Production Part Approval Process

Supplier Information

➔ Supplier Readiness and Qualification – 07.2020

Production Part Approval Process
Navigation

- What´s PPAP?
  - meaning
  - origin

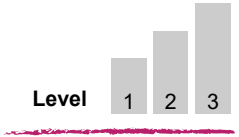
Benefits & Targets

Improve quality cooperation
Zero failure target Increase customer satisfaction
confidence in future product Risk reduction **Benefits** Part view + Process view design integrity
Reduce warranty charges smooth SOP managing supplier changes
standardization **Prevents costs for poor quality**
Global approach

What does it mean for you as the supplier?

past → today

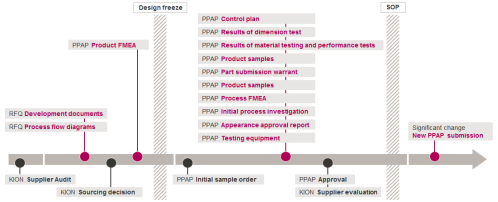
PPAP Level



PPAP Content

12 different requirements including example

PPAP Timeline



Additional information

- KION standard
- PPAP website
- contact

Production Part Approval Process
Navigation

- What´s PPAP?
  - meaning
  - origin

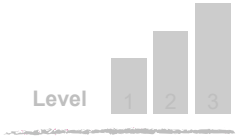
Benefits & Targets

Improve quality cooperation
Zero failure target Increase customer satisfaction
confidence in future product Risk reduction **Benefits** Part view + Process view design integrity
Reduce warranty charges smooth SOP managing supplier changes
standardization **Prevents costs for poor quality**
Global approach

What does it mean for you as the supplier?

past → today

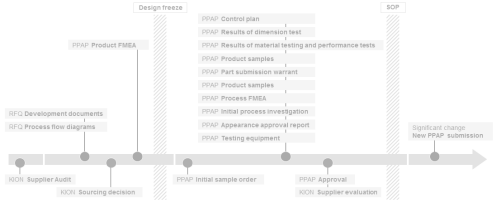
PPAP Level



PPAP Content

12 different requirements including example

PPAP Timeline



Additional information

- KION standard
- PPAP website
- contact

Production Part Approval Process

What´s PPAP?

P P A P

PRODUCTION PART APPROVAL PROCESS

- Standard used to reduce risks prior to product release
- Team oriented approach using well established tools and techniques
- Developed by Ford, Chrysler and General Motor in 1993

Production Part Approval Process
Navigation

- What´s PPAP?
  - meaning
  - origin

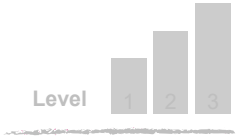
Benefits & Targets

Improve quality cooperation
Zero failure target Increase customer satisfaction
confidence in future product Risk reduction **Benefits** Part view + Process view design integrity
Reduce warranty charges smooth SOP managing supplier changes
standardization **Prevents costs for poor quality**
Global approach

What does it mean for you as the supplier?

past → today

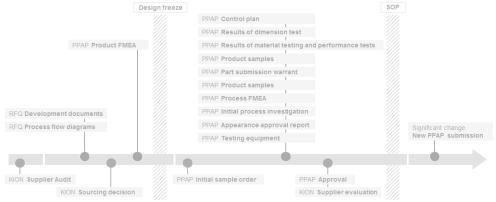
PPAP Level



PPAP Content

12 different requirements including example

PPAP Timeline



Additional information

- KION standard
- PPAP website
- contact

Production Part Approval Process

Benefits & Targets

Production Part Approval Process
Navigation

- What´s PPAP?
  - meaning
  - origin

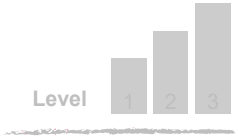
Benefits & Targets

Improve quality cooperation
Zero failure target Increase customer satisfaction
confidence in future product Part view + Process view
Risk reduction **Benefits** design integrity
Reduce warranty charges smooth SOP managing supplier changes
standardization **Prevents costs for poor quality**
Global approach

What does it mean for you as the supplier?

past → today

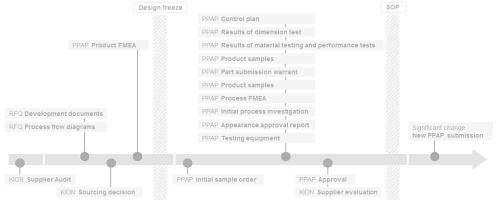
PPAP Level



PPAP Content

12 different requirements including example

PPAP Timeline



Additional information

- KION standard
- PPAP website
- contact

Production Part Approval Process

What does it mean for you as a supplier?

What is the past?	What is it like now?
– Initial sample inspection – Part/ product view	– Process view added – A stable process guarantees conform parts
– Different plants with own quality organization – Different initial sampling procedures	– KION quality organization – Standardized processes – No surprise for supplier to work with all plants
– Huge number of suppliers in KION – Local sourcing approach	– Global suppliers delivering to different KION plants

➔ Win-Win for supplier and KION

Production Part Approval Process
Navigation

- What´s PPAP?
  - meaning
  - origin

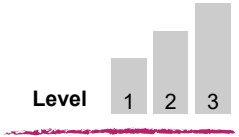
Benefits & Targets

Improve quality cooperation
Zero failure target Increase customer satisfaction
confidence in future product Part view + Process view
Risk reduction **Benefits** design integrity
Reduce warranty charges smooth SOP managing supplier changes
standardization **Prevents costs for poor quality**
Global approach

What does it mean for you as the supplier?

