**THALES DEFENSE & SECURITY, INC.**

**QUALITY MANUAL**

**AS9100**

**1900555, Rev. 15**

This Quality Manual was approved for initial use effective August 14, 1996 by the unanimous action of the Executive Quality Council (EQC) on August 14, 1996. The EQC approves subsequent revisions prior to release.

# EQC APPROVAL LIST

**THALES DEFENSE & SECURITY, INC.**

**AS9100 QUALITY MANUAL (Doc. # 1900555)**

**Rev. 15**

**Approval List**:

|  |
| --- |
| President and CEO |
| CFO, Vice President Finance, & Compliance Officer |
| Vice President Communications |
| Vice President Engineering & CTO |
| Vice President Human Resources & Ethics Officer |
| Vice President Operations |
| Vice President Program Management, Legal, Contracts, & Trade Compliance |
| Vice President Sensors and Missile Systems |
| Vice President Systems Solutions |
| Vice President Visionix |

# REVISION HISTORY

|  |  |  |
| --- | --- | --- |
| **Rev.** | **Date** | **Change Description** |
|  | 08/14/96 | Initial Release |
| A | 12/20/96 | Incorporated changes as a result of initial auditing and review |
| B | 02/05/97 | Incorporated minor changes as a result of ISO Document Review |
| C | 12/17/97 | Incorporated minor revisions as a result of Internal Auditing and organization changes |
| D | 10/01/99 | Incorporated minor changes as a result of implementing PeopleSoft in place of MANMAN, title change of the Director of Product Assurance, and added reference to organization charts which have been removed from the document. |
| E | 07/01/01 | Incorporated changes due to company name change, address change, and incorporation of Aviation Electronics. |
| F | 11/19/02 | Reformatted and revised to conform to the requirements of the ISO 9001:2000 standard. |
| 1 | 4/15/05 | Assigned a PeopleSoft document number (1900555), initial release as 01 under the TCI Document Release Process (**NOTE: All previous alpha revisions were not maintained under the TCI Document Release Process)**: Added: (1) process changes due to reorganizations; (2) process improvement initiatives (Integrated Program Management [IBPM] and Capability Maturity Model [CMM], and Capability Maturity Model Integrated [CMMI]); (3) use of the TCI Intranet to access procedures and organization charts; (4) a TCI Business Development and Conference Center facility and a Software Engineering facility; (5) TCI Process Map; and (6) added CMMI references in Appendix E. CHANGED: The TCI Quality Policy. |
| 2 | 8/9/05 | Expanded Management Reviews to address the full scope of the TCI ISO Certificate, added the Ft. Wayne facility, added Internal Controls Audit Program; and listed the six types of TCI Corrective Action Requests. |
| 3 | 2/6/06 | Changed Quality Policy to include continual improvement; added Bldg. 4; revised TCI Process Map; included a separate process map for Ft. Wayne; revised 7.3.6 for Product Assurance testing.Added CMMI level 3 process areas to Appendix E. Added the TCI lifecycle (TLC) to the Overview. |
| 4 | 4/9/07 | Removed references to Process Definitions (PDs), Integrated Bid and Program Management (IBPM), and the Ft. Wayne Facility.Added expansion in Bldg. 3 and Appendix F; and TCI’s achievement of CMMI Level 3. |
| 4 | 4/9/07 | Removed references to Process Definitions (PDs), Integrated Bid and Program Management (IBPM), and the Ft. Wayne Facility.Added expansion in Bldg. 3 and Appendix F; and TCI’s achievement of CMMI Level 3. |
| 5 | 4/2/08 | Removed Sr. Director, Finance, and Sr. Director, Quality Assurance, and changed title to VP, Finance and CFO from the approval list.Added Appendix F, Environmental Management System.Added two additional quality metrics: one to address TCI Business goals and one to monitor the financial health of TCI.Revised the TCI core processes, the Process Flow Diagram, Process IPO Diagram, and Process-Output Map. |
| **REVISION HISTORY (cont.)** |
| **Rev.** | **Date** | **Change Description** |
| 6 | 2/23/09 | Added ISO 14001 to title and Organization Process Improvement Plan (PIP) to Continual Improvement section.Revised the Quality Manual to conform to the ISO 9001:2008 standard; the TCI Quality Policy; the TCI Process Map; Appendix E for CMMI V1.2; and the Development and Design Validation, Monitoring and Measurement, and Improvement sections to reflect current practices. |
| 7 | 05/05/09 | Minor change to Appendix F par 4.4.3 – Clarify internal / external EMS communication responsibilities. |
| 8 | 03/22/11 | Added evaluation of effectiveness of preventive actions and Building 5.Established a subset of TCI’s Overall Quality Policy in Section 5.3 for the operations performed in each TCI facility.Minor changes made throughout the document, TCI Process Map, and Appendix F. |
| 9 | 06/24/13 | Revised to reflect Organizational and infrastructure changes.Removed Appendix E, CMMI Organizational Process Standards. |
| 10 | 01/17/14 | Changed name to Thales Defense & Security, Inc. (TDSI) |
| 11 | 01/09/15 | Added CMMI Model – Process description and required goals for each of the 18 processes required for Level 3 Process Maturity.Revised the location of Building 4.Removed references to the Environmental Management System. |
| 12 | 6/22/15 | Added AS9100 standard requirements.Removed separate Records Matrix and consolidated core procedures and associated records in the TDSI Process Document Matrix. |
| 13 | 9/28/15 | Added requirement for control of outsourced processes to 4.1.Added ensuring product conformity and on-time delivery performance are measured and appropriate action is taken if planned results are not, or will not, be achieved to 5.2Revised the TDSI Quality Policy in 5.3.2 and 5.3.3.Added reference to a TDSI quality plan to 7.1.Added references to special requirements and examples of post-delivery activities to 7.2.1. |
| 14 | 9/7/17 | Incorporated AS9100D requirements |
| 15 | 8/14/18 | Added Systems Solutions and Sensors and Missile Systems.Added general description of TDSI’s Core Processes and revised the TDSI QMS Core Process Flow Diagram to address NCR JTW-01 from 2018 recertification audit.Revised to reflect Clarksburg facility moves from Bldg. 2 to Bldg. 1 and Bldg. 3.Limited scope of CMMI to the TDSI Clarksburg campus. |
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# FOREWORD

This manual documents Thales Defense & Security, Inc.’s (TDSI’s) process for maintaining quality in design, development, production, installation, and servicing of tactical electronics products and systems at its Montgomery County, Maryland operations. The manual conforms to the requirements of the AS9100D, Quality Management Systems – Requirements for Aviation, Space and Defense Organizations.

This manual is supported by the TDSI Process Document Matrix listing the TDSI core process documents that address all AS9100D Quality Management System requirements.

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# OVERVIEW

Thales Defense & Security, Inc. (TDSI) is a world leader in the market of tactical electronics products and systems. TDSI, headquartered in Clarksburg, Maryland, designs, develops, manufactures, repairs, markets, and supports tactical electronics products and systems for U.S. and Allied military and the U.S. Federal Government. TDSI’s miniaturized tactical electronic products and systems provide reliable, secure links for critical voice and data communications and other tactical applications. TDSI’s success in the tactical electronics products and systems market has enabled TDSI to expand its product lines to encompass a wider range of mission critical products and services. TDSI is backed by the assets of the worldwide Thales Group of electronics companies, but operates independently of foreign ownership, control and influence through a U.S. Government sanctioned proxy trust arrangement. The combination of local control and access to the resources of a large company allows TDSI to be agile in a world of change with quick response to customer direction, and yet still have deep financial and technical resources.

TDSI continues to achieve profitable growth by focusing on quality and efficiency improvements in the key areas of product design, manufacturing, repair, product testing, business development, and product support. The use of computer aided design and analysis reduces product development time, improves product quality and reliability, and increases responsiveness to customers. TDSI continues to significantly improve manufacturing efficiency and product quality levels through prudent investment in leading edge electronic assembly equipment, streamlined production work flow, and broad employee training programs. Extensive use of automated test and data collection enables TDSI to thoroughly test and continuously monitor performance trends to identify and correct problems before problems significantly impact production flow, cost, quality, or schedule.

TDSI recognizes the critical role suppliers play in TDSI’s success. As such, TDSI works proactively, by carefully selecting suppliers, monitoring supplier quality, providing accurate and timely feedback, and aiding suppliers in corrective actions.

To ensure compliance with the requirements outlined in the Sarbanes-Oxley Act, TDSI instituted an Internal Controls Audit Program.

The TDSI Clarksburg campus maintains a systematic approach to product development in accordance with the CMMI Institute) Capability Maturity Model Integration (CMMI) Level 3 processes. The Thales LifeCycle (TLC), TDSI’s product development lifecycle model, consists of a series of tollgates with a set of defined inputs and outputs that must be met before proceeding to the next tollgate. Each tollgate has a standard set of required approvers. The TLC, with the tollgates, is documented in the TCINet.

The key element in TDSI’s successes is the dedicated involvement of each of its employees. Through communication of our commitment to quality, focus on internal and external customers, and an ongoing training program, all employees focus on achievement of the well-defined goals in the State-of-the-Company presentation. The vitality of TDSI’s intense commitment to “Continual Improvement” flows through the entire organization, extending from the Senior Staff Management Reviews through the Suggested Improvement Opportunity and Employee Recognition Award Programs. People, the most valued resource, are essential to TDSI’s increased quality, productivity and continued success.

# 1 SCOPE

## 1.1 General

This Quality Manual documents Thales Defense & Security, Inc. (TDSI) performance of the tasks associated with the AS9100D standard. The manual provides the direction for TDSI to:

a. Demonstrate the ability to consistently provide product that meets customer and applicable legal requirements.

b. Enhance customer satisfaction though the effective application of TDSI’s Quality Management System (QMS), including processes for improvement of the QMS and the assurance of conformity to customer and applicable legal requirements.

