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Message from the BOS Management

Dear Suppliers,

Here at BOS we have developed what we call the “BOS Production System” (BPS). This helps BOS identify any type of waste within our processes and assists us in reducing or even completely eliminating such waste. The BOS Production System is our continuous improvement tool aimed at creating a lean production and logistic organization.

The BOS Production System does not end at the gates of our manufacturing plants. Like a network, it includes all functions and disciplines involved in the value added and product development process, both internal and external. All at BOS and within our supplier base must work in accordance with the principles of this production system if we are to secure the future of our respective companies.

For this very reason embedded within these Supplier Guidelines are many of the BPS principles to provide the same framework and direction to our extended organization (the BOS supplier network). This is designed to achieve what must be, the same goals of continuous improvement in all functions, disciplines and processes at a greater speed, based upon a consistent and systematic approach.

All the best for our future together!
Section 1 – Introduction

1A. Policy and Vision

It is the policy of BOS to achieve a clear competitive advantage through continuous improvement in quality, service, delivery and cost from our suppliers in the total supply chain.

BOS is committed to providing products and services to our customers that fully meet their present and future requirements. BOS’s suppliers are a critical strategic resource in meeting this customer commitment.

BOS requires suppliers and their sub-suppliers to have an effective Quality System. The basis for BOS’s quality system requirements is the Quality System Requirements ISO/TS16949 developed in coordination with the Automotive Industry Action Group (AIAG). This standard is based upon the ISO 9000 series standard. BOS has adopted ISO/TS16949 as the framework for the basic quality systems required for all suppliers of products and services. These requirements are an integral aspect of BOS’s purchase order.

BOS requires the following:

Suppliers to BOS’s ISO/TS 16949 registered facilities are encouraged to achieve ISO/TS 16949, but as a minimum must have third party registration to ISO 9001:latest version.

1B. Purpose

The purpose of these Supplier Guidelines is to specify BOS Automotive Products quality system requirements for our suppliers. These requirements extend from supplier qualification, to new product development, to production. The manual is also designed to assist in conveying how the requirements can be implemented.

1C. Scope

BOS’s Supplier requirements contained in this manual are applicable to all Supplier Manufacturing sites and include production parts, service parts and production materials as well as assemblers of production parts that are supplying BOS plants.

This manual reinforces the BOS Purchase Order Terms and Conditions and the General Purchasing Conditions.

1D. Special Supplier Responsibilities

The Supplier shall undertake to:

1. **comply with the environmental regulations** and requests (material and substances reporting, recycled content, recycling solutions, European Directive on End of life vehicles and its annex, customers' special requests)

2. **guarantee that no critical / hazardous material and substances** such as heavy metals are contained in its Parts and Materials according to ELV directive (2000/53/EC and its updated Annex II. see the consolidated text of the ELV Directive on the following website [http://europa.eu/] see Environment / waste / waste from consumer goods / end-of-vehicle life. Hexavalent chromium will have to be suppressed from all the corrosion preventative coating applications from the 1st of January 2007 (as the regulation deadline was set at the 1st of July 2007).

3. **provide material data documentation**
BOS Automotive Products
Quality guidelines for suppliers.

Controlled only when viewed online at BOS Automotive Products' Website

Revision V6.2 October 2013

BOS accepts two formats for suppliers to submit ELV data:
  a. Direct entry into IMDS via the Internet (www.mdsystem.com).

4. Fulfilling the requirements of the Supplier PEP +

   Use the standardised schedule of activities in the product development phase. When SE Partnership use the Supplier PEP + SE, with serial tool creation or change follow the Supplier PEP + Regular Supply. For more details see Section 2B.2.

5. comply with all BOS quality management procedures in development, including:
   a. use of APQP (Advanced Product Quality Planning) tool to ensure that preventive quality actions are used.
   b. comply with Production Part Approval Process

6. use of Automotive Industry standard tools & procedures such as:
   a. APQP, FMEA (Failure Mode and Effects Analysis), MSA (Measurement System Analysis) and SPC (Statistical Process Control) as defined in AIAG (Automotive Industry Action Group www.aiag.org) and VDA (Verband der Automobilindustrie http://www.vda.de/de/index.html) procedures or other tutorial documents.

7. set up and maintain a Sub-Supplier management in accordance with the requirements as laid down in this manual, including:
   a. documented evidence from the Supplier on the follow up of second tier quality management system
   b. ensure the quality of the sub-supplier parts using other suitable measures (including PPM quality target setting, special key characteristics follow up, Validation plan, Control plan, Run@Rate and Process audit, Initial Samples submission)

   BOS reserves the right, jointly with the Supplier to conduct process approval audits at the sub-supplier(s) on its own in case of major problem or risk.

8. put in place an early containment plan for all Program start-ups - Safe Launch planning (minimum 3 months before series deliveries and up to 3 months after SOP without defects, extended for the same period when defects are found) and product changes. This containment plan will include a Pre-launch Control Plan for all parts (see SLP within 2.17. Production Process review).

9. put in place a Containment in case of proven repetitive failures thus exceeding the PPM target (controlled shipping level 1 & 2). This status are define by the concerned BOS plant.

10. meet these SQ Guideline requirements. Failure to meet these requirements may result in the loss of existing and/or future BOS business, in addition to reimbursement of the cost to BOS resulting from those failures.

11. adopt the standards of Zero Defects and 100% On Time Delivery / Right Quantity to BOS. Suppliers shall understand that any established PPM target is not an Accepted Quality Level, but represents an intermediate continuous improvement step toward shipment of components/materials meeting the Zero Defects requirement.
1E. Language

BOS’s international language is English. The default mode for all official communication with BOS is English. Documents may be in the local BOS native language with prior agreement, but to avoid parallel translation, English is the only valid version.

1F. Government Regulatory Compliance

Suppliers shall comply with all applicable governmental regulations. These regulations relate to the health and safety of the workers, environment protection, toxic and hazardous materials, and free trade. Suppliers should recognize that the applicable government regulations might include those in the country of manufacture, as well the country of sale. Registration to ISO14001 is strongly recommended. Registration to ISO 19001 OCHAS is also preferred.

1G. Code of Conduct

In view of the international activities of the BOS Group there is a need for a consistently high set of standards with respect to our employees, our environment as well as our external partners. The Code of Conduct developed for this purpose is largely oriented to the UN Global Compact (www.unglobalcompact.org) and applies to all locations of the BOS Group.

We also encourage our suppliers to adopt the same or similar social standards. Furthermore, we prefer suppliers who demonstrate social and environmental responsibility.

BOS Code of Conduct
Section 2 - BOS Automotive Products Requirements

2A. Supplier Selection

2A.1. ISO/TS 16949: Latest Version

BOS Automotive Products' goal for all suppliers of materials and services affecting production material is to demonstrate compliance to ISO/TS 16949:latest version. Suppliers shall also comply with BOS Automotive Products Quality Requirements as defined in this document, also to be found at the supplier portal:  http://www.bos.de/index.php?id=4

Supplier datasheet

Suppliers to BOS Automotive Products shall be third party certified to ISO9001 or ISO/TS 16949:latest version. This is consistent with BOS's customer expectations, and ISO9001:latest version is seen as the first step in becoming ISO/TS 16949 certified. The scope of this requirement affects subassembly, sequencing, sorting, rework and calibration services in addition to direct material suppliers.

