Prototype 2018

World Wide NPI: PBA Passport facilitates manufacturing

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Agenda

- Introduction
- History
- Quality Acceptance Manual (QAM)
- Passport
- Request for Quotation
- Embedded in NPI
- Benefits

Introduction

"Enabling Bright outcomes"

We empower you with impressive visualization and innovative collaboration solutions!

ENTERTAINMENT

➤ **Entertainment**: Cinema, Venues and Hospitality and professional Audio Visual (pro-AV), Simulation

HEALTHCARE

➤ **Healthcare**: Diagnostic and Surgical Displays and Original Equipment Manufacturer (OEM) business

ENTERPRISE

➤ **Enterprise**: Meeting, Learning, Operator and Virtual Experience.

History

- Due to …
  - **Reliability issues** of PBA's in the past
  - **Lack of knowledge** of PBA and PCB technologies
  - Too many **iterations** in PCB design phase
 - Too many **revisions** of the PBA before final production

- … we needed to improve and act upfront …
  - In order to capture **possible issues at the start** of the project
  - By defining a **Quality Acceptance Manual** for PBA & PCB
  - By defining the **process requirements** for the PBA at the EMS
  - To improve the **manufacturability** of the board
  - To **pro-actively** request a **Price Quotation**
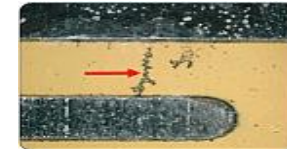
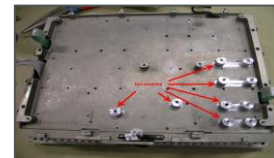- … in collaboration with cEDM (Imec)

Component Selection

Material Selection

Pb Free soldering
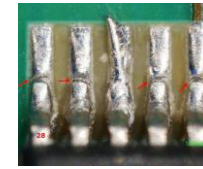
Green Design Halogen Free
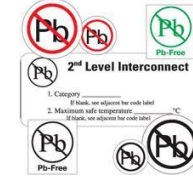
Design for Reliability

PBA Design Complexity

Mechanical Vibration Stress design

Thermal Design

Design for Cost

Supplier Selection

Quality Acceptance Manual (QAM)

- What are the required Quality criteria for PBA?
  - o Max Quality @ minimum cost
  - o Max Quality @ best manufacturability

- How to ensure these Quality criteria are guarenteed?
  - o Reduce risks on rework & repair
  - o Acceptable quality for all applications

- Who defined these requirements? Who was involved?
  - o Multidisciplinairy team
  - o cEDM (Imec)
  - o Signed off by our EMS & PCB Manufacturers

Quality Acceptance Manual (QAM)

