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Production Part Approval Process Requirements
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## 1. Purpose

To communicate the requirements of the Production Part Approval Process (PPAP) as required by Banks Technologies and the Automotive Industry Action Group standards.

## 2. Application

This procedure applies to all parts, components, and material purchased by Banks Technologies when required per the purchase order or other contract.

This procedure applies to all PPAPs requested by Banks Technologies for any of the reasons listed below:

- 1) Initial Submission
- 2) Engineering Change(s)
- 3) Tooling: Transfer, Replacement, Refurbishment, or additional
- 4) Correction of Discrepancy
- 5) Production Break to Banks Technologies is greater than 1 year
- 6) Change to Optional Construction or Material
- 7) Sub-Supplier or Material Source Change
- 8) Change in Part Processing
- 9) Parts Produced at Different or Additional Location
- 10) Other – To be specified

### 2.1. JLTV A2 program

In addition to the requirements listed in this procedure, components to be used for the JLTV A2 program are also subject to the requirements listed in Attachment 1 - JLTV A2 Specific Requirements.

## 3. References


Automotive Industry Action Group PPAP Manual 4th edition  
Automotive Industry Action Group APQP Manual 2nd edition  
Automotive Industry Action Group FMEA Manual 2nd edition  
Automotive Industry Action Group MSA Manual 4th edition  
Federal Acquisition Regulations 2.101

## 4. Definitions

Commercially available off-the-shelf (COTS) item - Items sold in the commercial marketplace that are not modified, combined, evolved, or “of-a-type” commercial items. For further definition, refer to FAR 2.101.

## 5. Responsibility

The Banks Tech Supply Chain personnel issuing the purchase order (PO) is responsible for ensuring the PO communicates and properly informs the supplier of the PPAP requirements.

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It is the supplier’s responsibility to meet the requirements of this procedure and the Banks Tech PPAP Workbook (Doc #50303) when completing and submitting PPAPs.

Banks Tech Quality personnel are responsible for reviewing and approving PPAPs. They are responsible for communicating PPAP status (rejected, approved, interim approved) to the supplier.

## 6. Requirements

### 6.1. General

Four levels of PPAP have been established, one of which will be identified on the Banks Tech PO to communicate the specific requirements for that submission. Submission requirements are listed on the “PPAP REQUIREMENTS” tab within the Banks Tech PPAP Workbook (Doc #50303).

PPAP sample parts should be sent to Banks Tech for review along with the PPAP submission and shall be clearly identified per the requirements defined in the “LABELING” tab of the PPAP workbook. All PPAPs shall be submitted at least 7 calendar days prior to the ship date that is required to meet the purchase order date.


Suppliers are not authorized to ship production material to Banks Tech without written PPAP approval (full or interim). Banks Tech communicates written approval via a signed Part Submission Warrant (PSW) page. A PPAP re-submission is required for a break in production or manufacturing greater than 12 months.

#### 6.1.1. Component First Article Test

Component First Article Test (CFAT) requirements are noted on the part prints and all requirements must be tested and met prior to PPAP approval. The Supplier shall perform CFAT testing on a minimum of two component units unless otherwise stated on the part print. All testing shall be performed on the two component units. If a test results in degradation or damage to a test component while successfully completing a specified CFAT test (i.e. reduced life, performance, destructive testing, etc.) and additional CFAT tests are required, additional component units shall be tested to complete all specified CFAT tests with a minimum of two component samples for each test.

The Component First Article units offered for test(s) shall be manufactured at the facilities in which that item(s) is to be produced and shall be manufactured using the final production process and production released tooling. The Supplier shall certify to this requirement within the applicable PPAP document.

Supplier must notify Banks Tech 30 days in advance of conducting a CFAT to allow proper scheduling for onsite viewing by Banks Tech and Government representatives. If a component fails the specified CFAT requirements, the Supplier shall notify Banks Tech within 24 hours of the failure. Upon CFAT failure, supplier must immediately establish containment, and investigate root cause.

