AS9100 Quality Manual

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1 Scope

Advanced Companies (Advanced) has established a Quality Management System (QMS) compliant with AS9100 that applies to all three companies, co-located at 11212 E 112th St. N, Owasso OK 74055. These companies are:

- **Advanced Plastics, Inc.** (API) is a distributor of engineered plastics, and fabricator of plastics and metal components.
- **Advanced Machining & Fabricating, Inc.** (AMF) is a CNC machine shop and provider of precision components / parts (metal and plastic) and light assemblies.
- **Advanced Plastics Composites Marketing Group, Inc.** (CMG) is a distributor of composite materials, and manufacturer’s representative organization.

Advanced takes exclusions from clauses 7.3, design and development, and 7.5.1.4, post-delivery support, because Advanced does not design, develop or provide post-delivery support.

2 References

- AS9100C, Quality Management Systems – Requirements for Aviation, Space and Defense Organizations, revised 2009-01
- ISO 9000:2005, Quality management systems – Fundamentals and vocabulary

3 Terms and Definitions

- Advanced uses the terms and definitions provided in ISO 9000 and AS9100.
- E2 – Advanced’s ERP (Enterprise Resource Planning) system

4 Quality Management System

4.1 General Requirements

Advanced has implemented and maintains a quality management system and continually improves its effectiveness in accordance with the requirements of AS9100. Furthermore, Advanced’s QMS addresses customer and applicable statutory and regulatory quality management system requirements.

The QMS processes, their sequence and interaction are shown in Figure 1. Adequate resources and information necessary to support the operation and monitor processes are provided.
Figure 1. Advanced’s Quality Management System
4.2  Documentation

Documents are controlled in accordance with ADVCOS 1201, Document Control. Records are controlled in accordance with ADVCOS 1202, Records Control.

5  Management Responsibility

Top management demonstrates commitment to the QMS and improving its effectiveness by communicating the importance of meeting customer and regulatory requirements, establishing the quality statement (below), establishing objectives (below), conducting management reviews and ensuring the availability of adequate resources.

<table>
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<th>QUALITY STATEMENT</th>
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<td>Through a culture based on teamwork and continuous improvement, Advanced provides manufactured and distributed goods while bringing measured value to our customers and meeting requirements.</td>
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<tr>
<th>QUALITY OBJECTIVES</th>
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<tr>
<td>1. Increase on-time deliveries</td>
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<td>2. Increase sales</td>
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<td>3. Reduce scrap</td>
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<td>4. Reduce returns</td>
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Appropriate action is taken when planned results for product conformity or on-time delivery performance are not achieved.

The organizational chart in Figure 2 defines the basic management structure of Advanced. In all cases, the appropriate person has been granted both the responsibility and authority for their position's duties, which are further defined within position specific job descriptions.
Figure 2. Advanced Companies’ Organizational Chart

Top management shall review the QMS, at quarterly intervals, to ensure its continuing suitability, adequacy and effectiveness. This review shall include assessing opportunities for improvement and the need for changes to the QMS, including the quality Statement and objectives. Records (management review meeting minutes) are maintained.
6 Resource Management

Advanced’s management determines and provides the resources needed to maintain and continually improve the quality management system and enhance customer satisfaction. Adequate resources include a competent workforce comprised of individuals with the education, training, skills, and experience to perform assigned tasks and who are aware of the relevance and importance of their activities and how they contribute to the achievement of the quality objectives. Adequate resources also include the infrastructure and work environment necessary to achieve product conformity.

Specifically, Advanced has established a warehouse, production facility, and inspection lab with the necessary environmental controls for factors including temperature, humidity, lighting, and cleanliness.

Advanced’s internal server is equipped with a battery backup preventing loss of power and data in the event of a power outage. In the event of a sustained power outage, loss of data is prevented through daily back up. Critical data is also backed up daily through an off-site third party data storage vault.

7 Product Realization

7.1 Planning of Product Realization

Planning for manufacturing operations involves reviewing all related drawings, specifications, technical data provided by or referenced by the customer and creating the necessary programming, purchase orders, subcontractor’s instructions, and work order sequences for manufacturing and inspection steps. This process is performed by Value Stream or top management and includes the Programming and Inspection departments.

Advanced determines, as necessary,

a) the product requirements,
b) the need to establish any documents, processes, or specific resources,
c) the required inspections and tests to ensure product meets requirements,
d) related records to prove product meets requirements, and
e) configuration management to ensure the correct revision along with any engineering change notices or other customer-requested changes are incorporated.
Advanced does not have design authority for manufactured parts and does not determine what resources are required to support the use and maintenance of the parts it manufactures.

The output of the planning is the routing summary (available in E2), related drawings, inspection packages, operator check sheets, technical data, and/or specifications that show dimensions, characteristics, tolerances, and any key characteristics identified by Advanced or the customer.