## 1.2 Application

This manual is applicable where design, product development, production, installation, and servicing are required. The foundation for TDSI’s QMS and the implementation of the QMS is provided through the processes defined in this manual and Policy Procedures (PPs), Operating Procedures (OPs), Operating Instructions (OIs), associated Operating Templates (OTs), and Manufacturing Work Instructions (WIs). No exclusions are made.

# 2 NORMATIVE REFERENCE

This Quality Manual contains provisions in accordance with the AS9100D standard. As changes occur in the national standard or in TDSI procedures, this manual is revised accordingly. The TDSI Quality Management Representative maintains the TDSI Quality Manual.

# 3 TERMS AND DEFINITIONS

The definitions listed in ISO 9000:2005, Quality Management Systems – Fundamentals and Vocabulary, and the AS9100, Section 3, apply.

3.1 Outsourced Process. A process that TDSI needs for its QMS that TDSI chooses to have performed by an external party.

3.2 Risk. An undesirable situation or circumstance that has both a likelihood of occurring and a potentially negative consequence.

3.3 Special Requirements. Those requirements identified by the customer, or determined by TDSI, which have high risks to being achieved, thus requiring their inclusion in the risk management process. Factors used in the determination of special requirements include product or process complexity, past experience, and product or process maturity. Examples of special requirements include performance requirements imposed by the customer that are at the limit of the industry's capability, or requirements determined by TDSI to be at the limits of TDSI’s technical or process capabilities.

3.4 Critical Items. Those items (e.g., functions, parts, software, characteristics, processes):

* Having significant effect on the product realization and use of the product; including safety, performance, form, fit, function, producibility, service life, etc.
* Requiring specific actions to ensure the critical items are adequately managed.
* Examples of critical items include safety critical items, fracture critical items, mission critical items, key characteristics, etc.

3.5 Key Characteristic. An attribute or feature whose variation has a significant effect on product fit, form, function, performance, service life, or producibility, that requires specific actions to control variation.

3.6 Planned Activities. The means, methods, and internal requirements by which TDSI intends to achieve planned results of a given process to meet customer, regulatory or statutory, and AS9100 requirements. Planned activities include conformity to process requirements and procedures.

3.7 Planned Results. The intended performance of a process, as defined and measured by TDSI. Planned results include product conformity and on-time-delivery to meet customer requirements, and may include other elements related to the process as define by TDSI’s QMS.

3.8 Key Performance Indicator (KPI). Measure associated with goals or targets established by TDSI that show how well TDSI is achieving its objectives or critical success factors for a particular project or process. KPIs are used to objectively define a quantifiable and measurable indication of TDSI’s progress towards achieving its goals.

3.9 Containment. Action to control and mitigate the impact of a non-conformity and protect the customer’s operation (stop the problem from getting worse). Containment includes correction, immediate corrective action, immediate communication, and verification that the nonconforming situation does not further degrade.

3.10 Counterfeit Parts. An unauthorized copy, imitation, substitute, or modified part (e.g., material, part, component), which is knowingly misrepresented as a specified genuine part of an original or authorized manufacturer. Examples include, but are not limited to, the false identification of marking or labeling, grade, serial number, date code, documentation, or performance characteristics.

3.11 Product Safety. The state in which a product is able to perform to it’s designed or intended purpose without causing unacceptable risk of harm to persons or damage to property.

3.12 Organizational Knowledge. Knowledge specific to TDSI that is generally gained by experience. It is information that is used and shared to achieve TDSI’s objectives and can be based on (a) internal sources (e.g., intellectual property; knowledge gained from experience; lessons learned from failures and successful projects; capturing and sharing undocumented knowledge and experience; the results of improvements in processes, products and services); and (b) external sources (e.g., standards; academia; conferences; gathering knowledge from customers or external providers).

# 4 CONTEXT OF TDSI

## 4.1 Understanding TDSI and Its Context

TDSI determined external and internal issues that are relevant to TDSI’s purpose and strategic direction and that affect TDSI’s ability to achieve the intended result(s) of its QMS. TDSI monitors and reviews information about these external and internal issues.

## 4.2 Understanding the Needs and Expectations of Interested Parties

Due to their effect or potential effect on TDSI’s ability to consistently provide products and services that meet customer and applicable legal requirements, TDSI determined interested parties relevant to TDSI’s QMS and the requirements of these interested parties. The list of relevant interested parties is summarized in Table 1. TDSI monitors and reviews information about these interested parties and their relevant requirements.

**Table 1. Summary of Relevant Interested Parties**

|  |  |  |  |
| --- | --- | --- | --- |
| **Relevant Interested Party** | **Needs & Expectations** | **How we address** | **Risk** |
| Thales Group Corporate | * Profitability
* Innovation
* Ethical business practices
 | * Strategic planning
* Operation to budget
 | * Loss of profitability
* Business survival
 |
| TDSI Proxy Board | Maintaining US Govt. FOCI statutes | * Security Planning
* Proxy Board
 | * Penalties / fines
* Inability to conduct business
 |
| US DOD Armed Services | * Deliver highly reliable mission critical equipment
* Meet requirements
* On-time delivery
 | Thales Life Cycle | * Loss of profitability
* Business survival
 |
| International Defense Markets | * Deliver highly reliable mission critical equipment
* Meet requirements
* On-time delivery
 | Thales Life Cycle | * Loss of profitability
* Business survival
 |
| US Federal Agencies | * Deliver highly reliable mission critical equipment
* Meet requirements
* On-time delivery
 | Thales Life Cycle | * Loss of profitability
* Business survival
 |
| Defense Contractor Management Agency (DCMA) | * Meet contract requirements
* Maintain an approved QMS
 | * Contract review
* Thales Life Cycle
 | * Loss of profitability
* Business survival
* Increased oversight
 |
| Defense Contactor Auditing Agency (DCAA) | Maintain an approved Cost Accounting System in accordance with the FAR | Internal Controls | * Loss of profitability
* Business survival
* Increased oversight
 |
| Prime Aerospace / Defense Contractors | * Meet contract requirements
* Provide highly reliable mission critical equipment
 | Thales Life Cycle | * Loss of profitability
* Business survival
* Increased oversight
 |
| Satellite Communication Customers | * Deliver highly reliable mission critical equipment
* Meet requirements
* On-time delivery
 | Thales Life Cycle | * Loss of profitability
* Business survival
 |
| Thales Intracompany Business Lines | * Strategic design collaboration
* Responsiveness
 | * Strategic Planning
* Thales Life Cycle
* Chorus 2.0
 | * Loss of diversification
* Profitability
* Business survival
 |
| Federal / State / Municipal regulatory agencies | Meet regulatory requirements | * Facilities monitoring
* Internal controls
* Thales Life Cycle
 | * Penalties / fines
* Inability to conduct business
 |
| External Providers / Subcontractors | * Fair business practices
* Timely payment
 | Supplier Agreement Process | * Ineffective unreliable supply chain
* Deliver equipment on time with profit margin
 |
| TDSI Employees | * Fair and ethical treatment
* Job Security
 | * Employee handbook
* Benefits package
* Training plans
 | * Poor morale
* Turn-over
* Impacting cost
 |
| Independent certification bodies | Ethical, honest, reporting / behavior | * Internal control
* Internal audits
* Annual ethics training
 | * Lose certifications
* Inability to bid new contracts
 |

## 4.3 Determining the Scope of TDSI’s QMS

4.3.1 TDSI determined the boundaries and applicability to establish the scope of TDSI’s QMS. In determining the QMS scope, TDSI considered the internal and external issues, the requirements of relevant interested parties, and TDSI products and services.

4.3.2 TDSI’s Quality Manual conforms to the AS9100D requirements and TDSI’s quality policy and documents TDSI’s compliant QMS. The scope of the QMS is fully defined in the Quality Manual – No exclusions taken. The TDSI Quality Manual is reviewed and approved by TDSI Senior Management and includes:

a. Reference to the documented procedures established for the QMS.

b. A description of the interaction between the processes TDSI’s QMS.

## 4.4 TDSI’s QMS and the QMS Processes

4.4.1 TDSI maintains and continually improves its QMS. The TDSI QMS addresses customer and applicable legal quality management system requirements. The commitment to and application of the TDSI QMS is focused on conformity to customer requirements, concurrently aligning to the TDSI Quality Policy and Quality Objectives, and is supported and encouraged through the leadership of the President/CEO and his staff. TDSI:

1. Determined the processes needed for its QMS and their application throughout TDSI.
2. Determined the inputs and the outputs expected form these processes.
3. Determined the sequence and interaction of these processes.
4. Defined and applied the criteria and methods needed to ensure effective operation and control of these processes.
5. Determined the availability of the resources needed for these processes.
6. Assigned the responsibilities and authorities for these processes.
7. Addressed the risks and opportunities.
8. Evaluates these processes and implements any changes needed to ensure these processes achieve their intended results.
9. Improves the processes and the QMS.
10. Maintains organizational standards, process descriptions and procedures in accordance with CMMI for Development® Model Level 3.

4.4.2 To the extent necessary, TDSI maintains documented information to support the operation of TDSI processes and retains documented information to have confidence that the processes are carried out as planned. TDSI personnel have access to, and are aware of, relevant TDSI QMS documented information and changes. TDSI QMS documented information includes:

1. Documented statements of TDSI’s quality policy and quality objectives.
2. This quality manual.
3. Documented information required by the AS9100D standard.
4. Documented information determined by TDSI to be necessary to ensure the effective planning, operation, and control of TDSI’s processes.
5. A general description of relevant interested parties.
6. The scope of TDSI’s QMS, including boundaries and applicability.
7. A description of the processes needed for TDSI’s QMS and their application throughout TDSI.
8. The sequence and interaction of these processes
9. The assignment of the responsibilities and authorities for these processes.

