



Foreword

Competing in today's global market, requires that products and services must be of high quality and delivered on time, increasingly within short lead times and at a competitive cost.

In order for UAV Engines Ltd (UEL) to be successful and meet the needs of our customers, we must have a process in place that encourages, supports and ensures our suppliers meet quality expectations.

To ensure this, the role played by our suppliers is crucial to our future success and it's our intention to involve suppliers as partners in our plans.

The objective of this manual is to define the basic system requirements that we will use and expect our suppliers to use to ensure that our mutual responsibilities for product and service quality are understood and implemented.

We look forward to your support as our partners and believe that by working together we can develop our supply chain to the benefit of all.

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UAV Engines Ltd



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Introduction

In order for UAV Engines Limited to succeed in a competitive global market it is imperative that we develop close and open relationships with our suppliers, where mutual efforts support a continual improvement environment. Increasingly stringent and demanding economic and quality requirements from the market place compel us to understand and continually improve our supplier base.

UEL's goal is to progress and expand our existing global base to become the world leader in our chosen market fields. To ensure we achieve this target UAV Engines Limited has developed specific strategies that include:

- ▲ Long term relationships with fewer suppliers.
- ▲ Close interaction among manufacturing, engineering, purchasing and quality personnel of UEL and our suppliers.
- ▲ Deployment of Advanced Product Quality Planning.
- ▲ Assure compliance of market specific requirements such as BS EN ISO 9001 and AS9100 and other customer and regulatory standards.

To assist in the implementation of our objectives UEL will utilise a Supplier Quality Assurance (SQA) programme, which embodies all the measures specified and mutually applied, between UAV and the supplier to obtain and maintain the high quality standard required.

The development of Supplier Quality Assurance requires a close collaboration between UEL and the supplier and this necessarily involves an in depth knowledge of the organisation and methods employed by the supplier. It equally involves the supplier being familiar with the requirements when doing business with UAV Engines Limited.

This manual details the facilities and features of the supplier's quality system that will be assessed by UEL Quality Department representatives prior to the placing of new orders and the procedures to be followed by the supplier after orders have been placed.

Please remember that if there is any doubt regarding any of UEL requirements then contact must be made during your Contract Review phase.



Introduction (Continued)

It will also be used as a standard for the development of existing relationships between UAV Engines Limited and its current approved supplier base. It is applicable to all suppliers of manufacturing materials (e.g. raw materials, components, assemblies) or processing services (e.g. plating, heat treatment, NDT etc) to UAV Engines manufacturing facility at:

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UEL consists of dedicated production facilities operating from one site, manufacturing Wankel-type engines for the propulsion of small and medium sized Unmanned Air Vehicles (UAV's), which we supply to a number of recognised customers, i.e. AAI Corporation, IAI Malat, KAI, China Aerospace, MBDA, Galileo Avionica and Aurora.



UAV Engines Ltd

Main UEL Contacts

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Engineering	uavengineering@uavenginesltd.co.uk
Quality	uavquality@uavenginesltd.co.uk
Accounts	uavaccounts@uavenginesltd.co.uk
Purchasing	uavpurchasing@uavenginesltd.co.uk
Sales	uavsales@uavenginesltd.co.uk

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General Requirements

The following are mandatory General Requirements we expect our suppliers to fulfil.

Right of Access

Suppliers shall provide access to their premises and facilities for UAV Engines Limited, our customers and regulatory authorities for co-operation on product, process and business issues

Notification of Organisation Changes

Changes to the supplier's organisation that may affect quality and/or finance, shall be notified in advance to UAV Engines Limited. These changes may include; Company ownership, company name, manufacturing location, quality approvals, significant changes to process or inspection techniques.

Applicability

All suppliers are to fully comply with the stated requirements of this manual. Individual waivers on certain elements may be granted at the discretion of UAV Engines Ltd. Application for dispensation for any element of this manual is to be made in writing and presented to UAV Engines Ltd who will action the request internally with the relevant function

Purchase Order Requirements

The supplier shall adhere to all Purchase order Terms & Conditions plus stated special instructions. The PO is the controlling document and will communicate any deviations to the requirements stated within this manual, the drawing, Engineering Specifications or other as authorised to the supplier. Any queries must be highlighted and reported to UEL, prior to the commencement of any work. The Purchase Order will detail your current performance via a KPI score which is based on the scoring detailed later in this manual. Any query or concern regarding your scoring should be addressed to the Supply Chain Manager.