- **General requirements**
  - Datapackage
  - Precedence order …
- **Environmental Requirements**
  - Reach / RoHS …
- **PCB related Requirements**
  - Classification
  - Material specification
  - Plating & Finish …
- **PBA Requirements**
  - Solder Processes, Solder alloy & Fluxes
  - Cleanliness
  - Label requirements & marking …
  - Clearances
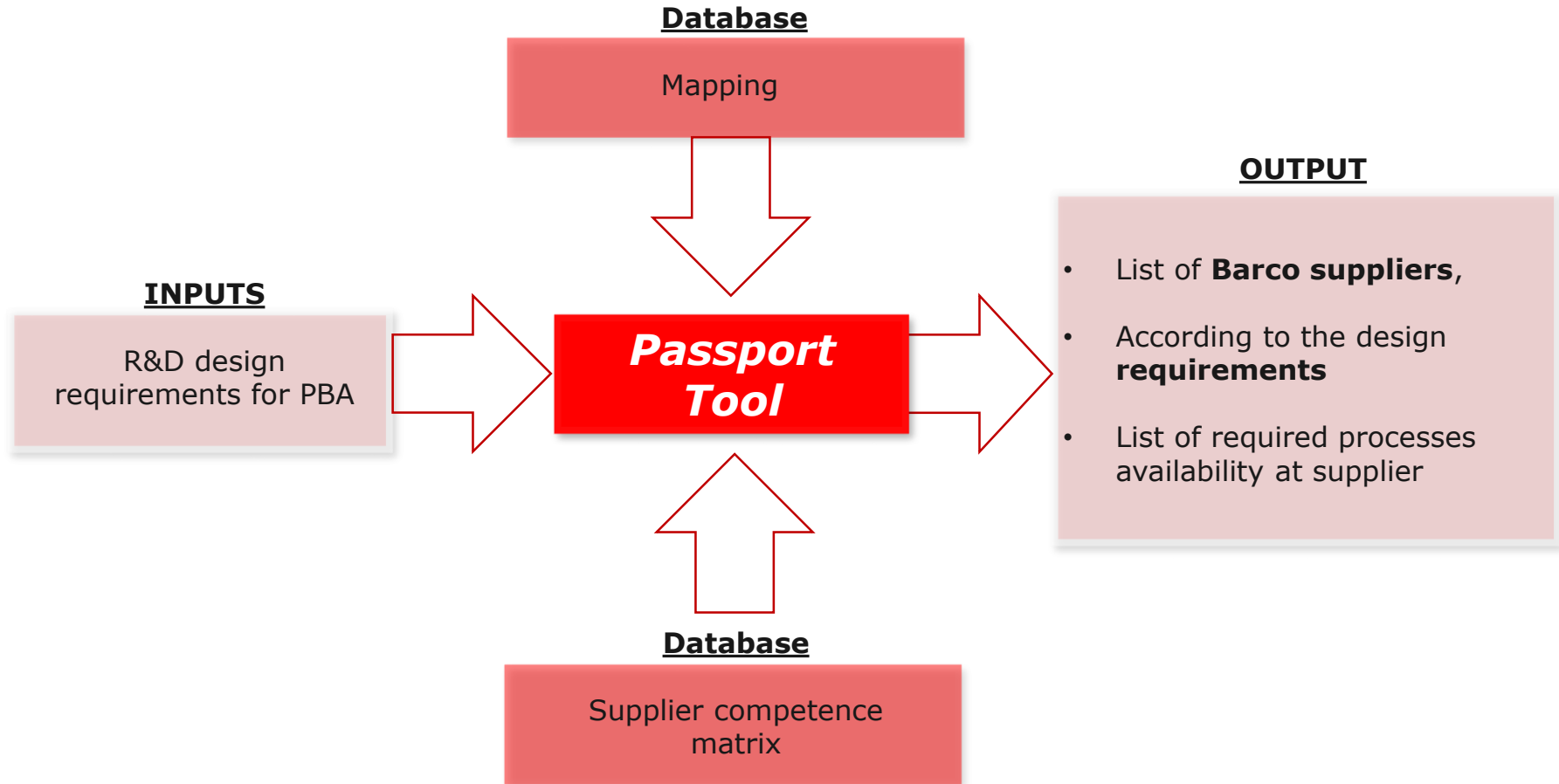
QAM007

QUALITY ACCEPTANCE MANUAL PCBA

Barco NV
President Kennedypark 35
8500 Kortrijk
Belgium

B-WIRED

QAM007 Revision 03 – 04/06/2018

Passport

Database

Mapping

OUTPUT

- List of **Barco suppliers**,

- According to the design **requirements**

- List of required processes availability at supplier

INPUTS

R&D design requirements for PBA

Passport Tool

Database

Supplier competence matrix

In a very early stage of the PCB design !

