LPE-SQM-10
Supplier Quality Manual

Revision 001

Issued 20/10/2017

Conforms to AS9100 Rev. D

Contents

0.0 Revision History and Approval

Rev.	Nature of changes	Approval	Date
001	Original release.	D. Harris	20 October 2017

1.0 Welcome to Senior Flexonics LPE

Lymington Precision Engineers Co Ltd is a Senior plc owned company and operates within the Flexonics division. Senior plc employs over 7,500 people and has a turnover of £820M, split between Aerospace and Flexonics, with LPE becoming part of the Flexonics division.

Lymington Precision Engineers is a major employer in the New Forest and surrounding areas, employing over 160 members of staff.

Our employees are our greatest asset – their ambition, innovation, experience and skills have been major factors in our success. We continue to train and encourage our workforce and conduct our business in a fair, open and ethical manner.

We operate an excellent apprenticeship scheme, providing the engineering industry with young, skilled engineers, helping to promote the industry and encourage engineering in the United Kingdom.

2.0 About the LPE Supplier Quality Manual

This manual provides information about LPE to its suppliers and defines quality requirements Suppliers are expected to meet when performing work required by a LPE purchase order.

3.0 Scope

This manual provides information about LPE to its suppliers and defines quality requirements Suppliers are expected to meet when performing work required by a LPE purchase order.

4.0 Expectation

The requirements identified are critical to LPE and it is important that suppliers familiarize themselves with this manual so that they understand how, when and why submissions and documentation are requested by LPE.

Suppliers are encouraged to contact their Supplier Quality Engineer, Strategic team or buyers whenever clarification is needed or if a supply issue is foreseen. Non-compliance with these requirements put the supplier at the highest risk of violating the purchase order terms and conditions.

5.0 Terms and Definitions

LPE adopts the following terms and definitions within its Supplier Quality Manual. Where no definition is provided, the company typically adopts the definitions provided in ISO 9000: Quality Management – Fundamentals and Vocabulary and AS9100 latest revision. In some cases, specific procedures or documentation may provide a different definition to be used in the context of that document; in such cases, the definition will supersede those provided for in this Supplier Quality Manual or the referenced definition sources.

5.1 General Terminology

LPE – *Senior Flexonics LPE*

Document – *Written information used to describe how an activity is done.*

Record – *Captured evidence of an activity having been done.*

6.0 Quality Management System

6.1 General Requirements

a) Suppliers to LPE shall conduct business with a high degree of integrity and in an environmentally responsible manner.

b) LPE require suppliers within their supply chain to be registered or compliant to standards or programs audited by third party registrars such as ISO 9001 standard (or equivalent) for quality management systems and ISO 17025 standard for testing and calibration laboratories.

c) Suppliers shall perform a self-evaluation to determine where the supplier's and the supplier's supply chain system aligns with this manual.

d) LPE reserves the right to conduct a quality management system assessment at the supplier's facility. When conducting the assessment LPE shall have access to the supplier's personnel, documentation, gauging and test facilities. At the close of the assessment, LPE shall share the findings with a debriefing meeting and, later, shall issue a report to the supplier summarizing the results of the assessment.

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

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

6.2 Quality Plan

The supplier shall have a structured quality planning process that should specify how their Quality Management System applies to LPE requirements by defining the controls related to the activities, processes, responsibilities and resources required. The Supplier will receive a Supplier Questionnaire (LPE 23) and a Non-Disclosure Agreement (LPE191) and a Capability Matrix (LPE 197) (Appendix 1) prior to Supplier Approval being granted.

7.0 Risk Assessment

The Supplier shall conduct a risk assessment of their operations that support LPE's production, quality requirements and delivery schedule. Each assessment should consider, at a minimum, the impact arising from:

- Natural disasters
- Geo-political hazards
- Supply chain disruptions

- Facility or system issues
- Information Loss

The supplier shall prepare contingency plans to ensure continued operations at LPE. The supplier shall communicate any critical risk scenario without a contingency plan that may result in a major disruption. The supplier shall provide the contingency plans to LPE when requested.

8.0 Training and Competence

The supplier shall provide appropriate training to ensure that employees are competent and qualified to produce quality deliverables. The supplier shall review and document the required skills and competencies necessary for the production, inspection, handling, and delivery of products to LPE and/or its customers. The supplier shall provide appropriate training to ensure that employees follow applicable procedures and instructions. The supplier shall maintain employee records of training, performance metrics, and skills.