4.4.3 Where TDSI chooses to outsource any process that affects product conformity to requirements or legal requirements, TDSI ensures control over such processes. The type and extent of control to be applied to these outsourced processes is defined within the TDSI QMS. Processes include processes for management activities, provision of resources, product realization, measurement, analysis, and improvement. Ensuring control of outsourced processes does not absolve TDSI of the responsibility of conformity to all customers, statutory and regulatory requirements. The type and extent of control to be applied to the outsourced process can be influenced by factors such as:

a. The potential impact of the outsourced process on TDSI’s capability to provide product that conforms to requirements.

b. The degree to which the control for the process is shared.

c. The capability of achieving the necessary control through the application of TDSI’s Purchasing Process.

4.4.4 The TDSI QMS Structure.

a. Figure 1 illustrates the interaction of TDSI’s QMS five core processes:

* Leadership and Monitor/Control. Establish the direction for TDSI’s Quality and Business Management System by establishing strategic goals and objectives, assessing performance to TDSI’s strategic goals and objectives, and ensuring continual conformance to requirements.
* Design/Development. Capture business and ensure requirements are identified and managed for the development of TDSI products. The Proposal/Contract Review Key Performance Indicator (KPI) assesses effectiveness of conformance to proposal/product requirements. The Product Development Performance Index (PDPI) KPI assesses effectiveness of product development activities.
* Build/Repair. Build deliverable products and repair customer returns that conform to requirements. The Purchasing KPI assesses TDSI’s suppliers for on-time delivery and quality of purchased materials. The Manufacturing Quality Metric KPI assesses the effectiveness of the product build activities.
* Order Delivery. Deliver products that conform to the requirements specified in customer orders.
* Customer Support. Provide after-market support to customers for delivered products.

**Figure 1. TDSI QMS Core Process Flow Diagram**



b. Appendix A summarizes TDSI functional area interactions as a bubble chart.

c. Appendix B summarizes TDSI’s QMS inputs and outputs in an Input-Process-Output (IPO) block diagram.

d. Appendix C illustrates TDSI’s Process Mapping to the AS9100D elements.

e. Appendix D outlines the TDSI Organizational Process Standards related to the CMMI-DEV model.

# 5 LEADERSHIP

### 5.1 LEADERSHIP AND COMMITMENT

5.1.1 TDSI’s commitment to the development and implementation of TDSI’s QMS and continually improving QMS effectiveness begins with our President/CEO, is supported by his staff, and extends to everyone in the company. TDSI Senior Management demonstrates leadership and commitment with respect the TDSI’s QMS by:

* 1. Taking accountability for the effectiveness of the QMS.
	2. Ensuring that the quality policy and quality objectives are established for the QMS and are compatible with TDSI’s context and strategic direction.
	3. Ensuring the integration of the QMS requirements into the TDSI’s business processes.
	4. Promoting the use of the process approach and risk-based thinking.
	5. Ensuring that the resources needed for the QMS are available.
	6. Communicating the importance of effective quality management and of conforming to the quality management system requirements.
	7. Ensuring that the QMS achieves its intended results.
	8. Engaging, directing, and supporting persons to contribute to the effectiveness of the QMS.
	9. Promoting improvement.
	10. Supporting other relevant management roles to demonstrate their leadership as it applies to their areas of responsibility.

a. Customer requirements are determined and are met with the aim of enhancing customer satisfaction, product conformity, and on-time delivery.

b. Performance is measured and appropriate actions are taken if planned results are not, or will not be, achieved.

c. Management Reviews, presided over by Senior Management, provide the leadership for and define the commitment to continually improve the QMS effectiveness by:

* + - * Communicating to TDSI the importance of meeting customer as well as legal requirements.
			* Establishing a Quality Policy.
			* Establishing Quality Objectives.
			* Conducting management reviews.
			* Ensuring the availability of resources.

5.1.2 Customer Focus

Senior management ensures customer, legal, and special requirements are identified, understood, consistently and met with a focus on enhancing customer satisfaction. Prior to submittal of any proposal in response to a solicitation, senior management performs a Management Review to ensure customer, legal, and special requirements are adequately defined and understood and exceptions, clarifications, and risks are addressed. TDSI Management Reviews are continuously conducted with the customer throughout the project life cycle – from product development through delivery and follow-on support – to ensure the customer’s and regulatory agencies’ expectations are satisfied. Senior management demonstrates leadership and commitment with respect to customer focus by ensuring product and service conformity and on-time delivery performance are measured and appropriate action is taken if planned results are not, or will not be, achieved.

## 5.2 POLICY

5.2.1 Senior management developed and maintains a quality policy that:

1. Is appropriate to the purpose and context of TDSI and supports TDIS’s strategic direction.
2. Includes a commitment to satisfy applicable requirements and continually improve TDSI’s QMS.
3. Provides the framework for setting TDSI quality objectives.

5.2.2 Communicating the Quality Policy

The quality policy:

1. Is available and maintained as documented information.
2. Is communicated, understood, and applied within TDSI.
3. Is available to relevant interested parties, as appropriate.

5.2.3 TDSI’s Quality Policy is:

It is Thales Defense & Security, Inc.’s policy to strive to continually improve our processes to deliver competitive, highly reliable mission critical electronics products and systems that meet our customers’ requirements. We recognize that lives depend on what we do.

5.2.4 Each of TDSI’s facilities contributes to the overall TDSI Quality Policy. TDSI’s Quality Policy as it relates to the operations performed in each TDSI facility is:

* + - * 1. Building #1: To strive to continually improve resource planning, manufacturing, customer support, contract, and shipping processes to deliver competitive, highly reliable mission critical electronics products and systems that meet our customers’ requirements. We recognize that lives depend on what we do.
				2. Building #3: To strive to continually improve program management, bids and proposals, product design and development, product validation, and IT support processes to deliver competitive, highly reliable mission critical electronics products and systems that meet our customers’ requirements. We recognize that lives depend on what we do.
				3. Building #4: To strive to continually improve the repair and warehousing processes to deliver competitive, highly reliable mission critical electronics products and systems that meet our customers’ requirements. We recognize that lives depend on what we do.
				4. Sensors and Missile Systems, Totowa, NJ: To strive to continually improve bid and proposal, order delivery, and repair processes of competitive, highly reliable mission critical optronics products and systems that meet our customers’ requirements. We recognize that lives depend on what we do.

## 5.3 ORGANIZATIONAL ROLES, RESPONSIBILITIES, AND AUTHORITIES

5.3.1 Senior management ensures the responsibilities and authorities for relevant roles are assigned, communicated, and understood within TDSI. Senior management assigns the responsibility and authority for:

1. Ensuring that the TDSI QMS conforms to the requirements the AS9100D Standard.
2. Ensuring that the TDSI QMS processes are delivering their intended outputs.
3. Reporting on the performance of the QMS and on opportunities for improvement, in particular to senior management;
4. Ensuring the promotion of customer focus throughout TDSI;
5. Ensuring that the integrity of TDSI’s QMS is maintained when changes to the QMS are planned and implemented.

5.3.2 TDSI organizational charts, approved by TDSI Senior Management and accessed via the TCINet, illustrate the management structure and relationship to the TDSI QMS. Approved organizational charts are maintained by Human Resources.

5.3.3 Appendix C, TDSI INPUT-PROCESS-OUTPUT (IPO) Diagram, illustrates the interrelationship of TDSI activities associated with TDSI core processes. The TLC further expands on the inputs and outputs during development phases in the TDSI Development / Design Process.

5.3.4 Appendix D, TDSI Process Map, cross-references TDSI core processes to the AS9100D elements.

5.3.5 Senior Management appointed a specific member of TDSI’s management, identified as TDSI’s Quality Management Representative, and has the authority and responsibility for oversight of the QMS. The Quality Management Representative has the organizational freedom and unrestricted access to senior management to resolve quality management issues.

# 6 PLANNING

## 6.1 ACTIONS TO ADDRESS RISKS AND OPPORTUNITIES

6.1.1 Senior management, through Management Reviews, ensures QMS planning is carried out to meet the issues referred to in 4.1, the requirements referred to in 4.2, and TDSI quality objectives and determined the risks and opportunities that need to be addressed to.

a. Give assurance that the QMS can achieve its intended result(s).

b. Enhance desirable effects.

c. Prevent, or reduce, undesired effects.

d. Achieve improvement.

e. QMS integrity is maintained when changes to the QMS are planned and implemented.

6.1.2 TDSI plans actions to address identified risks and opportunities and how to integrate and implement the actions into TDSI QMS processes and evaluate the effectiveness of the actions taken. The actions taken to address risks and opportunities are proportionate to the potential impact on the conformity of products and services.

## 6.2 QUALITY OBJECTIVES AND PLANNING TO ACHIEVE THEM

6.2.1 TDSI senior management provides the leadership and direction to ensure TDSI’s quality objectives, including those needed to meet requirements for product, are established at relevant functional levels, and processes needed for TDSI’s QMS. The quality objectives are measurable in accordance with the TDSI metrics handbook and consistent with TDSI’s Quality Policy. TDSI quality objectives:

Take into account applicable requirements.

Are relevant to conformity of products and services and to enhancement of customer satisfaction.

Are monitored.

Are communicated.

Are updated, as appropriate.

Are maintained as documented information.

6.2.2 When planning how to achieve its quality objectives, TDSI determined:

a. What will be done.

b. What resources are required.

c. Who is responsible.

d. When the change will be completed.

e. How the results are evaluated.

6.2.3 TDSI’s Quality Objectives are:

1. Business financial goals are defined and measured against the established targets.
2. Customer requirements are identified and effectively managed to expectations throughout the product development lifecycle.
3. All delivered product works “out-of-the-box” upon delivery to the customer and operates as expected by the customer in a highly reliable manner.
4. Product yield targets are established and monitored for test and inspection.
5. Product quality targets are established and monitored in the Quality Trend Report for manufactured product.
6. Supplier rating criteria is established and monitored for received product.
7. Goals are established and monitored for customer satisfaction of delivered product.

## 6.3 PLANNING OF CHANGES

When TDSI determines the need for changes to the QMS, the changes are carried out in a planner manner. In the planning for changes to the QMS, TDSI considers:

1. The purpose of the changes and their potential consequences.
2. The integrity of TDSI’s QMS.
3. The availability of resources;
4. The allocation or reallocation of responsibilities and authorities.