Request for Quotation

- At final schematic entry:
  - Request for Quotation to EMS & PCB Manufacturer can be sent out before PCB design is started
  - Process & capabilities requirements are extracted from the Passport
  - Additional information to be sent out for RFQ
    - Approved Manufacturers List (AML) of the Components
    - Dimensions of the board
    - Layer Stackup

Component Side Bottom Mounting	SMD + Through Hole	Processes: SMD	Convective reflow soldering	Optional
Component Side Bottom Mounting	SMD + Through Hole	Processes: SMD	Vapor phase soldering in-line/off-line	Optional
Component Side Bottom Mounting	SMD + Through Hole	Processes: Through hole (see QAM 007)	Selective soldering (fountain)	Optional
Component Side Bottom Mounting	SMD + Through Hole	Processes: Through hole (see QAM 007)	Selective dip soldering	Optional
Component Side Bottom Mounting	SMD + Through Hole	Processes: Through hole (see QAM 007)	Pin-in-Paste reflow soldering	Optional
BOM build-up (component)				
Component SMD types	High Density & Standard	High Density & Standard	Placement: Chips down to 0402	Required
Component SMD types	High Density & Standard	High Density & Standard	Placement: Peripheral leaded down to 0.5mm pitch	Required
Component SMD types	High Density & Standard	High Density & Standard	Placement: BGA down to 0.8mm pitch	Required
Component SMD types	High Density & Standard	High Density & Standard	Placement: QFN down to 0.5mm pitch - LGA down to 0.8mm	Required
Component SMD types	High Density & Standard	High Density & Standard	Placement: Peripheral <0.5mm pitch	Required
Component SMD types	High Density & Standard	High Density & Standard	Processes: Solder paste jetting	
Component SMD types	High Density & Standard	High Density & Standard	Processes: Stencil thickness range 100/125	100	Optional
Component SMD types	High Density & Standard	High Density & Standard	Processes: Stencil thickness range 100/125	125	Optional

RoHS compliant	Pb Free Soldering	Finish: Pb Free (see QAM 007)	ImAg IPC-4553	Required
PBA Length (X in mm)	279.4	Max PCB Width (mm)		
PBA Length (X in mm)	279.4	Min PCB Width (mm)		
PBA Width (Y in mm)	218.93	Max PCB Height (mm)		
PBA Width (Y in mm)	218.93	Min PCB Height (mm)		
IPC Class	IPC Class 2	Logistics: IPC 6012 / 6013 Plating Class 3		
IPC Class	IPC Class 2	Logistics: IPC-601X/IPC-A-600 Class 2 manufacturing (see QAM 007)		
IPC Class	IPC Class 2	Logistics: QAM 007 Document for PCB		
PCB Design Options & Attributes				
Controlled Impedance	Yes, Via Back Drilling not Required	Logistics: Impedance control according IPC-TM-650 2.5.5.12	Impedance Test Method IPC-TM-650: Effective Bandwidth (EBW) method	Optional
Controlled Impedance	Yes, Via Back Drilling not Required	Logistics: Impedance control according IPC-TM-650 2.5.5.12	Impedance Test Method IPC-TM-650: Root Impulse Energy (RIE) method	Optional
Controlled Impedance	Yes, Via Back Drilling not Required	Logistics: Impedance control according IPC-TM-650 2.5.5.12	Impedance Test Method IPC-TM-650: Short Pulse Propagation (SPP) method	Optional
Controlled Impedance	Yes, Via Back Drilling not Required	Logistics: Impedance control according IPC-TM-650 2.5.5.12	Impedance Test Method IPC-TM-650: Frequency Domain (FD) method	Optional
Cu foil thickness on outer layers (μm)	17	Cu-thicknesses outer layers (foil)		
Cu thickness inner layers (μm)	17	Cu-thicknesses inner layers (laminates)		
Solder Mask Color	Green	Material: Solder mask IPC-SM-840 qualified (see QAM 007)		
Solder Mask Color	Green	Solder Mask Color		
Silkscreen color	White	Silk screen Color		
PCB Thickness Tolerance	10%	Overall Board Thickness Tolerance: 10%		
Laminate Performance Class	High Performance	Logistics: PCB moisture control IPC-1601 (see QAM 007)		
Laminate Performance Class	High Performance	Logistics: UL qualification for Rigid PCB (see QAM 007)		
Laminate Performance Class	High Performance	Material: IPC-4101 sheets /126 or /129 qualified laminates (no lead-free req.) (see QAM 007)		
Contact Finish	Hard Gold	Contact Finish: Electroplated Au ASTM B-488 Contact (see QAM 007)		
Estimated drilled Via Holes	12000	Logistics: see Stackup Detail according QAM007		
PCB complexity				
Layer count	14	Max. number of layers		
Design Center Class	T100 V125p SM50 MVL300	Design Centers (PCB Class combination)		