Suppliers, with manufacturing capability, shall continue on to ISO/TS 16949:latest version third party registration by submitting a plan with details including internal self-appraisals and the name of the third party registrar body. A plan to achieve certification shall be submitted to your respective Commodity Buyer and Supplier Development Engineer.

BOS Automotive Products recommends for its suppliers to continue using the latest Automotive Industry Action Group (AIAG) versions of the Advanced Product Quality Planning and Control Plan (APQP), Potential Failure Mode and Effects Analysis (FMEA), Measurement System Analysis (MSA), Production Part Approval Process (PPAP), and Statistical Process Control (SPC) manuals as guidelines for their system development.

For these publications, visit http://www.aiag.org
The VDA requirements as specified in manuals one to nine are also acceptable.
For these publications, visit http://www.vda-qmc.de

2A.2. e-Business Capabilities

Supplier Portal address:  http://www.bos.de/index.php?id=4 then go to heading Supplier

Electronic Commerce requirements

It is our strategy that all our suppliers have the capability to interface with BOS with a traditional EDI package. Thus allowing any updates, new releases, system changes, etc. will be communicated to our suppliers by the BOS Supply Chain Management and Purchasing organisations.

This includes the ability to receive releases and send ASN’s. All of our initiatives, policies, and transaction sets comply with the guidelines set forth by the Automotive Industry Action Group (AIAG) / VDA.  ASN?

All suppliers must develop a contingency plan for their primary EDI system. This allows us to keep both product and information flowing if the primary system fails for any reason.

To inquire about the specific details of using EDI with BOS, please utilise the forms –
- (Communications Data for Data Transmission with Suppliers via OFTP according to VDA 4905/06/07/08/13/15
- Communications Data for CAD Data Transmission via OFTP according to VDA 4914/2

Both are available within supplier portal at [http://www.bos.de/index.php?id=4](http://www.bos.de/index.php?id=4). Should a supplier wish / or is required to have EDI then the forms shall be completed and forwarded to: purchasing@bos.de

All logistical requirements can be found in the Supplier Portal within the document titled “Logistical Terms” this provides a comprehensive guideline in to such subjects as Communications Matrix, Electronic Data Interchange / EDI, Supplier Requirements, Delivery Schedules / Call-Offs, Explanatory Notes Regarding Delivery Schedules, Under- / Over-Shipsments, Transportation and Material and Information Flow Emergency Concept.
2A.3 **New Supplier Evaluation and release process**

Potential suppliers are released internally after a quality process audit and/or a technical process audit depending on the perceived risks to BOS.

![Diagram of New Supplier Evaluation and release process]

- **Input Activities**
  - Request for pre-audit
  - Technical Process Audit checklist
  - General checklist (Checklist # 0)
  - QP Process Audit checklist

- **Output Activities**
  - New potential Supplier
  - Capability approval Audit requested
  - ISO TS16949 or ISO9001 + Automotive experience?
  - BOS Supplier Process Quality Audit
  - Technical Process Audit Checklist + General Checklist (not signed)
  - Responsibility defined
  - Audit Preparation
  - Audit Report + LOP
  - Audit Closure
  - Release of new supplier form SIGNED by QSI

- **Audit Database in Intranet (Zero defects Team 2)**
2B. New Product Launch

2B.1. Supplier PEP + (product creation process+)

The aim of this process is to ensure a common understanding of the requirements of a project and the timely exchange of relevant information & documents between the supplier and BOS. The process is applicable to the SE projects, procurement of new tooled parts and complex tool changes. The supplier has to report the project’s progress at defined intervals using the Supplier Status Report to the EU-Purchasing. In the Supplier Status Report documents the BOS milestones are the fixed dates. They are crucial to the success of a project. The nominated suppliers have a duty, by all the means available, to meet the deadlines of BOS requirements.

PEP+ Supplier SE, PEP+ Supplier Regular Supply

2B.1.1. Kick-off Meeting

When nominating a supplier for building a tool or an SE-activity, a kick-off meeting is convened by the BOS EU team. Here, the key to a successful project launch is sharing the information and recording it via the kick-off protocol.

2B.1.2. Supplier Status Report

The Supplier Status Report is a BOS standard document in the product development phase. It contains the following components:

- BOS milestones and their attainment
- Communication Matrix (BOS and supplier)
- Action Plan (adopted in case of scheduling deviations)
- Template for photo documentation of a new tool

LINK: Introduction Supplier Status Report
2B.2. Advanced Product Quality Planning (APQP)

Introduction

New Product Launch initiates a design concept and runs through a production launch of a new component. BOS Automotive Products Engineering Units will define component criticality together with our suppliers during the product development cycle. This designation determines the involvement of BOS EU QE in the APQP and launch process with suppliers. All suppliers, regardless of component criticality, shall use a disciplined launch and APQP process. Specifications such as DIN, ISO, etc. cannot be supplied by BOS but can be purchased via www.beuth.de

2.1. Supplier APQP Activity

BOS utilises a team approach for the management of Advanced Product Quality Planning (APQP). The BOS Engineering Unit (EU) is a cross-functional team responsible for assuring that the new product being launched satisfies the customer. The BOS EU follows a structured method of defining the customer requirements and establishing the steps necessary to provide a quality product on time and at the lowest cost to the customer. The typical cross-functional BOS EU includes representatives from sales, engineering, manufacturing, quality, purchasing, packaging and suppliers as appropriate. Depending on the complexity of the new product launch, the supplier may be asked to participate on the BOS EU activities as a SE (Simultaneous Engineering supplier) – early supplier involvement, Secrecy Agreement

The general course of the SE Partnership is described in the Supplier PEP+ SE process. Irrespective of this participation, the supplier also has an obligation to establish a cross-functional team that coordinates their APQP activity.

The outputs of this cross functional team are:

- Select the disciplines and individuals required to address the scope of the APQP activity
- Define the roles and responsibilities for each area represented
- Identify the customers, both internal and external
- Define the customer requirements
- Understand the customer expectations
- Assess the feasibility of the proposed product design
- Identify the costs, timing and constraints of the processes that will be used
- Determine what customer assistance will be required
- Complete all the APQP requirements required by BOS

Documentation of the Suppliers internal APQP process is essential to assure that all parties are aware of the program requirements and that all deliverables are completed. The Supplier APQP activity should be documented using the following:

- Team Charter – defines team membership, program scope, key timing milestones and key deliverables
- Supplier Status Report for continuous documentation and communication of milestones, an update is usually required every 2 weeks.
- Product Development Plan – defines all program milestones (typically in Gantt format)
- Statement of Work – defines program scope and provides a of review product specifications
- LOP for supplier Quality Planning – A document to track open issues from inception to completion/resolution. This is a living document that the team reviews usually weekly to keep a pulse on the progress of the team.
Supplier APQP Diagram showing the link from APQP to series production and beyond as managed by BOS.
Quality Planning Requirements - Shown with completion dates for planning purposes. The following items are the minimum to be included:

- Process Flow Diagram
- Design FMEA *
- Process FMEA
- Control Plan
- Tool Progress Report *
- Product Validation Plan *
- Inspection Standard *
- Engineering Change History Log *
- Launch Support Plan *
- Initial sample Submission

Excluded only at the discretion of the Engineering Unit Quality Engineer. (EU-QE)

2.2. The Design Failure Modes Effects Analysis (DFMEA)

The Design Failure Modes Effects Analysis (DFMEA) is an analytical technique that shall be utilised by all design responsible suppliers to assure that potential design failure modes and their associated causes have been considered and addressed to the extent possible. During the initial DFMEA process, the responsible engineer is expected to directly and actively involve representatives from all the affected areas. These areas should include, but are not limited to: assembly, manufacturing, materials, quality, service and suppliers, as well as the design area responsible for the next assembly. The DFMEA should be a catalyst to stimulate the interchange of ideas between the functions affected and thus promotes a team approach.