# 7 SUPPORT

## 7.1 RESOURCES

7.1.1 TDSI reviews new contracts in conjunction with existing contracts to determine and provide the resources needed to implement, maintain, and continually improve its QMS and to enhance customer satisfaction by meeting customer requirements. In determining and providing the resources needed, TDSI considers:

1. The capabilities of, and constraints on, existing internal resources;
2. What needs to be obtained from external providers.

7.1.2 People

TDSI determines and provides the persons necessary for the effective implementation of the QMS and for the operation and control of its processes.

## 7.1.3 Infrastructure

TDSI determines, provides, and maintains the infrastructure necessary for the operation of its processes and to achieve conformity of products and services. TDSI’s infrastructure includes:

1. A 96,000 sq. ft. facility (Building #1) in Clarksburg, MD, to manage business activities (Executive, Contracts, Finance, Customer Service, Human Resources, Operations, and Quality Assurance), and the Systems Solutions Business Unit.
2. A 72,000 sq. ft. facility (Building #3) in Clarksburg, MD, to support Program Management, Engineering, Integrated Logistics Support~~, nd Product Validation~~ Information Technology, and the Communications Business Unit.
3. A 20,800 sq. ft. facility (Building #4) in Clarksburg, MD, to support the repair of customer returns and warehouse 3rd party purchased product, office furniture, and other miscellaneous TDSI materials and equipment.
4. A facility in Totowa, NJ, to support the delivery and repair of optronics products, manufactured and repaired at a supplier site, to customers.
5. All the necessary process equipment (both hardware and software) to support the manufacture of hardware and the development of supporting software.
6. Supporting services (transportation and information and communication technology).

7.1.4 Environment for the Operation of Processes

TDSI determines, provides, and maintains the environment necessary for the operation of its processes and to achieve conformity of products and services, to include social, psychological, and physical factors.

7.1.5 Monitoring and Measuring Resources

7.1.5.1 TDSI determines and provides the resources needed to ensure valid and reliable results when monitoring or measuring is used to verify the conformity of products and services to requirements. TDSI retains appropriate documented information as evidence of fitness for purpose of the monitoring and measurement resources. TDSI ensures the resources provided:

a. Are suitable for the specific type of monitoring and measurement activities performed.

b. Are maintained to ensure their continuing fitness for their purpose.

7.1.5.2 When measurement traceability is a requirement, or is considered by the organization to be an essential part of providing confidence in the validity of measurement results, measuring equipment shall be:

a. Calibrated or verified, or both, at specified intervals, or prior to use, against measurement standards traceable to international or national measurement standards; when no such standards exist, the basis used for calibration or verification shall be retained as documented information.

b. Identified in order to determine their status.

c. Safeguarded from adjustments, damage, or deterioration that would invalidate the calibration status and subsequent measurement results.

7.1.5.3 TDSI maintains a process for the recall of monitoring and measuring equipment requiring calibration or verification.

7.1.5.4 TDSI maintains a register of the monitoring and measuring equipment. The register includes:

a. The equipment type, unique identification, location, and the calibration or verification method, frequency.

b. Acceptance criteria.

7.1.5.5 Calibration or verification of monitoring andmeasuring equipment shall be carried out under suitable environmental conditions.

7.1.5.6 TDSI determines if the validity of previous measurement results has been adversely affected when measuring equipment is found to be unfit for its intended purpose, and shall take appropriate action as necessary.

## 7.1.6 Organizational Knowledge

a. TDSI determines the knowledge necessary for the operation of its processes and to achieve conformity of products and services. This knowledge is maintained and is made available to the extent necessary.

b. When addressing changing needs and trends, TDSI considers its current knowledge and determine how to acquire or access any necessary additional knowledge and required updates.

## 7.2 COMPETENCE

TDSI:

* + - * 1. Determines the necessary competence for person(s) doing work under TDSI’s control that affects the performance and effectiveness of the TDSI QMS.
				2. Ensures that person(s) doing work under TDSI’s control are competent on the basis of education, training, or experience.
				3. Where applicable, takes actions to acquire the necessary competence.
				4. Evaluates the effectiveness of actions taken on an annual basis.
				5. Retains appropriate documented information as evidence of competence.
				6. Conducts periodic reviews of necessary competence.

## 7.3 AWARENESS

TDSI ensures persons doing work under TDSI’s control are aware of:

a. TDSI’s quality policy.

b. Relevant TDSI quality objectives.

c. Their contribution to the effectiveness of TDSI’s QMS, including the benefits of improved performance.

d. The implications of not conforming to TDSI’s QMS requirements***.***

e. Relevant QMS documented information and changes thereto.

f. Their contribution to product or service conformity.

g. Their contribution to product safety.

h. The importance of ethical behavior.

## 7.4 COMMUNICATION

TDSI determines the internal and external communications, including internal and external feedback, relevant to TDSI’s QMS, including:

a. On what TDSI communicates.

b. When to communicate.

c. With whom to communicate.

d. How to communicate.

1. Who communicates.

## 7.5 DOCUMENTED INFORMATION

7.5.1 TDSI’s QMS documented information is traceable to each requirement contained in the AS9100D standard and is determined by TDSI as being necessary to ensure the effective planning, operation, and control of TDSI’s processes. TDSI’s QMS process documented information is listed in the TDSI Process Document Index (PDI). The PDI is available via the TCINet, Company Procedures page, for use and reference by all employees and customers to preclude the use of invalid and/or obsolete process documents.

7.5.2 Creating and Updating

When creating and updating documented information, TDSI ensure appropriate:

a. Identification and description (e.g., a title, date, author, or reference number).

b. Format (e.g., language, software version, graphics) and media (e.g., paper, electronic).

c. Review and approval for suitability and adequacy. Authorized persons and approval methods are identified for the relevant types of documented information.

7.5.3 Control of Documented Information

7.5.3.1 Documented information required by TDSI’s QMS and AS9100D is controlled to ensure the documented information is available and suitable for use, where and when it is needed, and is adequately protected (e.g., from loss of confidentiality, improper use, or loss of integrity).

7.5.3.2 For the control of documented information, TDSI addresses, as applicable:

a. Distribution, access, retrieval, and us.

b. Storage and preservation, including preservation of legibility.

c. Control of changes (e.g., version control).

d. Retention and disposition.

e. Prevention of the unintended use of obsolete documented information by removal or by application of suitable identification or controls if kept for any purpose.

7.5.3.3 Documented information of external origin determined by TDSI to be necessary for the planning and operation of TDSI’s QMS is identified as appropriate, and controlled.

7.5.3.4 Documented information retained as evidence of conformity is protected from unintended alterations.

7.5.3.5 Data protection processes are defined for TDSI documented information that is managed electronically, (e.g., protection from loss, unauthorized changes, unintended alteration, corruption, physical damage).

# 8 OPERATION

## 8.1 OPERATION PLANNING AND CONTROL

TDSI plans, implements, and controls processes needed meet the requirements of the provision of products and services, and to implement actions planned actions by:

1. Determining requirements for TDSI products and services, to include: product and personal safety; reliability, availability and maintainability; producibility and inspectability; suitability of parts and materials used in the product; selection and development of embedded software; product obsolescence; prevention, detection, and removal of foreign objects; handling, packaging, and preservation; and recycling or final disposal of the product at the end of the product’s life.
2. Establishing criteria for the processes and the acceptance of products and services. According to the nature of the product and depending on the specified requirements, statistical techniques are used to support design verification (e.g., reliability, maintainability, product safety), process controls (e.g., selection and verification of key characteristics, process capability measurements, statistical process control, and design of experiments), verification, and failure mode, effects, and criticality analysis.
3. Determining the resources needed to achieve conformity to the product and service requirements and to meet on-time delivery of products and services.
4. Implementing control of TDSI processes in accordance with the criteria.
5. Determining, maintaining, and retaining documented information to the extent necessary to have confidence that the processes were carried out as planned and to demonstrate the conformity of products and services to their requirements***.***
6. Determining the processes and controls needed to manage critical items, including production process controls when key characteristics are identified.
7. Engaging representatives of affected TDSI functions for operational planning and control.
8. Determining the process and resources to support the use and maintenance of TDSI’s products and services;
9. Determining the products and services to be obtained from external providers.
10. Establishing the controls needed to prevent the delivery of nonconforming products and services to the customer.
11. Program Management. As appropriate to TDSI, customer requirements, and products and services, TDSI plans and manages product and service provision in a structured and controlled manner including scheduled events performed in a planned sequence to meet requirements at acceptable risk, within resource and schedule constraints.
12. The output of operational planning and control is suitable for TDSI’s operations. As an output of this planning, documented information specifying the processes of TDS’s QMS and the resources to be applied to a specific product, service, project, or contract is referred to as a quality plan.
13. TDSI controls planned changes and reviews the consequences of unintended changes, taking action to mitigate any adverse effects, as necessary.
14. TDSI ensures outsourced processes are controlled.
15. TDSI maintains a process to plan and control the temporary or permanent transfer of work, to ensure the continuing conformity of the work to requirements. The process ensures that work transfer impacts and risks are managed.

8.1.1 Operational Risk Management

TDSI controls a process for managing risk to the achievement of applicable requirements that includes, as appropriate to TDSI and the product and services:

a. Assignment of responsibility of risk management.

b. Definition of risk criteria (e.g., likelihood, consequences, and risk acceptance).

c. Identification, assessment, and communication of risks throughout operations.

d. Identification, implementation, and management of actions to mitigate risks that exceed the defined risk acceptance criteria.

e. Acceptance of risks remaining after implementation of mitigating actions.

### 8.1.2 Configuration Management

TDSI controls a configuration management process as appropriate to TDSI and its products and services in order to ensure the identification and control of physical and functional attributes throughout the product lifecycle. This process:

* 1. Controls product identity and traceability to requirements, including the implementation of identified changes.
	2. Ensures the documented information (e.g., requirements, design, verification, validation and acceptance documentation) is consistent with the actual attributes of the products and services.

