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- Yellow New content

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- Deleted content
- Content moved within manual
- Rewording to improve clarity



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Supplier Quality Manual — Program Requirements

Table of Contents

1	Scope	3
2	Terms and Definitions	3
3	Quality Management System	8
4	Management Responsibility	12
5	Resource Management	16
6	Product Realization — Enterprise Product Delivery Process	18
7	Measurement, Analysis and Improvement	41
8	Engineering Standards	47
9	Contact Information	47
10	References	48
	Summary of Changes from Previous Edition (For Information Only — Not Part of the Standard)	50

List of Tables

Table 1	Production Part Approval Requirements by Quality Plan Level	20
Table 2	Planned Changes Requiring Approval Prior to Implementation	25
Table 3	Changes Requiring PPAP Approval Prior to First Production Shipment	27
Table 4	Reliability Goal Breakdown	29
Table 5	Component Mounting Location Information (Examples)	30
Table 6	Usage Environment Conditions	31

1 Scope

1.1 JDS-G223 establishes the minimum criteria for suppliers to implement and maintain a quality system that allows them to produce and deliver globally competitive products and services to John Deere. JDS-G223 provides a uniform method for all John Deere units to communicate general requirements, expectations, and guidelines to the supply chain. JDS-G223 supports the John Deere Achieving Excellence process: Continuously measuring supplier performance, rewarding improvements, and recognizing suppliers' outstanding efforts; embracing proactive quality planning as a routine part of doing business; and helping suppliers' continuous improvement efforts.



1.2 The requirements identified with a key are critical. Non-compliance with these requirements put the supplier at the highest risk of violating the Purchase Order Terms and Conditions.

1.3 Additional information can be found in JDS-G223X1, JDS-G223X2, and John Deere Supply Network ([JDSN](#)).

1.4 JDS-G223 can contain mandatory provisions, which are identified by the words "shall" or "required". Compliance with the mandatory provisions is required to claim conformance with JDS-G223. JDS-G223 can also contain guideline provisions, which are generally identified by the words "should" or "recommended". Compliance with the guideline provisions is not required, because they might not be appropriate for all machines or all applications.

2 Terms and Definitions

For the purpose of JDS-G223, the following terms and definitions apply:

2.1

Cp

Ratio of tolerance to 6 Sigma, or the upper specification limit (USL), minus the lower specification limit (LSL), divided by 6 Sigma.

Note 1 Sometimes referred to as the engineering tolerance divided by the natural tolerance, and is only a measure of dispersion.

2.2

Cpk

Equals the lesser of the USL minus the mean divided by 3 sigma (or the mean) minus the LSL divided by 3 sigma. The greater the Cpk value, the better.

2.3

control plan

Documented description of the systems and processes for controlling product.

Note 2 The control plan describes the actions that are required at each phase of the process, from receiving to shipping, to ensure that all process outputs remain in a state of control. The control plan reflects a strategy that is responsive to changing process conditions, and is maintained and used throughout the product life cycle.

2.4

Design Process and Assembly Review (DPAR)

Simultaneous engineering process designed to optimize the relationship between design function, manufacturability, and ease of assembly.

Note 3 This process is also referred to as Design for Manufacturability and Assembly.

2.5 discrimination

Ability of the gage or measuring equipment to detect and indicate small changes in the measured characteristic.

Note 4 Sometimes referred to as resolution.

2.6 engineering deviation

Document required prior to shipment, to record and control the authorization and use of product when part specifications do not comply with engineering specifications. Also documents corrective action.

2.7 Enterprise Product Delivery Process (EPDP)

Sequence of processes required to successfully design, test, and produce a product or service that meets or exceeds the expectations of John Deere and our customers.

2.8 Failure Modes and Effects Analysis (FMEA)

Systematic group of activities intended to recognize and evaluate the potential failure of a product, the effects and causes of that failure, identify actions that could eliminate or reduce the chance of the potential failure occurring, and document the process.

2.9 gage repeatability

Variation in measurements obtained with one measurement instrument, when used several times by one appraiser, while measuring the identical characteristic on the same part.

2.10 gage reproducibility

Variation in the average of the measurements made by different appraisers, using the same measurement instrument, used several times by each appraiser, while measuring the identical characteristic on the same part.

2.11 intellectual property

Creative ideas and expressions of the human mind that have commercial value and receive the legal protection of a property right. It includes ideas, inventions, business methods and manufacturing processes.

Note 5 The major legal mechanisms for protecting intellectual property rights are copyrights, patents, and trademarks.

2.12 John Deere Supply Network (JDSN)

Website that assists John Deere employees and suppliers to manage relationships while providing suppliers with the necessary information and tools to effectively conduct business with John Deere.

2.13 key characteristic

Product or manufacturing process parameter which can affect safety or compliance with regulations, fit, function, performance, or subsequent processing of product. Targeting control is necessary to meet John Deere requirements that directly or significantly impact John Deere satisfaction through compliance with government, country or industry standards and regulations, ability to perform its intended design requirements, or manufacturability and ability to assemble.



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2.14

Order Fulfillment Process (OFP)

Global process at John Deere that is designed to deliver the right product at the right place at the right time.

2.15

physical build

Physical model which is used to evaluate the complete product, processes, and tooling during the Enterprise Product Delivery Process.

2.16

Pp

Estimate of the capability of a process during its initial set-up, before it has been brought into a state of statistical control (for example, when few data points are available.)

2.17

Ppk

Term used to predict the process capability of a new process.

Note 6 Also referred to as the performance index.

2.18

process capability

Range over which the natural variation of a process occurs as determined by the system of common causes.

Note 7 Process capability is comprised of three important components: the design tolerance, the centering of the process, and the range or spread of the process variation.

2.19

process control

Monitoring of characteristics for capability to produce a feature under stable conditions to maintain ongoing acceptable quality levels.

Note 8 Examples of process control documents include process sheets, inspection and test instructions, test procedures, standard operating procedures, preventive maintenance instructions, and specific part control plans.

2.20

Process Failure Modes and Effects Analysis (PFMEA)

Systematic group of activities intended to recognize and evaluate the potential failure of a process, the effects and causes of that failure, identify actions that could eliminate or reduce the chance of the potential failure occurring, and document the process.

2.21

Product Verification and Validation (PV&V)

Process by which a product is proven to meet the required specification through the use of objective evidence, and a product's features and performance are confirmed to meet John Deere expectations.

Note 9 Also referred to by AIAG as Design Verification and Validation, and by ISO as Development Verification and Validation.

2.22

Risk Priority Number (RPN)

Product of severity, detection, and occurrence in a FMEA.

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2.23

special process

Processes used in the production of products whose quality cannot be fully verified later by nondestructive inspection of the product. (For example, welding, painting, heat treat, and plating).

2.24

subcontractor

Suppliers that supply John Deere primary suppliers.

Note 10 Subcontractors are also referred to as second and third tier suppliers, sub tier suppliers, or the supplier's supply chain.

2.25

total variation

Ratio of the uncertainty of the repeatability and reproducibility of the gaging system to the tolerance range of the characteristic to be measured.

2.26

Quality Plan Level (QPL)

Part risk based on three categories: cost, severity, and complexity.

Note 11 Each category affects the overall risk of a part or component to John Deere. Quality Plan Levels range from 0 to 4, with 4 representing the greatest risk. The required quality activities are identified based on the Quality Plan Level.

2.27

quality record

Records established to provide evidence of conformity to requirements, and the effective operation of the quality management system.

2.28

warrant (verification warrant)

Cover page for the PPAP documents and requires John Deere approval prior to shipping production parts.

2.29

wavelength

Composite analysis of the supplier's initiative, attitude, responsiveness, attention to detail, communications, and performance as evaluated in the Achieving Excellence program.

3 Quality Management System

3.1 General Requirements

3.1.1 Suppliers to John Deere shall conduct business with a high degree of integrity, and in a socially and environmentally responsible manner in accordance with the [John Deere Supplier Code of Conduct](#).

3.1.2 The adoption of a quality management system should be a strategic decision of the supplier. The design and implementation of the supplier's quality management system is influenced by varying needs, objectives, products, and processes as well as the size of the supplier.

3.1.3 Although many suppliers are currently registered, or are currently pursuing registration or compliance to standards or programs audited by third party registrars (such as ISO/TS 16949, Malcolm Baldrige, ISO 9001, or one of the various equivalents from other industries, states, or countries) suppliers in the John Deere supply chain should become compliant to the ISO/TS 16949. JDS-G223 represents the minimum requirement for John Deere.

3.1.4 Suppliers shall perform a self-evaluation to determine where the supplier's and the supplier's supply chain quality systems align with this manual. Acceptance of a John Deere purchase order constitutes acceptance by the supplier of the requirements of JDS-G223.

3.1.5 Suppliers shall discuss and understand the specific applicability of JDS-G223 requirements with John Deere representatives and the supplier's supply chain in order to make effective business decisions.

3.1.6 Individual John Deere units may require registration to more stringent standards.

Note 12 Many of the activities referenced in JDS-G223 are further explained in the AIAG (Automotive Industry Action Group) manuals, such as Measurement System Analysis (MSA) and Failure Mode and Effects Analysis (FMEA). Suppliers should obtain copies of the AIAG manuals.

3.1.7 John Deere reserves the right to conduct a quality system assessment at the supplier's facility. When conducting this assessment, John Deere shall have access to the supplier's personnel, documentation, gaging, and test facilities. At the close of the assessment, John Deere shall share findings in a debriefing meeting and, at a later date, shall issue a report to the supplier summarizing the results of the assessment.

3.1.8 John Deere may conduct a Product Engineering Assessment using the Product Engineering Questionnaire (PEQ) for components with quality plan Levels ≥ 3 when the supplier has component or subsystem design control.

3.1.9 John Deere may conduct Process Verification Audits (PVA) on selected components. This on-site supplier quality audit is intended for parts with a high level of criticality to determine the effectiveness and conformance of process controls. This audit may also be performed on similar parts when the work has not yet been sourced, or during preparation for full production.

3.1.10 John Deere may conduct Special Process Audits (SPA) of supplier's special processes in the manufacturing of John Deere parts (see clause 6.6.3.1). If a first tier supplier outsources, either temporarily or permanently, the first tier supplier shall be responsible for assessing and approving the second tier suppliers.

3.1.11 John Deere may conduct an Order Fulfillment Risk Assessment (OFRA). This is a high level assessment intended to assess the supplier's order fulfillment (delivery) readiness, identify risks, and drive improvements.

3.1.12 Any items requiring corrective action shall be clearly noted, and the supplier shall submit a corrective action plan to address these issues within the agreed upon target date.



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3.2 Supplier Roles and Responsibilities

3.2.1 The supplier shall establish, document, implement, and maintain a quality management system, and shall continually improve the system's effectiveness in accordance with the requirement of JDS-G223.