The DFMEA is a living document and should be initiated before or at the design concept finalization, be continually updated as changes occur or additional information is obtained throughout the phases of product development, and be fundamentally completed before the production drawings are released for tooling.

The DFMEA addresses the design intent and assumes the design will be manufactured/assembled to this intent. Potential failure modes and/or causes that can occur during the manufacturing process need not, but may be included in a DFMEA, when the Process FMEA covers their identification, effect and control.

The DFMEA does not rely on process controls to overcome potential weaknesses in the design, but it does take the technical limits of a manufacturing process into consideration, e.g.:

- Necessary mold drafts
- Limited surface finish
- Assembly space/access for tooling
- Limited ability to hardening of steels
- Process capability/performance

The process begins by developing a listing of what the design is expected to do, and what it expected not to do, i.e., the design intent. Customer wants and needs should be incorporated. The better the definition of the desired characteristics, the easier it is to identify potential failure modes for corrective action.

2.3. Critical To Quality - CTQ List

BOS and its suppliers must determine, during the design and prototype phases, whether components can be produced at the desired quality levels. To put it in layman's terms, CTQ are what the customer expects of a product. CC (characteristics related to safety and/or regulations) and SC (characteristics important for the product quality) must be consider as CTQ.

A primary first step in this quality determination is the selection of Significant, Critical and other important characteristics that reflect the concerns of our customers, including fit, finish and function, which must be controlled to assure customer satisfaction.

The CTQ List must define all characteristics and acceptance criteria for each part along with the method and frequency by which the part should be monitored and controlled at the supplier. Examples would include: datum, performance, weight, material appearance, noise level.

The CTQ List may be developed by BOS EU QE or BOS EU QE may request the supplier to prepare the initial draft of the CTQ List and submit to BOS. Those developing the list must be concerned with the “correctness and the control” of the critical and significant characteristics and are required to analyse and establish significant characteristics and provide for their control.

These drafts will be reviewed by the respective companies for completeness. Once approved, the signed original will be returned to the supplier and BOS will keep a copy. Other means of defining part requirements can be used at the discretion of the EU QE in work together with the supplier.

Updates or changes to the CTQ List can be requested for the following reasons:

- Change or update due to Engineering Change
- A correction to the CTQ List (must be approved by both Supplier and BOS)
- An addition or correction based on process capability studies in production
- A change to improve the BOS part or BOS Customer build condition (must be approved by all parties)

The supplier has the responsibility for:

- Their internal quality planning and implementation and to “relay” this knowledge of the part's critical and significant characteristics to their sub-suppliers.
- The concept of early quality planning must extend to all levels of procurement in the supply chain. Ensuring these agreed characteristics are controlled on prototype parts using the P/PPE process (section 2B2.7).

2.4. The Process FMEA

The Process Failure Modes Effects Analysis – PFMEA is an analytical technique utilised by a Manufacturing Responsible Engineer or Manufacturing Team to assure that potential process failure modes and their associated causes have been considered and addressed to the extent possible. In its most rigorous form, a PFMEA is a summary of the engineer's or team's concerns as a process is developed. The Process FMEA is a document required within the Initial sample submission. (We can’t require the FMEA)

The Process FMEA:
Identifies potential product related process failure modes, including an analysis of items that could go wrong based on experience and past concerns.
• Assesses the potential customer effects of the failures.
• Identifies the potential manufacturing or assembly process causes.
• Identifies process variables on which to focus controls for occurrence reduction or detection of the failure considerations.
• Develops a ranked list of potential failure modes, thus establishing a priority system for corrective actions.
• Documents the results of the manufacturing or assembly process.

During the initial PFMEA process, the responsible engineer is expected to directly and actively involve representatives from all affected areas. The PFMEA should be a catalyst to stimulate the interchange of ideas between the functions affected and thus promote a team approach. The PFMEA is a living document and should be initiated before or at the feasibility stage, prior to tooling for production, and take into account all manufacturing operations. Early review and analysis of new or revised process is promoted to anticipate, resolve or monitor potential process concerns during the manufacturing planning stages of a new model or component program. The PFMEA assumes the product as designed will meet the design intent. Potential failures which can occur because of a design failure, which can occur because of a design weakness, need not, but may be included in a PFMEA. Their effect and avoidance is covered by the Design FMEA.


2.5. Prototype Fabrication, Quality Evaluation, Pre-Production Process Changes

For the fabrication of prototype or pre-production parts, suppliers shall imitate the planned production process as closely as feasible. For these prototypes, BOS may require that the suppliers provide material, dimensional, performance, or process data. If the prototype and production suppliers are different, the prototype supplier shall share with the production supplier the process knowledge gathered in prototype fabrication. Proprietary information may be withheld by prior agreement with BOS.

Once a supplier starts providing parts, as part of the process development and validation stage, any changes to the process require notification to BOS of those changes. These changes may include:

• To outside or sub-tier suppliers
• Addition/deletion of capital equipment
• Tooling and/or gauges
• To manufacturing methodology
• To internal secondary processing.

Suppliers of proto-type parts, when required, shall report corrective actions required by BOS. (prototypes must be of a known quality level)

2.6. Prototype / Pre-production Part Evaluation

This BOS Prototype and Pre-Production Part Evaluation process has been established to assure purchased components meet dimensional and functional requirements at the earliest stages of the process, i.e. Prototype and/or Pre-Production. It is the responsibility of all component suppliers to provide BOS with products, which meet or exceed dimensional, functional and material requirements agreed upon during the bid process.
Prototype Measurement & report control plan is to be fully completed and be included with all prototype or pre-production submissions. Any component deviations, which do not meet design intent, must be clearly denoted. Corrective actions and timing to bring components to full design intent must be provided with component part submission. Even if multiple submissions from a single fabrication run are provided, BOS expects each separate shipment will be documented in compliance with this procedure.

For each Prototype or Pre-Production Part Submission, BOS requires that 3 (three) parts be fully certified by documenting measurements to all dimensional or material characteristics on the part drawing or requirements sheet. In addition, all Key Product Characteristics agreed upon between BOS and Supplier will be evaluated and documented for the three certification parts. BOS prefers that the three certified parts be taken from throughout the production run, i.e. beginning, middle and end. Even if the supplier provides multiple submissions from a single fabrication run, BOS expects each separate shipment will be documented in compliance with this procedure.

The three (3) certified parts will be packaged separately from the remaining parts provided. Included within the certified part package will be a copy of the Prototype measurement report / control plan form. The three parts will be clearly marked with either an alphabetic or numeric designation (at the supplier’s discretion) and these designations will carry over to the certification form. These parts will not be utilised for BOS part submission, but will be maintained for future review should questions arise regarding their compliance to design. This will aid in any discussion or review that may be necessary with the supplier or end customer.

