemented as planned.

c. Management personnel at the facility shall take timely corrective action on deficiencies and/or unstable processes found during the internal assessment.

d. Follow-up evaluations shall verify and record the implementation and effectiveness of the corrective action. Management shall review these evaluations (see 4.1.7).

e. The facility shall strive to achieve smaller production lot sizes and quicker throughput (e.g., reduce set-up/changeover times).

4.16 Training

a. The facility shall establish, maintain, and implement documented procedures for identifying training needs.

b. The facility shall implement individual training plans to ensure that all personnel performing materials functions have the appropriate knowledge/skill level.

c. The facility shall provide relief coverage where needed to ensure that individuals are given opportunities to attend training.

4.17 Statistical Techniques

a. The facility shall use statistical techniques where appropriate.
GLOSSARY

830 Planning Schedule with Release Capability Transaction Set
ASCX12 standard for the Planning Schedule

856 Ship Notice/Manifest Transaction Set
ASCX12 standard for the Advanced Ship Notice (ASN)

862 Shipping Schedule Transaction Set
ASCX12 standard for the Ship Schedule

866 Production Sequence Transaction Set
ASCX12 standard for the In-Sequence Ship Schedule

Advance Product Quality Planning (APQP)
A supplier-led program for ensuring the quality of parts with a medium- or low-risk assessment. It is a structured process for defining key characteristics important for compliance with regulatory requirements and achieving customer satisfaction. APQP includes the methods and controls (i.e., measurements, tests) that will be used in the design and production of a specific product or family of products (i.e., parts, materials). Quality planning embodies the concepts of defect prevention and continuous improvement as contrasted with defect detection.

Advanced Ship Notice (ASN)
An EDI transaction listing the contents of a shipment of goods as well as additional information relating to the shipment including order information, product description, physical characteristics, packaging type, marking, carrier information, and configuration of goods within the transportation equipment. The ASN completes the JIT circle, and when used in conjunction with bar coded shipping labels it virtually eliminates manual receiving functions by moving data to accounting records for electronic payment reducing the need for traditional invoicing procedures. The ASC X12 Ship Notice/Manifest (856) transaction set is the format used for the ASN in the automotive industry.

ASC X12
Accredited Standards Committee (ASC) X12 for electronic data interchange of the American National Standards Institute (ANSI).

Automotive Industry Action Group (AIAG)
A trade association working to increase member productivity through a cooperative effort of North American vehicle manufacturers and their suppliers.
Balance Out
The final quantity required by a customer before the item is discontinued.

Bar Code
A series of alternating bars and spaces printed or stamped on parts, containers, labels, or other media representing encoded information that can be read by electronic readers. Bar codes are used to facilitate timely and accurate input of data to a computer system.

Bill of Lading (BOL)
A legal document generated by a shipper to consign a load to a carrier or transfer responsibility to a carrier. Generally, a bill of lading includes such information as number of cartons, weight, carrier, etc.

Bill of Material (BOM)
A list of all material (components, raw materials, etc) used in the assembly of a particular item.

Bill of Material Review
A periodic review of the bills of material to ensure accuracy and completeness.

Buffer
A quantity of materials used to protect against process variability.

Calibration
A set of operations that establish, under specific conditions, the relationship between values indicated by a measuring system, or values represented by a material measure or reference material, and the corresponding values of a quantity realized by a reference standard.

Capacity
The highest number of units that can be consistently produced in a given period of time, generally expressed in time increments of both straight time and maximum sustainable overtime levels.

Capacity Requirements Planning (CRP)
The process of determining in detail the resources required to accomplish the tasks of production.

Central Material Area (CMA)
See Designated Storage, Supermarket.

Changeover
Setting up a manufacturing operation to run a different product from what was previously run.
Container
Receptacle or a flexible covering for containment and transport of materials. Types of containers include bulk, collapsible, nestable, knockdown (kd), returnable, and stackable, such as a box, bag, package, or pallet.

Commodity
A category of similar products (e.g., electronics, fabrics, metals, tires).

Common Lot Method
Reducing the variation in the material flow pipeline through the use of factors of 60 as standard pack/standard lot quantities. Factors of 60 are: 60, 30, 20, 15, 12, 10, 6, 5, 4, 3, 2, 1.