3.2.2 The supplier quality management system shall include the following:

- Identifying the processes needed for the quality management systems and its application throughout the supplier's operations.
- Determining the sequence and interaction of the quality system's processes.
- Determining criteria and methods needed to ensure that both the operation and control of the quality system's processes are effective.
- Ensuring the availability of resources and information necessary to support the operation and monitoring of the quality system's processes.
- Monitoring, measuring, and analyzing the quality system's processes.
- Implementing actions necessary to achieve planned results and continual improvement of the quality systems' processes.
- Managing the quality system's processes in accordance with the requirements of JDS-G223.
- Adhering to the [John Deere Supplier Code of Conduct](#).
- Communicating to John Deere, within 30 days, any changes to third party certification (quality, regulatory, health and safety, and environmental).

3.2.3 When the supplier chooses to outsource any process that affects product conformity with requirements, the supplier shall ensure control over such processes, including control of raw material. Control of such outsourced processes shall be identified within the quality management system.

3.2.4 Processes needed for the quality management system should include processes for management activities, provision of resources, product realization, and measurement. See clause 6.3 for John Deere notification requirements.

3.2.5 If the supplier does not meet the minimum level of performance of these requirements as measured by the JDS-G223 Supplier Quality System Audit, such failure shall impact and potentially can restrict future business until the identified major non-conformances are corrected, verified, and closed.

3.2.6 John Deere training for JDS-G223, John Deere Standards, and Enterprise Product Delivery Process Supply Chain Integration are available on [JDSN](#).

3.3 Documentation Requirements

3.3.1 Quality Management System

3.3.1.1 The supplier shall establish and maintain a documented quality management system.

3.3.1.2 The quality management system documentation shall include the following:

- Documented statements of a quality policy and quality objectives.
- A quality manual.
- Documented procedures as required by JDS-G223.
- Documents needed by the supplier to ensure the effective planning, operation, and control of its processes.
- All records required by JDS-G223.

3.3.2 Quality Manual

3.3.2.1 The supplier shall establish and maintain a controlled quality manual covering all products and services to John Deere.

3.3.2.2 The quality manual shall include the following:

- The scope of the quality management system.
- Documented processes and procedures.
- A description of the interaction between the processes of the quality management system.

3.3.3 Control of Documents

3.3.3.1 The supplier shall establish and maintain a documented procedure to control all documents and data of internal and external origin such as standards and John Deere drawings.

3.3.3.2 The document control procedure shall include the following:

- Approval for adequacy prior to release.
- Documentation review, update, and re-approval.
- Identification of document changes and current revisions.
- Assurance that documents are available at all points of use.
- Assurance that documents are legible and identifiable.
- Relevant external document identification and distribution.
- Identification of and prevention of unintended use of obsolete documents.

3.3.3.3 For specifications referenced within a document, the supplier shall have currently released editions of these documents available at all appropriate manufacturing locations.

3.3.3.4 The supplier shall have a documented procedure for control and distribution of drawings and standards.



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3.3.3.5 Suppliers shall use the most current standards, understand relevant standards, and review any changes in those standards. Suppliers can review changes to John Deere standards by selecting “What’s New” on [JDSN](#).

3.3.3.6 Obsolete drawings shall either be destroyed or appropriately identified as obsolete and archived.

3.3.3.7 When John Deere is using a supplier-controlled drawing and this drawing is changed, the supplier shall notify John Deere by using the Supplier Change Request (SCR) system on JDSN (see clause 6.3.) and receiving approval prior to change. See clause 2 in JDS-G223X1 (2015).

3.4 Control of Records

3.4.1 All quality records shall be kept for at least three years unless otherwise specified in the supplier’s quality manual and agreed to by John Deere.

3.4.2 Quality records shall be stored in an environment that protects documents from deterioration and at locations which are readily accessible upon request by John Deere.

3.4.3 The supplier’s supply chain records pertaining to John Deere product shall be retained in the same manner as the supplier’s quality records.

Examples of quality records should include, but are not limited to:

- Measurement Data
- Design and Process Failure Modes and Effects Analysis
- Measurement Systems Analysis Data
- Capability and Statistical Process Control Data
- Major Process Change Data
- Production Lot Control Data
- Verification Warrant and Documents
- Corrective Action Requests and Responses
- Gage Calibration and Maintenance Records
- Gage Repeatability and Reproducibility Analysis
- Input data from special processes for example:
 - Heat Treatment
 - Welding
 - Painting
 - Plating
 - Casting
 - Electronics
- Initial Sample Inspection Report
- Quality System Internal Assessments
- Employee Training Records (kept for term of employment)
- Destructive and Non-Destructive Testing Data

- Scrap, Reclaim, and Deviation Records
- Product Verification and Validation Activity Template
- Functional and Performance (Laboratory and Field) Test Data
- Quality Plans or Control Plans for Parts and Assemblies (most recent plan only)
- Quality Rejections and Disposition Records
- Quality System Audits, Process Audits, and Corrective Actions
- Appearance Approval Report
- Production Part Approval Documents
- Design Review and Design Analysis Documents
- Risk Assessments

4 Management Responsibility

4.1 Management Commitment

4.1.1 General

4.1.1.1 Top management shall take an active role in the quality management system. This commitment shall address the managerial processes of quality planning, quality control, and quality improvement.

4.1.1.2 The supplier shall demonstrate a top management commitment to continuous improvement.

4.1.1.3 Top management shall provide documented evidence of its commitment to the development and improvement of the quality management system by the following:

- Communicating to the supplier's organization the importance of meeting John Deere requirements as well as regulatory and legal requirements.
- Establishing the quality policy and objectives.
- Conducting regularly scheduled management reviews of the quality system and execution.
- Ensuring the availability of necessary resources.

4.1.1.4 A sound quality system shall be structured after a proven methodology such as ISO 9001, ISO/TS 16949, the Malcolm Baldrige Criteria for Performance Excellence, the Deming Prize, or the European Foundation for Quality Management. Each business process should detail the roles of management.

4.1.2 Quality Planning

Top management shall participate in the following:

- Developing and maintaining quality policies.
- Determining customers and their needs.
- Developing and maintaining short- and long-range goals/metrics.
- Supporting supplier development strategies.
- Supporting product-feature and manufacturing-process development.
- Developing and maintaining training procedures.



4.1.3 Quality Control

Top management shall participate in the following:

- Assuring systems adequacy and developing a quality manual.
- Creating information feedback loops.
- Implementing mistake-proofing techniques.
- Creating an environment for quality and process control by individual workers through procedures and job instructions documentation.
- Monitoring cost of quality.
- Developing and maintaining quality plans and control plans.
- Developing and maintaining gage calibration system.
- Developing and maintaining change notification procedures.
- Adhering to problem containment and traceability procedures.

4.1.4 Quality Improvement

Top Management shall participate in the following:

- Formulating a continuous improvement policy.
- Integrating controls in problem solutions.
- Identifying projects to resolve current problems.
- Communicating corrective action to John Deere.
- Creating continuous improvement teams to complete projects and solve problems using structured problem-solving processes.
- On-going evaluation of effectiveness and efficiency of quality management system.
- Providing resources and training.
- Providing recognition.

4.2 John Deere Focus

4.2.1 Top management shall ensure that John Deere's needs and expectations are determined, converted into requirements, and fulfilled with the aim of achieving customer satisfaction.

4.2.2 The needs and expectations of John Deere include conformance to design and performance specifications, reliability, delivery, cost management, wavelength, and technical support.

4.3 Quality Policy

Top management shall endorse a written quality policy that:

- Is appropriate to the purpose of the organization.
- Includes a commitment to meeting John Deere requirements and to continuous improvement.
- Provides a framework for establishing and reviewing quality objectives.
- Is communicated and understood at appropriate levels at the supplier.
- Is reviewed for continued appropriateness and accuracy.

4.4 Planning

4.4.1 General

4.4.1.1 Top management shall ensure that quality objectives are established for the appropriate functions and levels.

4.4.1.2 The quality objectives shall be measurable and consistent with the supplier's quality policy.

4.4.2 Quality Plan

4.4.2.1 The supplier shall have a structured quality planning process. The purpose of the quality plan is to drive improvement in both the short-term and the long-term.

The quality plan shall include, but is not limited to the following elements:

Quality Training

- Quality planning processes and tools.
- Root cause determination, mistake proofing, and team involvement.
- Basic statistical concepts identifying and improving variation and control.
- Inspector and operator training programs in the use of control plans and care of measurement and test equipment.

Manufacturing and Tooling Improvements

- Capability studies and capability objectives for current and new processes, and for approval of new tooling.
- Assembly team or cell-unit manufacturing concepts.
- Training aids for set-up and operation of equipment.
- Preventive maintenance programs.

Quality Information Systems

- Integration of computers to statistically analyze data, to assist corrective action activities, and to provide timely reporting to John Deere.
- Installation of inspection equipment and gaging to provide improved monitoring of manufacturing processes and quality data collection.

Quality Budgeting

- Budget planning for quality and plant improvements such as training, equipment, and program development
- A quality plan to shift resources spent on appraisal and correcting internal and external failures to defect prevention, such as: APQP (Advanced Product Quality Planning), PPAP (Production Part Approval Process), Control Plan Checklist and Form (see JDS-G223X1 or [JDSN](#)), and other continuous improvement methods and activities.



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4.5 Responsibility, Authority, and Internal Communication

4.5.1 Responsibility and Authority

4.5.1.1 Management shall ensure that a quality management system is implemented in order to provide confidence that the supplier can satisfy the needs of John Deere. The system should be consistent with the size, culture, and products of the supplier.

4.5.1.2 Management shall ensure that the responsibilities and authorities are defined and communicated within the supplier's organization.

4.5.1.3 The supplier shall show evidence of a quality policy which emphasizes continuous quality improvement driven by top management through preventive and corrective action.

4.5.1.4 A copy of a long-term quality improvement program shall be available for review by John Deere.

4.5.1.5 Management shall define specific quality indicators (metrics).

4.5.1.6 Management shall have a system in place to track the defined quality indicators and monitor them for trends. Improvement activities should be based around these trends.

4.5.1.7 Top management shall appoint members of management who shall have responsibility and authority for planning, execution, control, and improvement of quality-related activities.

4.5.2 Internal Communication

4.5.2.1 The supplier shall ensure that communication takes place between its various levels and functions regarding the processes of the quality management system and the effectiveness of those processes.

4.5.2.2 This communication may take the form of team meetings, bulletin boards, publications, electronic media, or other techniques.

4.6 Management Review

4.6.1 General

4.6.1.1 The supplier's management shall review the supplier's quality management system at planned intervals, to ensure its continuing suitability, adequacy, and effectiveness.

4.6.1.2 This review shall include assessing opportunities for improvement and the need for changes to the quality management system, including the quality policy and quality objectives.

4.6.2 Review Input

4.6.2.1 Management review input shall include current performance and improvement opportunities.

4.6.2.2 Input shall include the following:

- Audit results and schedule (internal/external).
- John Deere feedback (such as Achieving Excellence and warranty).
- Process performance and product conformance (internal and external quality and delivery levels).
- Status of preventive and corrective actions.
- Follow-up actions from earlier management reviews.
- Changes that could affect the quality management system.

4.6.3 Review Output

4.6.3.1 Management review output shall include supporting and leading actions addressing deficiencies.

4.6.3.2 Output shall include the following:

- Improvement of the system and its processes.
- Improvement of product related to customer satisfaction.
- Resource needs.