Protection of information

Any information the supplier receives from UAV Engines Limited must be kept confidential and never disclosed to any third party without the prior written agreement of UAV Engines Ltd. The proprietary information can include, but is not restricted to all versions of electronic data, drawings and documentation, Tooling and materials. Under no circumstance is the supplier to make a direct approach to UEL's customers in relation to agreed business dealings. Any information received from UEL suppliers will be treated in the same manner. This protection of information is covered under the UEL Non Disclosure Agreement. It is the suppliers responsibility to flow down all / any Non Disclosure Agreements through the supply chain for all UAV contracts.

Code of Conduct

This code is applicable to all UEL's supplier base and outlines the essential need for suppliers, their employees and sub-contractors to operate to the highest standards of business integrity in their relationship with UAV Engines Limited.

UAV Engines Ltd wishes to work collaboratively with all suppliers to ensure proper understanding and compliance with this code of conduct. It is recognised that there are different legal and cultural environments in the countries that UEL's supply base operate in, however this code of conduct sets forth the minimum requirements that all suppliers should meet in doing business with UEL.

Suppliers must comply with all national and other applicable laws and regulations relating to the respective country of operation. This includes ensuring that business transactions with UEL are fully reported / recorded, ensuring that their employees are aware and properly trained to meet the requirements.

UEL expects its suppliers to make proper provision for the health, safety and welfare of its people, visitors, contractors, customers and those in the community who may be affected by their activities.

Suppliers within the UEL supply base are expected to deal with UEL in a manner that avoids conflict between personal interests and those of the employer and UEL. This requirement applies equally to business relationships and personal activities.



Contingency Plans

Where appropriate, suppliers / sub-contractors shall be requested to prepare and submit a contingency plan to ensure Quality and Delivery requirements are met in the event of the following situations occurring:

- ▲ Emergency situations (Fire, flood, environmental incident)
- ▲ Utility supply interruptions
- ▲ Labour shortages
- ▲ Key equipment failure
- ▲ I.T Failure
- ▲ Adverse trading situations
- ▲ Appropriate Insurance cover for the key points listed above

Supplier Quality System Requirements

UAV Engines Limited requires all suppliers to acknowledge and retain total ownership for the quality of their products and to develop Quality Assurance Systems which ensure that the requirements of the purchase order are fully met.

The development of these systems should provide for continuing improvement in product quality, leading to the attainment of zero defects, whilst also providing speedy and effective corrective action in the event of defective products being delivered to UEL.

This Supplier Development manual is sequenced and based on the requirements of the ISO 9001 Quality System standard. It is a requirement of UEL that suppliers are to be ISO 9001 / AS9100 approved. Suppliers are evaluated and selected on an individual merit basis for the product/service they supply. Non ISO approved organisations will be expected to demonstrate adequate management and controls of their processes that satisfies UEL's minimum requirements



Quality Management System

The supplier shall establish and maintain a comprehensive documented quality system that provides a means of ensuring that products conform to specified requirements. This system shall control the issue of drawings, specifications, procedures etc. Provision shall be made for the control of obsolete copies and their subsequent archiving and disposition. **The use of correction fluid is not permitted on any UEL related documentation. Any amendment shall be made by crossing out the error with a single line and initialling the change.**

All records pertaining to quality shall be stored and maintained in a legible form for a minimum of 10 years. No records will be destroyed until authorised by UAV Engines Ltd. Specific projects and/or regulatory bodies may require longer retention periods and this will be notified in advance to the supplier.

Management Responsibility

The supplier shall make known a person to UAV Engines Limited, who will have the necessary authority and responsibility for product quality (Quality Representative).

It is expected that the named person will provide evidence of the supplier's commitment to the development and implementation of the quality management system and continually improving its effectiveness.