### 8.1.3 Product Safety

TDSI controls the processes needed to assure product safety during the entire product life cycle, as appropriate to the organization and the product, to include:

1. Assessment of hazards and management of associated risks.
2. Management of safety critical items.
3. Analysis and reporting of occurred events affecting safety.
4. Communication of these events and training of persons.

8.1.4 Prevention of Counterfeit Parts

TDSI controls processes, appropriate to the TDSI and the product, for the prevention of counterfeit or suspect counterfeit part use and their inclusion in product(s) delivered to the customer. The TDSI counterfeit part prevention processes consider:

1. Training of appropriate persons in the awareness and prevention of counterfeit parts.
2. Application of a parts obsolescence monitoring program.
3. Controls for acquiring externally provided product from original or authorized manufacturers, authorized distributors, or other approved sources.
4. Requirements for assuring traceability of parts and components to their original or authorized manufacturers.
5. Verification and test methodologies to detect counterfeit parts.
6. Monitoring of counterfeit parts reporting from external sources.
7. Quarantine and reporting of suspect or detected counterfeit parts.

## 8.2 REQUIREMENTS FOR PRODUCTS AND SERVICES

### 8.2.1 Customer Communication

TDSI maintains processes for communicating with customers and potential customers.

1. Communications provides product and service information to potential customer inquiries through product literature, trade shows, and demonstrations.
2. The Program Manager, supported by the assigned Engineering Project Manager, communicates with customers regarding product information, order handling, and product development status.
3. The Contracts Business Manager communicates with the customer regarding all contractual issues.
4. The Customer Support Help Desk handles customer feedback on inquiries and customer complaints.
5. The Contracts Business Manager and the Customer Property Custodian communicate with customers regarding the handling and controlling of customer property.
6. The Return Material Authorization (RMA) database maintained by TDSI is accessible to customers to track customer returned product.
7. Customer Service, supported by the Program Manager and Contracts Business Manager, establishes specific requirements for contingency actions, when relevant.

### 8.2.2 Determining the Requirements for Products and Services

When determining the requirements for the products and services to be offered to customers, TDSI ensures:

1. The requirements for the products and services are defined, including any applicable legal requirements and those considered necessary by TDSI.
2. TDSI can meet the claims for the products and services it offers.
3. Special requirements of the products and services are determined.
4. Operational risks (e.g., new technology, ability and capacity to provide, short delivery time frame) have been identified.

### 8.2.3 Review of the Requirements for Products and Services

8.2.3.1 TDSI ensures it has the ability to meet the requirements for products and services to be offered to customers. At a minimum, TDSI conducts a review of contract, contract amendment, and order requirements with the relevant stakeholders before committing to supply products and services to the customer. If TDSI determines that some customer requirements cannot be met or can only be partially met, TDSI negotiates a mutually acceptable requirement with the customer. TDSI also ensures contract or order requirements differing from those previously defined are resolved. The review includes:

a. Requirements specified by the customer, including the requirements for delivery and post-delivery activities.

b. Requirements not stated by the customer, but necessary for the specified or intended use, when known.

c. Requirements specified by TDSI.

d. Legal requirements applicable to the products and services.

e. Contract or order requirements differing from those previously expressed.

The customer requirements are confirmed by TDSI before acceptance when the customer does not provide a documented statement of their requirements.

8.2.3.2 TDSI retains documented information, as applicable on the results of the review and on any new requirements for the products and services.

### 8.2.4 Changes to Requirements for Products and Services

When the requirements for products and services are changed, TDSI ensures relevant documented information is amended and the relevant stakeholders are made aware of the changed requirements.

## 8.3 DESIGN AND DEVELOPMENT

8.3.1 TDSI maintains a design and development process that is appropriate to ensure the subsequent provision of products and services.

### 8.3.2 Design and Development Planning

1. Design and development planning begins with an approved requirements document. Systems Engineering develops and maintains the requirements document, with support from relevant stakeholders..
2. TDSI determines the stages and controls for the design and development using the Thales LifeCycle (TLC) Product Development Model, taking into consideration:
	* + - The nature, duration, and complexity of the design and development activities.
			- The required process stages, including applicable design and development reviews.
			- The required design and development verification and validation activities.
			- The responsibilities and authorities involved in the design and development process.
			- The internal and external resource needs for the design and development of products and services.
			- The need to control interfaces between persons involved in the design and development process.
			- The need for involvement of customers and users in the design and development process.
			- The requirements for subsequent provision of products and services.
			- The level of control expected for the design and development process by customers and other relevant interested parties.
			- The documented information needed to demonstrate that design and development requirements have been met.
3. When appropriate, TDSI divides the design and development effort into distinct activities and, for each activity, defines the tasks, necessary resources, responsibilities, design content, and inputs and outputs.
4. Design and development planning considers the ability to provide, verify, test, and maintain products and services.
5. The different design and development tasks to be carried out are based on the safety and functional objectives of the product in accordance with customer, statutory, and regulatory requirements.
6. The requirements document is tailored to meet specific contract requirements and the particular equipment being designed. Approval in accordance with the requirements document procedure is required prior to the release of the requirements document for design engineering use.
7. TDSI uses the TLC to manage the interfaces between different groups involved in the design and development to ensure effective communication and clear assignment of responsibility.
8. Design and Development planning output is updated, as appropriate, as the design and development progresses.

### 8.3.3 Design and Development Inputs

TDSI determines the requirements essential for the specific type of products and services to be designed and developed. TDSI ensures these inputs are adequate for design and development purposes, complete, and unambiguous. TDSI retains documented information on the design and development inputs. TDSI considers:

1. Customer identified requirements.
2. Functional and performance requirements.
3. Information derived from the previous or similar design and development activities.
4. Applicable legal requirements.
5. Standards or codes of practice that TDSI has committed to implement.
6. Potential consequences of failure due to the nature of the products and services.
7. When applicable, the potential consequences of obsolescence (e.g., materials, components, equipment, products).
8. Other requirements essential for design and development.

### 8.3.4 Design and Development Controls

TDSI conducts systematic design reviews, attended by the relevant stakeholders, at suitable stages outlined in TLC tailored for the specific design and development program. Documented information of the results of the reviews and any necessary actions is retained. The reviews:

* 1. Ensure the results to be achieved are defined.
	2. Evaluate the ability of the results of design and development to meet requirements.
	3. Ensure verification activities to be conducted to ensure the design and development outputs meet the input requirements.
	4. Ensure validation activities are conducted to ensure the resulting products and services meet the requirements for the specified application or intended use.
	5. Ensure any necessary actions are taken on problems identified during the reviews or verification and validation activities.
	6. Authorize progression to the next stage.

8.3.4.1 When tests are necessary for verification and validation, these tests are be planned, controlled, reviewed, and documented to ensure and prove:

a. Test plans or specifications identify the test item being tested and the resources being used, define test objectives and conditions, parameters to be recorded and relevant acceptance criteria.

b. Test procedures describe the test methods to be used, how to perform the test, and how to record the results;

c. The correct configuration of the test item is submitted for the test.

d. The requirements of the test plan and the test procedures are observed.

e. The acceptance criteria are met.

8.3.4.2 At the completion of design and/or development, TDSI ensures reports, calculations, test results, etc., are able to demonstrate that the design for the product or service meets the specification requirements for all identified operational conditions.

### 8.3.5 Design and Development Outputs

1. Engineering prepares the design and development documents, consisting of drawings, parts lists, firmware, and supplier specifications as applicable. The design and development outputs are in a form suitable for verification against the requirements. The relevant stakeholders approve the design and development outputs prior to release to ensure design and development outputs:
	* + Meet the input requirements.
		+ Provide appropriate information for purchasing, producing, and servicing the product or service.
		+ Include or reference monitoring and measuring requirements, as appropriate, and acceptance criteria.
		+ Specify the characteristics of the products and services that are essential for their intended purpose and their safe and proper use.
		+ Specify, as applicable, any critical items, including any key characteristics, and specific actions to be taken for these items.
2. TDSI defines the data required to allow the product to be identified, manufactured, verified, used, and maintained. The data includes:
	* + The drawings, parts lists, and specifications necessary to define the configuration and the design features of the product.
		+ The material, process, manufacturing, assembly, handling, packaging, and preservation data needed provide and maintain a conforming product or service.
		+ The technical data and repair schemes for operating and maintaining the product.

### 8.3.6 Design and Development Changes

1. TDSI identifies, reviews, and controls changes made during, or subsequent to, the design and development of products and services, to the extent necessary to ensure that there is no adverse impact on conformity to requirements.
2. Design and development changes are identified, documented, reviewed, verified and validated, as appropriate, and approved by the relevant stakeholders before implementation in accordance with released process documents. Changes requiring customer concurrence or approval are transmitted through letters, engineering change proposals, deviations and/or waivers, or other appropriate formats that meet the contract requirements. The review of design and development changes includes evaluation of the effect of the changes on constituent parts and product already delivered.
3. TDSI retains documented information on design and development changes, the results of review of design and development changes, and actions taken to pervert adverse impacts.
4. Design and development changes are controlled in accordance with the TDSI configuration management process requirements.

## 8.4 CONTROL OF EXTERNALLY PROVIDED PROCESSES, PRODUCTS, AND SERVICES

8.4.1 TDSI ensures externally provided processes, products, and services conforms to requirements. TDSI is responsible for the conformity of all externally provided processes, products, and services, including from sources defined by the customer.