past → today

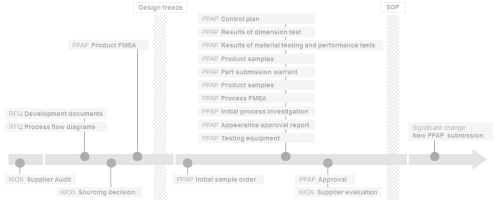
PPAP Level



PPAP Content

12 different requirements including example

PPAP Timeline



Additional information

- KION standard
- PPAP website
- contact

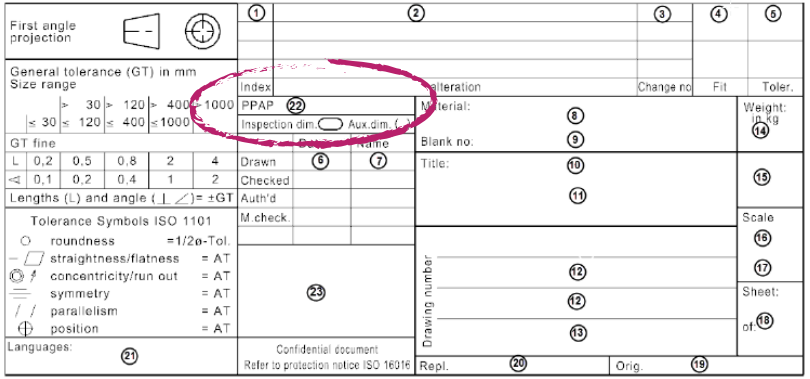
Production Part Approval Process

PPAP Level

Level	Requirements
1	PPAP with sample parts and **limited** data submitted
2	PPAP with sample parts and **extensive** data submitted
3	PPAP with sample parts and **complete** data submitted

KION R&D defines the submission level depending on the following criteria :

- Complexity of part
- Complexity of process
- Safety relevance of the part
- Traceability



Production Part Approval Process
Navigation

- What´s PPAP?
  - meaning
  - origin

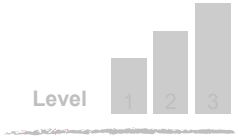
Benefits & Targets

Improve quality cooperation
Zero failure target Increase customer satisfaction
confidence in future product Risk reduction **Benefits** Part view + Process view design integrity
Reduce warranty charges smooth SOP managing supplier changes
standardization **Prevents costs for poor quality**
Global approach

What does it mean for you as the supplier?

past → today

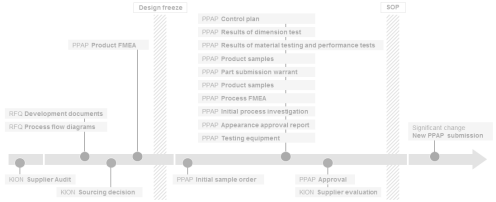
PPAP Level



PPAP Content

12 different requirements including example

PPAP Timeline



Additional information

- KION standard
- PPAP website
- contact

Production Part Approval Process
Requirements

	Level 1	Level 2	Level 3
1. Development documents	S	S	S
2. Product FMEA			S
3. Process flow diagrams		S	S
4. Process FMEA		R	S
5. Production control plan	R	S	S
6. Results of dimension tests	S	S	S
7. Results of material testing and performance tests	S	S	S
8. Initial process investigations		S	S
9. Appearance approval report		S	S
10. Product samples	S	S	S
11. Testing equipment			R
12. Part submission warrant	S	S	S

S – to be submitted to KION
R – to be available on request

Automotive industry: 18 criterias
KION: 12 criterias

Production Part Approval Process
Requirements

KION GROUP

	Level 1	Level 2	Level 3
1. Development documents	S	S	S
2. Product FMEA			S
3. Process flow diagrams		S	S
4. Process FMEA		R	S
5. Production control plan	R	S	S
6. Results of dimension tests	S	S	S
7. Results of material testing and performance tests	S	S	S
8. Initial process investigations		S	S
9. Appearance approval report		S	S
10. Product samples	S	S	S
11. Testing equipment			R
12. Part submission warrant	S	S	S

S – to be submitted to KION
R – to be available on request

Production Part Approval Process
Development documents

Level 1 2 3

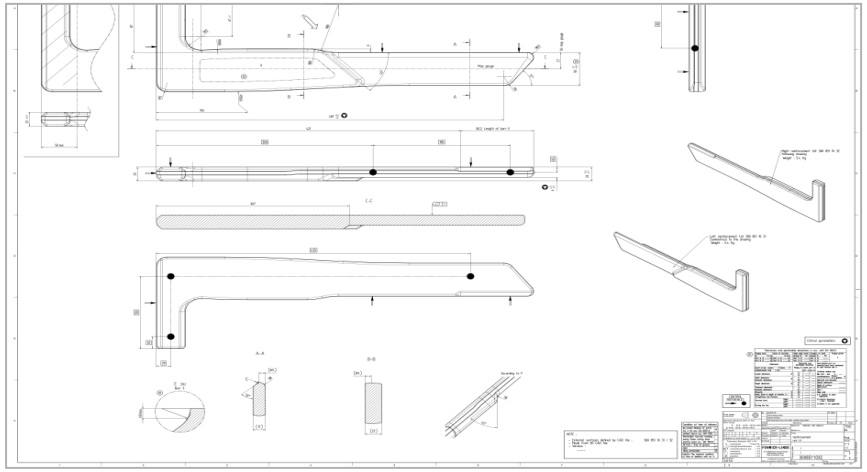
KION GROUP

Description

Includes:

- Component drawings
- Assembly drawings
- Bill of Material
- Material specifications
- Functional/ performance specifications
- Further documents

Example



➔ Ensures manufacturer has the complete design record at the correct revision levels

➔ To be submitted with the quotation

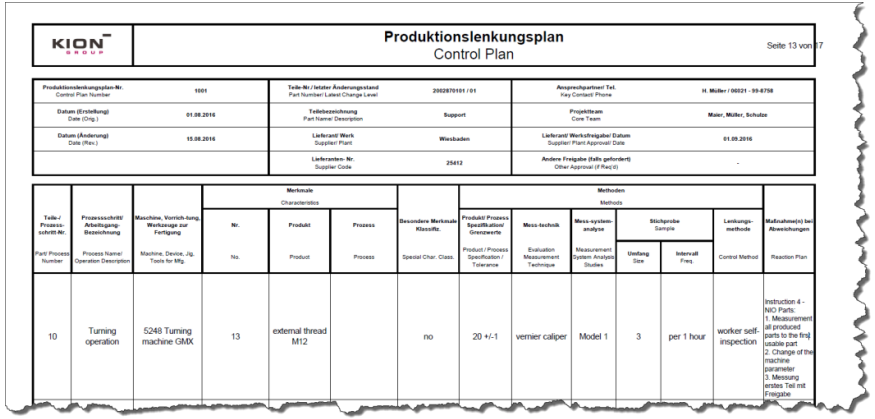
Production Part Approval Process
Production control plan