Continuous Improvement Plan/Program
A plan or program for the optimization of characteristics and parameters of a product or process at a target value. Note: Continuous improvement is only applicable where conformance has been established.

Conveyance
Equipment used to move parts and or containers (e.g. sea containers, semi trailers, rail car)

Conveyance Departure
When the carrier takes possession of the shipment.

Cube Utilization
An efficiency measure of transportation equipment loading which compares the filled volume with the available volume. (Note: A trailer or railcar can also be "cubed" by weight when heavy material is shipped.).

Cum Based System
A system that uses the cumulative quantity received and cumulative quantity shipped to calculate net quantities required and the past due quantity.

Cum Start Date
The date that the customer specifies he will begin counting. Used in a cum-based system.

Cumulative Quantity
An accumulated total of items shipped or received.

Customer
In a transaction, the trading partner who receives, buys, or consumes an item or service.
Customer Requirements
The quantity of products that the customer needs to support its operation.

Customer Scheduling
The functional area of an organization that interacts with the customer to support customer requirements by coordinating production, shipping, etc. of end items to the customer.

Cycle Counting
A method of auditing inventory accuracy by counting only specified parts/material on a predetermined schedule.

DELFOR Message
UN/EDIFACT standard for the Planning Schedule.

Delivery Order Number
A number used for tracking an order (represents a quantity ordered and a delivery or ship date).

DELJIT Message
UN/EDIFACT standard for the Shipping Schedule.

Demand Variability
Fluctuations in demand from one release to another for the same time period.

DESADV Message
UN/EDIFACT standard for the Advance Shipment Notice (ASN) – (Despatch Advice)

Designated Storage
Specific storage locations assigned for each part number.

Dunnage
Packaging material that protects the product during transit.

EDIFACT
EDI for Administration, Commerce, and Transport. EDIFACT is the current acronym for international standards developed by the United Nations.

Electronic Data Interchange (EDI)
The computer-to-computer exchange of formatted data between trading partners by electronic means. The most widely accepted standards for the EDI formats are ASC X12 in the U.S. and UN/EDIFACT in the rest of the world.
Ergonomics
The science of relating the operator's physical and mental abilities to a given task's description, layout, and execution.

Enterprise Resource Planning (ERP)
A suite of computer applications usually combining manufacturing, logistics, accounting, and human resources.

Excess Transportation
See Premium Freight.

Expendable Container/Pallet
Container systems or components for shipping, sorting, or handling that can be programmed for a pre-determined number of life cycles.

Expendable Packaging
See Expendable Container/Pallet.

Facility
The operation (manufacturing, assembly, or logistics) where the reader of this document is employed.

Finished Goods Inventory
Produced items, ready for transfer to the customer.

First In, First Out (FIFO)
Management process ensuring that the first received is first used.

Footprint
(1) The area within which a job function is performed.
(2) The area on a horizontal plane describing the outermost dimensions of length and width of a pallet, container, or container system. AIAG RC-1 Returnable Containers Transported by Truck standard mentions footprints of 45" x 48" and 30" x 32".

Functional Build
Functional Build material is required to “function” parts undergoing an engineering change. Functioning involves trials with the new level part to ensure that it works with the assembly equipment and other mating parts and causes no system problems.
High Point Material Authorizations
The maximum cum quantity of a contracted part to which the customer will commit.

Individual Training Plans
Training plans targeted to achieve specific levels of performance for specific tasks.

International Standards Organization (ISO)
Formerly International Organization for Standardization–A worldwide federation of national standards-setting bodies from more than 90 countries. There are over 8,000 ISO standards. ISO is not only an acronym: ISO is a Greek prefix meaning "equal," i.e., a level playing field for the exchange of goods and services worldwide.

Inventory
Material, supplies and/or finished goods held for future use or sale. Inventory buffers the production process against the uncertainty of demand, the variability of the process, and the cycle time of the process.

Inventory Buffers
See Buffers.

Inventory Locations
See Designated Storage.

Inventory Transactions
Inventory transactions document the quantitative change in inventory due to a business event or transaction (e.g., supplier receipt). In addition to the inventory impact of the event (i.e., the actual receipt quantity of a part), inventory transactions also record contextual information about the event. In the case of a supplier receipt, contextual information could include the supplier, date/time of the receipt, part lot number, etc.