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## 6.2. PPAP Elements

PPAP content requirements shall be adhered to in accordance with the following Automotive Industry Action Group (AIAG) standards:

Automotive Industry Action Group PPAP Manual 4th edition

Automotive Industry Action Group APQP Manual 2nd edition

Automotive Industry Action Group FMEA Manual 2nd edition

Automotive Industry Action Group MSA Manual 4th edition

Further clarification of some requirements as well as some definitions are provided below:

### 6.2.1. Part Submission Warrant (PSW)

The Supplier shall complete the Part Submission Warrant after all PPAP elements are verified and conform to all requirements. Banks Technologies requires that Suppliers only submit one part number on a Part Submission Warrant (PSW).

### 6.2.2. PPAP Checklist

The supplier shall complete and submit the PPAP check list with every level 3 PPAP to ensure all sections are complete when using the Banks Tech PPAP Workbook.

### 6.2.3. Design Record

Engineering Drawings (Balloon Prints) shall accompany each PPAP submittal. Only production-released / approved drawings shall be utilized for PPAP submittals unless otherwise authorized by Banks Tech.

### 6.2.4. Design Failure Modes and Effects Analysis


Banks Technologies requires suppliers to develop a Design FMEA in accordance with, and compliant to, Banks Technologies requirements if design-responsible. The Supplier shall use their own format for the DFMEA.

### 6.2.5. Supplier Change Requests

The Supplier shall maintain copies of any authorized engineering change documents for those changes not yet recorded in the Design Record but incorporated in the product, part or tooling. Marked drawings are acceptable for PPAP submission, with approved SCR, if a released version is not available due to timeline constraints.

### 6.2.6. Process Flow Diagrams

The Supplier shall have a process flow diagram outlining the process steps to manufacture the quoted product. Process flow diagrams for “families” of similar parts are acceptable if the new parts have been reviewed for commonality by the Supplier. The PFD must represent the process flow of material from receipt of raw material to finished goods at the dock for shipment.

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#### 6.2.7. Process Failure Mode and Effects Analysis

Banks Technologies requires the Supplier to develop and maintain a Process FMEA in accordance with the requirements outlined in the Banks Tech PPAP Workbook (Doc #50303). The Supplier shall conduct the MFMEA – Machinery Failure Modes & Effects Analysis at the discretion of the Quality representative assigned to the Supplier for APQP activities.

#### 6.2.8. Dimensional Results

The Supplier shall provide evidence of dimensional verification as required by the Design Record and the Control Plan proving compliance with specified requirements. 100%-dimensional inspection is required for a minimum of three (3) parts for each Level 3 PPAP submittal. 100%-dimensional inspection is required for a minimum of one (1) part for each Level 2 PPAP submittal.

Dimensional results for PPAP must be taken from production parts. The Supplier shall have dimensional results for each unique manufacturing process, e.g., cells or production lines and all cavities, molds, patterns or dies. The Supplier shall record actual results for all dimensions, characteristics, and specifications as noted on the Design Record and Control Plan.

Measuring equipment should have a discrimination of at least one-tenth of the total tolerance being measured (AIAG MSA, chapter 1 sect. E).

##### 6.2.8.1. 3D Model Requirements

If the product drawing (composites, castings, etc.) relies upon the 3D CAD model to fully define the part, the PPAP shall include evidence that all measured samples conform to the geometry and associated GD&T requirements defined by the 3D CAD model.


#### 6.2.9. Records of Material / Performance Test Results

The Supplier shall have records of material and/or performance test results for tests specified on the Design Record or Control Plan and adhere to the retention requirements.

#### 6.2.10. Material Test Results

The Supplier shall perform all chemical, physical, metallurgical, or mechanical property tests for all parts and product materials when chemical, physical, metallurgical or mechanical property requirements are specified by the Design Record or Control Plan. Material Test Results shall indicate and include the following:

- 1) The Design Record change level of the parts tested.
- 2) Any authorized engineering change documents that have not yet been incorporated in the Design Record.