Level 1 2 3

Description

- Define measuring and testing methods including sample size/ frequency, testing equipment and documentation
- Includes reaction plan in case characteristic or process parameter is found to be out of control
- Inputs come from the supplier knowhow (Process FMEA , experiments)

KION Form



KION GROUP

Produktionslenkungsplan
Control Plan

Seite 13 von 17

Produktionslenkungsplan-Nr. Control Plan Number	1001	Teile-Nr./letzter Änderungsstand Part Number/ Latest Change Level	2002870101 / 01	Ansprechpartner/ Tel. Key Contact/ Phone	H. Müller / 06021 - 99-8758
Datum (Erstellung) Date (Orig.)	01.08.2016	Teilebezeichnung Part Name/ Description	Support	Projektteam Core Team	Maier, Müller, Schulze
Datum (Änderung) Date (Rev.)	15.08.2016	Lieferant/ Werk Supplier/ Plant	Wiesbaden	Lieferant/ Werksfreigabe/ Datum Supplier/ Plant Approval/ Date	01.09.2016
		Lieferanten- Nr. Supplier Code	25412	Andere Freigabe (falls gefordert) Other Approval (if Req'd)	-

Teile-/ Prozess-schritt-Nr. Part/ Process Number	Prozessschritt/ Arbeitsgang-Bezeichnung Process Name/ Operation Description	Maschine, Vorrich-tung, Werkzeuge zur Fertigung Machine, Device, Jig, Tools for Mfg.	Merkmale Characteristics: Nr. No.	Merkmale: Produkt Product	Merkmale: Prozess Process	Besondere Merkmale Klassifik. Special Char. Class.	Methoden Methods: Produkt/ Prozess Spezifikation/ Grenzwerte Product / Process Specification / Tolerance	Methoden: Mess-technik Evaluation Measurement Technique	Methoden: Mess-system-analyse Measurement System Analysis Studies	Methoden: Stichprobe Sample: Umfang Size	Methoden: Stichprobe: Intervall Freq.	Methoden: Lenkungs-methode Control Method	Maßnahme(n) bei Abweichungen Reaction Plan
10	Turning operation	5248 Turning machine GMX	13	external thread M12		no	20 +/-1	vernier caliper	Model 1	3	per 1 hour	worker self-inspection	Instruction 4 - NIO Parts: 1. Measurement all produced parts to the first usable part 2. Change of the machine parameter 3. Messung erstes Teil mit Freigabe

➔ Ensure that the production process is under control

Production Part Approval Process

Results of dimension test

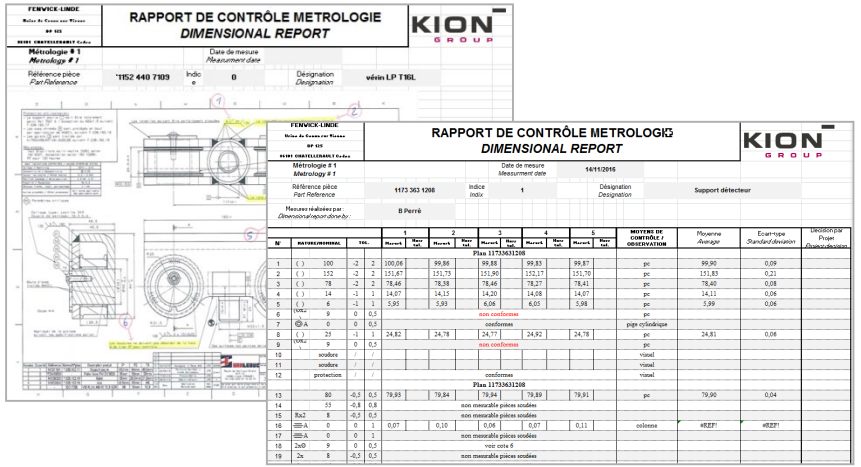
Level 1 2 3

KION GROUP

Description

- Evidence that **the complete** dimensional check has been performed
- Record results for all specified requirements out of every tool, cavity, production cell or line
- PPAP samples used for dimensional check must be identified

Example



➔ If dimensions are not conformed to the specification, the manufacturer informs KION R&D and Quality prior to PPAP submission

Production Part Approval Process

Results of material testing and performance tests

Level 1 2 3

KION GROUP

Description

- Evidence that material, performance or functional tests according to requirement (development documents or production control plan) have been performed
- Record results including test report number, date, laboratory that performed the test

Example

Measured values Tamb 24,8 °C

	U1 [V]	U2 [V]	U3 [V]	Usum [V]	I1 [A]	I2 [A]	I3 [A]	Isum [A]	P1 [W]	n [RPM]	f [Hz]
accel	16,7	16,8	16,7	16,7	40,6	40,5	40,5	40,5	458	3402	113,980
right	13,9	13,9	13,9	13,9	39,8	39,					
accel	16,8	16,8	16,8	16,8	40,4	39,					
left	14,0	14,0	14,0	14,0	39,7	38,					

Vibration **Speed s**

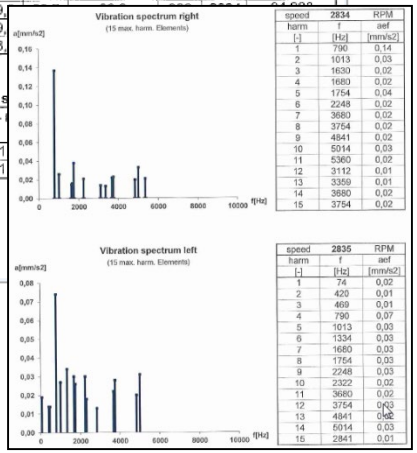
sinn	aef [m/s2]	amax - fmax [m/s2] - [Hz]	p. ratio [%]	p.
right	0,49	0,14 - 790	49,0 - 50,0	91
left	0,54	0,07 - 790	49,0 - 50,0	91