Note: If parts are produced in a multi-cavity operation, three (3) samples from each cavity must be measured, documented and submitted to BOS. Example: Part XYZ produced in a four (4)-cavity mold. Therefore, 12 parts (3/cavity) are to be measured.

Labelling requirement: All Prototype and Pre-Production packages must utilize ORANGE coloured labels, as these will be clearly definable when compared to mass production parts. Name, part number, BOS contact and date must be identified. BOS will not define a specific ORANGE colour standard Etiquette. Each supplier may choose from materials available to them.

Use of rating numbers for prototypes

Suppliers of prototypes must maintain a system that ensures data recording during the prototype stage.

2.7. Product Validation (DVP & R)

Product Validation refers to the development and successful completion of engineering tests that validate that those products made from production tools and processes meet all functional and reliability criteria. The Product Validation Test Plan itemizes the test description, acceptance criteria, test responsibility, sample size and timing requirements. The testing required by the supplier is specified in the Initial sample checklist and / or the BOS component drawing. Should the supplier be obliged to conduct testing, an effective Product Validation Test Plan is needed that includes:

- Assurance that product reliability meets customer objectives
- Development of reliability testing requirements
- Summary of functional, durability and reliability testing requirements and results in one document
- Provides communication format with the customer

Reliability of the product is paramount to the success of the overall program. BOS will review and approve the Suppliers Product Validation Test Plan for appropriateness of the planned tests.
2.8. Process Flow Chart and Control Plan

The process flow chart is a schematic representation of the current or proposed process flow. It can be used to analyse sources of variations of machines, materials, methods, and manpower from the beginning to end of a manufacturing or assembly process. The flow chart helps to analyse the total process rather than individual steps in the process. The flow chart also helps in the development of the PFMEA and Control Plan.

The Control Plan provides a written description of the systems used to avoid process and product deviation. The Control Plan also provides a structured approach that aids in the manufacture of quality products according to customer requirements. The Control Plan is an integral part of an overall quality process and is to be utilised as a living document.

The Control Plan describes the actions that are required at each phase of the process. During regular production runs, the Control Plan provides the process monitoring and control methods that would be used to control characteristics. Since processes are expected to be continually updated and improved, the Control Plan reflects a strategy that is responsive to these changing conditions.

The Control Plan must be maintained and used throughout the product life cycle. Early in the product life its primary goal is to document and communicate the initial plan for process control. Subsequently, it guides manufacturing in how to control the process and ensure product quality. Ultimately, the Control Plan remains a living document, reflecting the current methods of control and measurement systems used. The Control Plan is updated as measurement systems and control methods are evaluated and improved. Where poka-yoke devices are used they shall be included in the control plan under “methods of control”.

For process control and improvement to be effective, a basic understanding of the process must be obtained. A cross functional team should be established to develop the Control Plan by utilising all the available information to gain a better understanding of the process, such as:

- Process Flow Diagram
- Special Characteristics (CTQ List)
- Design Failure Mode and Effects Analysis
- Process Failure Mode and Effects Analysis
- Special Characteristics (CTQ List)
- Lessons Learned from Similar Parts
- Team’s knowledge of the process
- Design Reviews
- Optimization Methods


For these publications, visit [http://www.aiag.org](http://www.aiag.org).

2.9. Process Capability Studies

Process capability refers to a comparison between the inherent variability of a process and the specified tolerance. It is important to note that acceptable process capability is achieved through the study and control of key process parameters (e.g. temperature, pressure, shot weight, etc.). It is recommended that the supplier use the latest AIAG Reference Manual - Statistical Process Control (SPC) and the Advanced Product Quality Planning and Control Plan (APQP) Reference Manual, latest edition as the reference for conducting process capability studies.

Process Capability Requirements are as follows:
### 2.10. Sub-Supplier Management in Launch

Suppliers of BOS shall have the capabilities to manage their respective suppliers including APQP disciplines and periodic auditing. BOS, when it deems necessary, will audit the critical processes of the sub-tier suppliers to assure that proper controls are in place throughout the entire supply chain. Suppliers of BOS shall ensure critical processes such as heat treating and plating are audited and managed and, when directed, use the BOS documentation.

Sub-suppliers have a tremendous impact on the quality of the final component. Whether they provide raw materials, services or sub-components their influence is so profound that it is critical for each of BOS’s suppliers to have a supplier management system in place. This system shall track and report on their supply base quality and delivery performance. Supplier shall be able to demonstrate that they manage their suppliers’ issues through documented corrective actions and verification activities.
2.11. Engineering Change and / or Manufacturing Change

The supplier must have a system in place for the control and tracking of engineering and manufacturing changes.

**Engineering Changes:**
EU Purchasing will notify the supplier in writing when an engineering change to the product being supplied is required. Prior to implementation of the engineering change, the supplier is responsible for updating all quality planning documents, inspection standards and checking fixtures to reflect the new engineering change. Typically, BOS will require sample parts before the conversion to the new engineering change. Also, a new Initial sample submission will be required for each engineering change. Any additional requirements will be communicated by the BOS Supplier Quality Engineer.

Engineering changes must be incorporated in a timely manner, in accordance with the instructions from BOS. All product shipped to BOS must be clearly marked with the engineering change level. In addition, a Process and Parts History Log, or similar document showing the history of engineering changes must be maintained by the supplier. The Log must be made available upon request by the BOS Supplier Quality Engineer.

**Manufacturing Changes:**
The supplier is expected to notify the EU Quality Engineer and Purchasing in advance of any planned manufacturing process or product changes. The notification must be made using the Supplier Change Request.

These changes include, but are not limited to:
- Product material changes or changes in product material suppliers
- New or revised production tooling
- New or upgraded production processes
- Movement of product to a different production operation
- Product design changes
- BOS will review the proposed change and request samples for evaluation. Depending on the extent of the manufacturing change, BOS may also request:
  - DFMEA and/or PFMEA (we can’t require)
  - Product Validation Test Plan
  - Capability analysis
  - Initial sample submission
  - Documentation and communication of the change using the Supplier Status Report

In all cases, the supplier is not to ship production quantities of the product produced under the manufacturing change conditions until BOS has validated that the product does not adversely affect overall product performance.

2.12. APQP Process Checklists (Supplier)

The following checklists can be used by the supplier to develop their APQP process. Other means to track the APQP process can be used.
- Design Information Checklist
- Product Validation Plan Checklist
- Design FMEA Checklist
- Process FMEA Checklist
- Control Plan Checklist
- Product / Process Quality Checklist

Reviewing the above checklist (found in AIAG APQP booklet) items will help assure that the APQP requirements have been completed to the satisfaction of both the supplier and BOS.
recommends that the format of the quality planning documents follow the AIAG standards/manuals. However, a well-documented system created by the supplier can be used if found acceptable by the BOS team.

We must Translate in German

APQP CASCADE PHILOSOPHY

2.13. Measuring and testing instruments

The supplier is responsible for the use of suitable measuring and testing instruments (including software and programmes) to supervise the processes sufficiently. The supplier and BOS must come to an agreement about the measuring methods and instruments to be used. To guarantee a safe production and perfect parts all measuring and testing instruments mentioned in the control plan must be released and their suitability proven. (For details see AIAG-reference manual "Measurement System Analysis" (MSA).) (Is a TS requirement)

The supplier has the sole responsibility for the provision of standard measuring instruments. Special tests and the procurement of the corresponding measuring instruments are subject to the approval of BOS (see AIAG-reference manual "Advanced Product Quality Planning and Control Plan"). The measuring methods and instruments suggested by the supplier and approved by BOS must be listed in the control plan.