5 Resource Management

5.1 Provision of Resources

5.1.1 Employees

5.1.1.1 Employees shall be qualified for the job the employee performs through education, training, and work experience.

5.1.1.2 Employees shall be knowledgeable about appropriate quality tools and processes that affect the quality of products and services provided to John Deere.

5.1.1.3 Employees shall be provided with equipment, facilities, and a work environment conducive to producing high quality products and services that consistently meet functional requirements and product specifications.

5.2 Management Plan

5.2.1 The supplier shall develop a quality management system and resource management plan that demonstrates a commitment to continuous improvement. See clause 4.1.

5.2.2 The resource management plan shall provide for the evaluation of the resources needed to implement and improve the processes of the quality management system, and John Deere satisfaction.

5.2.3 The resource management plan shall include evaluation of the skill level of employees to determine employee's understanding of quality tools, processes, and employee's ability to apply these tools relevant to employee's job.



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5.3 Human Resources

5.3.1 The supplier shall provide a system of ongoing monitoring of each employee's education, training and work experience.

5.3.2 The supplier shall provide opportunities for training and continuing education to improve employee's skill level.

5.3.3 The training shall provide employees with an awareness of the relevance and importance of employee's activities, and how employees contribute to the achievement of quality objectives in the business plan.

5.3.4 The supplier should provide cross training to ensure product quality.

5.3.5 Although certification is not required, the supplier should ensure that employees responsible for products produced for John Deere have the same competency as those certified by international quality organizations such as the American Society for Quality (ASQ).

5.4 Infrastructure

5.4.1 The supplier shall provide and maintain facilities, equipment, workspace, hardware, and software to achieve conformity to product specifications and functional requirements.

5.4.2 The supplier shall provide support services, such as simulation models and testing capabilities, to verify conformity to product specifications and functional requirements.

5.5 Work Environment

5.5.1 The supplier shall provide a safe, healthy, and compliant work environment that supports quality objectives by identifying and managing human and physical factors that affect the quality of products and services provided to John Deere.

5.5.2 Suppliers shall conduct operations in a way that minimizes negative impact to the environment, and ensure compliance with laws related to air emissions, water discharges, toxic substances, and hazardous waste disposal.

6 Product Realization — Enterprise Product Delivery Process

6.1 Planning of Product Realization



6.1.1 The supplier shall have a documented process for planning of product realization to meet requirements of the John Deere Enterprise Product Delivery Process (EPDP), with evidence of product conformance being driven by the PDP and Initial Production (Pre-Launch), and Order Fulfillment Process (Production) flowcharts. See clause 3 and clause 4 in JDS-G223X2 (2015).

6.1.2 An effective and structured product realization planning process shall result in the determination of the following:

- Quality objectives for the product or the service.
- The need to develop specific processes, resources, and facilities.
- Documentation, verification and validation activities, and the criteria for acceptability.

6.1.3 Advanced Product Quality Planning

6.1.3.1 Suppliers shall participate in advanced product quality planning activities (such as design reviews, FMEAs, and electronic build events) for the purposes of collaboratively planning for product realization and preventing problems during physical builds.

6.1.3.2 Key characteristics are identified and recorded during the early stages of design and communicated to suppliers. See clause 6.2.2.

6.1.3.3 Quality planning activities shall be completed for first physical builds, and shall be updated for subsequent physical builds.



6.1.3.4 Parts shall be production intent for physical builds, and should be produced using production tooling in a production process, unless otherwise approved by John Deere.

6.1.3.5 Quality planning steps shall be repeated for parts that are supplied not using production tooling and processes. If there is a tooling or process difference between the actual parts used on the physical build versus the tooling or process to be used for the production build, there shall be evidence of conformance to the specification and of risk mitigation.

6.1.3.6 After successful completion of the final phase of EPDP, the Order Fulfillment Process flowchart shall be followed. See clause 4 in JDS-G223X2 (2015).

6.1.4 Acceptance Criteria

Acceptance criteria shall be approved by John Deere, where required.

6.1.5 Confidentiality

The supplier shall ensure the confidentiality of John Deere-contracted products, projects under development, and related product information.



6.2 John Deere Related Processes

6.2.1 Determination of Requirements Related to the Product

6.2.1.1 Specific quality planning activities are required for every new or revised part and for every new or revised process. At John Deere the Part Level Quality Planning (PLQP) activities help ensure that new products or processes, and changes to existing products or processes, fulfill the intended purposes. PLQP provides a consistent, structured, and preventive process for managing risks associated with new or revised parts and assemblies, and with changes to suppliers and processes.

6.2.1.2 The Quality Plan Level (QPL) is a measure of part risk based on three categories: cost, severity, and complexity. Each category affects a part or component's overall risk to John Deere. QPL range from 0 to 4, with 4 representing the greatest risk. The required quality activities are identified based on QPL. See Table 1.

6.2.1.3 One of the activities that can be required is the Design, Process, and Assembly Review (DPAR). A DPAR is a meeting which confirms all expectations of the products or services prior to a physical build. John Deere teams initiate this review as early as possible before tooling release.

6.2.1.4 Multiple DPAR events may be required for multiple physical builds, depending on the magnitude of change from one build to the next. Parts or subsystems may be grouped together in a DPAR. Documentation of DPAR events shall be maintained by the design control entity.

6.2.1.5 Production Part Approval Process (PPAP) requirements shall be clearly understood as an output of the DPAR.

6.2.1.6 Unless otherwise communicated, the supplier shall document conformance to all specifications, dimensions, and drawing notes on the Initial Sample Inspection Report (ISIR). See clause 6 in JDS-G223X1 (2015).

6.2.1.7 A graphical representation (bubble print) shall accompany the ISIR, unless waived by a John Deere quality representative.

6.2.1.8 The PPAP requirements shall be documented on a Verification Warrant Form.

6.2.1.9 The required Production Part Approval activities are determined by the QPL, unless otherwise specified by John Deere Quality representative.

6.2.1.10 After the PPAP documents have been submitted, John Deere reviews the data and either approves or rejects the verification warrant. Approval is required prior to shipping production parts for all physical builds (including prototype machines). Conditional approval may be granted to authorize limited production shipments when there are outstanding PPAP requirements.

Table 1 Production Part Approval Requirements by Quality Plan Level

	Requirement	John Deere Quality Plan Level					Complete By
		0	1	2	3	4	
1.	Design Record						
	- for proprietary components / details		R	R	R	R	Prior to supplier shipment
	- for all other components / details		R	R	R	R	Prior to supplier shipment
2.	Engineering Change Documents, if any		R	R	R	R	First supplier production
3.	* John Deere Engineering approval						Prior to supplier shipment
4.	Design FMEA (Failure Modes and Effects Analysis)				R	S	Prior to complete design
5.	Process Flow Diagrams / Process Map		R	R	S	S	Prior to supplier production
6.	Process FMEA			R	S	S	Prior to control plan
7.	Control Plan (including Checking Aids)			S	S	S	Prior to supplier production
8.	Measurement System Analysis Studies - Gage R & R Studies for Key Characteristics			S	S	S	Prior to use
9.	Initial Sample Inspection Report - ISIR (Dimensional Results)		S	S	S	S	Prior to supplier shipment
10.	Material / Metallurgical / Functional / Test Results (as appropriate)		S	S	S	S	Prior to supplier shipment
11.	Initial Process Studies – Capability Studies			S	S	S	Prior to control plan
12.	* Qualified Laboratory Documentation				R	R	Prior to supplier shipment
13.	Appearance Approval Report, if applicable (for JD Class A parts)				S	S	Prior to supplier shipment
14.	Verification Warrant		S	S	S	S	Prior to supplier shipment
15.	Experimental Part Inspection (Engineering)			S	S	S	Prior to supplier shipment
16.	Supplier Functional Verification Testing Results			R	S	S	Prior to supplier shipment
17.	* Sample Product						
18.	* Master Sample						
19.	* Records of Compliance With John Deere-Specific Requirements						
<p>S = the supplier shall submit to John Deere and retain a copy of records or documentation items at appropriate locations.</p> <p>R = the supplier shall retain at appropriate locations and make available to John Deere upon request.</p> <p>* If requested by John Deere, provide documentation.</p>							



6.2.1.11 Where the supplier maintains design control of the product, the supplier shall form a team to conduct design and part level quality planning reviews with the supplier's supply chain. The teams should include supply management, quality engineering, design engineering, supplier representatives, and any other personnel necessary to evaluate the supplier's capability to meet product or service requirements.

6.2.1.12 Examples of the items covered during this meeting are shown in the DPAR Checklist. See clause 5 in JDS-G223X1 (2015). All action items shall be documented and tracked.



6.2.2 John Deere-Designated Key Characteristics



6.2.2.1 Key characteristics can exist for both products and processes. See clause 6.6.1.3 for minimum process capability on key characteristics. A structured process shall be used to identify key characteristics and corresponding controls.

6.2.2.2 Product key characteristics are those part characteristics for which variation within the design tolerance, the specification or both can affect John Deere satisfaction. The selected measurable characteristics require extra control. Product key characteristics shall be documented on the control plan.

6.2.2.3 Product key characteristics shall also be documented on either the drawing, the model, product specifications, assembly specifications, or a combination of the four as required by John Deere. No deviations are allowed for out-of-tolerance or out-of-specification product key characteristics.

6.2.2.4 Product key characteristics shall be identified by the symbol <KC>. Product key characteristics on older drawings can be depicted through the use of a special symbol such as  or .

6.2.2.5 Process key characteristics are those process characteristics that significantly impact the ability of the process to meet specifications, that affect John Deere satisfaction, or that require extra control. Process key characteristics can exist without corresponding product key characteristics; Process key characteristics are not designated by a special symbol.

6.2.2.6 Process key characteristics shall be documented on the control plan.

6.2.3 Review of Requirements Related to the Product or Processes

6.2.3.1 Key characteristics for the product and processes are confirmed in the DPAR using information from Design Reviews, FMEAs, and historical information.

6.2.3.2 When requested by John Deere, the supplier shall provide a Process Failure Modes and Effects Analysis (PFMEA) for each part, component, or process with one or more key characteristics.

6.2.3.3 The supplier's processes, process capabilities, PFMEA, and the supply chain's capabilities and requirements should be reviewed during the DPAR.

6.2.3.4 If product or process key characteristics are not identified directly on the drawing, key characteristics shall be documented in the DPAR Checklist. The DPAR shall include but is not limited to the following:

- Confirm the product and process key characteristics.
- Discuss applicable John Deere requirements and John Deere Standards.
- Identify revisions to the part drawing or process necessary to manufacture or procure the product or service to specifications.
- Review the quality plan level.
- Ensure understanding of the part function and the manufacturing process.
- Review the supplier's processes, process capabilities, and PFMEA.
- Review the supplier's supply chain capabilities and requirements.
- Clarify requirements for capability assessment and gage studies on key characteristics, plus other characteristics that are identified by John Deere.
- Clarify supplier responsibility for PPAP requirements (communicate formally via Verification Warrant Form).
- Identify and assign preventive action for potential problems in manufacturing or procurement.
- Discuss product or service order quantities, delivery schedules, handling, packaging, product preservation, and product or service cost.
- Mistake-proof the design and manufacturing processes, including assembly, to ensure a low probability of error.
- Identify or evaluate potential cost reduction or value improvement opportunities.
- Review obligations related to product, including environmental, regulatory and legal requirements.
- Review dimensional featuring according to functional requirements.
- Review the Bill of Materials (BOM) for accuracy.
- Review service requirements.
- Ensure that material and products do not contain any substances in excess of the amounts set forth on John Deere's Restricted Materials List, and other substances restricted by applicable laws (for example, asbestos or lead in paint).