Brake

U	18,3	[V]
I	1,73	[A]
Ri	>10	[MΩ]

Braking

Ubr	0,00	[V]
Ibr	0	[A]



➔ Responsibilities for performance tests are fixed in cooperation with the KION R&D

Production Part Approval Process
Product samples

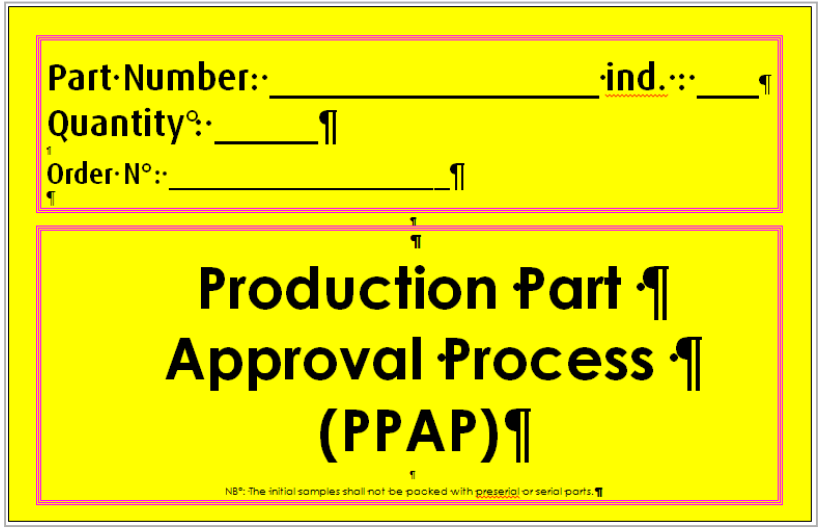
Level 1 2 3

KION GROUP

Description

- Quantity of samples defined by KION
- Product sample parts to be identified with specific label
- The product samples delivered are the parts that have been measured for the dimensional results

Example



Production Part Approval Process
Part submission warrant (PSW)

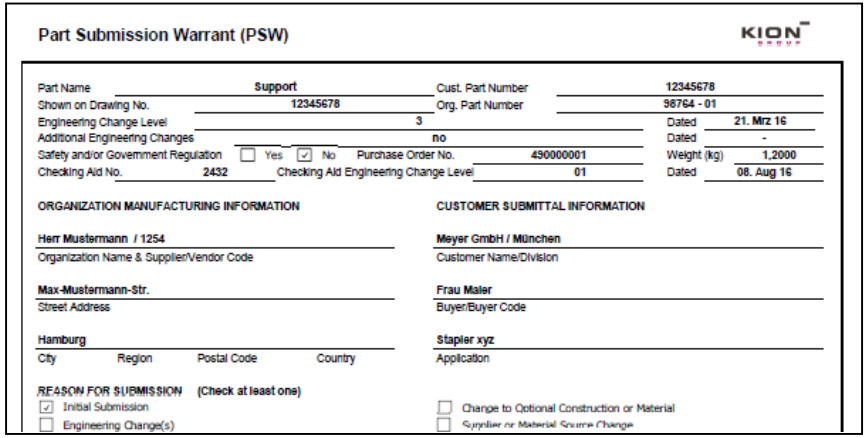
Level 1 2 3

KION GROUP

Description

- With the part submission warrant, the supplier confirms the design and the processes to manufacture the parts (including quantity of tools cavities, production cells or lines)
- Declaration that the results meet the drawing and specification requirement

KION Form



Part Submission Warrant (PSW)

KION GROUP

Part Name	Support	Cust. Part Number	12345678
Shown on Drawing No.	12345678	Org. Part Number	98764 - 01
Engineering Change Level	3	Dated	21. Mrz 16
Additional Engineering Changes	no	Dated	-
Safety and/or Government Regulation	☐ Yes ☑ No	Purchase Order No.	490000001
Checking Aid No.	2432	Checking Aid Engineering Change Level	01
		Weight (kg)	1,2000
		Dated	08. Aug 16

ORGANIZATION MANUFACTURING INFORMATION

Herr Mustermann / 1254
Organization Name & Supplier/Vendor Code

Max-Mustermann-Str.
Street Address

Hamburg
City Region Postal Code Country

CUSTOMER SUBMITTAL INFORMATION

Meyer GmbH / München
Customer Name/Division

Frau Maier
Buyer/Buyer Code

Stapler xyz
Application

REASON FOR SUBMISSION (Check at least one)

☑ Initial Submission
☐ Engineering Change(s)
☐ Change to Optional Construction or Material
☐ Supplier or Material Source Change

Production Part Approval Process
Requirements

	Level 1	Level 2	Level 3
1. Development documents	S	S	S
2. Product FMEA			S
3. Process flow diagrams		S	S
4. Process FMEA		R	S
5. Production control plan	R	S	S
6. Results of dimension tests	S	S	S
7. Results of material testing and performance tests	S	S	S
8. Initial process investigations		S	S
9. Appearance approval report		S	S
10. Product samples	S	S	S
11. Testing equipment			R
12. Part submission warrant	S	S	S

