ASSOCIATION CONNECTING
ELECTRONICS INDUSTRIES®

IPC-1710A

OEM Standard for Printed Board Manufacturers' Qualification Profile

Developed by the OEM council of the IPC, the MQP sets the standard for assessing PWB manufacturers capabilities and allows PWB manufacturers to more easily satisfy customer requirements.

IPC-1710A
May 2004

A standard developed by IPC

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The material in this standard was developed by the OEM Council of the Institute for Interconnecting and Packaging Electronic Circuits.

FOREWORD

It is not intended that this Manufacturers' Qualification Profile (MQP) satisfies all the requirements of the customer, however, conscientious maintenance of this document and or registration to ISO 9000 requirements should satisfy the major concerns. Thus, audits should be simpler, required less frequently, and facilitate less paper work as customers and suppliers work closer to meeting each others needs.

ACKNOWLEDGMENTS

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Although the IPC is grateful for all the involvement and individual contributions made in completing the MQP a special acknowledgment is extended to the following individuals. It was their dedication and foresight that made this publication possible.

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CONTENTS

SECTION 1.1
COMPANY DESCRIPTION

DATE COMPLETED: 15/Apr/2011

GENERAL INFORMATION

LEGAL NAME: National Technology, Inc.		
PHYSICAL ADDRESS: 1101 Carnegie Street		
CITY: Rolling Meadows	STATE: Illinois	ZIP: 60008
PROVINCE:	COUNTRY: USA	
TELEPHONE NUMBER: (847) 506-1300	FAX NUMBER: (847) 506-1340	TELEX NUMBER:
E-MAIL ADDRESS: sales@nationaltech.com	MODEM NUMBER:	DATE FOUNDED 1984 ☐ PUBLIC ☒ PRIVATE
INTERNET URL: www.nationaltech.com	FTP SITE:	

MANAGEMENT

PRESIDENT: Robert M. Keisler
CHIEF OPERATING OFFICER: Roger Patel
MANUFACTURING MANAGER: Mark Vicicondi
DIRECTOR OF QUALITY: Carl Schlemmer
MARKETING/SALES MANAGER: Robert M. Keisler
ENGINEERING MANAGER: Madhu Sharma
WASTE TREATMENT MANAGER (POLLUTION PREVENTION): Mark Viccicondi

CORPORATE DESCRIPTION		NUMBER OF EMPLOYEES CORPORATE	SITE	COMMENTS
DESIGN AND DEVELOPMENT		N/A	N/A	No design done at Facilities
ENGINEERING		15	4	
MANUFACTURING CONTROL		3	2	
MANUFACTURING	DIRECT	100	17	
	INDIRECT	18	7	
QUALITY CONTROL	QUALITY ENGINEERS	2	1	
	INTERNAL AUDITORS	10	5	
	GENERAL MANAGEMENT	10	4	
ADMINISTRATION		2	1	
TOTAL		160	41	

SECTION 1.2
SITE DESCRIPTION

(TO BE COMPLETED FOR EACH SITE) DATE COMPLETED 15/Apr/2011 ATTACH APPROPRIATE CHARTS (OPTIONAL)

MANUFACTURING FACILITY

COMPANY NAME National Technology, Inc.		
PHYSICAL ADDRESS 1101 Carnegie Street		
CITY Rolling Meadows	STATE Illinois	ZIP 60008
PROVINCE	COUNTRY USA	
TELEPHONE NUMBER (847) 506-1300	FAX NUMBER (847) 506-1340	TELEX
E-MAIL ADDRESS cad@sonictechindia.com	MODEM NUMBER	YEARS IN BUSINESS 24
INTERNET URL	FTP	
PRINCIPLE PRODUCTS/SERVICES/SPECIALTIES Double Sided and Multilayer Printed Circuit Boards	BUSINESS CHARACTERIZATION (HIGH VOLUME, QUICK TURN-AROUND, ETC.) Quick turn prototype/Medium Volume	

FACILITY MANAGEMENT	TITLE	REPORTS TO (Function/Job Title)
OVERALL OPERATION RESPONSIBILITY FOR THIS SITE Robert M. Keisler	GM/President	CEO
MANUFACTURING Mark Vicicondi	Manufactoring Manager	GM/President
TECHNICAL/ENGINEERING Madhu Sharma	Engineering Manager	CEO/President
MATERIALS Jeff Phillips	Accounting/CFO	CEO/President
PURCHASING Jeff Phillips	Accounting/CFO	CEO
QUALITY Carl Schlemmer	Director of Quality	CEO
SALES REPRESENTATIVE Robert Keisler	SalesManager	CEO/President
WASTE MANAGEMENT Mark Viccicondi	Manufactoring Manager	GM/President

BUILDINGS / SYSTEMS (INDICATE % COVERAGE)

	AGE	AREA (Sq. Ft.)	Construction (Wood/Brick)	Power Conditioning	Heating	Ventilation	Air Conditioning	Sprinklers	Waste Treatment	Other
Office	15 years	5K	Brick	100%	100%	100%	100%	100%	0%	
Manufacturing	15 years	33K	Metal/Brick	100%	100%	100%	90%	100%	100%	
Storage	15 years	15K	Metal/Brick	100%	60%	100%	20%	80%	100%	
Planned additions										

SAFETY AND REGULATORY AGENCY REQUIREMENTS

Are fire extinguishers functional and accessible to employees?	☒ YES	☐ NO	What is the distance to the nearest fire station? (in minutes)	10 Minutes
Do you conform to local/federal environment protection agency requirements?	☒ YES	☐ NO	Date of last OSHA visit Date of last EPA visit	2009
Are you currently operating under a waiver or in violation of local government requirements?	☐ YES	☒ NO	Other Agency Audits, UL, ISO 9000, NECQ, CSA Approval and Number	☒ UL # E97071 ☒ ISO 9001:2008 ☐ CSA # ____ ☐ Other ____
Do you have a safety program? Describe below.	☒ YES	☐ NO	Hazardous Waste Number Trade Waste Account Number	

PLANT PERSONNEL (TOTAL EMPLOYEES)

Regular	Contract	Office	Technical/ Engineering	Production	Full-Time QA	Part-Time QA	Union	Non-Union	Union Name	Contract Expires (Date)
41	0	7	5	17	4	0	0	41	N/A	N/A

COMMENTS

SECTION 2.1
PROCESS

DATE COMPLETED

15/Apr/1

This section is intended to provide overview information on the processes used to fabricate printed board products.

Site Capability Snapshot (Please Check all that apply)

	Designators		Remarks
A	Conductor Forming Processes	☐Subtractive ☐Thin Foil Subtractive less than .5 oz. ☐Semi-Additive ☒Additive (Electro-less) ☒Black Hole ☐Thick Film Paste and Fire ☐Thin Film Semi-conductor Sputtering ☐Other:	
B	PTH Materials and Processes	☒Acid Copper ☐Pyro-Phosphate Copper ☐Full Built Electro-Less ☐Gold Paste ☐Copper Paste ☐Gold Conductor Sputtering ☐Nickel Conductor Sputtering ☐Other:	
C	Permanent Over-plating	☐Tin ☒Tin-Lead ☐Tin-Nickel Alloy ☒Nickel ☒Nickel Gold (Hard) ☒Nickel Gold (Soft) ☐Nickel Rhodium ☒Conductive Polymer ☐Other:	

D	Permanent Selective Plating	☐Tin ☒Tin-Lead ☐Tin-Nickel Alloy ☐Nickel ☒Nickel Gold (Hard) ☒Nickel Gold (Soft) ☐Nickel Rhodium XOther: OSP	
E	Permanent Mask or Coating	☐Photo Dry Film ☒Photo Liquid ☒Image Transfer Screen Mask ☐Conformal Coating Solder Mask ☐Cover Coat ☐Other:	
F	Other Surface Finishes	☐Tin-Lead Fused ☐ Immersion Tin ☒Solder Leveled ☐Roll Soldered ☐Electro-less Solder Fused ☐Solder Bumped Lands ☐Solder Paste Fused ☒Azole Organic Protective Covering ☐Flux Protective Covering ☒Other: Immersion Silver	

SECTION 2.2
ELECTRICAL TEST EQUIPMENT

DATE COMPLETED
15/Apr/2011

This section is intended to provide overview information on the test equipment and testing capability of the manufacturer.

Site Capability Snapshot (Please Check the column that applies furthest to the right.)