6.2.3.5 Effective reviews require supplier participation. **Product, process, and supply chain experts from the supplier should attend the review.**

6.2.3.6 During this review, the supplier should ask for clarification of any unclear issue. The supplier should acquire from this meeting all of the information required to clearly understand John Deere requirements.

6.2.3.7 The supplier should be prepared to address questions in this meeting and to respond to any unanswered questions on the date specified during the meeting. The supplier shall communicate to John Deere any changes that can affect the data documented in this review.

6.2.4 John Deere Communication



6.2.4.1 The supplier shall identify and implement a communication plan with John Deere and with the supplier's supply chain relating to product or service information, contracts or order handling, product or process changes, contract amendments, and feedback from John Deere.

6.2.4.2 Where product requirements are changed, the supplier shall ensure that relevant documentation is revised appropriately.

6.2.4.3 The supplier shall ensure that personnel involved in the realization of the product or service are made aware of the changed requirements.

6.2.5 Material Control and Communication



6.2.5.1 The manufacture of equipment and components, based on a worldwide design, has significant material specification challenges. Materials that are commonly available in one geographical region can be difficult or excessively costly to obtain in another geographical region. Clause 6.2.5 through clause 6.2.5.6 is intended to clarify the determination of an equivalent or alternate material and the process for notification and approval.

6.2.5.2 An equivalent material is one whose specifications, in their full range of variation, meet the requirements of the material specified on the drawing. Determination that a material is equivalent requires a careful evaluation of all related specifications and characteristics. This review shall only be performed by individuals who are well versed in those particular materials, qualified to make that evaluation, able to provide supporting documentation (for example, mill certifications), and fully conversant with the relevant John Deere specifications. Unless specifically authorized, in writing by the appropriate John Deere representative, only the primary material producer (for example, steel mill, foundry, warehouse), may make that decision. If material is equivalent, the manufacturing process should not require revision.

6.2.5.3 An alternate material is one whose specifications does not fully meet the requirements of the material specified on the drawing, but whose specifications have been verified as fully meeting the design intent and can be used interchangeably with the specified material.

6.2.5.4 A material that is explicitly identified in John Deere standards as meeting the requirements of a specified John Deere material designation shall be considered equivalent to the specified material.

6.2.5.5 Alternate materials shall appear on the drawing. Either a print change or a temporary deviation to allow the alternate material is required. Refer to Engineering Deviation Authorization Checklist and Form. See clause 12 in JDS-G223X1 (2015). Alternate materials likely require changes to the manufacturing processes utilized to make or process parts. Processing areas like heat treatment, bending, forming, and welding are likely to show the greatest differences when utilizing alternate materials.

6.2.5.6 The subtleties of detail within the John Deere Material (JDM) specifications requires specialist training to interpret. Incorrect material substitutions can result in product failures. Any questions relating to the equivalence of two materials should be directed to a qualified John Deere materials engineer.

6.3 John Deere Notification and Submission Requirements

6.3.1 John Deere Notification



6.3.1.1 The supplier shall obtain approval from John Deere prior to making changes to a specification or process for supplied products or services for any change that can impact safety, fit, form, function, performance, durability, or appearance per the requirements listed in Table 2.

6.3.1.2 The supplier shall notify the responsible John Deere design unit of any design or process changes as indicated in Table 2 by using the Supplier Change Request (SCR) system on [JDSN](#).

6.3.1.3 Individual John Deere using units can subsequently elect to require a submission for PPAP approval. Table 2, which is derived from the AIAG Production Part Approval Process Manual, specifies when notification is required.

Note 13 PPAP forms are reprinted from the PPAP Manual with permission of Chrysler Group LLC, Ford, and GM Supplier Quality Requirements Task Force.

6.3.1.4 John Deere requires approval prior to implementation for items listed in Table 2.



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Table 2 Planned Changes Requiring Approval Prior to Implementation

Requirement	Clarification or examples
1. Use of other construction or material than was used in the previously approved part or product.	For example, other construction as documented on a deviation (permit) or included as a note on the design record and not covered by an engineering change.
2. Production from new or modified tools (except perishable tools), dies, molds, patterns, etc., including additional or replacement tooling.	This requirement only applies to tools, which due to their unique form or function can be expected to influence the integrity of the final product. It is not meant to describe standard tools (new or repaired), such as standard measuring devices, drivers (manual or power), etc.
3. Production following refurbishment or rearrangement of existing tooling or equipment.	Refurbishment means the reconstruction and/or modification of a tool or machine or to increase the capacity, performance, or change its existing function. This is not meant to be confused with normal maintenance, repair or replacement of parts, etc., for which no change in performance is to be expected and post repair verification methods have been established. Rearrangement is defined as activity which changes the sequence of product/process flow from that documented in the process flow diagram (including the addition of a new process). Minor adjustments of production equipment may be required to meet safety requirements such as, installation of protective covers, elimination of potential Electro Static Discharge risks, etc. These changes can be made without John Deere approval unless the process flow is changed as a result of this adjustment.
4. Production from tooling and equipment transferred to a different plant location or from an additional plant location.	Production process tooling and/or equipment transferred between buildings or facilities in one or more locations.
5. Change of supplier for parts, non-equivalent materials, or services (for example, heat-treating, painting, plating) that affect John Deere fit, form, function, durability, or performance requirements.	Suppliers are responsible for approval of subcontracted material and services that do not affect John Deere fit, form, function, durability, or performance requirements.
6. Product produced after the tooling has been inactive for volume production for twelve months or more.	For product that has been produced after tooling has been inactive for twelve months or more: notification is required when the part has had no active purchase order, and the existing tooling has been inactive for volume production for twelve months or more. The only exception is when the part has low volume, for example, service or specialty vehicles. However, John Deere may specify certain PPAP requirements for service parts.

Table 2 Planned Changes Requiring Approval Prior to Implementation

Requirement	Clarification or examples
<p>7. Product and process changes related to components of the production product manufactured internally or manufactured by suppliers that impact safety, fit, form, function, performance, durability, and/or appearance of the salable product. Additionally, the supplier shall concur with any requests by a subcontractor before submission to John Deere.</p>	<p>Any change that affects John Deere requirements for safety, fit, form, function, performance, durability, and/or appearance requires notification to John Deere.</p> <p>The safety, fit, form, function, performance, durability, or appearance requirements should be part of John Deere specifications as agreed on during reviews.</p>
<p>8. For bulk materials only:</p> <p>New source of raw material with special characteristics from new or existing subcontractor.</p> <p>Change in product appearance attributes where there is not appearance specification.</p> <p>Revised parameters in the same process (outside PFMEA parameters of the approved product, includes packaging).</p> <p>Change outside of DFMEA (product composition, ingredient levels) of the approved product.</p>	<p>These changes would normally be expected to have an effect on the performance of the product.</p>
<p>9. Change in test inspection method – new technique (no effect on acceptance criteria).</p>	<p>For change in test method, supplier should have evidence that the new method provides results equivalent to the old method.</p>

6.3.2 Submission to John Deere




6.3.2.1 The supplier shall obtain PPAP approval prior to the first production shipment in the following situations unless the responsible design control unit has waived this requirement. See Table 3. Conditional approval may be granted to authorize limited production shipments when there are outstanding PPAP requirements.

6.3.2.2 The supplier shall review and update, as necessary, all applicable items in the PPAP file to reflect the production process, regardless of whether John Deere requests a formal submission. The PPAP file shall contain the name of the responsible John Deere person granting the waiver and the date of the waiver.


Table 3 Changes Requiring PPAP Approval Prior to First Production Shipment

Requirement	Clarification or examples
1. A new part or product (i.e. a specific part, material, or color not previously supplied to John Deere).	Submission is required for a new product (initial release) or a previously approved product which has a new or revised (for example, suffix) product or part number assigned to it. A new part/product or material added to a family may use appropriate PPAP documentation from a previously fully approved part within the same product family.
2. Correction of a discrepancy on a previously submitted part.	Submission is required to correct any discrepancies on a previously submitted part. A “discrepancy” can be related to: <ul style="list-style-type: none"> • The product performance against John Deere’s requirement • Dimensional or capability issues • Subcontractor issues • Full approval of a part replacing an interim approval • Testing, including material, performance, engineering validation issues
3. Engineering change to design records, specifications, or materials for production products or production part numbers.	Submission is required on any engineering change to production product production part design records, specifications, or materials.
4. Process technology new to the supplier not previously used for this product.	For bulk materials only

 **6.3.2.3** Changes in any of the situations described in Table 2 or Table 3 requires appropriate quality planning and written request through the Supplier Change Request (SCR) system on JDSN, with acceptance to proceed from John Deere prior to implementation.

6.3.2.4 The supplier shall ensure that proper notifications of changes by second tier supply chain are communicated as well. PPAP approval is required prior to shipping parts.

6.4 Design and Development

 **6.4.1 General**

When design control of the product resides with the supplier, the supplier shall conduct design reviews; include representation from second tier suppliers, and John Deere as appropriate.

6.4.2 Design and Development Planning

6.4.2.1 Design reviews shall be conducted periodically as the product or process is designed, first to identify how the design works and how the various subsystems work together, then later when more detail is available.

6.4.2.2 Tools, such as FMEA, shall be used to identify problems. These tools are used in an iterative fashion with Design Reviews. Design Reviews take place earlier than the DPAR in the EPDP.

6.4.2.3 Design reviews are typically conducted with John Deere and supplier team members (design competency experts) from areas such as product engineering, product verification and validation, reliability engineering, marketing, supply management, quality engineering, manufacturing engineering, and materials engineering.

6.4.2.4 Typical areas for discussion are conformance to design specifications, designs, regulations, standards, product support, manufacturing processes, assembly techniques, and personal hazards. The review is documented and corrective action plans are developed and validated for any problems identified.

6.4.2.5 Design reviews can be conducted at various stages of the design and development process to accomplish the outputs listed in clause 6.4.2.7 and to periodically review the ability of the supply chain to fulfill requirements.

6.4.2.6 When requested, the supplier shall participate in design reviews. Suppliers shall provide technical leadership for supplier's product, assist in the identification of potential problems, and work with John Deere in correcting these problems.