* 1. TDSI ensures, when required, that customer-designated or approved external providers, including process sources (e.g., special processes), are used.
	2. TDSI identifies and manage the risks associated with the external provision of processes, products, and services, as well as the selection and use of external providers.
	3. TDSI requires that external providers apply appropriate controls to their direct and sub-tier external providers, to ensure that requirements are met.
	4. TDSI determines the controls to be applied to externally provided processes, products, and services when:
* Products and services from external providers are intended for incorporation into TDSI’s own products and services;
* Products and services are provided directly to the customer(s) by external providers on behalf of TDSI.
* A process, or part of a process, is provided by an external provider as a result of a decision by TDSI.
	1. TDSI determines and applies criteria for the evaluation, selection, monitoring of performance, and reevaluation of external providers, based on their ability to provide processes or products and services in accordance with requirements. TDSI retains documented information of these activities and any necessary actions arising from the evaluations.
	2. TDSI:
* Defines the process, responsibilities, and authority for the approval status decision, changes of the approval status, and conditions for a controlled use of external providers depending on the supplier’s approval status.
* Maintains a register of its external providers that includes approval status (e.g., approved, conditional, disapproved) and the scope of the approval (e.g., product type, process family).
* Periodically reviews external provider performance, including process, product, and service conformity, and on-time delivery performance.
* Defines the necessary actions to be taken when dealing with external providers that do not meet requirements.
* Defines the requirements for controlling documented information created by and/or retained by external providers.

### 8.4.2 Type and Extent of Control

* + 1. TDSI ensures that externally provided processes, products, and services do not adversely affect TDSI’s ability to consistently deliver conforming products and services to its customers.
		2. TDSI:
* Ensures that externally provided processes remain within the control of TDSI’s QMS.
* Defines both the controls that TDSI intends to apply to an external provider and those TDSI intends to apply to the resulting output.
* Takes into consideration the potential impact of the externally provided processes, products, and services on TDSI’s ability to consistently meet customer and applicable statutory and regulatory requirements; the effectiveness of the controls applied by the external provider; the results of the periodic review of external provider performance.
* Determines the verification, or other activities, necessary to ensure that the externally provided processes, products, and services meet requirements.
	+ 1. Verification activities of externally provided processes, products, and services is performed according to the risks identified by TDSI. These activities include inspection or periodic testing, as applicable, when there is high risk of nonconformities including counterfeit parts.
		2. Customer verification activities performed at any level of the supply chain does not absolve TDSI of its responsibility to provide acceptable processes, products, and services and to comply with all requirements. TDSI verification activities include:
* Review of objective evidence of the conformity of the processes, products, and services from the external provider (e.g., accompanying documentation, certificate of conformity, results of production process verification, and assessment of changes to the production process thereafter).
* Inspection and audit at the external provider’s premises.
* Review of required documentation.
* Review of production part approval process data.
* Inspection of products or verification of services upon receipt.
* Review of delegations of product verification to the external provider.
	+ 1. When externally provided product released for production use pending completion of all required verification activities, the product is identified and recorded to allow recall and replacement if the product is subsequently found not to meet requirements.
		2. When TDSI delegates verification activities to the external provider, the scope and requirements for delegation are defined and a register of delegations maintained. TDSI periodically monitors the external provider’s delegated verification activities.
		3. When external provider test reports are utilized to verify externally provided products, TDSI implements a process to evaluate the data in the test reports to confirm that the product meets requirements. When a customer or TDSI has identified raw material as a significant operational risk (e.g., critical items), TDSI implements a process to validate the accuracy of test reports.

### 8.4.3 Information for External Providers

* + - 1. TDSI ensures the adequacy of requirements prior to their communication to the external provider.
			2. TDSI communicates to external providers TDSI’s requirements for:
				* The processes, products, and services to be provided including the identification of technical data (e.g., specifications, drawings, process requirements, work instructions).
				* The approval of products and services; methods, processes, and equipment; and the release of products and services.
				* Competence, including any required qualification, of persons.
				* External providers’ interactions with TDSI.
				* Control and monitoring of the external providers’ performance to be applied by TDSI.
				* Verification or validation activities that TDSI, or its customer, intends to perform at the external providers’ premises.
				* Design and development control.
				* Special requirements, critical items, or key characteristics.
				* Test, inspection, and verification (including production process verification).
				* The use of statistical techniques for product acceptance and related instructions for acceptance by TDSI.
				* The need to implement a quality management system; use customer-designated or approved external providers, including process sources (e.g., special processes); notify TDSI of nonconforming processes, products, or services and obtain approval for their disposition; prevent the use of counterfeit; notify the TDSI of changes to processes, products, or services, including changes of their external providers or location of manufacture, and obtain the TDSI’s approval; flow down to external providers applicable requirements including customer requirements; provide test specimens for design approval, inspection/verification, investigation, or auditing; retain documented information, including retention periods and disposition requirements.
				* The right to access by TDSI, TDSI’s customer, and regulatory authorities to the applicable areas of facilities and to applicable documented information, at any level of the supply chain.
				* Ensuring that persons are aware of their contribution to product or service conformity; their contribution to product safety; and the importance of ethical behavior.

## 8.5 PRODUCT AND SERVICE PROVISION

### 8.5.1 Control of Product and Service Provision

a. TDSI implemented processes to plan and carry out product build and repair activities under controlled conditions. These controlled conditions include, as applicable:

* The availability of documented information, including digital product definition data, drawings, parts lists, materials, and process specifications, that defines the characteristics of the products to be produced, the services to be provided, or the activities to be performed, including process flow charts, control plans, production documents (e.g., manufacturing plans, travelers, routers, work orders, process cards), and verification documents, and the results to be achieved.
* The availability and use of suitable equipment, including product specific tools (e.g., jigs, fixtures, molds) and software programs and suitable monitoring and measuring resources.
* The implementation of monitoring and measurement activities at appropriate stages to verify that criteria for control of processes or outputs, and acceptance criteria for products and services, have been met.
* Ensuring that documented information for monitoring and measurement activity for product acceptance includes: criteria for acceptance and rejection; where in the sequence verification operations are to be performed; measurement results to be retained (at a minimum an indication of acceptance or rejection); any specific monitoring and measurement equipment required and instructions associated with their use;
* Ensuring that when sampling is used as a means of product acceptance, the sampling plan is justified on the basis of recognized statistical principles and appropriate for use (i.e., matching the sampling plan to the criticality of the product and to the process capability).
* The use of suitable infrastructure and environment for operation of processes.
* The appointment of competent persons, including any required qualifications.
* The validation, and periodic revalidation, of the ability to achieve planned results of the processes for production and service provision, where the resulting output cannot be verified by subsequent monitoring or measurement
* The implementation of actions to prevent human error.
* The implementation of product release, delivery and post-delivery activities.
* The establishment of criteria for workmanship, specified in the clearest practical way (e.g., written standards, representative samples, illustrations).
* Accountability for all products during production (e.g., parts quantities, split orders, non- conforming product).
* The control and monitoring of identified critical items, including key characteristics, in accordance with established processes.
* The determination of methods to measure variable data (e.g., tooling, on-machine probing, inspection equipment).
* The identification of in-process inspection/verification points when adequate verification of conformity cannot be performed at later stages.
* The availability of evidence that all production and inspection/verification operations were completed as planned, or as otherwise documented and authorized.
* The provision for the prevention, detection, and removal of foreign objects.
* The control and monitoring of utilities and supplies (e.g., water, compressed air, electricity, chemical products) to the extent they affect conformity to product requirements.
* The identification and recording of products released for subsequent production use pending completion of all required measuring and monitoring activities, to allow recall and replacement if it is later found that the product does not meet requirements.

b. Planning considers, as appropriate:

* Establishing, implementing, and maintaining appropriate processes to manage critical items, including process controls where key characteristics are 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.
* Special processes.

8.5.1.1 Control of Equipment, Tools, and Software Programs

* + - * 1. Equipment, tools, and software programs used to automate and control, monitor, or measure production processes is validated prior to final release for production and is maintained.
				2. Storage requirements, including periodic preservation/condition checks, are defined for production equipment or tooling in storage.

8.5.1.2 Verification and Control of Special Processes

When the resulting output cannot be verified by subsequent monitoring or measurement, TDSI establishes arrangements for these processes including, as applicable:

a. Definition of criteria for the review and approval of the processes.

b. Determination of conditions to maintain the approval.

c. Approval of facilities and equipment.

d. Qualification of persons.

e. Use of specific methods and procedures for implementation and monitoring the processes.

f. Requirements for documented information to be retained.

8.5.1.3 Production Process verification

* + - * 1. TDSI implements production process verification activities, such as risk assessment, capability studies, and control plans, to ensure the production process is able to produce products that meet requirements.
				2. TDSI uses a representative item from the first production run of 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 activity is repeated when changes occur that invalidate the original results (e.g., engineering changes, manufacturing process changes, tooling changes).
				3. TDSI retains documented information of the results of production process verification.

### 8.5.2 Identification and Traceability

* 1. TDSI uses suitable means to identify outputs when necessary to ensure the conformity of products and services.
	2. TDSI maintains the identification of the configuration of the products and services in order to identify any differences between actual configuration and the required configuration.
	3. TDSI identifies the status of outputs with respect to monitoring and measurement requirements throughout the production and service provision.
	4. When acceptance authority media are used (e.g., stamps, electronic signatures, passwords), TDSI established appropriate controls for the media.
	5. TDSI controls the unique identification of the outputs when traceability is a requirement and documented information necessary to enable traceability is maintained. Specific product identification and traceability requirements are conveyed by engineering drawings, Production Identification (PID) numbers, Work Instructions, or Special Inspection Instructions. Traceability requirements include:
		+ 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 (manufacture, assembly, inspection/verification) to be retrievable.

### 8.5.3 Property Belonging to Customers or External Providers

1. TDSI’s established a process to exercise care with property belonging to customers or external providers while it is under TDSI’s control or being used by TDSI.
2. TDSI identifies, verifies, protects, and safeguards customers’ and external provides’ property, including materials, components, tools and equipment, premises, intellectual property, and personal data, provided for use or incorporation into the products or services.
3. TDSI reports customer or external provider property lost, damaged, or otherwise found to be unsuitable for use to the customer or external provider. TDSI retains documented information on what has occurred.