	Designators		Remarks
A	Number of Nets	☐<200 ☐200 ☐500 ☐1000 ☐2000 ☐3000 ☐4000 ☐5000 ☒>5000 ☐Other:	
B	Number of Nodes	☐<500 ☐500 ☐1000 ☐2000 ☐3000 ☐4000 ☐5000 ☐6000 ☐>6000 ☐Other:	
C	Probe Point Pitch	☐>1.0 [.040] ☐1.0 [.040] ☐0.8 [.032] ☐0.65 [.025] ☐0.50 [.020] ☒0.40 [.016] ☐0.30 [.012] ☐0.20 [.008] ☐<0.20 [.008] ☐Other:	

D	Test % Single Pass	☐None ☐<60% ☐60% ☐70% ☐80% ☒90% ☐95% ☐99% ☐100% ☐Other:	
E	Probe Accuracy (DTP)	☐>0.2 [.008] ☐0.2 [.008] ☐0.15 [.006] ☐0.125 [.005] ☐0.1 [.004] ☒0.075 [.003] ☐<0.075 [.003] ☐Other:	
F	Grid Density	☐Single Side Grid ☐Double Sided Grid ☒Double Density Grid ☐Double Density Double Sided ☐Quad Density ☐Double Sided Quad Density ☒Flying Probe ☐Other:	
G	Netlist Capability	☐Golden Board ☐IPC-D-356 ☒Net List Extraction ☒CAD/CAM Net List Compare ☐Other:	

H	Test Voltage	☐<20 VDC ☐20 VDC ☐40 VDC ☐60 VDC ☐80 VDC ☐100 VDC ☐500 VDC ☐1000 VDC ☐>1000 VDC ☒ Other: 12-250V	
J	Impedance Meas	XMicro Section ☒Inboard Circuit ☒Coupon ☒Manual TDR ☐Automated TDR ☐Other:	
K	Impedance Tolerance	☐None ☐>20% ☐20% ☐15% ☐10% ☐7% ☒5% ☐2% ☐<2% ☐Other:	

SECTION 2.3
PRODUCT TYPE

DATE COMPLETED
04/May/2009

This section is intended to provide overview information on the printed board product types being fabricated by the manufacturer.

Site Capability Snapshot (Please Check all that apply.)

Designators			Remarks
A	Product Type	☒Rigid Printed Board ☐Flex Printed Board ☐Rigid/Flex Board ☐Rigid Back Plane ☐Molded Product ☐Ceramic Printed Board ☐Multichip Module ☐Liminated Multichip Module ☐Deposited Dielectric Multichip Modules ☐Other:	
B	Circuit Mounting Type	☒Single Sided ☒Double Sided ☒Miltilayer ☐Single-sided Bonded to Substrate ☐Double-sided Bonded to Substrate ☐Multilayer Bonded to Substrate ☐Constrained Multilayer ☐Distributed Plane Multilayer ☐Other:	
C	Via Technology	☐No-Vias ☒Thru Hole Vias ☒Buried Vias ☒Blind Vias ☒Thru Hole & Blind Vias] ☒Thru Hole & Buried Vias ☒Thru Hole Buried & Blind Vias ☒Buried & Blind Vias ☒Other: Plugged Vias	

D	Laminate Material	☐Phenolic ☐Epoxy Paper ☒Epoxy Glass ☒Modified Epoxy Composite ☐Polyimide Film & Reinforce ☐Cynanate Ester ☐Teflon ☐Ceramic Glass Types ☒Various Combinations ☒Other: RoHs Compliant/High Temp	
E	Core Material	☒No Core ☐Polymer ☐Copper ☐Aluminum ☐Graphite ☐Copper Invar/Copper ☐Copper Moly/Copper ☐Other:	
F	Copper Thickness (Oz.)	☐1/8 Minimum ☐1/4 Minimum ☐3/8 Minimum ☒1/2 Nominal ☐1 Nominal ☐2 Nominal ☒3-5 Max ☐6-9 Max ☐>10 ☐Other:	
G	Construction	☐≤4 Planes ☒>4 Planes ☒THK to TOL ≤0.2 mm ☐THK to TOL >0.2 mm ☒Bow/Twist ≤1% ☐Bow/Twist >1% ☐≤0.3 mm Profile Tolerance ☐0.3 mm Profile Tolerance ☐Other:	

H	Coatings and Markings	☒≤0.1 mm Mask Clearance ☒>0.1 mm Mask Clearance ☒One Side (Legend) ☒Two Side (Legend) ☒None (Legend) ☒UL Material Logo ☒U.L. V_0 Logo ☒U.L. V_1 Logo ☒U.L. V_2 Logo ☒ Other:" SL-0"	

SECTION 2.4
PRODUCT COMPLEXITY

DATE COMPLETED
15/Apr/2011

This section is intended to provide overview information on product complexity being fabricated by the manufacturer.

(Please check the column that applies farthest to the right)

Designators			Remarks
A	Board Size Diagonal	☐<250 [10.00] ☐250 [10.00] ☐350 [14.00] ☐450[17.50] ☒550 [21.50] ☒650 [25.50]X ☐750 [29.50] ☐850 [33.50] ☐>850 [33.50] ☐Other:	Interpreted this section to mean PANEL dimensions
B	Total Board Thickness	☐1,0 [.040] ☐1,0 [.040] ☐1,6 [.060] ☐2,0 [.080] ☐2,5 [.100] ☐3,5 [.135]X ☐5,0 [.200] ☒6,5 [.250] ☐>6,5 [.250] ☐Other:	
C	Number Conductive Layers	☒1-4 ☒5-6 ☒7-8X ☒9-12X ☒13-16X ☒17-20 ☒21-24 ☐25-28 ☐>28 ☐Other:	

D	Dia Drilled Holes	☒>0,5 [.020] ☒0,5 [.020] ☒0,4 [.016] ☒0,35 [.014] ☒0,30 [.012]X ☒0,25 [.010] ☒0,20 [.008] ☐0,15 [.006] ☐<0,15 [.006] ☐Other:	
E	Total PTH TOL (Max-Min)	☐>0,250 [.010] ☐0,250 [.010] ☐0,200 [.008] ☐0,150 [.006] ☐0,125 [.005] ☐0,100 [.004] ☒0,075 [.003] ☐0,050 [.002] ☐<0,050 [.002] ☐Other:	
F	Hole Location TOL DTP	☐>0,50 [.020] ☐0,50 [.020] ☐0,40 [.016] ☐0,30 [.012] ☐0,25 [.010] ☒0,20 [.008] ☐0,15 [.006] ☐0,10 [.004] ☐<0,10 [.004] ☐Other:	
G	Internal Layer Clearance (Min)	☐>0,350 [.014] ☐0,350 [.014] ☐0,250 [.010] ☐0,200 [.008] ☐0,150 [.005] ☐0,125 [.005] ☒0,100 [.004] ☐0,075 [.003] ☐<0,075 [.003] ☐Other:	

H	Internal Layer Conductor Width (Min)	☐>0,250 [.010] ☐0,250 [.010] ☐0,200 [.008] ☐0,150 [.006] ☐0,125 [.005] ☐0,100 [.004] ☒0,075 [.003] ☐0,050 [.002] ☐<0,050 [.002] ☐Other:	
J	Internal Layer Process Allowance	☐>0,100 [.004] ☐ 0,100 [.004] ☐0,075 [.003] ☐0,050 [.002] ☐0,040 [.0015] ☐0,030 [.0012] ☐0,025 [.001] X☐0,020 [.0008] ☐<0,020 [.0008] ☐Other:	
K	External Layer Clearance (Min)	☐>0,350 [.014] ☐0,350 [.014] ☐0,250 [.010] ☐0,200 [.008] ☐0,150 [.006] ☐0,125 [.005] ☒0,100 [.004] ☐0,075 [.003] ☐<0,075 [.003] ☐Other:	

L	External Layer Conductor Width (Min)	☐>0,250 [.010] ☐0,250 [.010] ☐0,200 [.008] ☐0,150 [.006] ☐0,125 [.005] ☒0,100 [.004] ☐0,075 [.003] ☐0,050 [.002] ☐<0,050 [.002] ☐Other:	
M	External Layer Process Allowance	☐>0,100 [.004] ☐0,100 [.004] ☐0,075 [.003] ☐0,050 [.002] ☐0,040 [.0015] ☐0,030 [.0012] ☐0,025 [.001] **X**☐0,020 [[.0008] ☐<0,020 [.0008] ☐Other:	
N	Feature Location DTP	☐>0,50 [.020] ☐0,50 [.020] ☐0,40 [.016] ☐0,30 [.012] ☐0,25 [.010] ☒0,20 [.008] ☐0,15 [.006] ☐0,10 [.004] ☐<0,10 [.004] ☐Other:	

All Dimensions are in millimeters [inches shown in brackets]

SECTION 2.5
QUALITY DEVELOPMENT

DATE COMPLETED
15/Apr/2011

This section is intended to provide overview information on the quality systems in place in the manufacturing facility.