Resource Management

The supplier shall determine and provide the resources needed to maintain the quality system and continually improve its effectiveness, and enhance customer satisfaction by meeting UEL requirements.

Personnel performing work affecting product quality shall be competent on the basis of appropriate education, training, skills and experience. This competence will be defined and quantified with appropriate evidence.

The supplier shall determine, provide and maintain the infrastructure needed to achieve conformity to product requirements



Product Realization

Customer related processes (Contract review)

Orders or contracts shall be formally reviewed to ensure that the supplier has the technical, operational and logistical capabilities to meet the requirements. Any discrepancies or queries shall be resolved before the order or contract is accepted by the supplier. Amendments to orders or contracts shall be formally reviewed. Records of contract review shall be maintained.

Design and Development

If Design activities are undertaken for UAV Engines Limited by the supplier then design inputs and outputs shall be adequately specified (e.g. by relevant specifications). Formal documented reviews shall be held at appropriate stages of design. Designs shall be checked by verification (theoretical check) and validation (practical check). All design changes shall be documented and approved by UEL authorised personnel before implementation.

Purchasing

Suppliers shall not sub-contract any work awarded by UEL without prior consent from UAV Engines Limited.

The supplier should ensure that their subcontractors are evaluated and selected on their ability to meet specified requirements. A list of approved subcontractors shall be maintained. Purchasing documents shall clearly describe the relevant drawings including issue status and the quality requirements to be applied



SUPPLIER QUALITY ASSURANCE REQUIREMENTS

Applicable to all Purchase Orders

- All items delivered shall be manufactured in accordance with applicable industry standards for good workmanship and shall be fit for purpose, in all respects.
- Packaging shall be of a standard, to prevent damage and deterioration during shipment and storage.
- Individual boxes must not exceed 25kg in weight; anything above this weight must be palletised and secured accordingly.
- Electrostatic sensitive items must be packaged to prevent static damage and conspicuously marked as static sensitive, including the documentation.
- Limited life Materials or articles having a definite characteristic of quality degradation with age shall be marked in a manner to indicate when the useful life will be expended, including the documentation.
- Products will not be accepted with less than 75% shelf life remaining.
- All suppliers shall ensure all work is carried out in a manner preventing Foreign Object Debris from contaminating the deliverables.
- Items with open orifices must be capped, bunged or packaged in a way to prevent contamination during storage and shipping.

The supplier shall use the quality codes and documentation submittal requirements for each shipment. Applicable requirements must be flown down to sub-tier suppliers. In the event any requirement cannot be met, notify the UEL buyer immediately for clarification, direction and authorisation.

Please ensure that each PO is reviewed to realise the quality requirements that UEL stipulate per part, per shipment as they may differ from part to part. The coding and their requirements can be found within QD54 'SQAR' which is available from the UEL website. It is the supplier's responsibility to ensure that the latest revision level of SQAR codes are downloaded.



Production and service provision

Any product supplied by UAV Engines Limited for incorporation into assemblies by the supplier, shall be suitably verified and controlled. If any customer (UEL) property is lost, damaged or otherwise found to be unsuitable for use, this shall be reported to UEL and records maintained.

The status of material and product shall be clearly identified by suitable means throughout product realisation.

The Supplier's quality control documents shall contain as a minimum the following information:

- To be able to demonstrate conformity of the product and that all process operations have been completed.
- Accountability for all products (part quantities, split batches, non conformances etc)
- Detail any differences between the actual product configuration and the agreed configuration.
- Cross references to relative documents i.e. drawings, purchase order, specifications.
- Maintain issue control status between the drawing and all manufacturing control documentation i.e. job cards, route cards, operator instructions.
- If applicable contain correct part serial numbers - avoiding duplication. Strict control over the traceability of product via serial number shall be maintained at all times. When a product is scrapped, the serial number shall under no circumstances be transferred to a substitute part.

The supplier shall preserve the conformity of product during internal processing and delivery. This preservation shall include identification, handling, traceability, packaging, storage and protection.

F.O.D (Foreign Object Damage/Debris)

Suppliers shall ensure work is accomplished in a manner preventing foreign objects or material in deliverable items. Further items with any open orifice shall be capped or plugged to prevent ingress of FOD during storage and shipping.