6.4.2.7 Important outputs of the design review process are:

- Identification of the design and development processes.
- Identification of the verification and validation activities appropriate for each design and development stage.
- Identification of responsibilities and authorities for each of the design and development stages.
- Determination of the requirements for, and methods of, communication at each stage in the design and development process.
- Specification of functional and performance requirements of the product or service.
- Identification of criteria for acceptability, including key characteristics plus other characteristics that are identified by John Deere.
- Determination of applicable regulatory and legal requirements.
- Identification of applicable information derived from previous similar designs.
- Identification of product or service acceptance criteria.
- Definition of the characteristics of the product that are essential for safe and proper use.
- Specification of special packaging requirements for proper delivery to John Deere.
- Determination of risk in not meeting specifications.
- Establishment of risk mitigation strategy for non-conformances to component specification.

6.4.3 Design and Development Inputs

6.4.3.1 Component specifications shall be developed, reviewed, and approved with the supplier and John Deere.



6.4.3.2 Any changes after initial approval shall be submitted by the supplier for approval from John Deere.

6.4.3.3 A component specification shall include, but is not limited to, a reliability goal breakdown, mounting location information, and usage environment conditions (see Table 4, Table 5, and Table 6).

Table 4 Reliability Goal Breakdown

John Deere Usage Information	
Average User Information	<ul style="list-style-type: none"> - Average Annual Usage (AAU) (hours, cycles) - Percentile John Deere used for AAU
Top User Information	<ul style="list-style-type: none"> - Annual Usage Period (AUP) (hours, cycles) - Percentile John Deere used for AUP
Warranty Period	<ul style="list-style-type: none"> - Warranty Period (years, hours)
Durability Period	<ul style="list-style-type: none"> - Design Life (hours)
Preferred Confidence Level for Durability/Reliability Testing	<ul style="list-style-type: none"> - Confidence Level (%)
Component Goal Breakdown	
Component Failure Mechanism	<ul style="list-style-type: none"> - Define as either wear-out, or overstress mechanism - Define the reliability % for the failure mechanism at a given point of time (e.g. B10 = 5,000 hours) - Define a specified design safety coefficient
High Level Duty Cycle Operation	
Expected Usage	<ul style="list-style-type: none"> - List of applications - Number of actuations per period of time - % of time spent on each of the different operations
Component Allocation	
Warranty	<ul style="list-style-type: none"> - Warranty Period (hours, cycles) - Reliability required at the end of the warranty period (%)
Durability	<ul style="list-style-type: none"> - Design life of the product (hours, cycles) - Reliability required at the end of the design life of the product

Table 5 Component Mounting Location Information (Examples)

Drawing/Chart	Reason
Component interface diagram (I/O)	An input/output (I/O) diagram illustrates the connection points that a component, or system, may have with other systems. Information from this chart may be used to understand key data to properly set up a test.
Identification of critical components/items in close proximity to the component (e.g. engine, exhaust, etc.)	Clear identification of potential stresses that might act as catalytic agents to induce a particular failure mode. For example, induced vibration from a nearby component, susceptibility due to an electric line, or heat conduction from a hydraulic line.
Drawings of mounting location (with dimensions)	Mounting location drawings are required to accurately replicate component mounting conditions on test fixtures.
Rigidity and cushioning conditions	Identifying any rigidity or cushioning conditions used to support the component in the vehicle. Most commonly used in vibration testing to determine if the design is adequate to avoid some resonant frequencies that may be harmful to the component.

Table 6 Usage Environment Conditions

Condition	Possible Test Conditions
Manufacturing	<ul style="list-style-type: none"> - Are there any environmental factors that may affect performance? (for example drops, electrostatic discharge (ESD) etc.) - Any assembly line risks associated with the product's manufacturing process (for example improper torque spec)?
Transportation to Dealership/End-Customer	<ul style="list-style-type: none"> - How is the product packaged (for example, crate, box, etc.)? - What is the mode of transportation? (for example, air, truck, ship, etc.) - Any risks associated with the transportation process? (for example, altitude, vibration, humidity)
Storage Conditions	<ul style="list-style-type: none"> - What are the expected warehouse environmental conditions? (for example humidity, temperature vapors, etc.)
Startup Conditions	<ul style="list-style-type: none"> - Are there any special conditions worth noting at startup (for example cold starts)?
Transportation to Field	<ul style="list-style-type: none"> - Are there any special conditions that the product experiences while transporting to the field (for example, highway conditions, trailer conditions, etc.)?
Operating Conditions	<ul style="list-style-type: none"> - How is the product used in the field? - What % of time is the product doing each operation? - What are the environmental conditions in the field? (for example, temperature ranges, humidity ranges, vibration) - Any chemicals or liquids present in the operation?
Special John Deere Conditions	<ul style="list-style-type: none"> - Are there special uses for the equipment? - What are those conditions? - Where are those conditions more prominent? - Are there any special requirements for the countries where the product will be sold (for example electromagnetic interference (EMI))? - Do any of these conditions happen while the product is turned off?

6.4.3.4 Design verification and validation plans are developed to ensure that the product design shall meet the objectives for performance and reliability that have been established, resulting in a product that meets or exceeds defined John Deere needs.

6.4.3.5 John Deere and the supplier shall jointly develop the PV&V plan.

6.4.3.6 The PV&V plan shall consider component functionality, reliability, durability, software function, environmental conditions, anticipated applications, existing and potential failure modes and mechanisms, interfaces with other system components and controls, John Deere expectations, and key performance characteristics.

6.4.3.7 The PV&V plan should have clear linkage between the component requirements and the tests.

6.4.3.8 Product Verification and Validation gaps shall be identified and mitigated through the use of processes and tools such as:

- Design analysis
- Key Technology Analysis
- FMEAs
- Design Reviews
- Lab and field testing

6.4.3.9 Component reliability shall be demonstrated for high risk failure modes and mechanisms through the John Deere Component Reliability Assessment Process, which shall include both overstress and wear-out failure mechanisms. See clause 3 in JDS-G223X1 (2015).

6.4.3.10 Product verification and validation plans and results shall be documented using a spreadsheet template provided by John Deere, from the John Deere V2 Net System. The completed form shall be returned to John Deere so the data can be imported into the John Deere V2 Net System for documentation and tracking purposes. See clause 4 in JDS-G223X1 (2015).

6.4.3.11 If requested, the supplier shall assist in conducting the PV&V activities either at John Deere or at the supplier's facility. The supplier shall provide information about standardized tests that are routinely conducted for the supplied product.

6.4.3.12 The supplier shall understand appropriate engineering standards. John Deere may conduct a Product Engineering Questionnaire (PEQ) audit for components with QPL 3 or QPL 4 when the supplier has component or subsystem design control and when required to support the Component Reliability Assessment Process.

6.4.3.13 Higher component reliability is important to John Deere satisfaction. A reliable machine starts with reliable components. To achieve component reliability, John Deere may provide suppliers a component reliability goal. In this case, the supplier shall provide statistical evidence that the component goal is met.

6.4.3.14 The Component Reliability Assessment Process ensures that component reliability goals are set and that plans are created and executed to validate and demonstrate the ability to meet the goals. The Component Reliability Assessment Process shall be used when directed by John Deere.

6.4.3.15 When a Component Reliability Assessment Process component is being supplied or if requested, the supplier shall complete and submit the Component Performance and Reliability Assurance Form to John Deere. See clause 3 in JDS-G223X1 (2015).

6.4.3.16 The supplier and John Deere shall sign this form when the component meets or exceeds its requirement(s), including reliability.

6.4.3.17 This form shall be signed before any components are provided for a John Deere physical build.

6.4.4 Product Design Input

6.4.4.1 The supplier shall identify, document, and review the product design input requirements.

6.4.4.2 Design input requirements shall include the following:

- John Deere requirements (contract review) such as key characteristics, identification, traceability, and packaging.
- Process to deploy information gained from previous design projects, competitor analysis, supplier feedback, internal input, field data, and other relevant sources, for current and future projects of similar nature.
- Targets for conformity to product requirements, life, reliability, durability, maintainability, timing and cost.

6.4.5 Manufacturing Processes Design Input

6.4.5.1 The supplier shall identify, document, and review the manufacturing process design input requirements.

6.4.5.2 Manufacturing process design inputs shall include:

- Product design output data
- Targets for productivity, process and cost
- John Deere requirements
- Experience from previous developments

6.4.6 Design and Development Outputs

6.4.6.1 The output of design and development shall be provided in a form that enables verification against the design and development input.

6.4.6.2 Output of design and development verification against design and development input shall be approved prior to release.

6.4.6.3 Design and development outputs shall meet the input requirements for design and development, provide appropriate information for purchasing, production and for service provision, contain or reference product acceptance criteria, and specify the characteristics of the product that are essential for its safe and proper use.

6.4.7 Product Design Output

6.4.7.1 The product design output shall be expressed in term that can be verified and validated against product design inputs.

6.4.7.2 The product design outputs shall include:

- Design FMEA
- Reliability results
- Product key characteristics and specifications
- Product error-proofing, as appropriate
- Product definition including drawings or mathematically based data
- Product design review results
- Diagnostic guidelines, where applicable

6.4.8 Manufacturing Process Design Output

6.4.8.1 The manufacturing process design output shall be expressed in terms that can be verified against manufacturing process design input requirements and validated.

6.4.8.2 The manufacturing process design outputs shall include:

- Specifications and drawings
- Manufacturing process flow chart/layout
- Manufacturing process FMEA
- Control plan (see clause 8 in JDS-G223X1 (2015))
- Work instructions
- Process approval acceptance criteria
- Data for quality, reliability, maintainability, and measurability
- Results of error-proofing activities, as appropriate
- Methods of rapid detection and feedback of product and manufacturing process nonconformities

6.4.9 Design and Development Review

6.4.9.1 At suitable stages, systematic reviews of design and development shall be performed in accordance with planned arrangement to evaluate the ability of the results of design and development to meet requirements, and to identify any problems, and to propose necessary actions.

6.4.9.2 Participants in such reviews shall include representatives of functions concerned with the design and development stages being reviewed.

6.4.9.3 Records of the reviews and any necessary actions shall be maintained.

6.4.10 Design and Development Verification

6.4.10.1 Verification shall be performed in accordance with planned arrangements to ensure that the design and development outputs have met the design and development input requirements.

6.4.10.2 Records of the results of the verification and any necessary actions shall be maintained.

6.4.11 Design and Development Validation


6.4.11.1 Design and development validation shall be performed in accordance with planned arrangements to ensure that the resulting product is capable of meeting the requirements for the specified application or intended use.

6.4.11.2 Whenever practical, validation shall be completed prior to the delivery or implementation of the product.

6.4.11.3 Records of the results of validation and any necessary actions shall be maintained

6.4.12 Control of Design and Development Changes

6.4.12.1 Changes to the design or production processes of a product or service shall be identified, documented, communicated and controlled.

 **6.4.12.2** In cases where design control resides with the supplier, the supplier shall take appropriate measures to communicate all changes proposed by the supplier, or by the supplier's supply chain, through the Supplier Change Request (SCR) system on JDSN.


6.4.12.3 The supplier shall evaluate the effect of any proposed changes to all constituent parts and completed products. This may be accomplished through a design review, failure modes and effects analysis, lab or field-testing, or other means, as determined jointly by John Deere and the supplier.