Site Capability Snapshot (Please Check all that apply.)

Designators			Remarks
A	Strategic Plan	☒Functional Steering Committee Formed ☒TQM Plan & Philosophy Established & Published ☒Documented Quality Progress Review ☒Implementation & review of Project Team Recommendations ☒TQM Communicated throughout organization ☒Controlled New process Start-up ☒Management Participates in TQM Audits ☒Employee Recognition Program ☒Total TQM Plan/Involvement Customer Training ☒Other: ISO 9001:2008 Certified	
B	Employee Involvement	☒Certified Training Available ☒Training of Employee Base ☒TQM Team Trained ☐Design of Experiment Training and Use ☒New Process Implementation Training ☒Support Personnel Training ☐Advanced Statistical Training ☒Quality Functional Deployment ☒Ongoing Improvement Program for Employees ☒Other: OSHA/EPA Regulatory Training	
C	Quality Manual	☐Quality Manual Started ☐Generic Quality Manual for Facility ☐10% of manufacturing depts. have process specifications ☐25% of manufacturing depts. have process specifications ☐50% of manufacturing depts. have process specifications ☐Non-manufacturing Manuals Developed ☐25% of all departments have quality manuals ☐50% of all departments have quality manuals ☒All Manufacturing and support depts. have controlled quality manual ☐Other:	

D	Instructions	☐Work Instructions Started ☐Quality Instructions Started ☐10% Work Instructions Completed ☐10% Quality Instructions Completed ☐25% Work Instructions Competed, Controlled ☐25% Quality Instructions Completed, Controlled ☐50% Work Instructions Completed, Controlled ☐50% Quality Instructions Completed, Controlled ☒Quality and work Instruct. Completed, Controlled ☐Other:	
E	SPC Implementation IPC-PC-90	☐Plan Exists ☐Training Started ☒Process Data Collected & Analyzed ☐All Employees Trained ☐First Process Stable & Capable ☒Several Major Processes Stable & Capable ☐Continued Improvement of Stable Processes ☒Additional Mfg Processes under Control ☐All Processes Under Control ☒Other: All Laboratory Chemical analysis under SPC format	
F	Supplier Programs/Controls	☒Supplier Rating Program ☒Monthly Analysis Program ☒Key Problems Identified ☐Supplier Reviews Performance Data provided ☐TQM Acceptance by suppliers ☐10% of Suppliers Using SPC ☒25% of Suppliers Using SPC ☐50% of Suppliers Using SPC ☒All Key Suppliers using Certified parts program ☐Other:	
G	Third Party IPC-QS-95	☐Instrument Controls in Place ☐Measurement System in Control IPC-PC-90 ☐Document Controls in Place ☐Reduced Lot Sampling ☐10% of Processes Under Audit Control ☐50% or Greater of Processes Under Audit Control ☐ISO-9003 Certified ☐ISO-9002 Certified ☒ISO-9001 ☒Other: Annual Internal Audits by multple Customers performed	

SECTION 3

DATE COMPLETED
15/Apr/2011

EQUIPMENT PROFILE (Pre-Site Audit)

* Examples of equipment limitations include: min/max board size & min/max working area

3.1 PHOTOTOOL CAPABILITY	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) AOI of phototool	☒	☐	Camtek ORION 604 Camtek Dragon	1	
B) AOI CAD reference (CAM)	☒	☐	CAM 350 Stations	4	
C) Photoplotting	☒	☐	Barco Laser Plotter	1	
D) Photo reductions	☒	☐			
E) Film scan and conversion	☒	☐			
F) Film processing ☐ air-dried ☐ force-dried ☒ processed in automatic processor	☒	☐	DuPont Film Processor		
G) Media types ☒ silver halide film ☒ glass ☒ diazo	☐	☐			

3.2 DRILLING EQUIPMENT	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Manual	☐	☐			
B) Optical (single spindle)	☐	☐			
C) N.C. drill	☒	☐	Excellon Century,Uniline and MKVI	8 total	21" X 24"

3.3 ROUTING EQUIPMENT	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Edge beveler	☒	☐	Radoll Edgemate	2	
B) Hand router (pin router)	☐	☐			
C) N.C. router	☐	☐			
D) N.C. driller/router	☒	☐	EXCELLON MKVI	3	
E) Scoring (profile)	☐	☐			
F) Scoring (straight line)	☒	☐	Geiko straight and Jump Scoring Machines	2	

3.4 MECHANICAL EQUIPMENT	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Punch press	☐	☒			
B) Shear	☒	☐	Wysong	1	
C) Milling machine	☒	☐	Performed on CNC Routers		

3.5 HOLE PREPARATION (DESMEAR)	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Permagnate	☒	☐		1	
B) Plasma	☐	☒			
C) Mechanical	☒	☐		1	
D) Etchback	☒	☐		1	

3.6 PRIMARY IMAGE APPLICATION	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Dry film	☒	☐	Hakuto Cut Sheet Laminators	3	
B) Hand screening	☐	☒			
C) Machine screening	☐	☒			
D) Wet film	☐	☒			
E) Liquid photoimageable	☐	☒			

3.7 TYPE OF TREATMENT FOR MULTILAYER INNERLAYERS	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Black oxide	☐	☐		1	
B) Red oxide	☒	☐	HOLLMULLER Horizontal Line		
C) Copper scrub	☒	☐			
D) Durabond	☐	☐			
E) Other	☒	☐	Chemcut Horizontal Clean Line		

3.8 LAMINATION	YES	NO	MATERIAL	QTY	APPLICATION TECHNIQUE
A) High pressure	☒	☐	OEM Vacuum Press/6 Openings		
B) High temperature	☒	☐			
C) Vacuum	☒	☐			
D) Vacuum assist	☒	☐			
E) Foil heat assist	☒	☐			
F) Separate cool-down	☒	☐			

3.9 ELECTROLESS COPPER PLATING	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Fully additive application	☒	☐	Baker Brothers Auto Line		
B) Electroless deposition (semiadditive)	☐	☐			
C) Through-hole and via	☒	☐			

3.10 COPPER ELECTROPLATING	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Copper sulfate	☒	☐	ME Baker Auto Line 6 Manual Copper / 2 Manual Tin	1	21" X 24"
B) Pyrophosphate	☐	☐			
C) Copper fluoborate	☐	☐			
D) Other	☐	☐			

3.11 TIN/LEAD SURFACE PLATINGS/COATINGS	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Tin/lead electroplated	☒	☐			
B) Immersion tin or tin/lead (electroless)	☒	☐	Hand Line		
C) Hot air solder leveled (HASL)	☒	☐	Argus Solder Leveling System	1	

3.12 FUSING PROCESSES	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) I.R. reflow	☐	☒			
B) Hot oil reflow	☐	☒			
C) Horizontal (hot air level)	☐	☒			
D) Vertical (hot air level)	☒	☐	See 3.11 Above	1	

3.13 NICKEL SURFACE PLATING	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Electroless nickel	☒	☐	Hand Line	1	18" X 24"
B) Electroplated nickel	☒	☐			18” X 24”

3.14 GOLD SURFACE PLATING	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Electroless gold	☒	☐	Hand Line	1	See 3.13 above
B) Electroplated gold	☒	☐	Micro Plate Auto Plate Line (Tabs)	1	24” 24”

3.15 PALLADIUM SURFACE PLATING	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Electroless palladium (immersion)	☐	☒			
B) Electroplated palladium	☐	☒			

3.16 SOLDERMASK	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Screened deposited image	☒	☐			
B) Dry film photoimageable	☐	☒			
C) Liquid photoimageable	☒	☐	Circuit Automation DP2500/DP1500	2	18” X 24”
D) Dry film/liquid combination	☐	☒			

3.17 ORGANIC SURFACE PROTECTION	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Benzotriazole	☒	☐	Hand Line	1	
B) Imidazole	☐	☒			
C) Benzimidazole	☐	☒			

3.18 MICROSECTION CAPABILITY	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Manual	☐	☒			
B) Single cavity automated	☒	☐	Buehler "EPO Met" system	1	
C) Multiple cavity automated	☒	☐	Bueler System		
D) Plating thickness analysis	☒	☐	"Unimet Unitron" Microscope	2	Photo Capabilities

3.19 CHEMICAL ANALYSIS	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Etching chemistry	☒	☐	Perkin Elmer AAnalyist Atomic Absorbtion Unit	1	
B) Plating chemistry	☒	☐	See "A" above		
C) Effluent (PPM) analysis	☒	☐	See "A" above		

3.20 ELECTRICAL TEST EQUIPMENT	YES	NO	EQUIPMENT	QTY	EQUIPMENT LIMITS
A) Continuity and shorts	☒	☐	Mania "Versa Tower" Flying Probe /ATG Everett Charles 9090	1	18" X 22"
B) Fixture development	☒	☐			
C) Flying probe test	☒	☐	ATG Fying Probe Tester	1	
D) Impedance control	☒	☐	POLAR Test/Software System	1	

MASTER EQUIPMENT LISTING

DATE COMPLETED
15/Apr/2011

FORM MQP 10 REF: Attached Electronic File “NATIONAL TECH.Calibration”

Please complete a Master Equipment List. You may use your own form or the MQP Form 10.