S – to be submitted to KION
R – to be available on request

Production Part Approval Process
Process Flow Diagrams

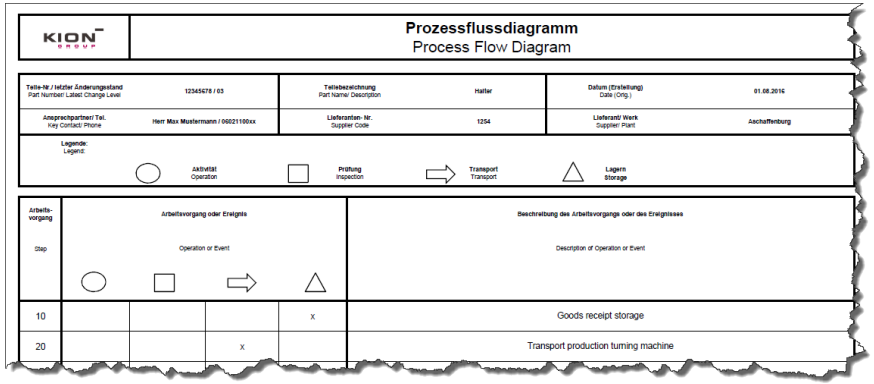
Level 1 2 3

KION GROUP

Description

- Designation and clear description of every single process step required to produce the referenced product

KION Form



KION GROUP

Prozessflussdiagramm
Process Flow Diagram

Teile-Nr / letzter Änderungsstand Part Number/ Latest Change Level	12345678 / 03	Teilebezeichnung Part Name/ Description	Halter	Datum (Erstellung) Date (Orig.)	01.08.2016
Ansprechpartner/ Tel. Key Contact/ Phone	Herr Max Mustermann / 06021100xx	Lieferanten- Nr. Supplier Code	1254	Lieferant/ Werk Supplier/ Plant	Aschaffenburg

Legende:
Legend:

Aktivität Operation | Prüfung Inspection | Transport Transport | Lagern Storage

Arbeits-vorgang Step	Arbeitsvorgang oder Ereignis Operation or Event				Beschreibung des Arbeitsvorgangs oder des Ereignisses Description of Operation or Event
10				x	Goods receipt storage
20			x		Transport production turning machine

- ➔ Provide linkage to Process FMEA and Control Plan
- ➔ Has to be submitted with the quotation

Production Part Approval Process
Process FMEA

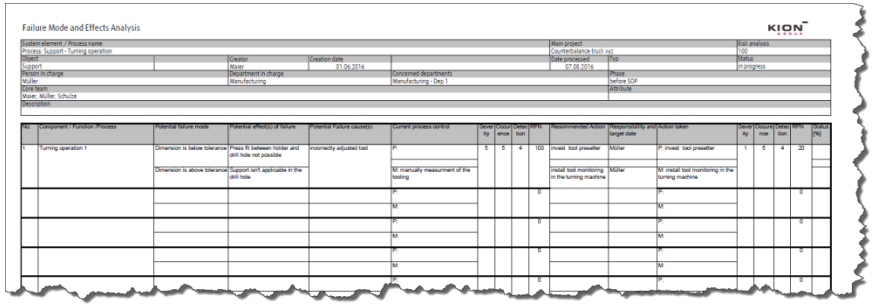
Level 1 2 3

KION GROUP

Description

- **P**rocess **F**ailure **M**ode and **E**ffects **A**nalysis:
  - determine the ways in which the Process Steps can go wrong including effects and causes
  - List the current controls for each potential cause
  - Evaluate the risk (RPN)
  - Define recommended actions
- Inputs come from the process flow diagram

KION Form


Failure Mode and Effects Analysis

Severity		Occurrence		Detection		RPN
5	X	4	X	2	=	40

➔ Carry over process controls and recommended actions into the control plan

Production Part Approval Process
Initial process investigations

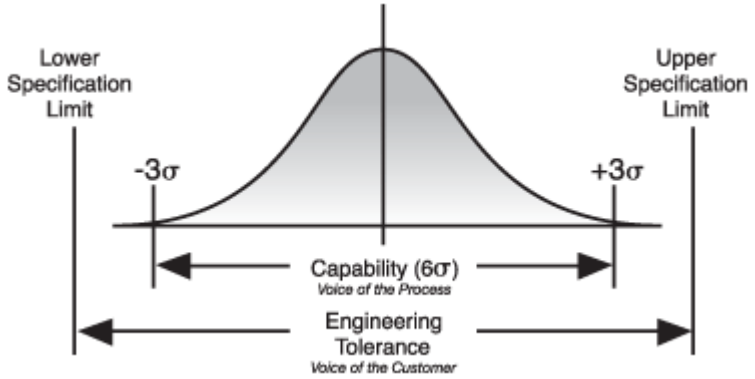
Level 1 2 3

KION GROUP

Description

- determine how well the production process can manufacture products that meets the design requirements (stable and capable)
- Short-term investigations for special characteristics according to the drawing
- The number of samples for the initial investigations depends on the supply quantity over one year
- Supplier agrees with KION index to be used to determine the initial process capability

Example



➔ May be replaced by long-term results from identical or similar processes (with KION agreement)

Production Part Approval Process

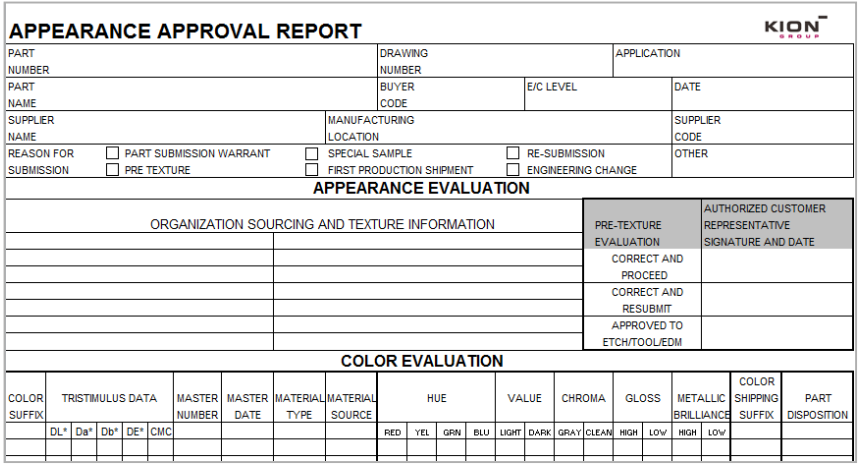
Appearance approval report

Level 1 2 3

Description

- Only suitable for products with color, grain or surface appearance requirement
- Appearance approval for families or individual parts is acceptable