6.4.12.4 The changes shall be approved by John Deere prior to implementation. See clause 6.2.4.

6.4.12.5 The results of the review of changes and any subsequent follow-up actions shall be documented.

6.5 Purchasing

6.5.1 Purchasing Process

 **6.5.1.1** As a primary supplier to John Deere, the supplier is responsible for the quality of the products and services provided by supplier's supply chain.

6.5.1.2 The requirements of this document should be extended to the supplier's supply chain.

6.5.1.3 The supplier shall have a documented system to properly select suppliers with the capability to meet JDS-G223 and other applicable John Deere Standards.

6.5.1.4 The initial supplier selection process for providers of products or services for John Deere shall include a documented assessment process to determine the supply chain's capability to meet the requirements of JDS-G223.

6.5.1.5 The supplier shall monitor second tier supply chain's performance on a reoccurring basis.

6.5.1.6 It can be appropriate for the supplier to have second tier suppliers participate in John Deere initiated DPAR and in other quality activities.

6.5.1.7 The supplier shall have a communication plan to notify second tier supply chain of the latest specifications and to verify the product on an ongoing basis.

6.5.1.8 A change in the supply chain, or any process change by the supply chain that produces the John Deere product, requires appropriate quality planning, and John Deere notification prior to implementation. John Deere units require documented approval before implementation. See clause 6.2.4.

6.5.2 Regulatory Conformity

6.5.2.1 The supplier shall own the patent or copyright that allows it to lawfully manufacture the product, or utilize the manufacturing process, that John Deere desires to purchase.

6.5.2.2 The supplier shall be properly licensed by the holder of the patent or copyright to produce or utilize the manufacturing process.

6.5.2.3 The supplier shall have documentation to substantiate either that it owns the requisite Intellectual property rights, or that it is properly licensed to use the requisite intellectual property rights.

6.5.2.4 When intellectual property rights are effective and legally enforceable in the country where the supplier produces the product or utilizes the manufacturing process, the supplier shall have documentation to substantiate that its intellectual property rights are effective in the country where it produces the product or utilizes the manufacturing process.

6.5.2.5 The duration of the requisite intellectual property shall be sufficient to cover the term of the proposed supply agreement.

6.5.2.6 The supplier shall identify any third party intellectual property rights that could interfere with the proposed supply agreement.



6.5.2.7 The supplier shall comply with the John Deere Restricted Materials List (for example, asbestos or lead in paint) and applicable laws that supplied products do not contain substances in excess of the amounts set forth on John Deere's Restricted Materials List, or any substances restricted by applicable laws.

6.5.2.8 If there is a conflict between the John Deere Restricted Materials List and applicable laws, the more stringent requirements shall be met. The Restricted Materials list is located on [JDSN](#).

6.5.3 Purchasing Information

6.5.3.1 Supplier purchasing documents shall contain information describing the requirements for approval of the product and for the qualification of the procedures, processes, specifications, equipment and personnel necessary to produce the product.

6.5.3.2 All John Deere purchase order requirements shall be met. Any exceptions shall be documented, communicated to John Deere, and approved prior to acceptance of a John Deere purchase order.

6.5.4 Verification of Purchased Product



6.5.4.1 Verification of purchased product shall be conducted using a documented quality assessment methodology.

6.5.4.2 The primary supplier to John Deere shall be fully responsible for the quality of the products and services provided, including that of the supplier's supply chain.

6.5.4.3 Suppliers may utilize John Deere audit forms for qualification of the supplier's supply chain.

6.5.5 Incoming Product Conformity to Requirements

6.5.5.1 The supplier shall have a process to ensure the quality of purchased product. See clause 6.5.4.

6.5.5.2 The process shall include one or more of the following:

- Receipt of and evaluation of statistical data by the supplier
- Receiving inspection or testing such as sampling based on performance
- Second or third party assessments of supplier sites, when coupled with records of acceptable delivered product conformity to specifications
- Part evaluation by a designated laboratory
- Another method agreed upon with John Deere

6.5.6 Supply Chain Monitoring

6.5.6.1 The supplier shall ensure supply chain monitoring of manufacturing processes.

6.5.6.2 Supply chain performance shall be monitored through the following:

- Delivered product conformity to specifications
- Customer disruptions including field returns
- Delivery schedule performance, including incidents of premium freight
- John Deere notifications related to quality or delivery issues

6.6 Production and Service Provision

6.6.1 Control of Production and Service Provision

6.6.1.1 Process control is needed to ensure that the manufacturing process is performed under stable conditions. Documentation shall be provided to ensure quality of products at initial production and to ensure ongoing maintenance of acceptable quality levels. Examples of process control documents include process sheets, inspection and test instructions, test procedures, standard operating procedures, preventive maintenance instructions, and specific part control plans.



6.6.1.2 Process control documents shall be in place prior to initial production and shall be readily available to the employees responsible for the operation of the process. The key processing parameters, process key characteristics, and product key characteristics identified during Design Reviews, FMEA, and DPAR shall be addressed in the process control documents, including a control plan.

6.6.1.3 Process control documentation and control plans shall be available for review by John Deere. The minimum process capability (adjusted for measurement uncertainty, and reported at the lower boundary of the 90 % confidence interval per clause 6 in JDS-G223X2 (2015)) for a key characteristic is a $P_{pk} \geq 1.33$ or $C_{pk} \geq 1.33$. Higher process capability requirements may be specified by John Deere.

6.6.1.4 If minimum process capability for a key characteristic has not been demonstrated, the Product Delivery Process (Initial Production) Flowchart (see clause 3 in JDS-G223X2 (2015)) shall be used to determine required activities, refer to Process Evaluation, unless otherwise agreed to by John Deere.

6.6.2 Control Plan

6.6.2.1 The supplier shall plan and carry out production and service provisions under controlled conditions.

6.6.2.2 The supplier shall develop control plans (see clause 8 in JDS-G223X1 (2015)).

6.6.2.3 Control plans shall include the following:

- Processes at the system, subsystem, component or material level for the product supplied.
- Processes producing bulk materials as well as parts.
- A plan for pre-launch and production; that takes into account the design FMEA and manufacturing process FMEA outputs.
- All elements specified by John Deere.

6.6.3 Validation of Processes for Production and Service Provision



6.6.3.1 The Supplier shall validate all special processes (for example, welding, heat treatment, plating, and painting). A list of special process can be found on [JDSN](#).

6.6.3.2 Validation shall demonstrate the ability of the processes to achieve planned results.

6.6.3.3 The supplier shall define arrangements for validation.

6.6.3.4 Validation shall include the following, as applicable:

- Qualification of processes
- Qualification of equipment and personnel
- Use of defined methodologies and procedures
- Requirements for records
- Re-validation



6.6.3.5 After PPAP documents have been submitted, John Deere shall review the submissions and approve or reject the Verification Warrant. See clause 2 in JDS-G223X1 (2015).

6.6.3.6 Approval shall be required prior to shipping production parts.

6.6.3.7 Conditional approval can be granted to authorize limited production shipments when there are outstanding PPAP requirements.

6.6.3.8 PPAP requirements shall be completed prior to full production.

6.6.4 Identification and Traceability

6.6.4.1 The supplier shall establish and maintain documented procedures for product identification to ensure that product is identified during all stages of production.

6.6.4.2 The supplier shall have product traceability to allow for parts to be matched to a certain time frame, processes, and specific lots of material, so if a discrepancy is found, product can be contained and corrective action can be initiated.

6.6.4.3 If non-conforming product is identified, John Deere and the supplier shall identify and trace suspect parts.

6.6.5 John Deere Property



6.6.5.1 The supplier shall exercise care with all John Deere property, including intellectual property, while such property is under the supplier's control or being used by the supplier.

6.6.5.2 The supplier shall identify, verify, protect and maintain John Deere property provided for use or incorporation into product.

6.6.5.3 John Deere property that is lost, damaged or otherwise found to be unsuitable for use shall be recorded and reported by the supplier to John Deere.

6.6.5.4 The supplier shall maintain processing equipment, tooling, measuring equipment, and fixtures owned by John Deere in an acceptable operating condition capable of meeting John Deere production requirements.

6.6.6 Preservation of Product



6.6.6.1 The supplier shall preserve conformity of product with John Deere requirements during internal processing and delivery to the intended destination. Preservation shall include identification, handling, packaging, storage, and protection. This requirement also applies to the constituent parts of a product.

6.6.6.2 Unless otherwise specified or communicated by the John Deere representative, all products shall be visually clean, free from visible corrosion upon delivery to the intended destination and withstand 90 days of non-climate controlled indoor storage without the development of visible corrosion.

6.6.6.3 Packaging shall meet all applicable shipping laws, codes, and regulations. Packaging shall meet all requirements imposed by John Deere. The supplier should ensure John Deere owned packaging is maintained to be clean and free from dirt, debris, foreign materials, and damage, while packaging is under supplier control.

6.6.6.4 Service parts shall be prepared in accordance with JDV 9.

6.7 Control of Monitoring and Measuring Devices

6.7.1 Gaging Selection

6.7.1.1 When selecting measuring equipment, John Deere is concerned with the capability of the measurement system to detect and indicate even small changes of the measured characteristic.

6.7.1.2 The measuring equipment selected should have a discrimination of less than one-tenth of the total product tolerance being measured.

6.7.2 Calibration

6.7.2.1 The supplier shall establish and maintain documented procedures for the calibration, control, and maintenance of measuring, inspection, and test equipment used to ensure that products and processes conform to applicable requirements.

6.7.2.2 The supplier shall calibrate the equipment covered by clause 6.7.2.1 at consistent, periodic intervals against applicable standards with known traceability to a national or international governing body, and shall safeguard the equipment against adjustments that would invalidate the calibration.

6.7.2.3 Records of calibration activities shall be maintained.

6.7.2.4 When using an external laboratory for calibration, the laboratory shall be accredited by a national or international accreditation body (for example, ISO/IEC 17025).

6.7.2.5 Gages shall be reviewed for potential revisions following engineering changes.

6.7.2.6 Whenever a gage is found out of calibration and it has been used to verify parts for John Deere, the supplier shall notify John Deere of the suspect parts.

6.7.2.7 Suspect part notification shall include:

- An assessment of the impact of out-of-specification condition
- Statements of conformity to specification after calibration and verification

6.7.2.8 For certain applications John Deere can provide gages, test fixtures, and test machines to the supplier. Such equipment remains the property of John Deere, which shall provide a gage drawing with the gage for the supplier's records.

6.7.2.9 The supplier shall review John Deere gages to ensure proper function and application, as well as calibrate, repair, and replace nonconforming gages.

6.7.3 Gage Repeatability and Reproducibility

6.7.3.1 A gage repeatability and reproducibility (Gage R&R) study measures the total repeatability and reproducibility of a gage system as a percentage of the total specification. The personnel who will use the measuring instrument in production should always conduct the Gage R&R study (see clause 5 in JDS-G223X2 (2015)).

6.7.3.2 Gage R&R studies should be performed whenever new production personnel begin using the measuring instrument. The method for performing the Gage R&R study shall be either the Range Method or the ANOVA method (see clause 5 in JDS-G223X2 (2015)).