9.0 Control of Documents and Records

Documentation includes both documents and records.

A documented procedure shall be established to define the controls of QMS documentation including identification, storage, retrieval, protection, retention time, and disposition of quality records.

The purpose of document control is to ensure that staff have access to the latest, approved information, and to restrict the use of obsolete information.

The supplier shall control records related to LPE purchase orders/contracts in a way to allow a retrievable readable version (including electronic) in an environment that protects from deterioration by ensuring that:

- Records are retrievable on request within 24 hours
- Records created by and/or retained by subcontractors' suppliers are controlled in accordance with these requirements
- Ensure that the usage and disposal of records are performed in an appropriate manner to prevent unauthorized or fraudulent use.
- Records are to be retained for a period of 15 years or the life of the product (whichever is longer).

10.0 Contract Review

The Supplier shall review the purchase order prior to committing to supply the product or service and acceptance of purchase/orders.

Records of contract reviews shall be maintained for 15 years.

11.0 Counterfeit, Fraudulent and Suspect Items (CFSI)

Operational controls shall be implemented to assure the prevention of counterfeit or suspect counterfeit part use and their inclusion in product(s) delivered to LPE in accordance with SAE AS6174.

12.0 Responsible Sourcing Policy

LPE expects its business dealings with Suppliers to be based on fairness, honesty, lawfulness, safety, environmental stewardship, social consciousness and respect for human rights. To ensure this, LPE has now formalized its ethical, social and environmental requirements of Suppliers within a Responsible Sourcing Policy which can be found on the LPE website http://lymingtonprecision.co.uk/

13.0 Product and Service Planning

New Product Introduction (NPI) and Product Introduction (PI)

13.1 Process flow NPI and PI

A NPI process flow is applicable to new product introduction and revised product. This process flow requires the Supplier to document the process, responsibilities and to include the following:

- Process operational sequence
- Identify pre-launch and post launch activities
- Identification of external (subcontractor) activities

The format of this process flow can be in the Supplier's own format provided it satisfies the requirements of this document.

13.2 Process Failure Mode & Effects Analysis (PFMEA)

The PFMEA should be conducted during product quality planning and submitted before beginning production. The Supplier shall:

- Develop a PFMEA for all production processes in advance of producing the product
- The PFMEA shall identify which processes hold high risk and how to reduce or eliminate the chance of the potential failure occurring
- Supplier must treat PFMEA as a "living document" and therefore review/update the PFMEA when changes are made to process operating conditions or when a nonconformance has been identified

The format of the PFMEA can be in the Supplier's own format provided it satisfies the requirements of this document. A single PFMEA may be applied to a group or family of products that are produced by the same process at the same source.

An example of a PFMEA can be found in Appendix 2 and an LPE template is available on request.

13.3 Process Control Plan (PCP)

The Supplier PCP is a document which identifies critical product characteristics and develops process controls for the PFMEA output and is to be submitted in advance of beginning production.

The Supplier PCP shall

- Be written, controlled and updated to include all critical items from receiving inspection of raw materials through packaging and finished goods.
- Document a process to review the effectiveness of these process controls

The format of the control plan can be in the Supplier's own format provided it satisfies the requirements of this document.

14.0 Product Part Approval Process (PPAP)

14.1 Product Approval

LPE utilizes the PPAP requirements for product approval. All suppliers shall comply with these requirements for all new products and any approved changes to production parts. LPE shall determine the PPAP level required. The LPE PPAP owner shall work with the supplier to define the PPAP submission supporting data.

14.2 First Article Inspection (FAI)

First Article Inspections are a complete inspection of a completed part, of all dimensions and criteria, to validate the production processes and equipment. The product used shall be a representative item from the first production run, a new part or assembly to verify that the production processes, production documentation and tooling are capable of producing parts and assemblies that meet requirements. This process shall be repeated when changes occur that invalidate the original results (e.g., engineering changes, manufacturing process changes, tooling changes).

The Supplier FAI shall:

- Be completed by the supplier
- Identify parts and include drawing revision number, date, quantity, part number, part name, Supplier name and reason for submission
- Ship the parts with all appropriate FAI documentation directly to LPE
- The format of the FAI can be the supplier's own equivalent provided it satisfies the requirements of LPE.