KION Form



APPEARANCE APPROVAL REPORT

PART NUMBER	DRAWING NUMBER		APPLICATION
PART NAME	BUYER CODE	E/C LEVEL	DATE
SUPPLIER NAME	MANUFACTURING LOCATION		SUPPLIER CODE
REASON FOR SUBMISSION	☐ PART SUBMISSION WARRANT ☐ PRE TEXTURE	☐ SPECIAL SAMPLE ☐ FIRST PRODUCTION SHIPMENT	☐ RE-SUBMISSION ☐ ENGINEERING CHANGE	OTHER

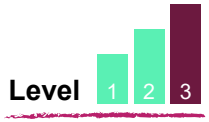
APPEARANCE EVALUATION

ORGANIZATION SOURCING AND TEXTURE INFORMATION		PRE-TEXTURE EVALUATION	AUTHORIZED CUSTOMER REPRESENTATIVE SIGNATURE AND DATE
		CORRECT AND PROCEED	
		CORRECT AND RESUBMIT	
		APPROVED TO ETCH/TOOL/EDM	

COLOR EVALUATION

COLOR SUFFIX	TRISTIMULUS DATA					MASTER NUMBER	MASTER DATE	MATERIAL TYPE	MATERIAL SOURCE	HUE				VALUE		CHROMA		GLOSS		METALLIC BRILLIANCE		COLOR SHIPPING SUFFIX	PART DISPOSITION
	DL*	Da*	Db*	DE*	CMC					RED	YEL	GRN	BLU	LIGHT	DARK	GRAY	CLEAN	HIGH	LOW	HIGH	LOW		

Production Part Approval Process
Requirements



KION GROUP

	Level 1	Level 2	Level 3
1. Development documents	S	S	S
2. Product FMEA			S
3. Process flow diagrams		S	S
4. Process FMEA		R	S
5. Production control plan	R	S	S
6. Results of dimension tests	S	S	S
7. Results of material testing and performance tests	S	S	S
8. Initial process investigations		S	S
9. Appearance approval report		S	S
10. Product samples	S	S	S
11. Testing equipment			R
12. Part submission warrant	S	S	S

S – to be submitted to KION
R – to be available on request

Production Part Approval Process
Product FMEA = Design FMEA

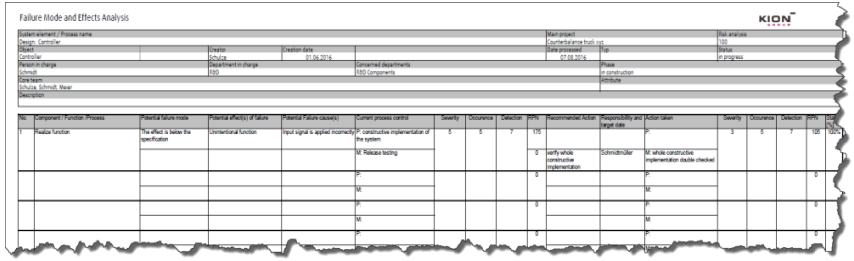
Level 1 2 3

KION GROUP

Description

- If supplier is responsible for the design
- **D**esign **F**ailure **M**ode and **E**ffects **A**nalysis:
  - Provide potential cause
  - Evaluate Risk Priority Number (RPN) of failures
  - Define corrective and preventive actions (Re-design, DVP&R…)
- Consider functions from product or system
- An individual Product FMEA may be applied to a family of similar individual parts

KION Form


Failure Mode and Effects Analysis

KION

System element / Process name				Main project		Risk analysis
Design Controller				Counterbalance truck ccc		100
Object	Creator	Creation date		Date processed	Top	Status
Controller	Schulze	01.04.2016		07.08.2016		in progress
Person in charge	Department in charge		Concerned departments		Phase	
Schmidt	EBO		EBO Components		in construction	
Core team					structure	
Schulze, Schmidt, Meier						
Description						

No.	Component / Function / Process	Potential failure mode	Potential effect(s) of failure	Potential Failure cause(s)	Current process control	Severity	Occurrence	Detection	RPN	Recommended Action	Responsibility and Target date	Action taken	Severity	Occurrence	Detection	RPN	Risk No.
1	Realize function	The effect is below the specification	Unintentional function	Input signal is applied incorrectly	P: constructive implementation of the system	5	5	7	175			P:	3	5	7	105	1
					M: Release testing				0	verify whole constructive implementation	Schmidtmüller	M: whole constructive implementation double checked				0	
					P:				0			P:				0	
					M:							M:					
					P:				0			P:				0	
					M:							M:					
					P:				0			P:				0	

Severity		Occurrence		Detection		RPN
5	X	4	X	2	=	40

➔ To be submitted before design freeze

Production Part Approval Process
Testing equipment

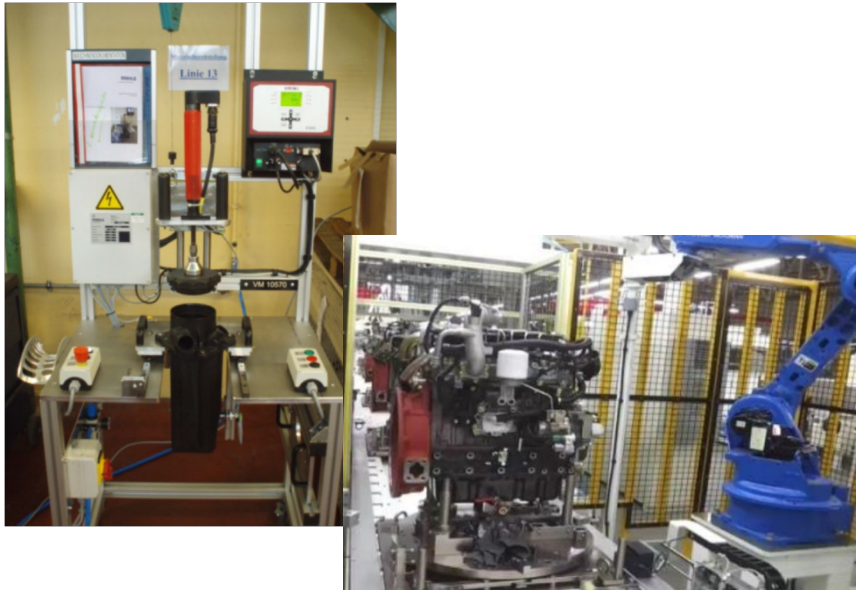
Level 1 2 3

KION GROUP

Description

- If required by KION, the supplier shall submit the part-specific testing equipment for assemblies or components as part of the PPAP submission