Inventory Turns
The total of all sales from inventory in a designated time frame divided by the inventory on hand (can be measured by value or pieces).

ISO 9000
A set of standards (ISO 9001, ISO 9002 and ISO 9003) issued by the ISO that deal with quality systems. A supplier can use the standards as guidelines when externally auditing the implementation of quality assurance processes and procedures. The U.S. version of the ISO-9000 set of standards is ANSI/ASQ Q91, ANSI/ASQ Q92, ANSI/ASQ Q93, and ANSI/ASQ Q94 (also See International Standard Organization (ISO), QS-9000).
KANBAN

(1) A method for Just-In-Time delivery of parts in which a work center signals to the supplying work center (either in-house or outside supplier) that an additional container of a particular part is needed. Sometimes called a Pull System.
(2) The physical card used to signal the requirement for an additional container of material.
(3) The plant material scheduling system developed and used by Toyota Corporation in Japan.

KANBAN Number

(1) A number assigned to a specific KanBan pull signal (e.g., Kanban card number 9999).
(2) A number that uniquely identifies a part number for the customer plant.

Launch

The pre-production process leading up to full production of a new program/product.

Lead Logistic Provider (LLP)

A logistics operator contracted to manage material flow between supplier and customer. Also referred to as 3rd Party Logistic Provider.

Lead Time

The time interval between the conception or designing of a product and its actual production; the time interval between the placing of an order and the delivery of the product or service.

Line Feed Location

The location on a manufacturing line where that material is used or stored.

Line of Sight Management

1. The ability, in a production environment, for operators to see the results of their work farther down the process, and for a team leader or foreman to see operations throughout their area of responsibility.
2. An inventory level that supports line of sight.

Lot

A quantity of homogeneous material either manufactured or received.

Manufacturing Cycle Time (MCT)

The time it takes to execute an operation on one piece of one item. It is made up of the operator time outside of machine run time, plus the machine run time. On a car assembly line, we define assembly cycle time, as the time that it takes for a vehicle to move through a line station. The most work-intensive line station has the longest cycle time, which in turn establishes the overall speed for the assembly line.
Master Production Schedule (MPS)
An aggregation of independent requirements used as input to the Material Requirements Planning process.

Material Authorizations
The amount of material that the customer is authorizing a supplier to either purchase (RAW) or produce (FAB). If the customer should cancel this order, the customer will pay the supplier for any material that the customer authorized. It is important for the balance-out process to track the highest value of RAW and FAB authorizations.

Material Flow Diagram
A graphic representation of a material flow process.

Materials Management Policy
See Policy.

Materials Management System (MMS)
A complete system to manage the flow of material from supplier to and through the facility to the facility's customer.

Material Requirements Planning System (MRP)
A time phased replenishment system to support production and/or manufacturing processes. It is generally identified with material/inventory control processes.

Milk Runs/Orderly Pick-Ups
A disciplined transportation process using dedicated trailers/drivers to combine less-than-truckload (LTL) shipments from multiple shipping locations on a predetermined route at scheduled pick-up times.

MMSA
Materials Management System Assessment.

Mode
Conveyance pattern (combination of vehicle and load make-up) used for moving material.

MP&L
Material Planning and Logistics — Ford Motor Company’s name for their materials management system.
MRO
Maintenance, Repair, and Operating Supplies – Purchased items not included into the finished product.

Obsolescence
Out-of-date material designated for disposal.

Partial Lots
The amount left over from a production run that is insufficient to fill a container or package to the customer’s required ship quantity.

Performance To Schedule
A performance measurement which represents the percentage of on-time deliveries to the customer.

Perpetual Inventory
The inventory as represented in computer records, used to reconcile against physical inventory.

Physical Inventory
A method of verifying inventory record balances by physically counting all inventory on hand.

Pilot Program
A Program to build saleable vehicles on line with samples of approved parts.

Point of Use
The location where material is needed.

Policy
The term is used to describe long- and medium-range management orientations as well as annual goals or targets. Another aspect of policy is that it is composed of both goals and measures, that is, both ends and means. Goals are usually quantitative figures established by top management, such as sales, profit, and market share targets. Measures, on the other hand, are the specific action programs to achieve these goals. It is imperative that top management determine both the goals and the measures and then deploy them throughout the organization.