IDENTIFICATION	EQUIPMENT NAME/DESCRIPTION	MANUFACTURER TYPE/MODEL	EQUIPMENT LIMITS	ACCURACY	CALIBRATION FREQUENCY	REMARKS
See attachement						

DATE COMPLETED
15/Apr/2011

SECTION 4
TECHNOLOGY PROFILE SPECIFICS

4.1 ADMINISTRATION

4.1.1 CAPACITY PROFILE	EST %	COMMENTS
A) Total annual capacity in square meters (surface area) per month	794	Based on 18" X 24" panel (3.0 sq. ft.surface area)
B) Presently running at ____ % of capacity	55%	Based on time frame this survey has been filed

4.1.2 PERCENTAGE OF DOLLAR VOLUME	EST %	COMMENTS
A) Single sided (rigid)	1.0%	Data based on 2008 Production records
B) Double sided (rigid)	10%	
C) Multilayer (rigid)	89%	
D) Single side (unreinforced-flex)	0%	
E) Double sided (unreinforced-flex)	0%	
F) Multilayer (unreinforced-flex)	0%	
G) Multilayer (rigid/flex)	0%	

4.1.3 PANEL PRODUCTION PROFILE	UNITS PER MONTH
A) Size of a production lot in panels	
1) Normal	100 panels NOTE: Multiple "lots" are often used for large releases
2) Smallest	3 panels
B) Number of panels per month	BASED ON 2010 PRODUCTION FIGURES
1) High Production	7,000
2) Medium Production	3,000
3) Low Production	
3) Short run	1,000
4) Prototype	>100

C) Average lead time (delivery) as defined in B)			
1) High Production	3 weeks		
2) Medium Production	2 weeks		
3) Low Production			
3) Short run	1 week		
4) Prototype Quick turn - No. of days 1.	24-48 hours		
D) Product delivered in full panel or array sub-panel format			
1) Total in panel or array format	40%		
2) Scored format	30%		
3) Tab breakaway format	10%		
4) Other			
5) Total to customer layout	40%		
6) Total to manufacturing layout	60%		
E) Product delivered in board format			
1) Total in board format	60%		
2) Extracted: scored to size	0%		
3) Extracted: sheared to size	0%		
4) Extracted: routed to size	100%		
4.1.4 APPROVAL AND CERTIFICATION	**YES**	**NO**	**COMMENTS**
A) Company approvals			
1) UL approval	☒	☐	94V Level -0,-1,-2,94VTM-0,94VTM-2,94HB. SL, SL-0, 4-7-0
2) Canadian standards	☐	☒	
3) MIL-P-55110	☐	☒	
4) MIL-P-50884	☐	☒	
5) ISO-9002	☐	☒	
6) ISO-9001	☒	☐	ISO9001:2008 EXP. March 2015

7) ISO-14000	☐	☒	
8) BABT	☐	☒	
9) EEC	☐	☒	
10) Customer satisfaction	☒	☐	This is being interpreted as meaning individual Customer supplier certifications granted.
B) Other certification information			
1)Laminate	☒	☐	
2)Quality standards	☒	☐	
3)Equipment calibration	☒	☐	

4.1.5 CUSTOMER INTERFACE PROFILE	YES	NO	COMMENTS
A) Modem capability	☒	☐	Modem technology not in use. "Cable" line in use.
B) Baud rate			Rate 27 MPS
C) Data verification technique	☒	☐	Barco UCAM
D) Engineering change order process	☒	☐	Through ERP II system "Pro Cim"
E) Job status reporting to customers	☒	☐	Through ERP II system "Pro Cim"

4.1.6 OTHER CAPABILITIES	YES	NO	COMMENTS
A) Facility research and development	☒	☐	Limited utilizing existing Lab and Eng. resources
B) (Automated) On-line shop floor control/MRP system	☒	☐	ERP II system, "Pro Cim" customized for facility requirements and needs.
C) Process control system	☒	☐	ERP II system, "Pro Cim" customized for facility requirements and needs.
D) Operator training system	☒	☐	Documented utilizing facility network system.

4.2 PROCESS ORIENTATION

4.2.1 LAMINATE MATERIAL	EST %	COMMENTS
A) Most commonly used laminates (G10, FR4, etc.)	40% 30% 20% 10%	Brand name Nanya Type FR4-86 Brand name Isola Type ED-130,FR402,FR406 Brand name Isola Type 185HR, 370HR Brand name Nanya Type NPN-140, NPN-170
B) Other laminate material		Bendflex
1) Planar resistor layers		UL approved ☐
2) BT epoxy		UL approved ☐
3) Kevlar		UL approved ☐
4) Teflon		UL approved ☐
5) Polyimide		UL approved ☐
6) Cyanate ester		UL approved ☐
7) Other		UL approved ☒ Various high Tg high Td RoHs compliant laminates. (Ref: UL File#E97071)
C) Specification to which laminate is purchased (check all that apply) ☒MIL-P-13949 ☐IPC-4204 ☒IPC-4101 ☒UL Approved ☐IPC-4103 ☐Other ☐IPC-4202 ☐IPC-4203		
D) Laminate storage ☐ Uncontrolled ☒ Humidity controlled ☒ Temperature controlled ☐ Dry box ☒ JIT inventory		Pre preg materials stored in controlled environment.
E) Panel size configurations in X, Y dimesions maximum X 441 Y 609.6mm minimum X 304.8 Y 304.8mm other X _____ Y _____mm		NOTE: Panel sizes reviewed to best possible material utilization based on customer requirements.

4.2.2 PROCESS PRECISION SPECIFICS	YES	NO	VALUE	COMMENTS
A) Maximum printed board thickness built in volume				
1) Single sided			.125”	
2) Double sided			.125”	
3) Multilayer			.130”	
4) Rigid flex			N/A	
B) Printed board electrical performance capability				
1) Impedance control	☒	☐		
2) Capacitance control	☒	☐		
3) Microstrip boards	☐	☐		
C) Tooling system description				
1) Same holes in panels used for all processes	☒	☐		
2) Optical registration	☒	☐		Process: Multilayer film and post etch punch, “Multiline” systems
3) Other	☐	☐		

4.2.3 OTHER PROCESS ORIENTATION SPECIFICS	YES	NO	SYSTEM	COMMENTS
A) Solder mask over bare copper	☒	☐	REF: Section 3.1 for Equiment	
B) Plating/coating information				
1) Tin/lead reflow	☐	☒		
2) Hot air leveling	☒	☐		
3) Azole organic	☒	☐		
4) Conductive	☐	☐		
C) Hole formation				
1) Hole cleaning	☒	☐		
2) Hole cleanliness verified	☒	☐		

4.3 PRODUCT DESCRIPTION

***CONSISTENCY IMPLIES YIELDS IN EXCESS OF 80%**

4.3.1. THROUGH HOLE INSERTION	EST %	SIZE (MM) - +/- TOL	COMMENTS
A) Smallest conductor width and tolerance produced with consistency			
1) Outer layers (print and etch)	30%	N/A	
2) Inner layers (print and etch)	30%	Size 0.101 mm Tol ± 0.020 .mm	Based on one ounce copper
3) Outer layers (plated)	30%	Size 0.101 mm Tol ± 0.020 .mm	
4) Inner layers (plated)	30%	Size 0.101 mm Tol ± 0.020 .mm	
5) Outer layers (additive plating)	N/A	Size _____ mm Tol ± _____ .mm	NOTE: Unsure of difference between #3 & 4 and 5 & 6.
6) Inner layers (additive plating)	N/A	Size _____ mm Tol ± _____ .mm	
B) Smallest plated-through hole (PTH) and tolerance consistently produced in 1.5mm thickness material or multilayer board			
1) Minimum PTH diameter	15%	Size 0.254 mm Tol ± 0.0762 .mm	
2) Largest panel where this hole can be controlled (across diagonal)		Size 736.6 mm Tol ± 0.0762 .mm	Size recorded is based on panel diagonal dimension.
C) Largest hole size that can be drilled and plated through in a 1.25mm diameter land while maintaining an annular ring of 0.125mm in large/small boards			
1) Largest board size (across diagonal)		Size 0.9144 mm	Based on DRILLED SIZE not Finished/Plated size.
2) Largest hole diameter		Size 0.9144 mm	
3) Smallest board size (across diagonal)		Size 0.9144 mm	
4) Largest hole diameter		Size 0.9144 mm	
D) Surface mount land pattern pitch (check all that apply) ☒1.27mm [.050] ☒0.63mm [.025] ☒0.5mm [.020] ☒0.4mm [.016] ☐0.3mm [.012] ☐0.25mm [.010] ☐Other _____ .			.020" pitch MIN. process capability (fixtured testing, .016" Flying Probe Testing)