### 8.5.4 Preservation

* + - * 1. TDSI maintains processes to preserve the product during production and service provision, to include identification, handling, containment control, packaging, transmission or transport, and protection, to the extent necessary to ensure conformity to requirements.
				2. Preservation of outputs includes, when applicable in accordance with specifications and applicable legal requirements, provisions for:
				+ Cleaning.
				+ Prevention, detection, and removal of foreign objects.
				+ Special handling and storage for sensitive products.
				+ Marking and labeling, including safety warnings and cautions.
				+ Shelf life control and stock rotation.
				+ Special handling and storage for hazardous materials.

### 8.5.5 Post Delivery Activities

TDSI meets requirements for post-delivery activities, including actions under warranty provisions, contractual obligations such as maintenance and service, and supplementary services such as recycling and final disposal, associated with the products and services.

In determining the extent of post-delivery activities that are required, TDSI considers:

* Legal requirements.
* The potential undesired consequences associated with its products and services.
* The nature, use, and intended lifetime of its products and services.
* Customer requirements.
* Customer feedback.
* Collection and analysis of in-service data (e.g., performance, reliability, lessons learned).
* Control, updating, and provision of technical documentation relating to product use, maintenance, repair, and overhaul.
* Controls required for work undertaken external to the organization (e.g., off-site work).
* Product/customer support (e.g., queries, training, warranties, maintenance, replacement parts, resources, obsolescence).

When problems are detected after delivery, TDSI takes appropriate action including investigation and reporting.

### 8.5.6 Control of Changes

TDSI reviews and controls changes for production or service provision, such as changes affecting processes, production equipment, tools, and software programs, to the extent necessary to ensure continuing conformity with requirements.

Persons authorized to approve changes to production processes are identified.

TDSI retains documented information describing the results of the review of changes, the person(s) authorizing the change, and any necessary actions arising from the review.

## 8.6 RELEASE OF PRODUCTS AND SERVICES

8.6.1 TDSI implements planned arrangements, at appropriate stages, to verify that the product and service requirements were met.

8.6.2 The release of products and services to the customer does not proceed until the planned arrangements have been satisfactorily completed, unless otherwise approved by a relevant authority and, as applicable, by the customer.

8.6.3 TDSI retains documented information on the release of products and services. The documented information includes:

* 1. Evidence of conformity with the acceptance criteria.
	2. Traceability to the person(s) authorizing the release.

8.6.4 When required to demonstrate product qualification, TDSI ensures that retained documented information provides evidence that the products and services meet the defined requirements.

8.6.5 TDSI ensures all documented information required to accompany the products and services are present at delivery.

## 8.7 CONTROL OF NONCONFORMING OUTPUTS

8.7.1 TDSI ensures outputs that do not conform to their requirements are identified and controlled to prevent its unintended use or delivery.

1. TDSI takes appropriate action based on the nature of the nonconformity and its effect on the conformity of products and services. This also apply to nonconforming products and services detected after delivery of products, during, or after the provision of services.
2. TDSI’s nonconforming control process is maintained as documented information including the provision for:
	* Defining the responsibility and authority for the review and disposition of nonconforming outputs and the process for approving persons making these decisions.
	* Taking actions necessary to contain the effect of the nonconformity on other processes, products, or services.
	* Timely reporting of nonconformities affecting delivered products and services to the customer and to relevant interested parties, to include external providers, internal organizations, customers, distributors, and regulatory authorities.
	* Defining corrective actions for nonconforming products and services detected after delivery, as appropriate to their impacts.
3. TDSI deals with nonconforming outputs through:
	* Correction.
	* Segregation, containment, return, or suspension of provision of products and services.
	* Informing the customer.
	* Obtaining authorization for acceptance under concession by a relevant authority and, when applicable, by the customer.
4. Dispositions of Accept-As-Is (AAI) or repair for acceptance of nonconforming products is only used
* After approval by an authorized representative of TDSI responsible for design or by persons having delegated authority from the design organization.
* After authorization by the customer, if the nonconformity results in a departure from the contract requirements.
1. Product dispositioned for scrap is conspicuously and permanently marked, or positively controlled, until physically rendered unusable.
2. When nonconforming outputs are corrected, the output is re-verified to demonstrate conformity to the requirements.

8.7.2 TDSI retains documented information that:

1. Describes the nonconformity.
2. Describes actions taken.
3. Describes any concessions obtained.
4. Identifies the authority deciding the action in respect of the nonconformity.

# 9 PERFORMANCE EVALUATION

## 9.1 MONITORING, MEASUREMENT, ANALYSIS, AND EVALUATION

### 9.1.1 General

1. TDSI determines:
	* What needs to be monitored and measured.
	* The methods for monitoring, measurement, analysis, and evaluation needed to ensure valid results.
	* When the monitoring and measuring shall be performed.
	* When the results from monitoring and measurement shall be analyzed and evaluated.
2. TDSI evaluates the performance and the effectiveness of the QMS.
3. TDSI retains documented information as evidence of the results of the evaluations.

### 9.1.2 Customer Satisfaction

* 1. TDSI monitors customers’ perceptions of the degree to which their needs and expectations have been fulfilled. TDSI determines the methods for obtaining, monitoring, and reviewing this information, such as customer surveys, customer feedback on delivered products and services, meetings with customers, market-share analysis, compliments, warranty claims, and dealer reports.
	2. Information to be monitored and used for the evaluation of customer satisfaction includes, but is not limited to:
		+ Product and service conformity.
		+ On-time delivery performance.
		+ Customer complaints.
		+ Corrective action requests.
	3. TDSI develops and implements plans for customer satisfaction improvement that address deficiencies identified by these evaluations, and assess the effectiveness of the results.

### 9.1.3 Analysis and Evaluation

1. TDSI determines, collects and analyzes appropriate data and information from monitoring and measurement, to include information on product or service problems reported by external sources (e.g., government/industry alerts and advisories).
2. The results of the analysis are used to evaluate:
	* Conformity of products and services.
	* The degree of customer satisfaction.
	* The performance and effectiveness of TDSI’s QMS.
	* If planning was implemented effectively.
	* The effectiveness of actions taken to address risks and opportunities.
	* The performance of external providers.
	* The need for improvements to TDSI’s QMS.

### 9.2 INTERNAL AUDIT

9.2.1 TDSI conducts internal audits at planned intervals to provide information on whether TDSI’s QMS:

* 1. Conforms to:
		+ TDSI’s QMS requirements, to include customer and applicable legal quality requirements.
		+ AS9100D requirements.
* Is effectively implemented and maintained.
1. Is effectively implemented.

9.2.2 TDSI:

* 1. Plans, establishes, implements, and maintains an audit program including frequency, methods, responsibilities, planning requirements, and reporting, taking into consideration the importance of the processes audited, the results of previous audits, and changes affecting TDSI.
	2. Define the audit criteria and scope for each audit.
	3. Select auditors and conduct of audits to ensure objectivity and impartiality of the audit process. Auditors do not audit their own work.
	4. Ensure that the results of the audits are reported to relevant management.
	5. Take appropriate correction and corrective actions without undue delay.
	6. Retain documented information as evidence of the implementation of the audit program and the audit results.
	7. Conduct follow-up activities, including the verification of actions taken.
	8. Additional audits of the QMS are performed by System Quality Assurance (SQA) to objectively evaluate performed processes and work products based upon the CMMI-Dev Model.

## 9.3 MANAGEMENT REVIEW

9.3.1 Senior management reviews TDSI’s QMS, at planned intervals, to ensure its continuing suitability, adequacy, effectiveness, and alignment with the strategic direction TDSI.

### 9.3.2 Management Review Inputs

Management Reviews are planned and carried out taking into consideration:

* 1. The status of actions from previous management reviews.
	2. Changes in external and internal issues that are relevant to TDSI’s QMS.
	3. Information on the performance and effectiveness of TDSI’s QMS, including trends in:
		+ - Customer satisfaction and feedback from relevant interested parties.
			- The extent to which quality objectives have been met.
			- Process performance and conformity of products and services.
			- Nonconformities and corrective actions.
			- Monitoring and measurement results.
			- Audit results.
			- The performance of external providers.
			- On-time delivery performance.
	4. The adequacy of resources.
	5. The effectiveness of actions taken to address risks and opportunities.
	6. Opportunities for improvement.

### 9.3.3 Management Review Outputs

The outputs of the management review includes decisions and actions related to:

* + - * 1. Opportunities for improvement.
	1. Any need for changes to TDSI’s QMS.
	2. Resource needs.
	3. Risks identified.

TDSI retains documented information as evidence of the results of management reviews.

# 10 IMPROVEMENT

### 10.1 GENERAL

TDSI determines and selects opportunities for improvement, such as correction, corrective action, continual improvement, breakthrough change, innovation, and re-organization, and implements any necessary actions to meet customer requirements and enhance customer satisfaction, including:

10.1.1 Improving products and services to meet requirements as well as to address future needs and expectations.

10.1.2 Correcting, preventing, or reducing undesired effects.

10.1.3 Improving the performance and effectiveness of TDSI’s QMS.

### 10.2 NONCONFORMITY AND CORRECTIVE ACTION

10.2.1 When a nonconformity occurs, including any arising from complaints, TDSI:

1. Reacts to the nonconformity and, as applicable, takes action to control and correct it and deals with the consequences.
2. Evaluates the need for action to eliminate the cause(s) of the nonconformity, in order that it does not recur or occur elsewhere, by:
* Reviewing and analyzing the nonconformity.
* Determining the causes of the nonconformity, including, as applicable, those related to human factors.
* Determining if similar nonconformities exist, or could potentially occur.
1. Implements any action needed.
2. Reviews the effectiveness of any corrective action taken.
3. Updates risks and opportunities determined during planning, if necessary.
4. Make changes to the quality management system, if necessary.
5. Flows down corrective action requirements to an external provider when it is determined that the external provider is responsible for the nonconformity.
6. Takes specific actions when timely and effective corrective actions are not achieved.

Corrective actions is appropriate to the effects of the nonconformities encountered. TDSI maintains documented information that defines the nonconformity and corrective action management processes.