6.7.3.3 Gage R&R studies apply to variable gages. Attribute gage R&R studies (such as ring or plug gages) can be required by John Deere (if required see clause 8 in JDS-G223X2 (2015)).

6.7.3.4 Attribute gages shall be checked periodically for accuracy.

6.7.3.5 For non-dedicated gages such as coordinate measuring machines, a repeatability and reproducibility analysis shall be conducted utilizing specific part programs on all key characteristics plus other characteristics that are identified by John Deere.



6.7.3.6 Gage R&R studies are required for each unique variable gage used to monitor key product or process characteristics. Studies on families of gages or equipment are not acceptable, unless the study uses an industry-approved methodology such as found in Concepts for R&R Studies (see clause 5 in JDS-G223X2 (2015)).

6.7.3.7 Gage R&R studies on families of gages shall be agreed to by John Deere prior to completion of the DPAR.

6.7.3.8 Some types of equipment, such as flow meters and hardness testers do not lend themselves to Measuring System Analysis. This type of equipment shall be identified in the calibration program and shall be verified at a specified frequency using industry standards.

6.7.3.9 If the total variation of the repeatability and reproducibility of the gage system (gage and operator) is less than 30 percent of the total tolerance range, and meets the additional requirements in JDS-G223X2 clause 5.8 (2015), the gaging system is acceptable for use. If the supplier uses a gage with a total variation greater than 30 percent, John Deere shall be contacted for approval.

6.7.3.10 A gage shall be proven repeatable and reproducible before it is used in a capability study or is used to accept or reject parts.

6.7.3.11 If the gage system fails, the supplier shall take corrective action to make the gage measurements repeatable and reproducible.



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JDS-G223

7 Measurement, Analysis and Improvement

7.1 General

7.1.1 Measurement, analysis and improvement are the process of planning, defining, and using performance metrics in processes and products critical to John Deere. These performance metrics are used to determine the current level of performance, drive continuous improvement activities, and monitor long-term performance levels.

7.1.2 Critical to the use of these performance metrics are statistical tools. These statistical tools are not only used on processes and products, but also measure John Deere satisfaction and supply chain performance.

7.1.3 The supplier shall define, plan, and implement measurements for processes that affect the quality of products or services John Deere receives.

7.1.4 The appropriate statistical tools for each process shall be determined during advanced quality planning and included in the control plan.

7.1.5 Basic statistical concepts, such as variation control (stability), process capability, and over-adjustment shall be understood and shall be utilized throughout the supplier's organization.

7.2 Monitoring and Measurement

7.2.1 John Deere Satisfaction

7.2.1.1 The supplier shall include a John Deere satisfaction metric in the review of its quality management system.

7.2.1.2 This metric shall be included in the management review process. Trends in John Deere satisfaction performance should be reviewed and improvement activities developed around the data.

7.2.1.3 John Deere satisfaction improvement activities should utilize a structured process improvement technique.

7.2.1.4 John Deere uses the Achieving Excellence process (with its associated metrics) and warranty data to measure satisfaction with the supplier's performance. Suppliers shall use this data to drive improvements in John Deere's satisfaction metrics.

7.2.2 Internal Audit

Suppliers shall conduct internal audits per clause 4.6.1 of JDS-G223.

7.2.3 Quality Management System Audit

7.2.3.1 The supplier shall audit its quality management system to verify compliance with JDS-G223 and any additional quality management system requirements.

7.2.3.2 A formal corrective action process shall include root cause determination to correct deficiencies.

7.2.3.3 The supplier shall have qualified internal auditors who are independent of area being audited perform the audits.

7.2.4 Manufacturing Process Audit

7.2.4.1 The supplier shall audit each manufacturing process to determine its effectiveness.

7.2.4.2 The work performed includes manufacturing operations at the supplier's facility and operations subcontracted to the supplier's supply chain. This audit may also be performed on similar parts when the work has not yet been sourced, or when preparing for full production.

7.2.5 Product Audit

The supplier shall audit products at appropriate stages of production and delivery to verify conformity to all specified requirements, such as product dimensions, functionality, packaging and labeling, at a defined frequency.



7.2.6 Monitoring and Measurement of Processes

7.2.6.1 The supplier shall determine and implement measurements necessary to monitor manufacturing and business processes that are critical to John Deere satisfaction.

7.2.6.2 A control plan shall be completed and submitted to John Deere for approval, prior to production (see clause 8 in JDS-G223X1 (2015)). There shall be documentation showing evidence that proper techniques are followed by the owner of the processes.

7.2.6.3 Mistake-proofing activities should be the first method of control considered. If mistake-proofing is not feasible, statistical techniques shall be used to monitor the process.

7.2.6.4 Where indicated by the Order Fulfillment Process Flowchart (see clause 4 in JDS-G223X2 (2015)), Statistical Process Control charting should be used on key process control variables in order to eliminate the possibility of producing deficiencies. The charting of the monitored variables should be completed by the persons able to take action on the process.

7.2.6.5 There shall be written procedure describing actions to take when out-of-control conditions exist.

7.2.6.6 Review of process monitoring techniques shall be made available to John Deere personnel upon request.

7.2.6.7 Manufacturing processes susceptible to tool wear and auto correlated data should consider using the analytical methods described in clause 9 and clause 10 in JDS-G223X2 (2015).

7.2.7 Monitoring and Measurement of Product

7.2.7.1 Product measurements and monitors are required to confirm that the products are being produced properly and that their characteristics remain stable over time. Product measurement and monitoring include capability studies.



7.2.7.2 Capability and variability studies shall be maintained in accordance with the Order Fulfillment Process (see clause 4 in JDS-G223X2 (2015)) on all key characteristics plus on other characteristics identified by John Deere and the supplier in the quality planning process.

7.2.7.3 For new or changed parts or processes, product conformance is driven by process control flow chart, PDP and Initial Production (see clause 3 in JDS-G223X2 (2015)), Order Fulfillment Process (see clause 4 in JDS-G223X2 (2015)), and Process Control Plan Design (see clause 8 in JDS-G223X1 (2015)).

7.2.8 Appearance Items

For supplier's manufacturing parts designated by John Deere as appearance items, the supplier shall provide the following:

- Appropriate resources for evaluation (for example, enhanced lighting).
- Masters for color, grain, gloss, metallic brilliance, texture, and distinctness of image (DOI), as appropriate.
- Maintenance and control of appearance masters and evaluation equipment.
- Verification that personnel making appearance evaluations are competent and qualified (see clause 8 in JDS-G223X2 (2015)).

7.3 Control of Nonconforming Product



7.3.1 General

7.3.1.1 The supplier shall establish and maintain documented procedures to ensure that proven or suspected nonconforming products are prevented from unintended use or installation.

7.3.1.2 This control shall provide for identification, documentation, evaluation, isolation, disposition of nonconforming products, and notification to the departments concerned (both internal and external).

7.3.1.3 If parts are found to be nonconforming at John Deere, the supplier shall provide the resources necessary to evaluate, contain, sort, and, reclaim or scrap the nonconforming product. The supplier shall have a representative establish containment at the John Deere factory, for material in transit, and at the supplier within 24 hours. Quicker response may be required based on the severity of the situation.

7.3.1.4 If containment of non-conforming product is unsuccessful, then third party inspection can be required by John Deere, to be performed at the supplier's expense.

7.3.1.5 If nonconforming material is shipped to John Deere units or become a warranty problem, the supplier shall be responsible to assist John Deere in evaluating and correcting the problem. John Deere shall be entitled to recover from the supplier all costs and expenses reasonably incurred in taking corrective action per the terms and conditions.

7.3.1.6 When nonconforming product is corrected, the material shall be subject to re-verification to demonstrate conformity to the requirements.

7.3.1.7 Product with unidentified or suspect status shall be classified as nonconforming product.

7.3.2 Control of Reworked Product

7.3.2.1 Instructions for rework, including re-inspection requirements, shall be accessible to and utilized by appropriate personnel.

7.3.2.2 Reworked product shall pass appropriate functional tests, in accordance with the original control plans.

7.3.2.3 All serialized product shall have documented records of rework. See clause 6.6.4.

7.3.3 John Deere Notification

The supplier shall inform John Deere promptly in the event that nonconforming product has been shipped.

7.3.4 John Deere Waiver



7.3.4.1 If the supplier wants to ship product not meeting the specified requirements, written approval shall be obtained from John Deere prior to shipment of the product. This request shall be made using the Engineering Deviation Authorization Checklist and Form (see clause 12 in JDS-G223X1 (2015)). This shall apply equally to products or services purchased from the supply chain.

7.3.4.2 The supplier shall agree with any change requests from their supply chain before submission of a Supplier Change Request (SCR) to John Deere. The supplier shall maintain a record of the expiration date and quantity authorized by any John Deere waiver.

7.3.4.3 The supplier shall ensure that compliance is met in accordance with the original or superseding product specifications and requirements when the authorization expires.

7.3.4.4 Each shipping container of deviated product shall be properly identified with the John Deere deviation number.

7.4 Analysis of Data

7.4.1 Suppliers shall obtain appropriate data and apply statistical and problem solving techniques to solve specific problems and to drive continuous improvement activities in a timely manner. See clause 13 in JDS-G223X1 (2015).

7.4.2 At a minimum, the supplier shall analyze the following.

- Achieving Excellence results
- Internal and external product failures (including warranty)
- Process or product quality trends
- Supply chain (including the supplier's supply chain) quality performance

7.4.3 Summarized quality performance should be made available to all of the supplier's employees. Quality performance data shall be made available to John Deere upon request.

7.4.4 Suppliers shall monitor warranty performance on [JDSN](#), and shall initiate warranty improvement activities based on warranty trends and analysis results. Suppliers are responsible for requesting specific warranty parts needed for investigations, and shall support John Deere in warranty reviews when requested by John Deere.

7.4.5 When a product or process does not meet John Deere specifications, or is not performing adequately, one suggested methodology is DMAIC (Define, Measure, Analyze, Improve, and Control):

- Define: Define the project goals and John Deere (internal and external) deliverables
- Measure: Measure the process to determine current performance
- Analyze: Analyze and determine the root cause(s) of the defects
- Improve: Improve the process by eliminating defects
- Control: Control future process performance

7.5 Improvement

7.5.1 Continuous Improvement

7.5.1.1 Suppliers shall demonstrate a commitment to continuous improvement in products, processes, and services provided to John Deere.

7.5.1.2 Suppliers shall have a formal continuous improvement process. The goal should be to reduce defects, scrap, and re-work to improve safety, reduce cost and RPN, and to improve operation efficiency and production capacity. Quality system emphasis is placed on preventing rather than detecting non-conformity.

7.5.2 Corrective Action

7.5.2.1 Corrective action eliminates the causes of nonconformities in order to prevent recurrence. Suppliers shall investigate resolution to nonconformities using eight Corrective Action steps or Resolution Phases. The supplier shall document Corrective Action in each Resolution Phase.

7.5.2.2 The Eight Corrective Action Disciplines (8D) or Resolution Phases required are:

D1 Establish the Corrective Action Team

Purpose: To define the members of the team that can successfully resolve the problem.