E) Solder mask dam between lands (check all that apply) ☒1.27mm [.050] ☒0.63mm [.025] ☒0.5mm [.020] ☒0.4mm [.016] ☒0.3mm [.012] ☒0.25mm [.010] ☒Other .004" .			
F) Flatness tolerance (bow & twist) after reflow or solder coating ☒1.5% ☒1.0% ☐0.5% ☐Other ____			In house specification per IPC-6012 class3.

4.3.2 PRODUCT QUALITATIVE AND QUANTITATIVE INFORMATION	YES	NO	QUANTITY OF PANELS	NUMBER or DIMENSION	COMMENTS
A) Multilayer layer count					
1) Maximum layers fabricated in volume (Maximum Lot)					10-12 layers in Production mode. Maximum quantities vary depending on Sales / Backlog mix.
2) Maximum layers fabricated in prototype (Minimum Lot)					21 layers in small run lot.
B) Buried vias produced consistently in volume	☒	☐			
1) Size				.010"	Finished Diam.
2) Number of layers				12	
B) Blind vias produced consistently in volume	☒	☐			
1) Size				.010"	
2) Number of layers				12	
1) Controlled depth drilling	☒	☐			
2) Total number of layers				8	

4.4. TESTING CAPABILITY

4.4.1 TEST AND TEST EQUIPMENT CAPABILITY	YES	NO	COMMENTS
A) SMT centerline pitch that can be electrically tested ☐ 0.63mm [.025] X 0.5mm [.020] ☒ 0.4mm [.016] ☐ 0.3mm [.012] ☐ 0.25mm [.010] ☐ Other			.020" pitch MINIMUM process capability on fixtured test/.016" on flying probes test
B) Double sided simultaneous electrical testing	☒	☐	
1) Equipment type	☒	☐	Mania "Versa Tower"/ ATG Flying Probe Tester/ Everett Charles 9090
2) X-ray fluorescence inspection equipment	☒	☐	CMI / OXFORD ENG. Model# XRX-A-BW-D-XY
3) TDR equipment	☐	☒	
4) Hi-pot test equipment	☐	☒	
5) Four-wire kelvin tester	☐	☒	

6) Capacitance meter	☐	☒	
7) Cleanliness testing	☒	☐	Omega Meter 600R

4.4.2 AUTOMATED OPTICAL INSPECTION USAGE	EST %	COMMENTS
A) Before etching	40%	
B) After etching	40%	
C) Internal layers	100%	
D) Final inspection	10%	
E) Other	0%	
F) Conductor/clearance normally inspected by AOI equipment		
1) ☐ 0.05mm [.002]		
2) ☐ 0.05-.10mm [.002-.004]		
3) ☒ >.10mm [.004]		AOI use primary function for Multilayer products and Dense Double sided applications. Photo tool AOI inspection as per Manufactoring Feasibility Review recommendation only.
4) ☒ Planes		
G) CAD download to AOI	100%	

SECTION 5
QUALITY PROFILE

DATE COMPLETED
15/Apr/2011

GENERAL INFORMATION	
COMPANY NAME National Technology, Inc.	
CONTACT Mr. Richard A. Mankiewicz	
TELEPHONE NUMBER (847) 506-1300	FAX NUMBER (847) 506-1340

This section of the Manufacturer's Qualification Profile is intended to describe the Total Quality Management (TQM) activity in place of being implemented at the manufacturing facility identified in the site description of this MQP.

To ease in the task of identifying the TQM program being planned or underway at the manufacturing site, the activities have been divided into twenty sections which when completed, provide the total picture of the posture toward managing quality issues. Each section contains a number of questions with regard to the topic under review.

It is not the intent to have the questions be all encompassing, nor is every question applicable to all manufacturers. However, identification of the status, related to each questions, when considered as a whole will convey an impression of the progress that the company has achieved in adopting the principles of total quality management.

The twenty sections, in order of the occurrence are:

5.1 General Quality Programs
5.2 New Products/Technical Services
5.3 Customer Satisfaction
5.4 Computer Integrated Manufacturing
5.5 Process Documentation
5.6 Quality Records
5.7 Skill, Training & Certification
5.8 Subcontractor Control
5.9 Calibration Control
5.10 Internal Audits
5.11 Statistical Process Control
5.12 Problem Solving
5.13 In-Process Control
5.14 Receiving Inspection
5.15 Material Handling
5.16 Non-Conforming Material Control
5.17 Inspection and Test Plan
5.18 Product Inspection/Final Audit
5.19 Tooling Inspection, Handling, & Storage
5.20 Corrective Action

Each section provides a status report related to each question. The question may not be applicable, no activity has started as yet, or the company may have developed an approach to the issues raised by the questions. An (X) is indicated in the appropriate column. If deployment/implementation has started, the status is reported as percent deployment; this is indicated in column 4. The percentage number closely approximates the status of deployment. If deployment exists, the percentage results that have been achieved is indicated in column 5. Results are based on expected goals. Not providing percent information in either the deployment or results column implies a lack of activity in the particular area.

The quality descriptions requested are completed on the following pages by checking (X) the appropriate column to reflect the status of the manufacturing facility TQM program. Additional information may be provided as comments shown below, or on individual sections, or additional sheets as necessary.

COMMENTS
National Technology, Inc.Inc. is an ISO 9001-2008 certfied and accredited Company. A copy of Certification has been electronically sent with this survey.

5.1 GENERAL QUALITY PROGRAMS		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are quality objectives and responsibilities clearly stated, widely distributed and understood through the company?			X	100%	100%
2.	Is there a quality function or well defined organization which provides customer advocate guidance to the total organization and is this position fully supported by management?			X	100%	100%
3.	Does a quality measurement system exist with clearly defined metrics and is it utilized as a management tool?			X	100%	100%
4.	Are work instructions approved and controlled; and are they under revision control?			X	100%	100%
5.	Are the quality procedures and policies current and available at the point of application; and are they under revision control?			X	100%	100%
6.	Are benchmark and customer satisfaction studies done to determine best in class for all products, services, and administrative functions; and are quality goals set?			X	100%	100%
7.	Are Statistical Process Control (SPC) principles understood by all levels of management?			X	100%	100%
8.	Are there programs with sufficient resources assigned to support corrective actions and prevention?			X	100%	100%
9.	Does management solicit and accept feedback from the work force?			X	100%	100%
10.	Is there management support of ongoing training (including quality training), and is it documented by an organizational training plan?			X	100%	100%
11.	Are there regular management reviews of elements of the quality improvement process, including feedback for corrective action, and are the results acted upon?			X	100%	100%
12.	Are the quality and reliability goals aggressive relative to customer expectations and targeted at continuous improvement?			X	100%	100%
13.	Are the people who are responsible for administering the quality assurance function technically informed?			X	100%	100%
14.	Does Management have a “defect prevention” attitude to achieve continuous improvement?			X	100%	100%

5.2 NEW PRODUCTS/TECHNICAL SERVICES		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Do new product/technology/service development policies and procedures exist, and do they result in clearly defined project plans with appropriate measureables and approvals?			X	100%	100%
2.	Is quantitative benchmarking used to evaluate all new products/technologies/services in comparison to best-in-class offerings?			X	100%	100%
3.	Does a roadmap exist to ensure continued development of leading edge, best-in-class products/technology/services?			X	100%	100%
4.	Is the capability of each operation which controls critical-to-function characteristics for new products, fully certified?			X	100%	100%
5.	Are statistical tools used in the development of robust (high yield) new processes, products, and services?			X	80%	80%
6.	When new product/technology/service requires a new process, is it developed jointly and concurrently with the customer and/or suppliers?			X	100%	100%
7.	Are design reviews conducted on a scheduled basis which properly address the process capability indices of critical-to-function and product/service characteristics?			X	100%	100%
8.	Is the new product/technology/service, as produced by the process, verified to meet all customer satisfaction requirements?			X	100%	100%