It is necessary that measuring programmes for CMM-measuring machines will be controlled. The supplier must work out and use a plan with which the suitability of the measuring system can be checked regularly in order to verify the measurement system as a whole.

If production tools, jigs and fixtures are used as measuring or testing instruments they must be checked, released and documented in the same way as other measuring instruments. In this case the traceability to national and respectively international reference standards must be ensured for calibration purposes.

For each new project, a supplier risk assessment is conducted by the engineering unit / SQE. A result of the risk assessment could be the application of the QFP document. This document considers on a part by part basis:

- Current performance
- Previous product experience & part complexity
- Sub-supplier experience & part complexity
- Capacity, flexibility and forecast volume
- Development of an emergency / contingency plan

Should a risk be higher than the threshold then the QFP document will be utilised to review the supplier’s quality planning activity thus reducing the perceived risk in the launch process. This will typically be conducted by the EU QE at the supplier's site and start after the supplier has a BOS part drawing and has been nominated.

2.15. Production Process review

(SAPI – Supplier Process Approval of Process Implementation)

The Production Process review (SAPI) is a systematic review of the supplier's manufacturing process prior to launch to verify the supplier’s production readiness. The SAPI will be conducted in advance of the Initial sample submission at the discretion of the EU-QE. If necessary, the EU-QE will visit the supplier’s facility to ensure that BOS requirements have been clearly understood and activities are in place to deliver a successful launch.

Supplier Run at Rate - a formalised supplier capacity survey that verifies proper cycle times, quality expectations and yields.

**Safe Launch Plan** (Quality Gate, Pre-Launch Control Plan, etc.) - a joint effort between the supplier and BOS to have Pre-Launch Control agreed. Safe Launch Plan requires the creation of a SLP Control Plan, in addition to the supplier's Production Control Plan. The implementation of an elevated, short-term Quality Inspection process is required. Safe Launch Plans will be signed-off by the Supplier, the BOS EU QE and the Plant SQE. Supplier will be required to submit on going performance data to the delivered plant(s) as part of this process utilizing the SLP QOS.

2.16. Packaging & Labeling

BOS and suppliers shall agree upon the packaging plan during APQP, including the following requirements.

There shall be only one part number in a box or packaging unit.

All packaging units shall be labeled and the label shall include:

- BOS part number with engineering level and part name.
- Quantity.
- Supplier name and BOS supplier code.
- Lot traceability number and date. This number shall have a direct relationship with Delivery Note supplied. Starting with the Delivery Note, the supplier shall be able to trace all the documents and record. BOS, at its discretion, may specify additional traceability requirements.
- Raw material Heat number, if requested.
A bar coded label applied to each packaging unit. BOS facilities may specify their own bar coding formats. Suppliers shall meet the bar code requirements of the BOS location they are shipping to. (see Logistic Terms in http://www.bos.de/index.php?id=4)

Suppliers providing product to multiple operating units, on a global scale, shall work with each of the locations to assure that the packaging is sufficiently robust to withstand shipment by sea and arrive on time, without damage.

BOS Automotive Products expects their suppliers to conduct, periodically, dock audits on packaged materials. Evidence of these audits shall be retained with other lot inspection documentation.

2B.3. Production Part Approval Process (PPAP & VDA versions)

The default Initial sample submission will be a AIAG level 3 submission comprised of those elements listed in the latest edition of the AIAG PPAP document (for the 4th edition, page 16). (VDA volume 2, page 20, QA of supplies)

Initial sample submission requirements are dictated by the EU QE and can be changed to meet particular requirements of a program. BOS Drawings & specifications contain crucial information that should be included in the Initial sample submission.

Initial Sample Submission will be performed via the “Initial Sampling Portal”. In this portal all requirements are listed and need to be answered by uploading the requested evidence into the system. The release of the ISIR will also be made via this portal. For further information see the user guide found at http://www.bos.de/index.php?id=26&L=1

A run at rate trial may be required (defined by risk evaluation) at the supplier’s site and would be conducted by EU QE & where required supported by EU Purchasing. This run at rate trial is a check to see if the production process can make enough good parts to satisfy both BOS’s required peak demand and also a demand equal to 20% greater than annual demand.

Suppliers shall ensure that the Initial sample documents and sample submissions are in accordance with the above requirements.

Suppliers shall only submit Initial sample packages from BOS production released drawings and a copy of this drawing shall be included in the submission package. They shall also ensure that all these requirements are met before submission to BOS, including obtaining BOS approvals for any change requests.

In addition, the supplier is responsible for all sub-tier initial sample submissions and approvals.

ELV data: refer to Supplier Special Responsibilities section 1.D.3

Supplier submission of a non-conforming Initial sample package may be recorded as a supplier performance failure and could affect the supplier’s performance rating and have financial consequences.

Where applicable, suppliers shall include within the Initial sample submission the Engineering Specification (ES) test plan and the ES test results. An approved/accredited laboratory shall conduct the ES tests.

Labelling requirement: All Initial sample packages must utilize ORANGE colour-coded labels, as these will be clearly definable when compared to mass production parts. Name, part number, Engineering level, BOS contact and date must be identified. BOS will not define a specific ORANGE colour standard. Each supplier may choose from materials available to them.
Each year a repeat dimension sampling must be conducted together with any other requirements as defined on the control plan. The results must retained in line with section 2C.4 and any deviations from Initial sample submission must be advised to the BOS Plant Quality immediately in writing.

2B.4. Lot Traceability

The evidence of traceability must be maintained for all parts and for characteristics that are concerned by safety or legal regulations as e.g. the Federal Motor Vehicle Safety Standards (FMVSS) for flammable parts. It is necessary that the supplier has implemented a system to trace all parts delivered to BOS that gives information on production batch, date etc. The supplier must stabilise and improve the quality of the system continuously to make a fast identification of faulty parts possible. In case of a recall action an effective system of traceability contributes to minimize the risk and cost.

The system must include:
- Traceability of batches per production line, shift, date of production and control documents.
- The batch number / data code shall be on each packaging unit.
- Not more than two batch numbers / date codes per delivery.
- The batch numbers / date codes must be delivered in the same order as produced.

The First In - First Out (FIFO) principle is essential for our stock management. BOS does not accept parts that arrive without proper marking for traceability.

For a safety critical part the traceability requirement is to an individual batch and records recoverable within 24 hours. Quality records must be available for a minimum of 15 years.

For safety/ critical parts, the required retention time for Lot Traceability records shall be found in section Quality records and Product Sample Retention

A BLUE label must be utilised by the supplier to denote the delivery of the first delivery of new parts. Labelling requirement: Name, part number, engineering level, BOS contact and date must be identified. BOS will not define a specific BLUE colour standard. Each supplier may choose from materials available to them.

2B.5 Special Processes

Suppliers providing products and services using a “Special Process”, to BOS, shall audit each manufacturing process to determine its effectiveness. Applicability and the effectiveness of Special Processes shall be determined utilising:

- CQI-11 Special Process: Plating System Assessment (PSA) and
- CQI-12 Special Process: Coating System Assessment (CSA)

Further information is available through AIAG http://www.aiag.org/. The effectiveness evaluation shall include the supplier’s self-assessment, actions taken, and that records are maintained.