### 7.1.1 Project Management

Advanced shall plan and manage operations in a structured and controlled manner to meet requirements at acceptable risk, within resource and schedule constraints.

### 7.1.2 Risk Management

Risks related to routine manufacturing operations are defined using team-based Process Failure Modes and Effects Analysis (PFMEA). PFMEA worksheets define risk criteria and identify, assess, and communicate risks. Top management reviews PFMEAs and has the authority to accept an identified risk or assign action to mitigate the risk.

Additional risks may be identified throughout contract review, purchasing, planning, production, inspection, and support processes. Actions taken to mitigate unacceptable risk are recorded in E2 (if related to a specific customer, supplier, part, or process) or otherwise in management review meeting minutes where related decisions are made and actions assigned.

### 7.1.3 Configuration Management

Configuration management includes planning, identification, change control, status accounting, and auditing. Part configuration is provided in the customer’s purchase order and referenced data. Configuration is identified on the job traveler and subsequent shipping documents based on the part-specific planning.

Configuration changes are controlled through the “1509 process” wherein all revision or configuration changes from the customer are communicated through the Value Stream, Planning, Programming, Production, and Quality. Each department has specific actions to take (defined on Form 1509) to ensure all changes are incorporated.

Configuration audits are conducted during internal audits.
7.1.4 Control of Work Transfers

Work transfers occur when Advanced sends or receives parts to/from a subcontractor. Parts and materials are adequately protected for shipment and any customer-provided requirements for shipping parts are followed. Parts sent for subcontracting include a purchase order that defines the subcontract work. Upon receipt from subcontractors, parts undergo receiving inspection to ensure adequate certification, traceability, and that parts were not damaged during the transfer. Sample inspections are recorded on job travelers.

7.2 Customer-Related Processes

7.2.1 Determination of Requirements

Advanced captures all contractual and special requirements, monitoring and measurement requirements, applicable statutory or regulatory requirements, and/or any necessary, unstated requirements as part of the contract review process.

7.2.2 Review of Requirements

Prior to accepting an order from a customer, Advanced shall review the product requirements and ensure that requirements are adequately defined (we understand what the customer needs), any differences between the quote and the order are resolved, Advanced has the ability to meet the requirements, special requirements are determined (as applicable), and risks have been defined.

Order Entry into E2 is the record of acceptable contract review and order acceptance.

Where product requirements are changed after work has begun, Advanced shall ensure that relevant documents are amended and that relevant personnel are made aware of the changes using the “1509 process”.

Advanced (typically API) sometimes performs miscellaneous work based on verbal requests, models, existing parts, or sketches from walk-in customers. If the Value Stream Manager determines that the part is non-critical and within Advanced’s capabilities, work will be initiated only after thorough communications with the customer to ensure Advanced understands the customer’s verbal requirements. Note, this is not applicable to aerospace or other regulated industries.
7.2.3 Customer Communication

Advanced determines and implements effective arrangements for communicating with customers in relation to

a. product information,

b. inquiries, contracts or order handling, including amendments, and

c. customer feedback, including customer complaints.

7.3 Design and Development

Not applicable: Advanced does not design or develop product.

7.4 Purchasing

7.4.1 Supplier Selection and Evaluation

Because Advanced is responsible for the conformity of all products purchased from suppliers, Advanced selects and evaluates suppliers in accordance with ADVCOS 1211, Supplier Selection and Evaluation.

7.4.2 Purchase Orders

Purchase orders or Terms & Conditions to suppliers and subcontractors shall include, where appropriate

a. requirements for approval of product, procedures, processes and equipment,

b. requirements for qualification of personnel,

c. quality management system requirements,

d. the identification and revision status of specifications, drawings, process requirements (specs), inspection/verification instructions and other relevant technical data,

e. requirements for design, test, inspection, verification (including production process verification), use of statistical techniques for product acceptance, and related instructions for acceptance by the organization, and as applicable critical items including key characteristics,

f. requirements for test specimens (e.g., production method, number, storage conditions) for design approval, inspection/verification, investigation or auditing,

g. requirements regarding the need for the supplier to

   □ notify Advanced of nonconforming product,
obtain Advanced’s approval for nonconforming product disposition,

- notify Advanced of changes in product and/or process, changes of suppliers, changes of manufacturing facility location and, where required, obtain Advanced’s approval, and

- flow down to the supply chain the applicable requirements including customer requirements,

- for supplier notification to Advanced of nonconforming product,

h. records retention requirements, and

i. right of access by the organization, their customer and regulatory authorities to the applicable areas of all facilities, at any level of the supply chain, involved in the order and to all applicable records.

Advanced shall ensure adequacy of specified purchase requirements before communicating them to supplier/subcontractor.