15.0 Special Process Procedures

Where the supplier outsources a special process, LPE requires the supplier to effectively manage their sub-contractor accordingly by using a tiered down approach of the LPE Supplier Quality Manual requirements.

Established documentation procedures/data cards specific to the product are required.

LPE requires special process procedures/data cards to be submitted for initial approval and approval of any changes.

16.0 Contamination and Foreign Object Debris (FOD) Control

The supplier shall establish a process which detects and prevents contamination and foreign debris to include.

- Training of contamination and FOD
- Material handling and product protection
- Tool/hardware accountability
- Production review of contamination and FOD

- Inspection of contamination during assembly

LPE require that incidents of contamination and FOD are reported and investigated.

17.0 Process and Product Audit

Evidence of process/product audits will be reviewed against the supplier's registered standard. Product/process supplied will be audited annually.

18.0 Measuring and Monitoring Devices

18.1 Gauge repeatability (GR&R)

The purpose of Gauge Repeatability and Reproducibility study (GR&R) is to identify the amount of measurement error associated with a particular gauge. This GR&R value obtained should be the basis for decision on whether the gauge should be replaced, repaired, operators trained or no action taken.

The Supplier shall conduct this study periodically. Where gauges are used, decide if a part is in specification or not.

All gauges measuring critical features are required to have an acceptable gauge R&R.

GR&R should be repeated after any change to a supplier's measurement system and/or product design.

18.2 Calibration

The supplier shall establish and maintain documented procedures for the calibration, control and maintenance of measuring, inspection and test equipment.

Records of calibration are to be retained for a minimum of 15 years or the life of the contract (whichever is longer).

The supplier shall calibrate equipment in accordance with BS EN ISO 10012:2003 or ISO/IEC 17025.

19.0 Identification and Traceability

The supplier shall properly identify product and establish a system that:

- Identifies the product status
- Verifies product acceptance with regards to inspection and testing
- Properly control product disposition

Unless otherwise indicated as nonconforming, pending inspection or disposition, or some other similar identifier, all product shall be considered conforming and suitable for use.

Where unique traceability is required by contract, regulatory, or other established requirement, the supplier shall control and record the unique identification of the product. This shall include, as appropriate:

- Product identification to be maintained throughout the product life
- The ability to trace all products manufactured from the same batch of raw material, or from the same manufacturing batch, to the destination (e.g., delivery, scrap)

- For an assembly, the ability to trace its components to the assembly and then to the next higher assembly
- For a product, a sequential record of its production

20.0 Preservation of Material

The supplier shall develop a plan to preserve conformity of product during internal processing and delivery to LPE. This preservation plan includes cleaning, FOD control, special handling for sensitive products, marking and labeling including safety warnings, shelf life control and stock rotation, and special handling for hazardous materials. The preservation plan also applies to the constituent parts of a product.

As required material handling, packaging and storage shall:

- Prevent contamination
- Prevent part to part contact
- Reduce environmental effects on product
- Prevent degradation of product
- Prevent loss of damage in transport

21.0 Product Changes

After product approval, the supplier shall control all changes to LPE deliverables. The supplier's QMS shall include procedures to manage all changes to engineering documents, manufacturing equipment and tooling, test and measurement equipment and all materials used in the process.

Any changes to engineering drawings, specifications, materials, manufacturing processes or other documents related to an LPE product/process require prior approval by LPE.The implementation date of the change shall be determined by both the supplier and LPE.

Various new process and product capability studies and approvals may be required as a result of the planned changes.

22.0 Control of nonconforming product/service

The supplier shall ensure that products or other process outputs that do not conform to requirements are identified and controlled to prevent their unintended use or delivery.

The supplier shall;

- Establish a documented procedure for the control of nonconforming product that defines the nonconformity, subsequent actions taken, reviews the effectiveness of any corrective action taken, and updates risks and opportunities determined during planning
- Contain nonconformities by segregating the product or process to prevent its unintended use or delivery
- Report nonconformities affecting delivery of products to LPE in a timely manner
- Define corrective actions for nonconforming products detected after delivery
- Maintain records related to the control of nonconforming product

23.0 Supplier Corrective action/Preventative action (SCAR)

LPE may issue a Supplier Corrective Action Report (SCAR), LPE 189, for the identification and resolution of non-conformance detected. The SCAR may be issued based upon incoming inspections, in-process rejects, field failures, packaging or labelling issues.