All “not satisfactory” and “needs immediate action” results must be addressed for root cause and corrective action. The corrective actions must include risk containment to immediately protect
BOS Automotive Products

Quality guidelines for suppliers.

Controlled only when viewed online at BOS Automotive Products' Website

Revision V6.2 October 2013

BOS and our customers. Long term actions shall be completed within 90 days unless approved by your BOS Supplier Quality Engineer.

Regardless of supplier tier, submissions of the annual validations are to be submitted to your BOS Quality Engineer at the manufacturing facility that you are submitting your PPAP to.

The goal is the development of a management system that provides for continual improvement, emphasizing defect prevention and the reduction of variation and waste in the supply chain.

2B.6 Agreement of Boundary Samples (appearance and noise)

Appearance and noise are characteristics that are vital to vehicle end-user satisfaction. These items are subjective and extremely difficult to quantify and get universal agreement on. However, this does not avoid the obligation to set clear objective standards with OEM, Tier 1, BOS and our suppliers. Where risk has been identified in the project, combined efforts shall be taken to quickly define and agree relevant boundary samples.

After PPAP submission and at the start of production ramp-up, the engineering unit together with the BOS site shall invite the supplier to a tri-partite meeting to establish the above.

For each type of appearance or noise boundary sample there shall be at least 3 samples – one for supplier, one for BOS and one for the customer. These shall be approved by all parties with permanent identification – name, signature (all parties), date and defect description.

In addition to the above, a master production sample must be retained for each year of production. This master sample is a perfect example of a supplied product.

These boundary samples shall be retained in a dust free environment (light free if possible) and avoid handling damage. The quality of the boundary samples shall be reviewed annually and should be integrated in the calibration system. These boundary samples shall be used to train employees.

2B.7 End-of-Life Vehicle (ELV)/International Material Data System (IMDS) Reporting


Additionally, other legal requirements, such as EU Directives 2002/95/EC, 2002/96/EC, and 2003/11/EC restrict the use of certain flame retardant substances: polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs). PBBs or PBDEs shall not be present in components or materials supplied to BOS.

Suppliers in all regions shall ensure that all components and materials supplied to any BOS facility comply with the above-mentioned legal requirements.

BOS has developed lead-free specifications to define the materials, processing and performance of lead-free components that are purchased for use in lead-free soldering environments. Suppliers of affected components shall meet the lead-free specifications.
To ensure compliance with the various legal and customer requirements, BOS requires its suppliers to report information on materials within their respective components. The International Material Data System (IMDS) has been developed by vehicle manufacturers to collect and manage this data.

Suppliers shall submit the required ELV data to BOS as soon as possible upon award of new business, but in any case prior to the Initial sample submission. The supplier as part of the Initial sample submission shall provide confirmation to BOS’s acceptance of the ELV data. Refer to section 2B.3, Production Part Approval Process for further explanation of the submission requirements.

BOS accepts two formats for suppliers to submit ELV data:
- Direct entry into IMDS via the Internet (www.mdsystem.com).

For suppliers located within the Asian-Pacific region, please contact your local SQE for specific ELV requirements.

Hazardous substances reporting
The European instruction 67/548/EEC demands the localization of all the hazardous substances listed in the Appendix 1 of the instruction. A global list for automotive industry has been made and is annually updated on the http://www.gadsl.org website. Renault uses a special list in the 00-010-050 standard. A declaration for chlorinated parts must be done for this OEM (00-010-060 standard).

Metal raw / bulk material (wire/strip/sheet etc.)
All metal materials used must be to the specifications and grade declared on the drawing. These must be the same as those used during the homologation, testing and production of the validated initial samples. With each delivery a material certificate which states clearly the material grade/specification used on the delivery note must be provided.

Plastic parts - basic rules
For the plastic material choice, the supplier will provide a technical justification where an alternative material to that specified on the drawing is to be considered. Any change in material to that specified must be approved by the responsible engineering unit.

Marking
Each component must be marked to permit the material identification regarding their recycling. The marking must still be present after the final assembly process. For guidance please refer to www.mdsystem.com where guidance is provided regarding part marking.

The material type mark must be in accordance with the BOS requirement:
- After assembly, no marking has to be visible on the visible side.
- In all cases, the marking area must be specified on the supplier drawing following agreement by all concerned parties.
- In the case of large parts, the marking will have to be repeated.
- When part traceability is required the marking has to be sufficient to meet the relevant requirement for individual traceability.
2C. Serial Production

2C.1 Introduction

Once the manufacturing process for producing a component is successfully validated, the next phase encountered is that of serial production. During this stage there are a number of requirements each supplier should be fully aware of and follow. Key areas include change management, concern management, problem escalation, and re-qualification. Additional expectations are also detailed in the following sections.

2C.2. Supplier Request for Change (Permanent Design or Process Change)

Supplier must propose / request any changes by using the Request for Deviation form and must request approval in writing from Purchasing and all BOS receiving facilities. This form shall be used in the following situations:

1. Changes in production process insofar as the product characteristics are affected
2. When production is to be restarted after 12 months production stop
3. Sub-supplier change
4. Change in purchased component function fit or performance
5. Utilisation of new, modified or replacement tools (after verbal confirmation from Purchasing)
6. Change in production location

The process to be followed must adhere to these criteria

1. EU Purchasing and the receiving facilities must approve the changes in advance.
2. Samples may be required for review and to evaluate potential impact on BOS’s manufacturing processes.
3. Submission for PPAP approval is mandatory prior to the shipment of the “new” parts (or from new location) unless specifically waived by the engineering unit.
4. After BOS written approval, the first delivery with “new” parts with suitable Identification can take place. (see section 2.B.3)
5. Any tool / equipment move plan must include definition of the required stock bank and contingency to ensure BOS’s Production and Service requirements are not affected.

2C.3. Concern Management

When purchased material does not meet BOS requirements (e.g. quality, engineering change level, adherence to test specifications, etc.), or last qualified PPAP, a quality claim is issued by BOS through our quality system. A Standard 8D form (SAP) is required in BOS format to ensure administration costs are kept to a minimum.

SUPPLIER is requested to:
- submit to BOS an 8D document using the procedure and chapters below to document the problem and prevent its reoccurrence (see help: 8D how to complete guide).
BOS expect within 24 hours (always from issuing date of complaint!):

- Problem description
- Problem understanding and problem solving launch
- Containment actions to secure BOS (customer) (D3)

BOS expect within 5 working days (from …)

- Root cause analysis for “Non-Detection”
- Root cause analysis for “Occurrence”
- Definition of actions to remove the root-cause

BOS expect within 10 working days (from …)

- Confirmation of implemented actions
- Confirmation of effectiveness of actions to remove Containment actions

BOS expect within 60 working days (from …)

- Actions to prevent reoccurrence
- Official closure of 8D

Where immediate implementation of the long-term solution is not possible, an action plan (LOP) shall be provided including due dates for each improvement / action. An updated copy of this plan showing progress made shall be sent to the relevant BOS SQE on a weekly basis (or as otherwise agreed), until all items are complete with proven capability of the long-term solution.