7.4.3 Receiving Inspection

Raw materials and parts are received in accordance with Work Instruction 1420, Receiving Raw Material. Processed parts from subcontractors are received and inspected in accordance with Work Instruction 1422, Receiving Outside Processing.

Purchased product is not released for production until all required receiving inspection activities are complete and product has been found to meet requirements. Inspection (verification) activities are not delegated to suppliers. Should Advanced, or their customer, intend to perform inspection (verification) at the supplier’s premises, Advanced will state the intended arrangements in the purchase order.

7.5 Production

7.5.1 Control of Production

Advanced plans and carries out production under controlled conditions. Controlled conditions include, as applicable:

a. the availability of information that describes the characteristics of the product,

b. the availability of work instructions, as necessary,

c. the use of suitable equipment,

d. the availability and use of monitoring and measuring equipment,

e. the implementation of monitoring and measurement,

f. the implementation of product release and delivery,
g. accountability for all products during production (e.g., parts quantities, split orders, nonconforming product)

h. evidence that all production and inspection/verification operations have been completed as planned, or as otherwise documented and authorized,

i. provision for the prevention, detection, and removal of foreign objects,

j. monitoring and control of utilities and supplies such as water, compressed air, electricity and chemical products to the extent they affect conformity to product requirements, and

k. criteria for workmanship (e.g., deburr or blending – smoothing out steps), specified in the clearest practical way (e.g., written standards, representative samples, or illustrations).

Planning considers, as applicable,

- establishing, implementing and maintaining appropriate processes to manage critical items, including process controls where key characteristics have been identified,
- designing, manufacturing and using tooling to measure variable data,
- identifying in-process inspection/verification points when adequate verification of conformance cannot be performed at later stages of realization, and
- special processes (see 7.5.2).

7.5.1.1 Production Process Verification

Advanced provides for the inspection, verification and documentation of a representative item from the first production run of a new part or assembly, or following any subsequent change that invalidates the previous first article inspection result. A First Article Inspection Report is provided when specified by the customer.

7.5.1.2 Control of Production Process Changes

Programming / Planning, Lead Machine Operator, Production Manager, Quality, Shipping/Receiving Manager, or Value Stream have the authority to approve changes to production processes.

To ensure product conformity, Advanced shall validate production processes; equipment, tools, setup and software programs through first piece inspection at each operation.

Equipment and process changes shall be documented on the job traveler. Permanent revisions to the job traveler shall be made in E2 and the specific changes documented in the comments.
section, so revisions can be tracked through the audit trail feature. Temporary revisions may be
hand-written on the job traveler and must be initialed and dated by someone with approval
authority.

7.5.1.3 Control of Production Equipment, Tools and Software Programs

Production equipment, tools and software programs used to automate and control / monitor
product realization processes, will be validated prior to release for production and will be
maintained.

Holding fixtures (vises, jaws, etc.), when not in use shall be stored indoors; they shall be
lubricated and inspected as necessary before use.

7.5.1.4 Post-Delivery Support

As of this revision, Advanced has no contractual requirements relating to post-delivery support.

7.5.2 Validation of Processes for Production (Special Processes)

Special processes are not performed in-house. Advanced subcontracts coatings, material
conversions, surface enhancement, chemical processing and non-destructive testing.

Validation demonstrates the ability of these processes to achieve planned results.

Advanced shall specify arrangements for these processes including, as applicable

a. defined criteria for review and approval of the processes,
b. approval of equipment and qualification of personnel,
c. use of specific methods and procedures,
d. requirements for records (see 4.2.4), and
e. revalidation.

7.5.3 Identification and Traceability

Product is identified by suitable means throughout product realization in accordance with Work
Instruction 1419, Identification.

Advanced shall maintain the identification of the configuration of the product in order to
identify any differences between the actual configuration and the agreed configuration.

Product status with respect to monitoring and measuring requirements is identified;
nonconforming parts are identified (and segregated) in accordance with ADVCOS 1204, Control
of Non-Conforming Product.
Inspection stamps are controlled in accordance with ADVCOS 1212, *Stamp Control*.

Where traceability is a requirement, Advanced controls and records the unique identification of the product according to the level of traceability required by contract, regulatory, or other established requirements.

Advanced’s system provides for:

- identification to be maintained throughout the product life,
- all the products manufactured from the same batch of raw material or from the same manufacturing batch to be traced, as well as the destination (delivery, scrap) of all products of the same batch,
- for an assembly, the identity of its components and those of the next higher assembly to be traced, and
- for a given product, a sequential record of its production (manufacture, assembly, inspection) to be retrievable.

### 7.5.4 Customer Property

Advanced exercises care with customer property while it is in Advanced’s control or use. Advanced shall identify, verify, protect and safeguard customer property provided for use or incorporation into the product. If any customer property is lost, damaged or otherwise found to be unsuitable for use, Advanced will report it to the customer and records maintained in accordance with ADVCOS 1202, *Records Control*.