COMMENTS

5.3 CUSTOMER SATISFACTION		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Is there a measurement system in place to assess the customer's perception of complete performance?			X	100%	100%
2.	Is an independent (unbiased) customer survey routinely conducted?			X	80%	100%
3.	Is there an internal measurement system within the organization which correlates to the level of customer satisfaction?			X	100%	100%
4.	Are there specific goals for achieving Total Customer Satisfaction, both internal and external?			X	100%	100%
5.	To what extent are customer satisfaction goals disseminated and understood by everyone in the organization?			X	100%	100%
6.	Does management regularly review and assess all operating systems to determine if barriers to customer satisfaction exist and are appropriate action plans then implemented?			X	100%	100%
7.	Is there a method in place to obtain future customer requirements?			X	100%	100%
8.	Are all findings of customer dissatisfaction reported back to the proper organization for analysis and corrective action?			X	100%	100%
9.	Are customer satisfaction requirements formally defined and documented, and are they based on customer input?			X	100%	100%
10.	Do all support organizations understand their role in achieving total customer satisfaction?			X	100%	100%

5.4 COMPUTER INTEGRATED MANUFACTURING		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are systems integrated to allow electronic transfer of information between multiple systems to eliminate redundant data entry?			X	100%	100%
2.	Can customers electronically transfer CAD/CAM directly into manufacturing?			X	100%	100%
3.	Can customers electronically transfer order information directly into the business system?			X	100%	100%
4.	Is data electronically shared between shop floor control and process control systems (i.e., CNC, SPC, Electrical Test, AOI, etc.)?			X	100%	100%
5.	Are planning systems (MRP, forecasting, capacity planning, financial planning, etc.) electronically integrated with operation systems (order processing, purchasing, inventory management, shop floor control, financial/cost control, etc.)?			X	100%	100%
6.	Is information available from system processes in real time (vs. batch processing)?			X	100%	100%
7.	Are processes and procedures documented and available on-line?			X	100%	100%
8.	Do all functional departments have system access to key financial, manufacturing, sales, and operational data, as it relates to their functional objectives?			X	100%	100%
9.	Are computer simulation and design tools used to the maximum extent practicable in the design of new products/technologies/services			X	100%	100%

COMMENTS

Integrated system used is Pro Cim, modified ERP II system.

5.5 PROCESS DOCUMENTATION		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are manufacturing product, process, and configuration documents under issue control?			X	100%	100%
2.	Are “preliminary” and “special product” specifications controlled?			X	100%	100%
3.	Does the system ensure that the most current customer specifications are available to the manufacturing personnel?			X	100%	100%
4.	Does the system ensure that the most current material specifications are available to the procurement function?			X	100%	100%
5.	Are incoming orders reviewed for revisions and issue changes?			X	100%	100%
6.	Is conformance to customer specifications assured before an order is accepted?			X	100%	100%
7.	Is customer feedback provided when designs do not meet manufacturability requirements?			X	100%	100%
8.	Are critical characteristics classified, relative to impact on product performance?			X	100%	100%
9.	Are customers informed of changes made to products controlled by customer drawings or specifications?			X	100%	100%
10.	Is there an effective internal deviation control procedure and, are customer requested deviations documented and followed?			X	100%	100%
11.	Do new product development procedures exist, and are they followed in the design development process?			X	100%	100%

5.6 QUALITY RECORDS		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are records of inspection and process control maintained and available for review?			X	100%	100%
2.	Are records of equipment and equipment maintenance kept?			X	100%	100%
3.	Is the record and sample retention program defined?			X	100%	100%
4.	Are quality data used as a basis for corrective action?			X	100%	100%
5.	Are quality data used in reporting performance and trends to management?			X	100%	100%
6.	Are quality data used in supporting certifications of quality furnished to customers?			X	100%	100%
7.	Is field information used for corrective action?			X	100%	100%
8.	Does a cost of quality measurement system exist?			X	100%	100%
9.	Are customer reported quality problems responded to, and resolved in the time period requested?			X	100%	99%
10.	Is quality information on production material rejects provided to sub-suppliers with required corrective action?			X	100%	100%
11.	Are computers used to collect and analyze quality data?			X	100%	100%

COMMENTS

#6: Only 60% of Customer base has at any given time required subject data.
#8: Cost of Quality measurement system exists, but usage as tool at present is restricted to Management Steering Committee only .
#9: Year to date SCAR response on time rate at 97%.
#10: Based on actual sub supplier involvement in Corrective Action investigations/root causes.

5.7 SKILLS, TRAINING, & CERTIFICATION		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Does management ensure that all personnel are trained in their role for achieving Total Customer Satisfaction?			X	100%	100%
2.	Do all personnel understand how their performance impacts internal and external customer satisfaction?			X	100%	100%
3.	Do all personnel who contact external customers reflect quality improvement programs?			X	100%	100%
4.	Do personnel participate in professional societies and growth programs?		X		30%	100%
5.	Are all personnel trained in sufficient detail to support key initiatives?			X	100%	100%
6.	Are the results of training evaluated and indicated program changes made?			X	100%	100%
7.	Does a policy exist which encourages the cross training and rotation of personnel, and is this policy used as the basis of job progression?			X	100%	100%
8.	Are performance standards participatively developed, and regularly applied for all personnel?			X	100%	100%
9.	Are Total Customer Satisfaction programs and resulting successes publicized to all personnel?			X	100%	100%
10.	Do goal setting and reward/incentive programs support the quality improvement process?			X	50%	100%

5.8 SUBCONTRACTOR CONTROL		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are requirements defined, communicated, and updated to ensure that the supplier understands expectations?			X	100%	100%
2.	Does a system exist which measures the performance of the supplier and communicates such information to the supplier? (i.e., supplier rating system)			X	100%	100%
3.	Have the organization's processes been characterized to identify the critical requirements for the suppliers products?			X	100%	100%
4.	Have the capabilities of the supplier's processes been assessed and considered in the establishment of the requirements?			X	100%	100%
5.	Have partnerships been established with suppliers, and is assistance provided to ensure that each supplier has the capability to consistently supply conforming products?			X	100%	100%
6.	Have quality and cycle time metrics and improvement goals been established participatively with the supplier?			X	100%	70%
7.	Has a system been established with the supplier for identification and verification of corrective action?			X	100%	100%
8.	Have the requirements for supplier materials been properly characterized and specified to ensure conformance of the product/service to the customer satisfaction requirements?			X	100%	100%
9.	Is there a supplier certification program or equivalent procured material/service continuous quality improvement program?			X	100%	100%
10.	Can all personnel who contract suppliers properly reflect appropriate quality improvement programs and status to them?			X	100%	100%

COMMENTS

SECTION 5.7

#4: Company QMS does not dictate any employee professional affiliation requirements. Reply to question based on actual employee involvement in professional affiliations.

#10: Awards/Incentives are not mandatory based on QMS, but are given randomly per Management consensus.

SECTION 5.8

#6: Metrics and goals have been established with selective suppliers as applicable.

5.9 CALIBRATION CONTROL		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are calibration and preventative maintenance programs in place and documented?			X	100%	100%
2.	Are calibration and maintenance personnel trained?			X	100%	100%
3.	Is traceability to NIST maintained?			X	100%	100%
4.	Is quality measurement and control equipment current, effective, and sufficiently integrated with production equipment?			X	100%	100%
5.	Is the history of quality measurement and control equipment documented?			X	100%	100%
6.	Has repeatability of measuring devices and inspection or testing processes been established and monitored; are gauge capability studies conducted and GR&R ratios acceptable(<10%)?			X	100%	3.0%
7.	Are calibration and preventative maintenance cycles on schedule?			X	100%	100%
8.	Is the use of non-calibrated equipment for design and production purposes prohibited?			X	100%	100%
9.	Are tools and fixtures used as criteria or acceptability of product/work fully qualified and identified?			X	100%	100%
10.	Are calibration intervals defined in accordance with industry standards or manufacturer's recommendations and the calibration history of the equipment?			X	100%	100%

5.10 INTERNAL AUDITS		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are regular reviews of the product/process conducted and are goals/plans established to continually improve?			X	100%	100%
2.	Are the processes/products properly documented and controlled? Do they include appropriate customer requirements and are they executed in conformance to the documentation?			X	100%	100%
3.	Are the required quality checks built into the operations within the manufacturing, field installation, and service process, and is the resulting data maintained and promptly acted upon?			X	100%	100%
4.	Are all pertinent methods of statistical quality control properly, effectively and efficiently used?			X	100%	100%
5.	Does a process change control system exist, and are customers informed of changes made to products and processes with customer approval prior to the change, when required?			X	100%	100%
6.	Are the operators within the process provided with written work instructions and are they trained?			X	100%	100%
7.	Is the receipt, handling, storage, packaging and release of all material, including customer provided items, at all stages, specified and controlled to prevent damage or deterioration, and to address obsolete material?			X	100%	100%
8.	Is there a first in/first out (FIFO) system in place, and is it followed?			X	100%	100%

COMMENTS

SECTION 5.9

#6: Only 3.0% of gauges in system require R&R studies to be performed.