Pre-Production
Manufacture or assembly using production parts and processes prior to continuous scheduled output.
Premium Freight
Charges incurred in addition to contracted delivery, often monitored as an indicator of potential supply problems and supplier efficiency.

Problem Solving
A disciplined process to analyze problems to determine and eliminate root causes.

Process
A series of changes by which something develops. A particular method of making or doing something, in which there are a number of steps.

Production
(1) The process of joining or modifying incoming material to create a changed entity.
(2) The facility’s function directly responsible for the production process.

Production Network
The complete set of all work centers, processes, and inventory points, including all suppliers, from the point of completion of the product all the way back to the raw material for all components.

Production Part
A part, assembly, or component that will be assembled into a product.

Production Parts Approval Process (PPAP)
Generic requirements for production part approval for all production and service commodities, including bulk materials. It applies equally whether parts are produced internally or externally by outside suppliers.

Pull Systems
A customer controlled system that uses signals to authorize replenishment of material by a supplying operation.

Quality System Requirements (QS-9000)
A document distributed by the AIAG, that defines the fundamental quality system expectations of subscribing companies (including DaimlerChrysler, Ford, Freightliner, General Motors, Mack Trucks, Navistar International, PACCAR, and Volvo GM Heavy Truck). ISO 9001:1994 Section 4 forms the foundation for QS-9000. (See ISO 9000.) QS-9000 was developed by the DaimlerChrysler/Ford/General Motors Supplier Quality Requirements Task Force.
Quality Operating System (QOS)
QOS is a systematic, disciplined approach that uses standardized tools and methods to manage a business and achieve ever-increasing levels of customer satisfaction.

Ramping Up
The schedule period(s) immediately preceding the point at which a process is operating at full rate.

Receipt Authorization Number (RAN)
A unique number which represents a firm order quantity of an item for a particular delivery date. This number is used to receive material and to track this receipt through the accounts payable process.

Receiving Discrepancies
Variance between documented receipts and physical receipts.

Receiving Window
Specific day/time of day dock schedule for receiving/unloading inbound material.

Record Integrity
The state in which records match actual occurrence.

Release
An order of material against a blanket purchase order. A release tells the supplier what, when, how much, and whom to ship it to. Some common EDI documents used for releasing are the X12 830, the UN/EDIFACT DELFOR, and the X12 862.

Returnable Container
Shipping container of any material designed to be used for more than one shipment.

Returns
Any material which is returned to the supplier. Could be due to quality issues, over shipments, foreign stock, etc.

Root Cause
The true cause(s) of a problem, not just its superficial symptoms. Identifying and correcting root cause ensures permanent corrective action.
Routings (Production Routings)
Information detailing the method of manufacturing of a particular item. It includes (at a minimum) the operations to be performed, the work centers involved and the standards for setup and run time. In some companies, the routing also includes information on tooling, operator skill levels, inspection operations and testing requirements.

Scheduling System
An integrated timed process of identifying customer requirements, managing production capacity, and requesting raw material from suppliers.

Scrap Rate
A predictable percentage of raw material rejected from use in a manufactured product.

Self-Assessment
A method by which a facility or organization compares actual methods/performance to an ideal.

Serial
A unique identifier assigned to an entity for tracking purposes.

Service
Parts manufactured for use as replacements. Service parts are produced in addition to parts required to support OEM assembly requirements.

Shipment Identification Number (SID)
A number used by Customs to identify, in a single number, the shipment crossing the border. Also, the control ID number assigned to an ASN transaction.

Shipping Windows
The specific dock schedule allocating days and times of day for loading outbound material.

Small Lot Strategy
The strategy of effectively reducing production/delivery lot quantities to approach an optimum one-piece flow.

Standard Quantity Pack
A pack that contains the same quantity of the same items.

Storage Location
The interim location where material is kept in inventory between the receiving dock and the point-of-use.
Materials Management Operations Guideline

Subcontractors
1. In QS-9000, providers of materials, parts, or services to Tier 1 suppliers; another name for Tier 2 suppliers
2. Providers of materials, parts or services to a contracted supplier.

Supermarket
A centralized storage area in a facility from which deliveries are made to points-of-use.

Supplier
A provider of materials, parts, or services directly to the customer.

Supplier Scheduling
A process to provide suppliers with timed customer requirements information.