Example



Production Part Approval Process
Navigation

- What´s PPAP?
  - meaning
  - origin

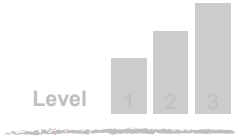
Benefits & Targets

Improve quality cooperation
Zero failure target Increase customer satisfaction
confidence in future product Part view + Process view
Risk reduction **Benefits** design integrity
Reduce warranty charges smooth SOP managing supplier changes
standardization **Prevents costs for poor quality**
Global approach

What does it mean for you as the supplier?

past → today

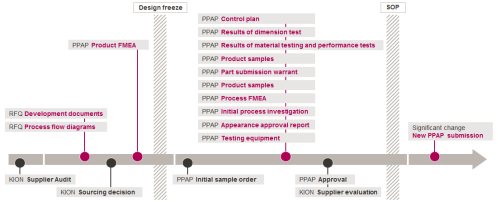
PPAP Level



PPAP Content

12 different requirements including example

PPAP Timeline

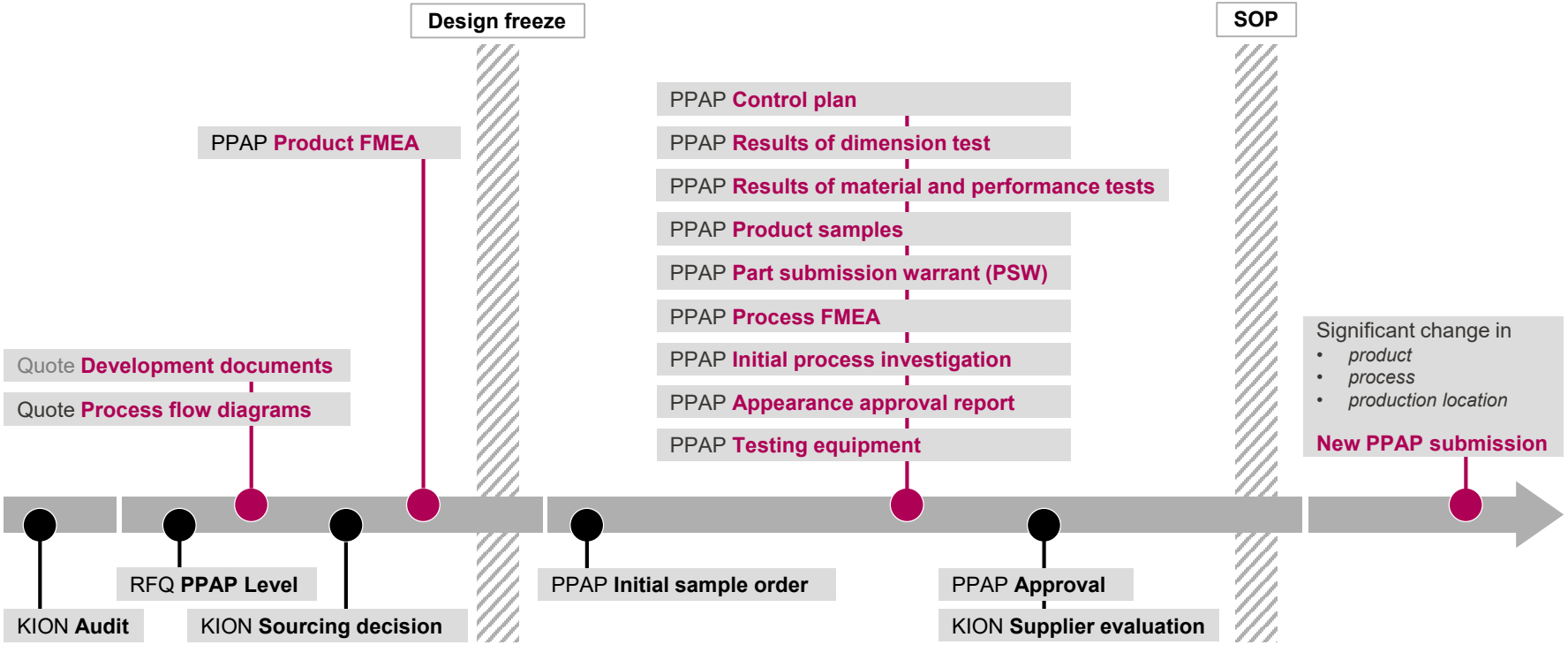


Additional information

- KION standard
- PPAP website
- contact

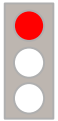
Production Part Approval Process

Timeline



Production Part Approval Process

PPAP status consequences

		Supplier evaluation
PPAP requirements are missing	– The supplier has 1 week to complete the PPAP presentation – After this time, the PPAP submission is rejected	
PPAP approval	– **Serial production deliveries** – **Payment of the tools**	

Production Part Approval Process
Navigation

- What´s PPAP?
  - meaning
  - origin

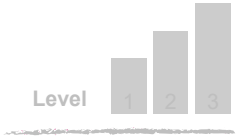
Benefits & Targets

Improve quality cooperation
Zero failure target Increase customer satisfaction
confidence in future product Part view + Process view
Risk reduction **Benefits** design integrity
Reduce warranty charges smooth SOP managing supplier changes
standardization **Prevents costs for poor quality**
Global approach