5.11 STATISTICAL PROCESS CONTROL		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Have the personnel who will be responsible for guiding the implementation of SPC been designated?			X	100%	100%
2.	Are statistical techniques used to reduce variation in the engineering process before the start of production?			X	100%	100%
3.	Is the quality system dependent upon process rather than product controls?			X	100%	100%
4.	Is the capability of critical processes and machines measured and monitored with CPK's >1.5, and targeted with CP of 2.0?		X		0%	0%
5.	Are incapable processes or machines targeted for improvement or replacement?			X	100%	100%
6.	Is SPC implemented for all critical processes?			X	100%	50%
7.	Are procedures that control the reaction to out-of-control situations adequate and effective?			X	100%	100%
8.	Are operators trained in the use of appropriate statistical techniques, and are they properly applying them?		X		0%	0%
9.	Are advanced problem solving techniques used by engineers to solve problems? (Design of Experiments, planned experimentation, advanced diagnostic tools, etc.)			X	60%	100%
10.	Are control charts and other process controls properly implemented?			X	100%	100%
11.	Is statistical process control being practiced in work centers and are yields being recorded and plotted on a scheduled basis, with respect to upper and lower control limits?			X	50%	50%

5.12 PROBLEM SOLVING		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are employees trained in problem solving techniques, in comparison to the needs of the organization?			X	100%	100%
2.	Does the organization utilize participative problem solving techniques to identify, measure and resolve internal and external problems?			X	100%	100%
3.	Are problem solving efforts timely and effective?			X	100%	100%
4.	Are applied resources sufficient to remove problem solving constraints?			X	100%	100%
5.	Are statistical techniques used for problem solving?			X	100%	100%
6.	Are quality data used to identify barriers, and to determine the priority of problems?			X	100%	100%
7.	Is there a policy/procedure that includes the use of problem solving techniques to systematically drive reduction in variability?			X	100%	100%

COMMENTS

SECTION# 5.12

#7: QMS does document recommend for subject techniques to be utilized to reduce variability. Subject techniques are often used, but NOT due to QMS requirements.

5.13 IN-PROCESS CONTROL		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are process capabilities established and maintained on all major processes? (critical parameters)			X	100%	100%
2.	Are in-process inspections, test operations, and processes properly specified and performed?			X	100%	100%
3.	Are in-process inspection facilities and equipment adequate?			X	100%	100%
4.	Are the results of in-process inspections used in the promotion of effective preventative action and corrective action?			X	100%	100%
5.	Is preventative maintenance performed on the equipment and facilities?			X	100%	100%
6.	Are housekeeping procedures adequate and how well are they followed?			X	100%	100%
7.	Are process management plans established, and are critical parameters followed?			X	100%	100%
8.	Are work areas uncluttered and free of excess work-in-process, supplies, debris, etc? Is the environment conductive to producing quality work? Is proprietary information adequately protected?			X	100%	100%
9.	Are certifications and in-process inspection results used in making final acceptance decisions?			X	100%	100%
10.	Are methods and procedures for the control of metallurgical, chemical, and other special processes established and followed?			X	100%	100%

5.14 RECEIVING INSPECTION		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are receiving inspection facilities and equipment adequately and properly maintained?			X	100%	100%
2.	Are receiving inspection procedures documented and followed?			X	100%	100%
3.	Are receiving inspection results used for corrective and preventive action?			X	100%	100%
4.	Are the procedures for storage and timely disposition of discrepant material in place and followed?			X	100%	100%

COMMENTS

5.15 MATERIAL HANDLING		STATUS				
DESCRIPTION OF PROGRAM		Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are procured material releases from receiving inspection clearly identified, as to acceptance status?			X	100%	100%
2.	Are procedures to facilitate limited life materials, such as prepreg, in place, properly controlled, and monitored?			X	100%	100%
3.	Are procured items identified with some means of traceability (serial number, lot number, date code, etc.)?			X	100%	100%
4.	Are procedures and facilities adequate for storage, release and control of materials?			X	100%	100%
5.	Are in-store and in-process materials properly identified and controlled?			X	100%	100%
6.	Is in-process material protected from corrosion, deteriorization, and damage?			X	100%	100%

5.16 NON-CONFORMING MATERIAL CONTROL		STATUS				
DESCRIPTION OF PROGRAM		Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Is non-conforming material identified, segregated from regular production material, and properly dispositioned?			X	100%	100%
2.	Are non-conforming materials properly identified and controlled to prevent inadvertent use?			X	100%	100%
3.	Is the review and disposition of non-conforming materials defined, and are provisions made for inclusion of the customer in disposition decision?			X	100%	100%
4.	Are procedures for controlling non-conforming materials, and for ensuing corrective action, in place and followed?			X	100%	100%
5.	Do procedures provide for material review by a committee consisting of Quality and Engineering (as a minimum), to determine the disposition of non-conforming materials? (deviating from drawings or specification)			X	100%	100%
6.	Do supplier's procedures and controls for corrective action prevent recurrence of non-conformances?			X	100%	100%
7.	Is there a system for coordinating necessary corrective action with purchasing personnel?			X	100%	100%
8.	Does the corrective action extend to all applicable causes of non-conformance (e.g., design, workmanship, procedures, equipment, etc.)?			X	100%	100%

COMMENTS

5.17 INSPECTION AND TEST PLAN		STATUS				
DESCRIPTION OF PROGRAM		Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are statistical techniques used in determining the acceptability of finished goods to customer requirements?			X	100%	100%
2.	Are periodic tests conducted to audit reliability and environmental performance of the final product?			X	100%	100%
3.	Is CPK tracking performed for critical characteristics, with plans to achieve CPK = 1.5 with a target of CP of 2.0?		X		0%	0%
4.	Is root cause failure analysis performed for internal and external failures, and is appropriate corrective action implemented?			X	100%	100%
5.	Are test and inspection personnel trained in the procedures of their operations, and are those procedures being followed?			X	100%	100%
6.	Is the new product/technology/service, as produced by the processes, verified to meet all customer satisfaction requirements?			X	100%	100%

5.18 PRODUCT INSPECTION/FINAL AUDIT		STATUS				
DESCRIPTION OF PROGRAM		Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are final product acceptance procedures documented and followed?			X	100%	100%
2.	Are all specific customer product audits conducted, as required?			X	100%	100%
3.	Are inspectors trained for the tasks performed?			X	100%	100%
4.	Are flow charts or milestones developed with checkpoints readily available?			X	100%	100%
5.	Is a system in place which denotes inspection performed; e.g., use of initials, stamps, labels, bar codes, etc., affixed to production documentation?			X	100%	100%
6.	Is a quality system established and maintained for control of product/production documentation?			X	100%	100%
7.	Is “accept/reject” criteria defined and available for use?			X	100%	100%
8.	Is a final audit performed to ensure that all required verifications and tests, from receipt of materials through point of product completion, have been accomplished?			X	100%	100%
9.	Are packing and order checking procedures documented and followed?			X	100%	100%

COMMENTS

5.19 TOOLING INSPECTION, HANDLING, & STORAGE		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are temperature, humidity, laminar flow controls in place to prevent contamination, and to assure dimensional stability?			X	100%	100%
2.	Do operators use hairnets, gloves & lab coats in all photolab and photoexposure areas?			X	100%	100%
3.	Are work instructions and related forms in place to control all applicable tooling requirements, as stated in the customer's purchase order?			X	100%	100%
4.	Are customer provided artworks controlled with regard to handling, storage, revision control and relationship to converted production phototools (working films)?			X	100%	100%
5.	Are production phototools (working films) controlled with regard to handling, storage, use life, and relationship to customer purchase order?			X	100%	100%
6.	Are customer provided artworks and production phototools (working films) inspected, including dimensional checks?			X	100%	100%
7.	Are all tools, fixtures, and other devices, used for tooling inspection and control, maintained under the calibration control procedure?			X	100%	100%
8.	Are records showing initial acceptance, periodic checks, and any needs for rework and/or modification available?			X	100%	100%