System
Work elements operating together or connected in some way to form a whole, with an orderly and methodical plan of proceeding to perform the main function; a combination of input, process, and output.

Third Party
A service provider that interfaces between the supplier and the customer to modify the packaging and/or provide a value-added process to the product.

Throughput Time
The elapsed time from when material starts into a process until it is finished, either through a plant or through an entire production network.

Tier 1 Part Number
Final assembly parts that are installed directly on a vehicle at the assembly plant.

Tier 2 Part Number
A subcomponent of the Tier 1 part.

Tiers
The levels of supplier in relation to the OEM final assembly operation. A company that supplies directly to a vehicle assembly plant is called a "first tier supplier." A company that supplies to a "first tier supplier" is called a "second tier supplier," etc.

Tooling
Specific tools, fixtures, dies, etc., installed in equipment to support the manufacture of a unique product.
Tooling Capacity
The highest number of units that can be consistently produced in a given period of time. Component manufacturing capacity should be equal to assembly capacity on a daily basis. Tooling capacity is a dynamic number that will reflect continuous improvement.

Traceability
A precise degree of documented history regarding the life of an entity such as a lot of material, including activities performed and components used.

Trading Partner
Any organization in a customer/supplier relationship. All members within the channels of distribution within an industry (suppliers, carriers, customers and intermediaries).

Transit Time
The elapsed time from shipping dock to receiving dock.

Transportation Conveyance Utilization
See Cube Utilization.

Transportation Mode
See Mode.

Transportation Routings
Pre-assigned routes given to carriers to maximize conveyance cube and minimize transportation costs.

Unscheduled Maintenance
Work done on an as-needed basis with no planning; commonly referred to as breakdown or emergency breakdown maintenance. It may or may not involve production losses.

Visual Controls
The use of job-related visual signals (words, symbols, lights) that are readily apparent and can be easily understood. This information can be used to identify, instruct or indicate that normal or abnormal conditions exist and that action may be required.

Visual Management
Arranging the workplace and/or inventory to facilitate the observation of normal and out-of-line conditions.
Waste

Any amount of equipment, materials, parts, and work time or any activity that does not add value to the final product. Obvious waste includes waiting time, repairs, overproduction, excessive inventories, etc. Hidden waste refers to aspects of the business that appear to be absolutely necessary under “current methods of operation” but could be eliminated if improved methods were adopted.

Waste of Conveyance

Waste of conveyance occurs whenever the producing process is not directly located next to the using process, thus requiring the transportation of materials between processes. The more conveyance per unit, the greater the final product cost. Ideally, waste of conveyance is zero. However, at present, some minimum conveyance is needed to keep "Just-In-Time" production operating smoothly. (Examples of waste of conveyance are temporary unloading, load transfer, removal of small quantities, and movement from one spot to another.)

Waste of Defects

Waste of defects occurs when effort and cost are expended to correct items that do not meet specifications. A production system that makes allowances for waste of defects has a larger (and more costly) capacity than is needed in a defect-free system. Examples of waste of defects are scrap and rework.

Waste of Inventory

Waste of inventory occurs when parts are produced when they are not needed and must therefore be stored, whether as backup or as inventory between processes. Ideally, all inventory is waste.

Waste of Motion

Waste of motion occurs when any human or machine movement in production adds no value to the product. For example, all walking or reaching is waste.

Waste of Overload

Waste of overload occurs when any resource (machine or worker) is used beyond its capability or its planned use. Waste of overload can lead to the production of defective items or to taking shortcuts, e.g., not performing preventive maintenance.

Waste of Overproduction

Waste of overproduction occurs when any producing process makes a part sooner or in greater quantity than is needed by the using process. The greatest form of waste is the waste of overproduction.
Waste of Processing

Waste of processing occurs when there are work process steps that could be eliminated or reduced through improved production methods. For example, steps to trim flash from castings are waste of processing.

Waste of Waiting

Waste of waiting occurs whenever a worker has no work to do. Examples are when a worker is idle while watching an automatic process or cannot work until a machine stops moving, when the volume of work is small, or when no work is available.

Work in Process (WIP)

Any production material on which the company has performed some manufacturing, processing, or converting operations but which is not yet in its finished form.

Workplace Organization

A safe, clean and neat arrangement of the workplace (physical space where products or services are generated) that provides a specific location for everything, eliminates anything not required, and supports the employee.