D2 Problem Identification

Purpose: To document all facts, research and field information that would quantify or describe the problem in detail.



D3 Containment Action and Short Term Corrective Action

Purpose: Actions to isolate the effect of the problem from John Deere until corrective action is implemented. To minimize the effect of any nonconforming product by containment, re-inspection, rework, etc., to verify conformance of current product. Identify and contain nonconforming product at all locations including, but not limited to; in-house at supplier facility, in-transit material, material located at various John Deere sites (including Parts Depots), dealers and end-use customer. Containment shall be completed within 24 hours of problem notification.

Production and Experimental or Pilot Build Problems:

- What you did to stop the problem today.
- John Deere / Warranty Problems:
- Interim John Deere solution used to quickly restore John Deere acceptance.

D4 Define and Verify Root Cause

Purpose: Scientific, complete breakdown of the Direct Cause, Contributing Causes and Root Causes of the problem.

D5 Choose and Verify Solution

Purpose: Identification of solutions or actions that will eliminate the Root Causes as well as the Contributing Causes. Quantitative results confirming that the selected corrective actions will resolve the issue for John Deere.

D6 Implement Permanent Corrective Action

Purpose: Action taken in this phase will correct the root cause of the problem and prevent its recurrence. Implementation includes listing action steps, identifying responsible people and target dates for each action. This action shall be completed by the target date as specified by John Deere.

D7 Prevent Recurrence

Purpose: Modifications to Management Systems, Operating Systems, practices, and procedures such as Process Control Plans, DFMEAs, PFMEAs, Work Instructions, Training Plans, Training Performed, Engineering Documentation to prevent recurrence of this and all similar problems. The responsible person or 8D team reviews all activity performed through resolution phases and confirms that all steps have been completed. It is recommended that the improvements resulting from the Eight Step Problem Resolution Process be replicated to like processes or products to ensure the problem has been solved.



D8 Team Recognition

Purpose: Acknowledgement from management of the good work done by the 8D team. This set is to recognize extra effort and reinforce successful behavior.

A status report shall be submitted to the originator of a John Deere initiated corrective action request via the Nonconformance Corrective Action (NCCA) system within five days from the date of receipt. Each corrective action D-step shall be completed by the target date.

7.5.3 Preventive Action

Preventive action eliminates the causes of potential nonconformities in order to prevent occurrence. Preventive action focuses on building good quality into the product and processes to ensure that nonconforming products never reach John Deere.

7.5.3.1 Processes should be developed so employees can do the job right every time. The processes include, but are not limited to the following:

- Data collection systems
- Process control plans
- Mistake proofing techniques
- Training
- Continuous improvement actions
- Design FMEAs and process FMEAs

7.5.3.2 FMEAs and other production documentation shall be maintained through the life of the product.

7.5.3.3 Preventive action activities shall be a part of the management review process.

7.5.3.4 At a minimum, FMEA items with Risk Priority Number value ≥ 100 , or the severity is ≥ 9 , require follow-up actions.

7.5.3.5 Use of the Risk Priority Number (RPN) can be a useful tool because RPN indicates overall risk levels. The limitation of using the RPN method needs to be fully understood, however, and the use of RPN thresholds alone to determine action priority is not recommended. Consideration of high severity ≥ 5 with high occurrence ≥ 5 can be an indication of required follow-up actions. For additional information, see AIAG Failure Mode and Effects Analysis Manual and SAE.



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JDS-G223

7.5.3.6 The supplier shall take a systematic approach to defining and implementing preventive action activities. The systematic process improvement approach should include five basic steps:

- Define: Define the project goals and John Deere (internal and external) deliverables.
- Measure: Measure and determine John Deere needs and specifications.
- Analyze: Analyze the process or product options to meet John Deere needs.
- Design: Design the process or product to meet John Deere needs.
- Verify: Verify the design performance and ability to meet John Deere needs.

8 Engineering Standards

8.1 Understanding Drawings Geometric Dimensioning and Tolerancing (GD&T)

John Deere expects suppliers to understand Geometric Dimensioning and Tolerancing (GD&T), and provide drawings incorporating GD&T principles for John Deere Worldwide factories to ASME Y14.5M.

9 Contact Information

To pose questions regarding JDS-G223, please contact a representative of John Deere Supply Management or John Deere Quality Engineering.

10 References

For undated references, the latest edition of the referenced document (including any amendments) applies.

10.1 Access to John Deere Standards

10.1.1 John Deere Standards can be accessed by John Deere personnel via the [Engineering Standards](#) internal website.

10.1.2 Employees of suppliers with an approved John Deere supplier number can obtain access to John Deere Standards via the [JD Supply Network \(JDSN\)](#). Access to JDSN is by approved individual name and password. Suppliers should contact John Deere Supply Management representatives with questions about JDSN.

Note 14 Only John Deere Standards which have been approved for supplier distribution are available via JDSN.

10.2 Access to Standards from External Organizations

10.2.1 Most standards from organizations external to John Deere are available to John Deere personnel via the [Engineering Standards](#) internal website.

10.2.2 Suppliers are responsible for obtaining relevant external standards. In accordance with copyright laws and Company policy, John Deere personnel shall not provide copies of these standards to suppliers.

10.3 John Deere Standards

JDS-G223X1 Supplier Quality Manual — Sample Forms

JDS-G223X2 Supplier Quality Manual — Methods and Examples

10.4 AIAG Standards (Automotive Industry Action Group)

AIAG FMEA Failure Mode and Effects Analysis (FMEA) Potential Failure Mode and Effects Analysis for Tooling and Equipment (Machinery FMEA)

AIAG MSA Measurement System Analysis (MSA)

AIAG SPC-3 Statistical Process Control

10.5 ASME Standards

ASME Y14.5M Mathematical Definition of Dimensioning and Tolerancing Principles

10.6 ISO Standards (International Organization for Standardization)

ISO/TS 16949 Quality management systems — Particular requirements for the application of ISO 9001:2008 for automotive production and relevant service part organizations



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JDS-G223

10.7 SAE Standards (SAE International)

SAE J1739

Potential Failure Modes and Effects Analysis

Summary of Changes from Previous Edition (For Information Only — Not Part of the Standard)

The major intention of this revision is to improve information flow, provide clarity of requirements; as well as to clarify the requirements of manufacturing process capability, and manufacturing process control.

There are two annex documents to accompany JDS-G223, JDS-G223X1 and JDS-G223X2.

Due to the numerous additions and reorganization of this information, it is strongly suggested that individuals read the documents in their entirety.

All sample documents can be found in JDS-G223X1 and on JDSN.

All method and example information can be found in JDS-G223X2.

Added clause 1.4 text about mandatory and guideline provisions.

Glossary of terms has been moved to clause 2 Terms and Definitions.

Revised clause 3.1.7 John Deere reserves the right to conduct a quality system assessment at the supplier's facility.

Revised clause 3.1.9 John Deere may perform Process Verification Audits.

Revised clause 3.1.10 John Deere may perform Special Process Audits.

Added clause 3.1.11 John Deere may perform Order Fulfillment Risk Assessments. Added to clause 3.2.2 bullet 8 to communicate any changes to 3rd party certifications to John Deere.

Added clause 3.2.5 not meeting the minimum level of requirements, as measured by the JDS-G223 supplier audit.

Added clause 3.2.6 John Deere classes for the Supplier Quality Manual, John Deere Standards, Enterprise Product Delivery Process, and supply chain integration are available on JDSN.

Added to clause 3.3.3.2 (7) bullets regarding control procedure requirements for documents.

Added to clause 3.4.3 bullet 11 regarding special processes.

Revised clause 4.4.2.1 to include short term plans.

Added clause 4.5.1.2 responsibilities and authorities are defined and communicated within the supplier's organization.

Revised clause 4.6.1.1 supplier's management shall review the supplier's quality management system at planned intervals, to ensure its continuing suitability, adequacy, and effectiveness.

Added clause 4.6.1.2 review shall include assessing opportunities for improvement, changes to the quality management system, including the quality policy and objectives.

Revised clause 4.6.2.1 added (internal/external) bullet 1.

Added clause 5.3.4 supplier should provide cross training to ensure product quality.



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DISTRIBUTION

JDS-G223

Added clause 5.3.5 regarding supplier employee certification.

Revised clause 5.5.1 redefined work environments.

Added clause 5.5.2 established environmental compliance.

Revised clause 6.2.1.2 verbiage and Table 1 regarding production part approval requirements.

Added clause 6.2.1.6 document conformance to all specifications and print notes on ISIR.

Added clause 6.2.3.5 recommendation that experts from supplier attend the DPAR meeting.

Revised clause 6.3.1.1 from shall request to shall obtain approval.

Added clause 6.4.1.1 regarding supplier design control.

Added to clause 6.4.2.7 last bullet regarding determination of risk and risk mitigation.

Added clause 6.4.3.1 regarding component specification.

Added clause 6.4.3.2 changes after initial approval shall be submitted for approval.

Added clause 6.4.3.3 component specification shall include but not limited to items in Table 4, Table 5, and Table 6.

Added Table 4, Table 5, and Table 6.

Removed from clause 6.1 EPDP gates and milestones figure.

Added clause 6.4.3.7 PV&V plan.

Added clause 6.4.3.8 product verification and validation.

Added clause 6.4.3.9 component reliability.

Added clause 6.4.4 product design input.

Added clause 6.4.5 manufacturing processes design inputs.

Added clause 6.4.7 process design output.

Added clause 6.4.8 manufacturing process design output.

Revised clause 6.5.2.7 regarding restricted materials.

Added clause 6.5.2.8 regarding restricted materials and local applicable laws.

Added clause 6.5.3.2 regarding purchase order requirements.

Added clause 6.5.4.3 acceptable for suppliers to utilize John Deere audit forms for qualification of the supplier's supply chain.

Added clause 6.5.5 Incoming Product Conformity to Requirements.

Added clause 6.5.6 Supply Chain Monitoring.

Added clause 6.6.2 Control Plan.

Revised clause 6.6.5.4 regarding John Deere property.

Added clause 6.6.6.2 all incoming product shall be clean and free from corrosion.

Added clause 6.6.6.3 packaging requirements.

Added clause 6.7.2.3 external laboratory for calibration.

Added clause 6.7.2.4 regarding gage review.

Added clause 6.7.2.5 regarding calibration.

Added clause 7.1.4 appropriate statistical tools.

Added clause 7.1.5 basic statistical concepts.

Revised clause 7.2.2 moved reservation of right to clause 3.1.

Revised clause 7.2.6.2 regarding control plan.

Added clause 7.2.7.3 new or changed parts or processes.

Added clause 7.2.8 Appearance Items.

Added clause 7.3.1.4 containment of non-conforming product.

Added clause 7.3.2.2 reworked product.

Added clause 7.3.2.3 serialized product.

Added clause 7.4.4 suppliers shall monitor warranty data.

Revised clause 7.5.1.1 Continuous Improvement.

Added clause 7.5.1.2 formal continuous improvement process.

Revised clause 7.5.3.5 FEMA items with Risk Priority Number ≥ 100 .

Added clause 7.5.3.5 use of Risk Priority Number (RPN).