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- 3) The number, date, and change level of the specifications to which the part was tested.
- 4) The date on which the testing took place.
- 5) The quantity tested.
- 6) The specified results.
- 7) The material Supplier's name and vendor code.
- 8) The Supplier shall use the PPAP workbook material template to report the above information

Qualified Lab documentation must accompany each performance test result form (reference the Qualified Lab Documents section).

#### 6.2.11. Performance Test Results

The Supplier shall perform tests for all part(s) or product material(s) when performance or functional requirements are specified by the Design Record or Control Plan. A performance test (unlike in-process checks, which do not require qualified laboratory documentation) is the process of verifying the functionality of the Product (Finished Part) when exposed to the conditions that they will be used in. The Supplier shall use the performance testing template within the PPAP workbook to document and submit the performance test results.


Performance test results shall indicate and include the following:

- 1) The Design Record change level of the parts tested.
- 2) Any authorized engineering change documents that have not yet been incorporated in the Design Record
- 3) The number, date, and change level of the specifications to which the part was tested.
- 4) The date on which the testing took place.
- 5) The quantity tested.
- 6) The specified results.

Qualified Lab documentation must accompany each performance test result form (reference the Qualified Lab Documents section).

#### 6.2.12. Testing frequency

It is the Supplier's responsibility to plan for ongoing material and performance testing and to identify these as separate line items in the Control Plan. This ensures that the Supplier has a plan for continuous verification of the performance and materials requirements. The interval of inspection is to be recommended by the Supplier, however, Banks Tech reserves the right to request a change in the frequency of this inspection. See Supplier Quality Manual (Doc #50301) Section 38 for casting-specific radiography requirements.

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### 6.2.13. Laboratory Documentation

The inspection and applicable testing for PPAP shall be performed by a “qualified laboratory” (internal or external to the Supplier organization). The laboratory must have a legitimate business license, scope of business, and all documentation proving that the laboratory is qualified for the specific type of inspection and testing performed on any sample part/component.

### 6.2.14. Qualified Lab Documents

Material or Performance Tests for PPAP shall be performed by a qualified laboratory.

If Material or Performance Tests are performed by an Internal or External Lab that IS accredited by a recognized member of the International Accreditation Forum Multilateral Recognition Arrangement (IAF MLA), the Supplier shall submit the test results on the laboratory letterhead or in the normal laboratory report format. The laboratory report must include:

- 1) The name of the laboratory that performed the test
- 2) The laboratory’s accreditation standard (and accreditation number and/or name of the 3rd party organization that provided accreditation)
- 3) List of standards used for testing
- 4) The date on which the testing took place

If Material or Performance Tests are performed by an Internal or External Lab that IS NOT accredited, the Supplier must provide:

- 1) The name of the laboratory that performed the test
- 2) Documentation (work instruction) for each type of test conducted
- 3) Training records / certifications of personnel who performed the testing (to show competency List of all test equipment used to perform testing
- 4) Calibration records of all test equipment used
- 5) The date on which the testing took place

### 6.2.15. Measurement System Analysis


The Supplier shall have applicable Measurement System Analysis (MSA) studies, such as gage repeatability and reproducibility (R&R), for each measurement gage or device family gage that is used to determine product or process conformance.

#### 6.2.15.1. Gage R&R Requirements

The minimum number of appraisers, trials and parts when performing gage repeatability and reproducibility (R&R) studies are as follows:

- 1) Variable data - 3 appraisers, 3 trials, 10 parts



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2) Attribute data - 3 appraisers, 3 trials, 50 parts

Parts used in the study should represent the entire range of the tolerance. Whenever possible, the appraisers used to conduct the study should be the ones who normally perform the measurements in production. Measurements should be taken in the normal production location utilizing the production measuring equipment for the entire study.