Create a new passport

Pcb Number		Name		PCB Engineer	
Nomenclature		Description		HW Engineer	

Requirements: All

Create

PBA / **PCB**

Embedded in NPI

- Different stage gates defined for each PBA
  - Each stage gate has a checklist to complete
  - Responsibilities are described in process document
  - Milestones in NPI require proof of these checklists
  - Risk assessment shall be done
  - This is a Team responsibility

- Checkist for each PBA stage gate, including:
  - Passport @ Concept phase
  - Passport @ Design Phase
  - Passport update at each redesigns

Concept

Design

Prototyping

Industrialization

Production
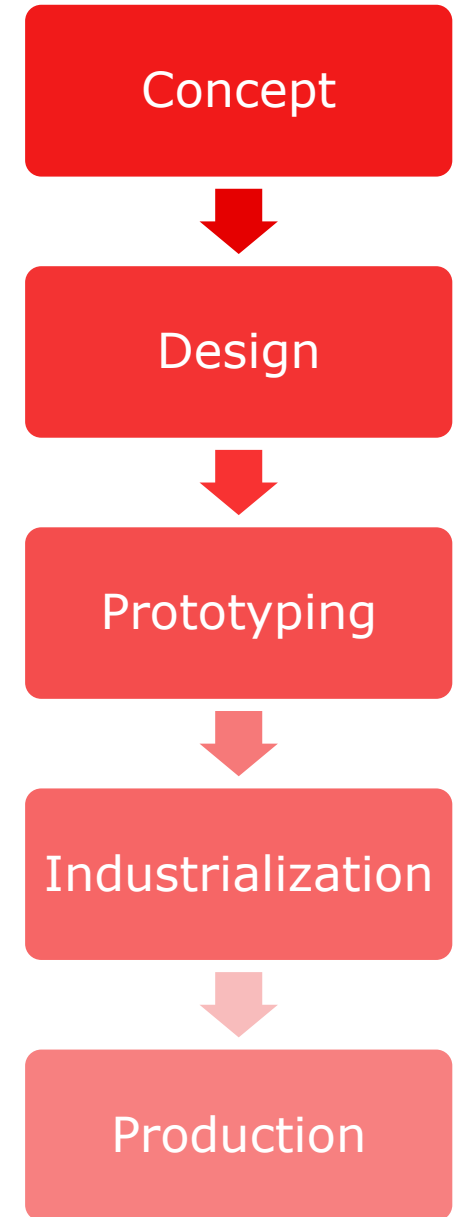
Benefits

Passport

- Questionair to be completed @ Concept and Design Phase to enable correct use of guidelines

Request for Quotation

- Before PCB layout starts: more negotiation power & cost simulations possible

Design verification

- Passport prevents impossible requirement combinations & identifies complex/expensive choices
- Early impact assessment enabling other design decisions

Supplier Assessment

- By requesting & updating their processes & capabilities on a regular base
- New technologies shall be assessed and included in QAM

World Wide NPI: PBA Passport facilitates manufacturing

Passport enables early Supplier involvement, early Cost indicator & early design guidelines choices

(early = design phase)

Passport embedded in NPI Process enables early risk assessment for all PBA designs WW

Questions?

ENABLING BRIGHT OUTCOMES

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