2C.3.1. Controlled Shipping (Quality Wall)

- Controlled Shipping 1 (CSL-1) is an additional 100% control (in addition to the standard end of line check) set up by SUPPLIER at his plant, using own personnel. 100% of parts shall pass through this inspection prior to delivery to BOS plant. Defect results and running improvement plan shall be sent at a specified interval (usually weekly) to the BOS plant SQE for the duration of the control shipping period.

- Controlled Shipping 2 (CSL-2) is an additional 100% control but now using an external independent company nominated by BOS to inspect for non-conforming parts (the contract must be established directly between independent company and the supplier). Controlled shipping level 2 is used if the CS1 is unsuccessful. 100% of parts shall pass through this inspection prior to delivery to BOS plant. Defects results and running improvement plan shall be sent at a specified interval to the BOS plant SQE for the duration of the control shipping period.

CSL-1 nor CSL-2 can only be stopped when the quality level (based on defects in the Controlled shipping inspection activity) has returned to an acceptable level for a minimum one month and minimum 5 shipments or 3000 pieces and with the approval from the Production site quality manager.

To stop this CSL-1 and/or CSL-2, a process audit could be performed.
2C.3.2. Cost Recovery

Suppliers are liable for all costs incurred by BOS when the root cause is the supplier’s responsibility i.e. downtime, additional hours, special delivery, warranty, material value. The reimbursement of the cost to BOS resulting from those failures will be fairly based upon the principle of cause. BOS shall calculate the total cost of the complaint and provide a summary to the supplier and then a credit note shall be sought from the supplier.

Defective parts will be returned to the supplier at supplier’s cost. The plant lodging the justified complaint may charge the administration costs of between €100 to €200 per 8D report which is not completed on time or completed incorrectly (irrespective of any additional costs which may be charged e.g. material value, down-time, sorting, etc).
If test results documented by the supplier in the initial sample test reports are found to be false by subsequent testing of BOS or that of our customer, the supplier maybe charged the resulting costs incurred. These shall including the costs of repeat / new testing to verify the new / replacement material / product.

If all non-compliances to the technical documentation are disclosed by the supplier within their initial sampling documentation then there is no risk of the above mentioned charges being made.

2C.3.3. Top Focus

Supplier Top Focus is a process that is needed when other supplier management processes have not been successful.

Firstly, the supplier selection process allows BOS only Suppliers with ISO9001 or TS16949 accreditation to be used; however, this is not a guarantee for excellent quality levels.

Secondly, during new Projects, the Supplier is managed using advanced quality planning techniques – this is Supplier Launch Management. Safe Launch Planning with Suppliers (future) is also used to remove risks during the ramp-up phase.

Thirdly, we have the Supplier concern management process where we request 8D’s from Suppliers for concerns. Fourthly, the suppliers are regularly informed of their Quality, Logistic and launch performance and requested to take remedial action.

When the above processes are not sufficient, we need to escalate the risk to BOS which means the Supplier is now under Top Focus.

Top Focus is a BOS global structured process to identify the worst quality offenders in the BOS supply chain and work with these suppliers to implement immediate, significant, measurable and permanent improvements.

2C.4. Annual Revalidation / Requalification

Unless otherwise specified by the supplier in their control plan at the time of initial sampling, a complete layout inspection and functional test against BOS requirements is required to be completed annually (including all sub-components) for all series parts. The minimum necessary
characteristics for requalification should be agreed before SOP together with BOS Quality to ensure an economical requalification process.

Those features and characteristics that are part of the revalidation requirements must have the revalidation results documented and available to BOS upon request.

BOS must approve any changes in writing to revalidation requirements before any changes are made.

Should BOS be required to submit initial or re-sampling to their customer it may be necessary that suppliers with initial sampling over one year old are required to provide new sampling results as directed by BOS. This is normally the case with new projects, but these also normally generate additional turnover for the supplier.

2C.5. Supplier Facility Access

Suppliers shall allow BOS and BOS customers' access to both their facilities to each time and those of their suppliers, for the purpose of evaluating parts, processes, documents (i.e. FMEA, Control Plan, Instructions, records...), methodologies and systems used in manufacturing of BOS products.

BOS may, at its discretion, use 3rd Party independent auditors. These individuals represent BOS Automotive Products and will audit the supplier's processes to establish conformance to validated quality systems.

2C.6. Contingency Plan / Emergency Plan

Suppliers shall develop a contingency plan for potential catastrophes disrupting product flow to BOS, and advise BOS at the earliest in the event of an actual disaster. In the event of an actual catastrophe, suppliers shall provide BOS access to BOS owned tools and/or their replacements.

The development of an emergency / contingency plan is a requirement of the launch process – see section B2.2.16.

2C.7. Quality Records and Product Sample Retention

Suppliers shall retain production quality records and product samples for at least 15 years after their creation.

All specific batch or part production quality records for safety related parts (also D parts) shall be kept a minimum period of 15 years (or more in some cases depending on OEM).

The PPAP dossier and master sample shall be retained for the active production life (after sales included) of the product + 15 year.

2C.8. Safety and D-marked Parts & Document Retention

Parts that are relevant for safety and/or regulation must be documented so that it is possible to trace back to the original quality records, original specification and batch test certificate. This applies to all products with Safety / Compliance characteristics CC (D) which can be identified by the bold letter CC (D) as shown on the products drawing. This letter CC (D) must be visible on all quality records.

D parts are concerned directly by legal rules or are important for the safety of the car and therefore have to be marked specially.
The batch test frequency will be agreed with BOS during the launch phase and be included in the production control plan. The CC (D) features must be checked in accordance with the test method. The results must be reported and be accessible. Personnel responsible for conducting the tests must be suitably qualified to ensure the adherence to legislative requirements.

In the event of any deviations, the supplier is obliged:

a) To stop the delivery of the deviating parts immediately.
b) To report the deviations to the BOS Plant Quality management.
c) Propose contingency actions to prevent production stop in BOS.
d) Suspect product shall be quarantined to prevent accidental shipment.

Application examples:
The documentation obligation relates to imitation leather and films. Flammability is tested according to company specifications / batch No. Every delivery is supplied with a supplier test certificate (COC).

Document retention

CC (D) part production quality records must be retained for 15 years and identified with a large bold CC (D) symbol.
All information appertaining to ISO 14001 must be retained for 5 years but it is still recommended to retain those documents for 15 years.

For further information on documentation and retention please refer to the booklet 1 of VDA (www.vda-qmc.de)

2C.9. Tooling

All tooling must be identified with the owner’s name, part number / description and engineering level. Maintenance and refurbishing of the tooling required to meet requirements shall be the sole financial responsibility of the supplier without any legal right to keep or sell BOS / customer property as security for a debt. The supplier is prohibited from using this tooling to make any product for any company except for the owner or its representative without written consent.

2C.10. Liability

Without prejudice to BOS's rights under any conditions, the supplier will be liable to BOS on demand for any indemnity and hold BOS harmless against any loss, damage, liability, claims, costs or expenses caused by any breach by the supplier or by any defect in any goods supply. Supplier shall have an insurance covering those risks.
2D. Continuous Improvement and supplier development

2D.1. Introduction

BOS Automotive Products defines supplier continuous improvement as a holistic approach to overall never-ending improvement. Suppliers should, at a minimum, after receiving their supplier periodic performance evaluations, develop and present plans to achieve the following:

- Systems that support the flawless launch of new products/components/sub-systems,
- Value and cost competitiveness,
- Agreed quality targets,
- Zero defects
- Sub-supplier performance

These plans should include lessons learned from previous launch, cost and quality issues, and how these lessons have been incorporated into respective continuous improvement proposals.