10.2.2 TDSI retains documented information as evidence of:

* + - * 1. The nature of the nonconformities and any subsequent actions taken.
				2. The results of any corrective action.

### 10.3 CONTINUAL IMPROVEMENT

10.3.1 TDSI continually improves the suitability, adequacy, and effectiveness of TDSI’s QMS.

10.3.2 TDSI considers the results of analysis and evaluation, and the outputs from management review, to determine if there are needs or opportunities to be addressed as part of continual improvement.

10.3.3 TDSI monitors the implementation of improvement activities and evaluate the effectiveness of the results.

10.3.4 Continual improvement opportunities include lessons learned, problem resolutions, and the benchmarking of best practices.

# APPENDIX A – TDSI INPUT-OUTPUT (IO) BUBBLE DIAGRAM



# APPENDIX B – TDSI INPUT-PROCESS-OUTPUT (IPO) DIAGRAM

BLOCK DEFINITIONS



1. The Input Provider block identifies the provider of the input to the process block.

2. The Input arrow indicates the input to the process block.

3. The Process block lists (a) TDSI Core Processes and (b) the activities associated with converting inputs to outputs.

4. The Output arrow indicates the output from the process block.

5. The Output Receiver identifies the recipient of the output from the process block.

6. An Output arrow from the Output Receiver block to the process block indicates a feedback loop.



# APPENDIX C – TDSI PROCESS MAP







Legend

 COM = Communications; CON = Contracts; CSD = Customer Service;

 ENG = Engineering; FIN = Finance; HR = Human Resources; IT Information Technology; OPS = Operations; PM = Program Management, QA = Quality Assurance; SS = System Solutions;

SMS = Sensors & Missile Systems

P = Primary

S = Support

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# APPENDIX D - TDSI ORGANIZATIONAL PROCESS STANDARDS

Organizational Process Standards (based on the CMMI-DEV model) and their respective institutional process requirements apply to all departments located at the TDSI Clarksburg campus, as required. The Organizational Process Standards apply to all programs, projects, and contract development efforts. In the event a contract imposes different standards for a project, the Program Manager and Engineering Project Manager ensure the intent of these standards is met without unnecessary duplication of effort.

TDSI Senior Management, through process owners, implements the CMMI Organizational Process Area requirements across all TDSI Departments and projects. The CMMI Organizational Process Areas include:

1. INSTITUTIONAL PROCESS REQUIREMENTS

**Generic Goal 1**: The specific goals of the process area are supported by the process by transforming identifiable input work products into identifiable output work products.

Perform the specific practices of the process area to develop work products and provide services to achieve the specific goals of the process area.

**Generic Goal 2**: The process is institutionalized as a managed process.

Establish and maintain an organizational policy for planning and performing the process Establish and maintain the plan for performing the process.

Provide adequate resources for performing the process, developing the work products, and providing the services of the process.

Assign responsibility and authority for performing the process, developing the work products, and providing the services of the process.

Train the people performing or supporting the process as needed.

Place designated work products of the process under appropriate levels of configuration management.

Identify and involve the relevant stakeholders as planned.

Monitor and control the process against the plan for performing the process and take appropriate corrective action.

Objectively evaluate adherence of the process against its process description, standards, and procedures, and address noncompliance.

Review the activities, status, and results of the process with higher level management and resolve issues.

**Generic Goal 3:** The process is institutionalized as a defined process.

Establish and maintain the description of a defined process.

Collect process related experiences derived from planning and performing the process to support the future use and improvement of the organization’s processes and process assets.

1. REQUIREMENTS MANAGEMENT (REQM)

The purpose of REQM is to manage requirements of the project’s products and product components and to ensure alignment between those requirements and the project’s plans and work products.

**Specific Goal 1**: Requirements are managed and inconsistencies with project plans and work products are identified.

1. PROJECT PLANNING (PP)

The purpose of PP is to establish and maintain plans that define project activities.

**Specific Goal 1**: Estimates of project planning parameters are established and maintained.

**Specific Goal 2**: A project plan is established and maintained as the basis for managing the project.

**Specific Goal 3**: Commitments to the project plan are established and maintained.

1. PROJECT MONITORING AND CONTROL (PMC)

The purpose of PMC is to provide an understanding of the project’s progress so that appropriate corrective actions can be taken when the project’s performance deviates significantly from the plan.

**Specific Goal 1**: Actual project progress and performance are monitored against the plan.

**Specific Goal 2**: Corrective actions are managed to closure when the project’s performance or results deviate significantly from the plan.

1. SUPPLIER AGREEMENT MANAGEMENT (SAM)

The purpose of SAM is to manage the acquisition of products and services from suppliers.

**Specific Goal 1**: Agreements with the suppliers are established and maintained.

**Specific Goal 2**: Agreements with suppliers are satisfied by both the project and the supplier.

1. PROCESS AND PRODUCT QUALITY ASSURANCE (PPQA)

The purpose of PPQA is to provide staff and management with objective insight into processes and associated work products.

**Specific Goal 1**: Adherence of the performed process and associated work products to applicable process descriptions, standards and procedures is objectively evaluated.

**Specific Goal 2**: Non-compliance issues are objectively tracked and communicated, and resolution is ensured.

1. CONFIGURATION MANAGEMENT (CM)

The purpose of CM is to establish and maintain the integrity of work products using configuration identification, configuration control, configuration status accounting, and configuration audits.

**Specific Goal 1**: Baselines of identified work products are established.

**Specific Goal 2**: Changes to the work products under configuration management are tracked and controlled.

**Specific Goal 3**: Integrity of baselines is established and maintained.

1. MEASUREMENT AND ANALYSIS (MA)

The purpose of MA is to develop and sustain a measurement capability used to support management information needs.

**Specific Goal 1**: Measurement objectives and activities are aligned with identified information needs and objectives.

**Specific Goal 2**: Measurement results, which address identified information needs and objectives, are provided.

1. DECISION ANALYSIS AND RESOLUTION (DAR)

The purpose of DAR is to analyze possible decisions using a formal evaluation process that evaluates identified alternatives against established criteria.

**Specific Goal 1**: Decisions are based on an evaluation of alternatives using established criteria.

1. INTEGRATED PROJECT MANAGEMENT (IPM)

The purpose of IPM is to establish and manage the project and the involvement of relevant stakeholders according to an integrated and defined process that is tailored from the organization’s set of standard processes.

**Specific Goal 1**: The project is conducted using a defined process tailored from the organization’s set of standard processes.

**Specific Goal 2**: Coordination and collaboration between the project and relevant stakeholders are conducted.

1. ORGANIZATIONAL PROCESS DEFINITION (OPD)

The purpose of OPD is to establish and maintain a usable set of organizational process assets, work environment standard, rules and guidelines for teams.

**Specific Goal 1**: A set of organizational process assets is established and maintained.

1. ORGANIZATIONAL PROCESS FOCUS (OPF)

The purpose of OPF is to plan, implement and deploy organizational process improvement based on a thorough understanding of current strengths and weaknesses of the organization’s processes and process assets.

**Specific Goal 1**: Strengths, weaknesses, and improvement opportunities for the organization’s processes are identified periodically and as needed.

**Specific Goal 2**: Process actions that address improvements to the organization’s processes and process assets are planned and implemented.

**Specific Goal 3**: Organizational process assets are deployed across the organization and process related experiences are incorporated into organizational process assets.

1. ORGANIZATIONAL TRAINING (OT)

The purpose of OT is to develop skills and knowledge of people so they can perform their roles effectively and efficiently.

**Specific Goal 1**: A training capability, which supports the roles in the organization, is established and maintained.

**Specific Goal 2**: Training for individuals to perform their roles effectively is provided.

1. PRODUCT INTEGRATION (PI)

The purpose of PI is to assemble the product from the product components, ensure that the product, as integrated behaves properly (i.e., possesses the required functionality and quality attributes), and deliver the product.

**Specific Goal 1**: Preparation for product integration is conducted.

**Specific Goal 2**: The product component interfaces, both internal and external, are compatible.

**Specific Goal 3**: Verified product components are assembled and the integrated, verified, and validated product is delivered.

1. REQUREMENTS DEVELOPMENT (RD)

The purpose of RD is to elicit, analyze, and establish customer, product and product component requirements.

**Specific Goal 1**: Stakeholder needs, expectations, constraints, and interfaces are collected and translated into customer requirements.

**Specific Goal 2**: Customer requirements are refined and elaborated to develop product and product component requirements.

**Specific Goal 3**: The requirements are analyzed and validated.

1. RISK MANAGEMENT (RSKM)

The purpose of RSKM is to identify potential problems before they occur so that risk handling activities can be planned and invoked as needed across the life of the product or project to mitigate adverse impacts on achieving objectives.

**Specific Goal 1**: Preparation for risk management is conducted.

**Specific Goal 2**: Risks are identified and analyzed to determine their relative importance.

**Specific Goal 3**: Risks are handled and mitigated as appropriate to reduce adverse impacts on achieving objectives.

1. TECHNICAL SOLUTION (TS)

The purpose of TS is to select, design, and implement solutions to requirements. Solutions, designs, and implementations encompass products, product components, and product related lifecycle processes either singly or in combination as appropriate.

**Specific Goal 1**: Product or product component solutions are selected from alternative solutions.

**Specific Goal 2**: Product or product component designs are developed.

**Specific Goal 3**: Product components, and associated support documentation, are implemented from their designs.

1. VALIDATION (VAL)

The purpose of VAL is to demonstrate that a product or product component fulfills its intended use when placed in its intended environment.

**Specific Goal 1**: Preparation for validation is conducted.

**Specific Goal 2**: The product or product components are validated to ensure they are suitable for use in their intended operating environment.

1. VERIFICATION (VER)

The purpose of VER is to ensure that selected work products meet their specified requirements.

**Specific Goal 1**: Preparation for verification is conducted.

**Specific Goal 2**: Peer reviews are performed on selected work products

**Specific Goal 3**: Selected work products are verified against their specific requirements.