Manufacturing processes shall be defined by documented procedures. Acceptance criteria for quality shall be defined in a clear and practical manner. Where processes cannot be verified by subsequent inspection or testing, such processes shall be performed by qualified operators or have suitable process control parameters established. All process controls shall be submitted to UEL when requested, and **any** changes to the process shall be advised to UEL prior to making any such change.

When applicable the supplier should clearly identify the date of expiry/shelf life and cure date of perishable / consumable items.

Where parts are classified as Key / Critical / Traceable / CSI *“any air vehicle part assembly, or installation containing a critical characteristic part whose failure, malfunction or absence may cause a catastrophic failure resulting in the loss or serious damage to the air vehicle”* suppliers shall apply additional controls when manufacturing such parts, the manufacturing processes shall be ‘frozen’ upon approval of the initial F.A.I.R and shall not be modified or changed without prior permission from UAV Engines Ltd.

CSI (Critical Safety Item) parts are subject to Control Plans agreed between UEL and UEL’s customer.

Suppliers of CSI / Class 1 products shall provide a completed IR (Inspection Report) which will be sent out with each Purchase Order from UAV Engines. This document details all features that we require specific inspection. The IR also requires the supplier to reference all relevant Certificates for all deliveries. Failure to provide a completed IR will result in the parts not being booked in and payment being delayed.

For base material the certificate should be as per BS EN 10204 type 3.1

Certificates of Conformity provided will include but not be limited to the following information:-

- UAV’s full order number
- Supplier’s delivery note number.
- Drawing/Issue numbers and/or Specification/Issue numbers.
- Batch/Serial numbers.
- A statement confirming the following:

“The goods have been inspected and tested to drawings/specifications quoted in the purchase order.

The goods conform in all respects to the requirements of the purchase order”



Control of monitoring and measuring devices

All measuring and test equipment used to demonstrate conformance of product shall be calibrated with reference to international or national standards. Such equipment shall be clearly marked with identification of its calibration status, including expiry date. Records of calibrated equipment shall be maintained. When equipment is found to be out of calibration, actions shall be taken to identify and rectify any affected product including product already despatched.

Measurement, Analysis and Improvement

Monitoring and Measurement of product

The supplier shall monitor and measure the characteristics of the product to verify that the product requirements have been met. This shall be carried out at appropriate stages of the product realisation process in accordance with the planned arrangements.

Ship to Stock

It is our policy to reduce the duplication of inspection by UEL and our suppliers wherever there is an established history of satisfactory quality. UEL will receive such goods direct to stock with zero incoming inspection. Suppliers shall record results of inspection as directed by UEL and send the results with the products. Ship to stock will only take place where contractually permissible by UEL and their customer. Unless otherwise notified UEL will perform a designated Goods Inwards Inspection.

The designation of ship to stock will be issued and controlled by UAV Engines Limited, through suitable and appropriate definition on the UEL Purchase Order.



Control of Non-conforming product

The supplier shall ensure that products, which do not conform to product requirement, are identified and controlled to prevent their unintended use or delivery. The controls and related responsibilities and authorities for dealing with non-conforming product shall be defined in a documented procedure. Nonconforming products that are received by UEL will be processed by our rejection procedure and the supplier will be liable for non-conformance administration costs and in the case of Ship to Stock items any costs associated with downstream manufacturing or recall. The supplier accepts the principle of such reasonable administration costs and the processing of debit notes where Nonconforming goods are identified after invoices have been paid.

Concession Application

Suppliers must submit a concession request **prior** to shipping non-conforming material to UEL. The request shall be for non-conforming material deemed fit for use, that however does not meet the drawing and/or stated specifications. The supplier shall properly identify non-conforming material accepted by the concession. Repeated applications for the same non-conformance or re-use of existing Concession will not be accepted and a corrective action / preventative action will be required for every concession granted. Please be aware Concessions will affect your vendor score.



Inspection Criteria

The criteria of each inspection level are explained below and the class is identified within the UEL drawing border.