What does it mean for you as the supplier?

past → today

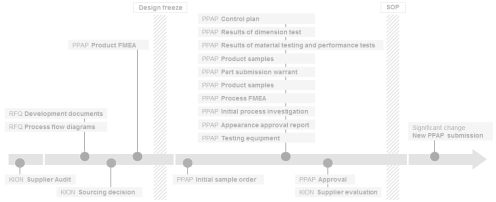
PPAP Level



PPAP Content

12 different requirements including example

PPAP Timeline

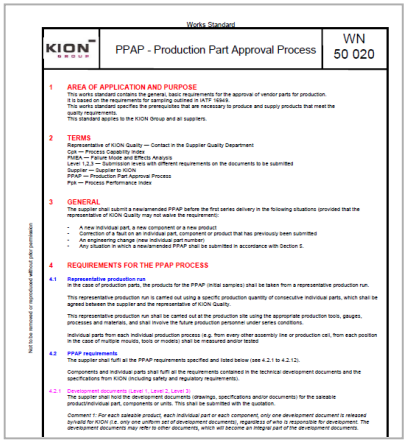


Additional information

- KION standard
- PPAP website
- contact

Production Part Approval Process
Additional Information

- KION Standard
  - WN 50020


Works Standard

KION GROUP | PPAP - Production Part Approval Process | WN 50 020

1 AREA OF APPLICATION AND PURPOSE

This works standard contains the general, basic requirements for the approval of vendor parts for production. It is based on the requirements for sampling outlined in IATF 16949. This works standard specifies the prerequisites that are necessary to produce and supply products that meet the quality requirements. This standard applies to the KION Group and all suppliers.

2 TERMS

Representative of KION Quality — Contact in the Supplier Quality Department
Cpk — Process Capability Index
FMEA — Failure Mode and Effects Analysis
Level 1,2,3 — Submission levels with different requirements on the documents to be submitted
Supplier — Supplier to KION
PPAP — Production Part Approval Process
Ppk — Process Performance Index

3 GENERAL

The supplier shall submit a new/amended PPAP before the first series delivery in the following situations (provided that the representative of KION Quality may not waive the requirement):

- A new individual part, a new component or a new product
- Correction of a fault on an individual part, component or product that has previously been submitted
- An engineering change (new individual part number)
- Any situation in which a new/amended PPAP shall be submitted in accordance with Section 5.

4 REQUIREMENTS FOR THE PPAP PROCESS

4.1 Representative production run

In the case of production parts, the products for the PPAP (initial samples) shall be taken from a representative production run.

This representative production run is carried out using a specific production quantity of consecutive individual parts, which shall be agreed between the supplier and the representative of KION Quality.

This representative production run shall be carried out at the production site using the appropriate production tools, gauges, processes and materials, and shall involve the future production personnel under series conditions.

Individual parts from each individual production process (e.g. from every other assembly line or production cell, from each position in the case of multiple moulds, tools or models) shall be measured and/or tested.

4.2 PPAP requirements

The supplier shall fulfil all the PPAP requirements specified and listed below (see 4.2.1 to 4.2.12).

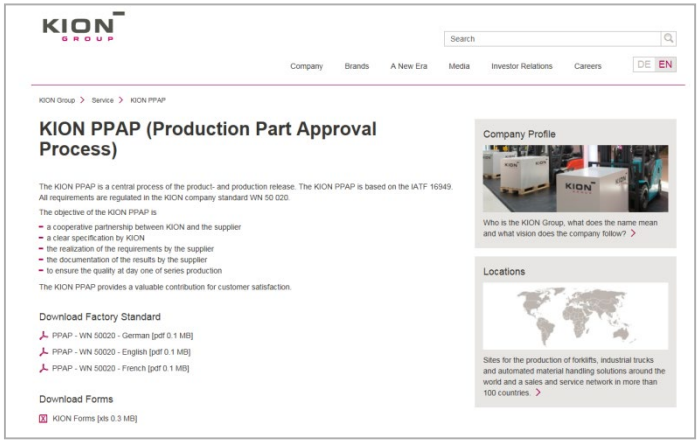
Components and individual parts shall fulfil all the requirements contained in the technical development documents and the specifications from KION (including safety and regulatory requirements).

4.2.1 Development documents for parts and components

The supplier shall host the development documents (drawings, specifications and/or documents) for the saleable product/individual part, components or units. This shall be submitted with the quotation.

Comment 1: For each saleable product, each individual part or each component, only one development document is released by/valid for KION (i.e. only one uniform set of development documents), regardless of who is responsible for development. The development documents may refer to other documents, which will become an integral part of the development documents.

- Website
  - KION PPAP website


KION GROUP

Search

Company | Brands | A New Era | Media | Investor Relations | Careers | DE | EN

KION Group > Service > KION PPAP

KION PPAP (Production Part Approval Process)

The KION PPAP is a central process of the product- and production release. The KION PPAP is based on the IATF 16949. All requirements are regulated in the KION company standard WN 50 020.

The objective of the KION PPAP is

- a cooperative partnership between KION and the supplier
- a clear specification by KION
- the realization of the requirements by the supplier
- the documentation of the results by the supplier
- to ensure the quality at day one of series production

The KION PPAP provides a valuable contribution for customer satisfaction.

Download Factory Standard

PPAP - WN 50020 - German [pdf 0.1 MB]
PPAP - WN 50020 - English [pdf 0.1 MB]
PPAP - WN 50020 - French [pdf 0.1 MB]

Download Forms

KION Forms [xls 0.3 MB]

Company Profile

Who is the KION Group, what does the name mean and what vision does the company follow? >

Locations

Sites for the production of forklifts, industrial trucks and automated material handling solutions around the world and a sales and service network in more than 100 countries. >

https://www.kiongroup.com/en/Service/KION-PPAP/

- Contact
  - Email/ Phone

Please contact the Quality@Supplier representative for specific questions


KION
GROUP