The supplier is expected to respond to all SCARs issued in the format received. When a supplier receives a SCAR the following policy shall be followed:

Within 48 hours:

- Acknowledge receipt of SCAR
- Identify all suspect product
- Notify quantity of suspect product en-route to LPE or subcontractor
- Immediate containment action taken

Corrective Action Plan within 48 hours

- Use problem solving techniques to determine the root cause of the non-conformance ensuring consideration is made to external impact including Human Factors
- Detailed plan for implementing corrective actions to control and prevent recurrence
- Disposition of suspect products

Final Report within 10 days

- Implemented corrective actions with supporting data
- Verify effectiveness of corrective actions

24.0 Deviation or Concession

Where a supplier has informed LPE of a nonconformity a concession may be required.

The supplier shall:

- Complete and submit the deviation/concession form LPE 12
- Ensure that written authorization for the deviation/concession has been granted before continuing
- Take appropriate corrective action
- Maintain records of deviation/concession

25.0 Release of Product or Service

The supplier shall ensure all LPE products undergo inspection and/or testing to ensure they meet all requirements at critical stages throughout the various processes, and then prior to final delivery.

The supplier shall ensure all measurement requirements are documented. This documentation is part of the release acceptance documentation, and includes:

- criteria for acceptance and / or rejection
- where in the sequence measurement and testing operations have been performed
- a record of the measurement results

- type of measurement instruments required, and any specific instructions associated with their use
- Traceability to the person authorising the release

Test records will show actual test results data when required by specification or acceptance test plan.

Where required to demonstrate product qualification the supplier shall ensure that records provide evidence that the product/process meets the defined requirements.

When key characteristics have been identified, they shall be monitored and controlled as required.

Where accurate visual verification is required the supplier shall ensure product verification/inspection activities are performed in local lighting conditions that provide a white light intensity at the point of inspection as follows:

- Not less than 500 LUX for dimensional inspection at point of inspection

For personnel engaged in product or service verification/inspection activities, a vision assessment is required, by a trained/qualified person, on commencement of employment and at two yearly intervals. Any optical aids used during product verification/inspection activities are to be worn during the vision assessment.

A colour perception test shall be performed at 5 early intervals to ensure personnel are capable of distinguishing and differentiating colours where colour perception is required.

Records of these assessments are to be maintained.

26.0 Certificate of Conformity (C of C)

The supplier shall provide a separate C of C with the delivery of each product/service and to contain the following information:

- Unique traceable document number
- Supplier’s name, address, and telephone number
- Delivery address
- LPE purchase number
- Product/service description
- Traceable reference (serial, batch, heat, cast numbers)
- Quantity
- Conformance/Compliance statement, drawing number and revision
- Drawing number/specification of material and revision number
- Signature of person authorized to release product

27.0 Supplier Performance Evaluation

Supplier evaluation is a process to develop relationships between LPE and its Suppliers with an aim to promote communication and continuous improvement throughout the product cycle. Routine reviews of suppliers will include, but not limited to:

- Quality performance; quantity delivered versus quantity rejected
- Delivery performance; On Time in Full

Appendix A: Capability Matrix Example (LPE 197)

YOUR COMPANY NAME HERE

DATE:

Plant List and Equipment			CAPACITY								Ball bar/ laser calibration results or Manufacturers Spec (Micron)			MATERIALS (Mark X as applicable)							
Please modify the plant list below to show the full range that is available at your site. Add or remove lines as applicable.	NUMBER OF MACHINES	MAKE OF EQUIPMENT	X Capacity - Length (mm)	Y Capacity - Width (mm)	Z capacity - Height (mm)	Capacity - Ø (mm)	4th Axis available (Y/N)	Spindle Speed (RPM)	Tool Capacity	Probing/Inspection capability	Positional Tolerance	Circularity XY	Sphericity	Aluminium	Stainless Steel	Titanium	Non Ferrous	Plastics	Stellite	Monel	Inconel
Manual Turn																					
Manual Milling																					
CNC Vertical Mill																					
CNC Mil (5 axis)																					
Robotic Flexcell UNO FZ 12																					
CNC Vertical Mil (Twin Pallet)																					
CNC Mil - Turn																					
CNC Turning Fixed head																					
CNC Universal Griding																					
Universal Grinding																					
Internal Grinding																					
Surface Grinding																					
Centreless Grinding																					
Tool and Cutter Grinding																					
Horizontal Honing																					
Surface Lap																					
Inspection Plant List																					
CMM																					
Air Gauging																					
Measurement Projector																					
Surface Finish Measurement																					
Roundness Measurement																					