Class 1

Parts that require measurement of all defined features, these will be defined on an IR supplied by UEL. These parts are to be 100% inspected and the measurement results submitted upon delivery, with supporting documentation as dictated by the SQAR code(s) detailed on the UEL Purchase Order.

Class 2

Parts that require sample measurements of defined features ***(these will be defined on an IR supplied by UEL as required)*** to a sample plan in accordance with BS6001 or an alternative agreed plan.

Class 3

Parts that in general require visual check to confirm that the part conforms as specified in the Purchase Order and match the part number description. C of C to be supplied when available

Customer specified supply – these parts are checked visually and where inspection data is specified this shall be confirmed as being in conformance.

Class 4

Will only be used for parts / assemblies that are defined as TOOLING. The supplier is required to ensure that all parts / assemblies meet the required specification. C of C to be supplied. Measurement reports / FAIR will not be required. Following delivery UEL will carry out 100% inspection of at least 1 part / assembly. Under certain circumstances a functional test of the tool may also be required to confirm conformity.



Corrective Action Report

UAV Engines Limited maintains a comprehensive system for the recording, monitoring and measurement of corrective actions. This system applies to both internal and externally generated concerns. In the event of a non-conformance, the supplier will be required to complete a Corrective Action Report. Root cause analysis shall be conducted to determine the cause of the non-conformance. The supplier shall complete the containment actions within 48 hours of receipt of issue and a target of 30 working days for complete closure. Supplier shall provide documented evidence of actions to prevent re-occurrence; this should be documented using an agreed format with UAV Engines Ltd. Please be aware that failing to adhere to the targets will affect your vendor score.

First Article Inspection Report (F.A.I.R)

The supplier shall provide a First Article Inspection Report (FAIR); this is required for the first batch produced from a new or modified drawing - after a change of the manufacturing process - as directed by UEL purchase order - a lapse in production for two years - as specified by the Customer. A First Article Inspection is a representative sample from the batch, which shall be 100%, inspected for conformance to dimensional, mechanical and/or performance requirements.

For all products: AS9102 FAI paperwork format accepted, both Excel / Word formats are available from the UEL Website. Forms other than those contained in AS9102 may be used; however they shall contain all “Required” and “Conditionally Required” information and have the same field reference numbers. All fields shall be addressed but may be marked as “not applicable” (N/A) if appropriate. Every design characteristic and drawing requirement, including drawing notes, shall have its own unique characteristic number. The numbers shall be recorded on the ballooned drawing(s) adjacent to the characteristic in addition to the form. This ballooned drawing(s) must be part of the UEL package.

Each engineering design characteristic shall be checked by direct measurement with currently calibrated measuring devices. Results from inspection of design characteristics shall be expressed in quantitative terms (variables data) when a design characteristic is expressed by numerical limits. The results recorded shall be in the units specified on the drawing or specification and shall be checked with currently calibrated measuring devices. CMM reports for models must indicate points inspected, tolerances and actual measurements recorded must be included in the FAI report.



Attribute data (e.g., go/no go, accept, pass, etc) may be used if no inspection technique resulting in variables data is feasible. Attribute data is permitted when the design characteristic does not specify numerical limits (e.g., break all sharp edges, markings, etc). Any discrepancies or non-conformances discovered during the FAI shall be documented and actioned by the appropriate UEL authority. All rejection documentation, UEL's dispositions and corrective action shall become part of the FAI report.

Any NC's accepted at FAI shall be re-measured as a Delta FAI when the next production is manufactured to demonstrate the corrective actions have been successfully applied.

Supplier Assessment

Method of Assessment

It is a requirement of UAV Engines Limited that suppliers must conform to one of the following controls.

The supplier has completed a UEL Supplier Quality Purchasing System Survey (SQPSS) or an equivalent supplier generated document that captures the requirements of UAV's SQPSS.

The suppliers Quality System will have been assessed and approved by UEL's Quality Department

The supplier may be registered as a BS EN ISO 9001 and/or AS EN 9100 approved organisation.

UAV Engines Ltd reserves the right to review / revoke an approval at any time and thus terminate business dealings.