### 7.5.5 Preservation of Product

Advanced preserves the product during internal processing and delivery to the intended destination in order to maintain conformity to requirements. As applicable, preservation includes identification, handling, packaging, storage and protection. Preservation also applies to the constituent parts of a product.

Preservation of product also includes, where applicable in accordance with product specifications and applicable statutory and regulatory requirements provisions for:

a. cleaning,
b. prevention, detection and removal of foreign objects,
c. special handling for sensitive products,
d. marking and labeling including safety warnings,
e. shelf life control and stock rotation,
f. special handling for hazardous materials.

7.6 Control of Monitoring and Measuring Equipment

Advanced manages a calibration program in accordance with ADVCOS 1210, *Control of Monitoring and Measuring Equipment*.

8 Measurement, Analysis, & Improvement

8.1 General

Advanced plans and implements the monitoring, measurement, analysis and improvement processes needed:

a. to demonstrate conformity to product requirements,
b. to ensure conformity of the quality management system, and
c. to continually improve the effectiveness of the quality management system.

This includes determination of applicable methods, including statistical techniques, and the extent of their use.

8.2 Monitoring and Measurement

8.2.1 Customer Satisfaction

As one of the measurements of the performance of the quality management system, Advanced monitors information relating to customer perception as to whether the organization has met customer requirements. The methods for obtaining and using this information are determined.

Advanced collects feedback from customers using one or more of the following methods to monitor and measure customer satisfaction:

a. corrective action requests
b. customer feedback, including complaints,
c. customer-provided performance data
d. on-time delivery
e. customer returns
Advanced develops and implements plans for customer satisfaction improvement to address deficiencies identified by these evaluations and assesses the effectiveness of the results.

8.2.2 Internal Audit

Internal audits are performed in accordance with ADVCOS 1205, Internal Audits.

8.2.3 Monitoring and Measurement of Processes

Advanced shall apply suitable methods for monitoring and, where applicable, measurement of the quality management system processes.

These methods demonstrate the ability of the processes to achieve planned results. When planned results are not achieved, correction and corrective action is taken, as appropriate.

In the event of process nonconformity, Advanced

a. takes appropriate action to correct the nonconforming process,
b. evaluates whether the process nonconformity has resulted in product nonconformity,
c. determines if the process nonconformity is limited to a specific case or whether it could have affected other processes or products, and
d. identifies and controls any nonconforming product.

8.2.4 Monitoring and Measurement of Product

Advanced monitors and measures the characteristics of the product to verify that product requirements are met. This is carried out at appropriate stages of the product realization process in accordance with the planned arrangements. Evidence of conformity with the acceptance criteria will be maintained as inspection steps on the traveler, in-process inspection sheets (IPIS), operator check sheets, CMM reports, and/or first article inspection reports.

Measurement requirements will include:

a. criteria for acceptance and/or rejection,
b. where in the sequence measurement and testing operation are performed,
c. required records of the measurement results and at minimum indication of acceptance or rejection, and
d. any specific measurement instruments required and any specific instructions associated with their use.
When critical items, including key characteristics, have been identified Advanced ensures they are monitored and controlled in accordance with established processes.

When Advanced uses sampling inspection as a means of product acceptance, the sampling plan is justified on the basis of recognized statistical principles and appropriate for use.

Product is not to be released until it has been inspected or otherwise verified as conforming to specified requirements.

Records indicate the person(s) authorizing release of product for delivery to customer.

Where required to demonstrate product qualification Advanced ensures that records provide evidence that the product meets the defined requirements.

Product release and delivery will not proceed until all the planned arrangements have been satisfactorily completed, unless otherwise approved by a relevant authority, and where applicable by the customer.

Advanced ensures that all documents required by the contract/order to accompany the product are present at delivery and are protected against loss and deterioration.

**8.3 Control of Nonconforming Product**

Nonconforming product is controlled in accordance with ADVCOS 1204, *Control of Nonconforming Product*.

**8.4 Analysis of Data**

Advanced determines, collects and analyzes appropriate data to demonstrate the suitability and effectiveness of the quality management system and to evaluate where continual improvement of the effectiveness of quality management system can be made. This includes data generated as a result of monitoring and measurement and from other relevant sources.

The analysis of data provides information relating to:

a. customer satisfaction (see 8.2.1),
b. conformity to product requirements (see 8.2.4),
c. characteristics and trends of processes and products including opportunities for preventive action (see 8.2.3 and 8.2.4), and
d. suppliers (see 7.4).
8.5 Improvement

Advanced continually improves the effectiveness of the quality management system through the use of the Quality Statement, quality objectives, audit results, analysis of data, corrective and preventive actions and management review. Corrective actions are performed in accordance with ADVCOS 1206, Corrective Action. Preventive actions are performed in accordance with ADVCOS 1207, Preventive Action.