Assessment of the measurement system should be based on the Total Tolerance of the feature being measured (i.e. %GRR to TOLERANCE). Guidelines for measurement system acceptability are as follows:

- 1) The percent GRR should be less than 10% for gages used to measure Special Characteristics
- 2) Gages whose percent GRR is between 10% to 30% may be acceptable for some applications, but use of the gage must be approved by Banks Tech
- 3) Gages whose percent GRR is over 30% are considered unacceptable for the application and cannot be used

6.2.16. Initial Process Studies (Capability)

Initial Process Studies are required for all Level 3 PPAP submittals where Special Characteristics (Significant, Critical, Major or Critical Safety Item [CSI]) are identified on the Design Record or listed in the Control Plan. Minimum requirements are as follows:


- 1) All Major or Critical Characteristics shall demonstrate a minimum Cpk of 1.67.
- 2) All Significant Characteristics shall demonstrate a minimum Cpk of 1.33.
- 3) 100% inspection is required until Cpk minimums are achieved.
  - a) Inspections to be reflected within the supplier's Process Control Plan
  - b) Records as evidence of 100% inspection to be maintained, and submitted upon request

The requirements for Significant Production Runs and Quality Indices shall be in accordance with PPAP Manual (Fourth Edition) Appendix H. All other PPAP Manual 2.2.11 requirements apply as written in the PPAP Manual (Fourth Edition).

Where no Special Characteristics are identified in the Design Record or in the Control Plan, Banks Tech reserves the right to require demonstration of Initial Process Capability on any other characteristics.

6.2.17. Process Control Plan

The Supplier shall have a Control Plan to define all methods used for process control. The Supplier shall use the Process Flow Diagram and FMEA to verify line of sight to the Control Plan. The Control Plan must include all Critical Product Characteristics and process controls driven by the FMEA process.

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#### 6.2.18. Master Sample

It is at the Banks Tech Quality Representative’s discretion to require the Supplier retain a Master Sample for all parts/components at the supplier location. This will be noted on the Part Submission Warrant. The Master Sample must be appropriately labeled with traceability. The Supplier is responsible to ensure appropriate preservation of the master sample.

#### 6.2.19. Checking Aids

Checking aids include all dedicated instruments, templates, attribute and variable gages, fixtures, or jigs that are used to determine acceptance/rejection of a product characteristic. If a device is specifically made for the part being verified, and the part is not available as a catalog item, it is a “checking aid”. The Supplier shall certify that all aspects of the checking aid agree with part dimensional requirements. The supplier shall document all released engineering design changes that have been incorporated in the checking aid at the time of PPAP submission. The supplier shall provide for preventative maintenance of any checking aids for the life of the part. If a checking aid is used to verify a print requirement, the Supplier shall conduct the appropriate MSA activities including Gage R&R.

#### 6.2.20. Submission Samples

If a sample is required for PPAP submission, the Supplier shall ensure that the “PPAP Parts Label” is filled out and attached appropriately to the outside of the sample container. For production parts that are produced from more than one die, mold, tooling, pattern, cavity or production process, the Supplier shall complete a full layout to all characteristics.


#### 6.2.21. Shipping Labeling

The supplier shall ensure that the Shipping Label is filled in correctly, including:

- 1) Part Number
- 2) Revision
- 3) Quantity
- 4) Purchase Order #
- 5) Supplier Name

### 6.3. Bill of Materials

When a Level 3 PPAP is required at the purchase part level, a Level 3 PPAP is also required for all sub-components listed on the Bill of Materials unless explicitly authorized by Banks Tech in writing. When a Level 2 PPAP is required at the purchase part level, one piece dimensional results are required for all sub-components listed on the Bill of Materials unless explicitly authorized by Banks Tech in writing.