Appendix 2: Process Failure Mode & Effects Analysis Example (PFMEA)

Process Details: CNC Milling	FMEA Owner: M. Hume	Date originated:09/09/2015	Revised by:	Issue #	Other relevant / supporting information:
Process Location: LPE Gosport St Lymington	FMEA cross functional team members & functional role Daryll Harris Quality Manager NPI, Steven Matthews Planning, Richard Hobbs Project Manager, Matt Bird Production Manager, Peter Kellock Production Manager	Dates Revised:			
Product Details / Part no: All for RR	and Chris Ansell Inspection Supervisor.				

Process Step / #	Process Details	Potential Failure Mode	Potential Effect(s) of Failure	SEV	Potential Cause(s) of Failure	OCC	Current Process Controls for: Detection of Failure Mode Cause	Detection of potential Failure Mode occurrence	RPN	Recommended Improvement / Corrective Actions	Action owner	Target Completion Date	Responsible Business / Department	Actual Improvement / Corrective	Actual Completion Date	Action results: SEV	OCC	DET	RPN
	Job pack arrives in department	Lost	Job pack is incomplete	1	Docs lost	1	None	2	2	None						1			
		Incorrect	Drawing is not at correct issue	3	Issued incorrectly	2	None	2	12	None						3			
		Omitted	Previous operations have not been carried out	3	Operator missed op	3	None	1	9	None						3			
		Omitted	Operations have not been stamped as complete	2	Operator failed to mark-up shop order	5	None	1	10	None						2			
	Clean M/C	Omitted	Not clean and there is a opportunity for contamination of parts	8	Operator failed to clean down M/C	5	None	5	200	Operation on process sheet to clean down M/C before use also form LPE8311	R. Hobbs	Ongoing	Projects/ Engineering		Ongoing	8	1	5	40
		Inadequate	Not cleaned to the required standard	8	Operator failed to clean down M/C correctly	5	None	5	200	Operator training for correct method of cleaning	D. Harris	Ongoing	Quality	M/C clean to correct standard	Ongoing	8	1	5	40
	Purge coolant	Omitted	Parts contaminated	8	Operator failed to purge coolant	3	None	5	120	Operation on process sheet to purge coolant before use	R. Hobbs	Ongoing	Projects/ Engineering	Clearly defined	Ongoing	8	1	5	40
		Incorrect	Parts contaminated	8	Operator used incorrect coolant	3	None	7	168	Operation on process states the coolant to use	R. Hobbs	Ongoing	Projects/ Engineering	Clearly defined	Ongoing	8	1	5	40
	Obtain new tool bits	Not new	Parts incorrect	5	Incorrect profile due to damaged tool	2	None	2	20							5			
		Not new	Parts contaminated	8	Tool is contaminated	3	None	5	120	Operation on process states only use new tools	R. Hobbs	Ongoing	Projects/ Engineering	Clearly defined	Ongoing	8	1	5	40
	Obtain set-up sheet part	Not available	Stops job	5	Not produced	2	None	1	10							5			
		Incorrect issue	Stops job	5	Incorrect issue	2	None	1	10							5			
	Obtain jigs and fixtures	Lost	Stops job	5	Not returned misplaced in store	2	None	1	10							5			
		Damaged	Stops job	5	Damaged on return to store	3	None	2	30							5			
		At wrong issue for part	Stops job	5	Not checked on up issue	2	None	1	10							5			

LPE Supplier Quality Manual

Supplier Declaration:

As a supplier to LPE, we accept the terms of this policy and undertake to fulfil and comply with the requirements and expectations that are described.

We confirm that:

1. We have received and read LPE's Supplier Quality Manual.
2. We commit to comply with the principles and requirements of the Supplier Quality Manual
3. Conformity with the Supplier Quality Manual may be reviewed as part of LPE's supplier auditing programme.

Supplier name:			
Address:			
Signature:			
Signed by (in capitals):		Position:	
Date:		Email:	

Please return this signed declaration to qa@lymingtonprecision.co.uk