Year

Usually twelve contiguous months. Types of “year” used in the automotive industry include:

(a) Calendar Year (January 1 thru December 31);
(b) Sales Model Year (October 1 thru September 30) – counts and reports all vehicles sold regardless of vintage;
(c) Production Model Year (usually August 1 through July 31) – traditionally offset ahead of Sales Model Year to plan vehicles available for sale;
(d) Model Year – often refers to a model run of single vintage models regardless of number of months produced/sold (e.g., 1999 pickup trucks)
REFERENCES

AIAG Publications

Supply Chain Recommended Business Practices for EDI Implementations for Requirements (Push) Based EDI (M-3 v2.0 2/98)

Supply Chain Recommended Business Practices for EDI Implementations for Requirements (Push) Based EDI (M-5 v1.0 3/98)

DELFOR EDIFACT Implementation Guidelines (E-7 v1.0 7/98)

Manufacturing Assembly Pilot (MAP) Project Final Report (M-4 v1.0 2/97)

EDI Industry Implementation Guidelines Version 004010 AIAG (EG-8 2/98)

Returnable Containers Transported by Truck (RC-1 V1.0 1/86)

Daimler Chrysler, Ford, and General Motors Supplier Quality Task Force Publications

Advanced Product Quality Planning & Control Plan (APQP-2 1995)

Quality Systems Requirements (QS-9000) Third Edition

The above publications are available from:

Automotive Industry Action Group
26200 Lahser Road, Suite 200
Southfield, Michigan 48034
(248) 358-3003
Fax: (248) 799-7995 or 358-9760

Other Publications

MS-9000 Materials Management System Requirement – Developed by Ford Motor Company

ISO 9001 Quality systems – Model for quality assurance in design, development, production, installation and servicing (ISO 9001 Second edition 1994-07-01)

The ISO 9001 publication is available from:

American National Standards Institute (ANSI)
11 West 42nd Street
New York, NY 10036
(212) 642-4900
Fax: (212) 302-1286
SELF-ASSESSMENT

Self-Assessment

The primary purpose of the self-assessment is to provide suppliers with a tool to drive continuous improvement either within your own facility or at a supplier’s facility. A self-assessment tool is being developed and will be included in the next version of this document. The questions included need to be addressed by each facility. Each question will be assessed and points scored based on the scoring guidelines that will be included. To perform a self-assessment, the facility should assess each question contained in the self-assessment and assign themselves a point score based on the scoring guidelines.
APPENDIX A - LEAN MANUFACTURING/LEAN MATERIAL FLOW

Lean manufacturing is a total system approach to the identification and elimination of waste. It is a way to direct the implementation of the Materials Management Operations Guidelines.

Improvements are achieved by efficiently and effectively supporting each process and operation. Manufacturing/assembly lines along with material storage areas can be condensed freeing up space for other value added activities. Capacity can be increased with little or no capital investment.

In today’s environment it is desirable to use a lean methodology to qualify/manage all of the facility’s processes. The Material Management Operations Guideline provides a listing of the business elements to which attention should be paid. Use a lean focus on each of the business elements - lean implementation will improve the quality and efficiency of manufacturing and material handling and reduce cost. Implementing Lean/Synchronous methods will also help streamline business processes such as eliminating the need for container counting in the receiving process. Three elements of lean are:

- Support the Operation
- Eliminate Waste
- Continuously Improve

Support The Operation (support the operator)

The primary objective of a lean manufacturing/material flow process is to efficiently and effectively support the needs of the customer (the person or location using the requested part).

Begin with the requirements of the customer operation when attempting to implement synchronous or lean techniques.

Everyone must understand that, for a lean manufacturing/assembly process to be effective, the right quantity of the right part must be put at the right operation in the right part orientation at the right time every time.

Eliminate Waste (waste = excess cost)

Elimination of waste in the entire material flow process, including handling, transportation, part presentation and inventory, is a key enabler to support lean manufacturing.
Seek out and destroy all aspects of waste. This will result in reduced cost, improved quality and improved productivity.

Avoid looking only for ways to reduce cost since this can lead to eliminating content or value from the product ultimately failing to satisfy our customers (reducing cost but also reducing sales). Attacking and eliminating the various forms of waste will lead to a high value product produced at lowered cost.