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#### 6.4. COTS Components

For a COTS component, all sections listed on the “PPAP REQUIREMENTS” tab within the Banks Tech PPAP Workbook are applicable and required for a specified level of PPAP. If the supplier has requested the production process documentation but is unable to obtain the information needed to complete all required sections, then the minimum requirements shall apply:

- 1) Design Record (Bubble Print)
- 2) Engineering Change Documents (If applicable)
- 3) Customer Engineering Approval (If applicable)
- 4) Dimensional Results / Print Notes Verification
- 5) Sample Production Parts
- 6) Master Sample Photos
- 7) Records of Compliance with Customer Specific Requirements
- 8) Parts Submission Warrant

The supplier is expected to demonstrate or affirm conformance with supporting PPAP documents or Certificates of Conformance (C of C). The C of C letter shall; affirm the article is commercially available, be on the supplier’s company letterhead, include the part number, include the part revision level, be signed by a representative within the contractor’s organization that has decision making authority. The C of C letter shall positively affirm that the part meets the requirements within the print. If the OEM catalog page or product data sheet that does not include all print specifications, the supplier is responsible to provide objective evidence that the part meets the requirement.


##### 6.4.1. Intentionally left blank

##### 6.4.2. COTS Plus

Commercially available off-the-shelf parts that have additional print or performance requirements that have been deemed important (because of the part’s application). If the OEM catalog page or product data sheet that does not include all print requirements, the supplier is responsible to provide objective evidence that the part meets the print requirement.

#### 6.5. PPAP Submission

The supplier shall submit the completed PPAP workbook on the Banks Tech FTP site. Sub-component PPAP workbooks, if applicable, should be included in a separate folder and zipped together with the parent item workbook. The supplier shall notify the Banks Tech Quality representative of the submission via email. PPAPs containing ITAR or EAR controlled drawings cannot be submitted via email.

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## 6.6. PPAP Status

A signed PSW uploaded to the Banks Tech FTP site will communicated one of the following statuses:


- 1) Approved – The Supplier will receive a signed and approved PSW via email to the email address provided on the PSW submitted with the PPAP package.
- 2) Interim Approved – The Supplier is authorized to ship material for production requirements on a limited time or piece part quantity basis. Interim approval is only permitted when the Supplier has clearly defined the discrepancies preventing full approval and has an action plan to resolve such discrepancies. Full PPAP approval is required no later than 120 days after interim approval is issued. Interim PPAP approval will not be granted if the following elements are missing or incomplete:
  - a) The QC-112 PPAP check list (within the Banks Tech PPAP workbook)
  - b) Design Record (Bubble Print)
  - c) Engineering Change Documents (If applicable)
  - d) Customer Engineering Approval (If applicable)
  - e) Dimensional Results / Print Notes Verification
  - f) Material / Performance test results
  - g) Qualified Lab Documents
  - h) Sample Production Parts
  - i) Master Sample Photos
  - j) Part Submission Warrant
- 3) Reject – A rejected PSW is sent to the Supplier in the event that the PPAP submission does not meet Banks Technologies requirements. In the event of a PPAP rejection, the Supplier shall take all action necessary to expediently correct the non-conformances.

## 7. Records / Forms

Banks Tech PPAP workbook (Doc #50303)

## 8. Attachments

Attachment 1 - JLTV A2 Specific Requirements

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## Revision History

Revision	Change(s)	Date	Authored by	Approved by
A	Initial release	7/20/2023	KM	MH
B	<p>Added Section 6.1.1 Component First Article Test</p> <p>Changed MSA requirement from Special Characteristics to product or process conformance in Section 6.2.15 Measurement System Analysis</p> <p>Changed attribute data gage R&amp;R requirement from 30 to 50 pieces in Section 6.2.15.1. Gage R&amp;R Requirements</p> <p>Updated submission requirements for COTS items in Section 6.4 COTS Components</p> <p>Removed Section 6.4.1 COTS subcomponents</p> <p>Changed submission requirement to allow native file types instead of pdf and added requirements for sub-component submission in Section 6.5 PPAP Submission</p> <p>Added Attachment 1 - JLTV A2 Specific Requirements to Section 8 Attachments</p>	2/12/2024	KM	MH