5.20 CORRECTIVE ACTION		STATUS				
	DESCRIPTION OF PROGRAM	Not Applicable	Not Started	Approach Developed	Percent Deployed	Percent Results
1.	Are final acceptance inspection results used for corrective and preventative action?			X	100%	100%
2.	Is root-cause analysis performed for non-conformances? This includes, but is not limited to, non-conformances (problems) caused by suppliers, found/caused "in-house" during processing, or those reported by the customer.			X	100%	100%
3.	Is positive action taken to prevent recurrence of problems, and are there documented reports/records of each occasion?			X	100%	100%
4.	Do procedures and systems provide for ensuring that replies are made to customer requests for correction action within the time limit specified?			X	100%	100%
5.	Is corrective action controlled and documented for all applicable work centers?			X	100%	100%
6.	When corrections are made, is their effectiveness subsequently reviewed and monitored?			X	100%	100%

COMMENTS

DATE COMPLETED

SECTION 6 (CHECK ONE IN EACH LINE THAT APPLIES)
MANUFACTURING HISTORY (See Section 2 Site Capability)

Please complete as many history profiles so that the total descriptions of products you manufacture account for production orders that reflect 70% of your business. History profiles are for board or board family (board types may be grounded together if they are similar).

BOARD TYPE	DATE OF ORDER	MATERIAL	HISTORY #
VIA TYPE	PRODUCTION QUANTITY	TOTAL YEARLY PRODUCTION %	

Dimensions in millimeters (inches in brackets)

BOARD			HOLES		
BOARD SIZE DIAGONAL	TOTAL BOARD THICKNESS	NUMBER CONDUCTIVE LAYERS	DIA DRILLED HOLES	TOTAL PTH TOL (MAX-MIN)	LOCATION TOL DTP
☐<250 [<10.00]	☐<1,0 [<.040]	☐1-4 [1-4]	☐>0,5 [>.020]	☐>0,250 [> .010]	☐**>0,50 [>.020]**
☐250 [10.00]	☐1,0 [.040]	☐5-6 [5-6]	☐0,5 [.020]	☐0,250 [.010]	☐**0,50 [.020]**
☐350 [14.00]	☐1,6 [.060]	☐7-8 [7-8]	☐0,4 [.016]	☐0,200 [.008]	☐**0,40 [.016]**
☐450[17.50]	☐2,0 [.080]	☐9-12 [9-12]	☐0,35 [.014]	☐0,150 [.006]	☐**0,30 [.012]**
☒550 [21.50]	☐2,5 [.100]	☒13-16 [13-16]	☐0,30 [.012]	☐0,125 [.005]	☐**0,25 [.010]**
☒650 [25.50]	☒3,5 [.135]	☐17-20 [17-20]	☐0,25 [.010]	☐0,100 [.004]	☒**0,20 [.008]**
☐750 [29.50]	☐5,0 [.200]	☐21-24 [21-24]	☒0,20 [.008]	☒0,075 [.003]	☐**0,15 [.006]**
☐850 [33.50]	☐6,5 [.250]	☐25-28 [25-28]	☐0,15 [.006]	☐0,050 [.002]	☐**0,10 [.004]**
☐>850 [>33.50]	☐>6,5 [>.250]	☐>28 [>28]	☐<0,15 [.006]	☐<0,050 [<.002]	☐**<0,10 [<.004]**
☐Other:	☐Other:	☐Other:	☐Other:	☐Other:	☐**Other:**

CONDUCTORS						
INTERNAL ELEC CLEARANCE (MIN)	INTERNAL COND WIDTH (MIN)	INTERNAL PROCESS ALLOWANCE	EXTERNAL ELEC CLEARANCE (MIN)	EXTERNAL COND WIDTH (MIN)	EXTERNAL PROCESS ALLOWANCE	FEATURE LOCATION DTP
☐>0,350 [>.014]	☐>0,250 [>.010]	☐>0,100 [>.004]	☐>0,350 [>.014]	☐>0,250 [>.010]	☐>0,100 [>.004]	☐>0,50 [>.020]
☐0,350 [.014]	☐0,250 [.010]	☐0,100 [.004]	☐0,350 [.014]	☐0,250 [.010]	☐0,100 [.004]	☐0,50 [.020]
☒0,250 [.010]	☐0,200 [.008]	☐0,075 [.003]	☐0,250 [.010]	☐0,200 [.008]	☐0,075 [.003]	☐0,40 [.016]
☐0,200 [.008]	☐0,150 [.006]	☒0,050 [.002]	☐0,200 [.008]	☐0,150 [.006]	☒0,050 [.002]	☐0,30 [.012]
☐0,150 [.005]	☐0,125 [.005]	☐0,040 [.0015]	☐0,150 [.006]	☐0,125 [.005]	☐0,040 [.0015]	☐0,25 [.010]
☐0,125 [.005]	☐0,100 [.004]	☐0,030 [.0012]	☐0,125 [.005]	☐0,100 [.004]	☐0,030 [.0012]	☒0,20 [.008]
☐0,100 [.004]	☒0,075 [.003]	☐0,025 [.001]	☐0,100 [.004]	☒0,075 [.003]	☐0,025 [.001]	☐0,15 [.006]
☐0,075 [.003]	☐0,050 [.002]	☐0,020 [.0008]	☒0,075 [.003]	☐0,050 [.002]	☐0,020 [.0008]	☐0,10 [.004]
☐<0,075 [<.003]	☐<0,050 [<.002]	☐<0,020 [<.0008]	☐<0,075 [<.003]	☐<0,050 [<.002]	☐<0,020 [<.008]	☐<0,10 [<.004]
☐Other:	☐Other:	☐Other:	☐Other:	☐Other:	☐Other:	☐Other:

DATE COMPLETED
15/Apr/2011

SECTION 7

IDENTIFICATION OF PREVIOUS AUDITS (Optional)

Please complete as many forms as you feel reflect the intensity of your customer visits.

COMPANY AUDITORS	DATE OF AUDIT
AUDIT TEAM MEMBERS	AUDITOR REMARKS
	SPECIFICATIONS USED IN AUDIT
LENGHT OF AUDIT	
TEAM MEMBERS MAY BE CONTACTED AT	

COMPANY AUDITORS	DATE OF AUDIT
AUDIT TEAM MEMBERS	AUDITOR REMARKS
	SPECIFICATIONS USED IN AUDIT
LENGHT OF AUDIT	
TEAM MEMBERS MAY BE CONTACTED AT	

COMPANY AUDITORS	DATE OF AUDIT
AUDIT TEAM MEMBERS	AUDITOR REMARKS
	SPECIFICATIONS USED IN AUDIT
LENGHT OF AUDIT	
TEAM MEMBERS MAY BE CONTACT AT	

*REPEAT THIS FORM AS NECESSARY

SECTION 8

DATE COMPLETED
15/Apr/2011

FINANCIAL REVIEW (OPTIONAL)

Please complete the following financial information that coincides with the company description and site information provided in section 1.

COMPANY FINANCIAL DESCRIPTION

LEGAL NAME		
TAXPAYER ID NUMBER	DUNS NUMBER	TRADING SYMBOL
ANNUAL SALES	PRIOR YEAR	YEAR-TO-DATE
FISCAL YEAR		
BANK	ACCOUNT NUMBER	
BANK ADDRESS	STATE	ZIP
PROVINCE	COUNTRY	
BANK TELEPHONE NUMBER	FAX NUMBER	
COMMENTS		

SITE FINANCIAL DESCRIPTION

SITE NAME		
TAXPAYER ID NUMBER	DUNS NUMBER	TRADING SYMBOL
ANNUAL SALES	PRIOR YEAR	YEAR-TO-DATE
FISCAL YEAR		
BANK	ACCOUNT NUMBER	
BANK ADDRESS	STATE	ZIP
PROVINCE	COUNTRY	
BANK TELEPHONE NUMBER	FAX NUMBER	
COMMENTS		

SECTION 9
MQP ELECTRONIC EDITING

This MS Word template comes with editable fields. IPC has made this electronic document available for ease of completing, updating, and filing the MQP, as well as to give the laminate manufacturer and customer a common interface. Using the template enables laminate manufacturers to maintain several customer specific files without the endless stream of paperwork.

Editable fields are highlighted in gray. To complete the fields in the template, use the TAB key to toggle from field to field, entering the information as instructed in the introductory text for each section.

The developers of this MQP strongly suggest the person at the laminate manufacturing facility responsible for creating and maintaining the MQP write protect the file to be sent.