The following mnemonic can be used to help remember major types of waste. It uses the acronym COMMWIP as outlined below.

<table>
<thead>
<tr>
<th>COMMWIP (COMMunicate to reduce Waste In Process)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C = correction</td>
</tr>
<tr>
<td>O = overproduction</td>
</tr>
<tr>
<td>M = movement of material</td>
</tr>
<tr>
<td>M = motion of the worker</td>
</tr>
<tr>
<td>W = waiting</td>
</tr>
<tr>
<td>I = inventory</td>
</tr>
<tr>
<td>P = processing</td>
</tr>
</tbody>
</table>

As long as there is a need to transport/move parts from one location to another in support of value-added activity, there will be opportunities to eliminate waste in the material flow process (changes in manufacturing processes will provide additional opportunities for improvements in material flow).

One key to eliminating waste is the concept of small lot size. The theoretical goal is one-piece flow. For many parts, one-piece-flow is desirable (examples include contiguous lines, modules and sequenced parts). Other parts may be better managed in less extreme small lots.

In production, small lot sizes enable reduction of inventory (raw, WIP and finished goods) and facilitate customer order driven manufacturing.

Small lot sizes in material flow create an environment where physical controls can be used to monitor and quickly highlight the need for corrective action.

**Continuously Improve** *(progress is never complete)*

Finally, the continuous improvement cycle is never complete. There will always be room for improvement in all of our processes. Continuous improvement frees us from the burden of having to know the perfect or best plan before implementing change.
The continuous improvement cycle consists of identifying an opportunity for improvement, analyzing and planning improvements, implementing change, then evaluating the results to either endorse or reject the change.

Every improvement, no matter how small, should be considered (multiple small improvements will sum to major improvements over time).
THE AIAG

Purpose Statement

To provide an open forum where members cooperate in developing and promoting solutions that enhance the prosperity of the automotive industry. Our focus is to continuously improve business process and practices involving trading partners throughout the supply chain.

Core Values

- **People** – Our strength comes from passionate and personally committed volunteers and staff. We provide an environment of integrity, trust, teamwork and mutual respect to foster open, frank communications as we achieve consensus on industry needs and solutions.

- **Innovation** – With a sense of urgency, we drive and support the development and implementation of common, leading-edge solutions that provide value to the automotive industry and its customers.

- **Excellence** – We provide quality and excellence in all we do and how we do it.

We do what’s right for the industry!

AIAG Organization

The AIAG is made up of a board of directors, an executive director, associate directors, a full-time staff and volunteers serving on project teams. Under the direction of the executive director, associate directors, along with the managing director, department managers and program managers, plan, direct, and coordinate the association’s activities. The executive and associate directors are executives on loan from member companies for varied lengths of time.

AIAG Projects

Member Committees focus on business processes or supporting technologies and methodologies. They conduct research, develop, publish and provide training on standards, conventions, standard business practices, white papers and guidelines in the areas of automatic identification, CAD/CAM, EDI/electronic commerce, continuous quality improvement, materials and project management, returnable containers and packaging systems, and transportation/customs.

The AIAG - An Association Fostering Total Supply Chain Partnering

Automotive Industry Action Group
26200 Lahser Road, Suite 200
Southfield, MI 48034
Phone: (248) 358-3570 Orders: (248) 358-3003 Fax: (248) 358-3253
MAINTENANCE REQUEST FORM

Name of Submitter: ___________________________ Date: ____________

Company: ___________________________

Company Address: ___________________________

Phone: __________________ Fax: ___________ E-mail: ____________________

MAINTENANCE REQUEST

Page Number of Change: ___________________________

Document Currently Reads:

__________________________________________

Recommended Changes/Should Read:

__________________________________________

Reason for Change (Use additional sheets if necessary):

__________________________________________

Signature of Submitter: ___________________________

DISPOSITION (AIAG USE ONLY)

Manager's Recommendation:

__________________________________________

Final Disposition:

__________________________________________

Comments:

__________________________________________

Note: Complete form and return to the AIAG Volunteer Programs Department for consideration.

Automotive Industry Action Group • 26200 Lahser Road • Suite 200 • Southfield, MI 48034
Telephone: (248) 358-3570 • Fax: (248) 358-3253
Web: www.aiag.org