Supplier Quality / Purchasing System Survey (SQPSS)

All potential new suppliers must complete the SQPSS. The blank form [QD1] will be forwarded by UAV Engines Ltd.

The purpose of the questionnaire is to give an initial overview of the supplier's organisation. After the completed questionnaire has been evaluated by UEL Quality Dept, a decision will be made as to the level of approval to be granted. This is based on the requirement for any further action such as assessment of the supplier's quality system



Supplier Audits

On site audits may be conducted as part of the initial introduction as a new supplier. The decision to audit a newly identified supplier depends on how many aspects such as criticality of supply, approvals held, location and financial implications. Notification of any planned audits will be given well in advance.

As part of UEL's Supplier Development programme and supplier control process, all Approved Suppliers may be subject to an ongoing Supplier Verification Audit. Selected Suppliers will be audited as necessary to verify product conformance. These audits may be made up of a cross-functional team consisting of procurement, quality and production staff. The purpose of a cross-functional team is to substantiate the effectiveness of the supplier's administration, manufacturing and quality system.

Approved Supplier List

UAV Engines Limited operates a controlled "Approved Supplier List" which consists of all suppliers approved to supply products/services to UEL.



Vendor Management System (VMS)

UAV Engines Limited operates a VMS to monitor and measure the performance of all Manufacturing Resource Suppliers. The process is an ongoing, comprehensive supplier monitoring and feedback procedure that allows UEL to communicate with its supplier base, recognising both high performance suppliers, as well as low performing suppliers.

Performance status is displayed on Purchase Orders and Non Conformance Reports. For detailed information regarding KPI Scoring and Grading please refer to QD56.

The following indices have been established as KPI's (Key Performance Indicators) used to measure the supplier's performance.

- ▲ **Quality Indices.** (50% of overall score).
- ▲ Number of Non Conformances.
- ▲ Overdue Corrective Action responses.
- ▲ PPM (Parts per million) score.

PPM levels for product quality will be calculated using the following formula:

$$\frac{\text{No of parts in the defective batch.} \times 1,000,000}{\text{No of parts received}}$$

- ▲ **Delivery Indices.** (50% of overall score).
- ▲ No of packaging anomalies.
- ▲ Documentation anomalies.
- ▲ Missed timeslot Deliveries

Any supplier that does not maintain acceptable performance requirements in any of the above established measurable will be invited to present to UEL's Quality and Purchasing functions, an action plan stating the supplier's intentions to show significant improvement towards meeting the required measurable within an agreed time period.

UEL will provide all the necessary assistance and resources to resolve all supplier related issues. However, repeated failure to comply with UEL requirements will inevitably result in the development of a resourcing plan for all products/services provided to UEL by the delinquent supplier. Current KPI scores can be seen on all incoming Purchase Orders and Non Conformance Reports. This score is a 3 month average, which provides each supplier an ongoing measure of their performance.



Forms / Documents

Examples of referenced forms are available for download from the UEL Website and / or via the Share Point Portal.

Title	Reference No
Supplier Development Manual	QD10
Terms and Conditions	
Non Disclosure Agreement	QD26
SQAR Coding	QD54
FAIR documents	QD5
Supplier Quality Purchasing System Survey	QD1
Vendor Management System KPI Scoring & Grading	QD56



Revision History

Detail	Issue Level	Date
Introduction of SDM	1	11.11.2008
Amendments to SDM Contingency Plan Protection of Supplier Information Certificate of Approval Use of correction fluids Revision History	2	06.01.2009
Amendments to SDM highlighted in grey Main areas modified: UEL Organisational Chart Production & Service Provision Inspection Criteria First Article Inspection Report	3	18.01.2011
Removal of Acknowledgement Form, APQP section & Contents Page. Organisational Chart updated, SQAR information added, Inspection Class section amended	4	25.06.2012
Changes to organisational chart Gauge R&R requirements removed Referencing QD54 SQAR coding.	5	06.06.2014
Removal of contact details and organisational structure	6	23.09.2014
Introduction of Class 4 inspection criteria and removal of person responsible on revision history	7	29.10.2014
Reference to VMS KPI Scoring and Grading document QD56	8	26.03.2015