Suppliers should also discuss their intent to proactively improve their strategic status with BOS globally. BOS recommends suppliers use the fundamentals outlined AIAG and VDA and the fundamental principles of Lean production systems and Six Sigma.

For their publications, visit http://www.aiag.org. The VDA requirements as specified in manuals one to nine are also available at http://www.vda-qmc.de

2D.2 Supplier Evaluation

BOS has established a standard supplier evaluation scheme. All BOS locations provide input regarding the selection, determination and evaluation of the supplier base. This provides a means of comparing suppliers with each other and to identify the best in their particular industries.

Furthermore, this policy serves as the basis for nominating suitable suppliers for new projects. The target is to create a climate in which ideas and issues are addressed and dealt with openly with continuous improvement in mind.

The supplier qualification process is applicable to all production suppliers. The evaluation will be performed by Purchasing, Quality and Logistics Management both from the Plant and from within the Central functions. The worldwide consolidation and communication of the results will primarily be handled by Central Purchasing.

In the selection of evaluation criteria the international TS 16949, regional customer requirements as well as legal requirements and national standards were considered.

Criteria evaluated are:
- Delivery reliability
- Adherence to quantity
- PPM-values

Auxiliary criteria:
- Number of complaints
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- Premium freight
- Evaluation Supplier Launch quality

Evaluation frequency:
High volume supplier: 1 Mio. € + Purchasing volume once / year
Middle volume supplier: > 250 < 999 € Purchasing volume once / year
Low volume supplier: < 250 € Purchasing volume as necessary

For suppliers ranked B & C an improvement plan with timings is required to be submitted to the relevant BOS commodity Manager.

C-Level Rating
- Award of no new contracts
- Supplier may be included in Top Focus process (QAI)

2D.3. Supplier Development

Focus is on quality, costs, delivery and design (QCDD)

Quality improvement (development priorities in this area are defined by quality ppm, concerns, rate of improvement).

Cost improvement (development priorities are driven by market pricing and commodity price development).

Delivery performance improvement (development priorities are driven by supply chain costs, value and speed) e.g. Kanban standard - KLT deliveries. Adoption of a consignment stock or milk run (??).

Design - process and product technology improvement (development priorities are set by the market demand and state-of-the-art technological developments). LEAN concepts, Six Sigma applications.

SE engineering activities.
ACKNOWLEDGEMENTS

The author (Carlton Herrington) would like to thank the following people for their contribution to this group supplier guidelines manual.

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GLOSSARY

AIAG

APQP
Advanced Product Quality Planning. A structure activity that plans, tracks and reports the development of a process to manufacture a component/material/assembly to meet customer requirements.

CC
Critical Characteristic – a feature which is critical / safety related. These require ongoing SPC control or 100% inspection via process control or a poka-yoke (fool proofing).

Cpk
The capability index for a stable process.

COC
Certificate of Conformity

CR
Cost Recovery.

CS
Controlled Shipping.

DFMEA
Design Failure Modes Effect Analysis. A document generated during the design phase that identifies weaknesses and establishes controls for potential failures in a component/material/assembly.

DV
Design Validation. Testing that assures that a component/material/assembly meets the users’ requirements.

ELV / IMDS
End-of-Vehicle-Life/International Materials Data System. ELV is a regulatory requirement to eliminate hazardous materials from current production components. IMDS is the data system used to collect and report on the materials that make up components and assemblies.

EU
Engineering Unit – this is a generic term used to describe the BOS project team who are responsible for new project development and design changes.

EU QE
Engineering Unit Quality Engineer. A quality engineer who is primarily responsible for APQP activity with customers and suppliers.

MSA
Measurement System Analysis. The analysis of the complete process and assumptions used to quantify a unit of measure or fix assessment to the feature characteristic being measured. (see AIAG MSA handbook)

OEM
Original Equipment Manufacturer. Applies to automotive corporations, i.e., BMW, Ford, Daimler-Chrysler, GM, Volkswagen, etc.

PFMEA
Process Failure Modes Effects Analysis. A team process that identifies and controls potential failures before the product goes into production.

PPAP
Production Part Approval Process. A defined process for the validation of new materials and subsequent process changes.

PPM
Parts per Million (defective).

Ppk
The performance index of a process. Normally used as part of the PPAP process.

PV
Production Validation. Testing that assures that the manufacturing process produces product that meets the customers requirements.

QIP
Quality Improvement Plan. A supplier intensive improvement tool used by SDE / SQA.
Quality Records
Record controls established satisfy all regulatory and customer requirements (including customer-specified records).

RPN
Risk Priority Number.

Safe Launch Plan
A joint effort between the supplier and BOS to have similar Pre-Launch Control Plans at both the shipping and receiving facilities.

SC
Special Characteristics – which require either initial or ongoing SPC control and a worthy of additional inspection or control i.e. 100% inspection / control / poka-yoke (fool proofing).

SCR
Supplier change request

SOP
Start Of Production

SOW
Statement of Work

SDE
Supplier Development Engineer. A quality engineer who is primarily responsible for assessing the capability of supplier and on-going development of specific supplier’s in need of assistance. The function also supports EU QE functions which are located outside that continent where the SDE is located.

SQE
Supplier Quality Engineer. A quality engineer who is primarily responsible for monitoring the suppliers’ quality during project development and after the start of production.

Supplier PEP+
Project control process to promote the co-operation between the supplier and the BOS EU for new tooled new parts, complex tool changes and SE developments.

TF
Top Focus. A supplier intensive improvement tool used by SQE & SDE.

WIP
Work In Progress
Revisions

This manual supersedes the previous BOS Automotive Products Supplier Manual Revisions and any regional specific supplier manuals. This manual is released electronically on the BOS website http://www.bos.de/index.php?id=4, without any hardcopy publication.

Revision History

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Topic</th>
<th>Description</th>
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<tr>
<td>6.2</td>
<td>01.03.2013</td>
<td>2B.1</td>
<td>Supplier PEP+ added which is a project control process to promote the co-operation between the supplier and the BOS EU for new tool parts, complex tool changes and SE developments.</td>
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<td>2C.8</td>
<td>Initial Sampling adapted to requirements PPAP-3 and ISPO+ integrated</td>
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<tr>
<td></td>
<td></td>
<td>2C.8</td>
<td>Removal of “D” and clarification of CC</td>
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<td>6.1</td>
<td>30.06.2010</td>
<td>2.6</td>
<td>Comment added: prototypes must be of a known quality level</td>
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<td>2C.2</td>
<td>Addition of “Change in production location”</td>
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<td>2C.4</td>
<td>Concept clarified, yearly requalification requirements must be stated in the control plan otherwise full requalification is expected.</td>
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<td>2C.7</td>
<td>All periods are 15 years</td>
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<td>2C.8</td>
<td>Deletion of “All other quality documents must be retained for 3 years after launch.”</td>
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<td>6</td>
<td>01.10.2009</td>
<td>all</td>
<td>Completely reworked / new layout</td>
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The Original version is the English version.