**TIER 5: Aerospace and Defense Technical Competencies**

1. Aerospace and Defense Fundamentals

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| **Competency Element** |  |  |  |
| **Demonstrating familiarity with aerospace and defense terminology** |  |  |  |
| **Identifying key differences and similarities among aerospace and defense industry sectors** |  |  |  |
| **Assessing the application of materials frequently used in the industry on the basis of their properties.**  |  |  |  |
| **Complying with relevant local, state, federal, and international laws, regulations, and certification requirements that impact the industry** |  |  |  |
| **Utilizing the security clearance and International Traffic in Arms Regulations (ITAR) processes as required for aerospace and defense applications** |  |  |  |

1. Design and Development

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| **Competency Element** |  |  |  |
| **Formulating conceptual design of aerospace and defense products or systems**  |  |  |  |
| **Developing design criteria for aerospace and defense products or systems, including testing methods, production costs, quality standards, completion dates, and design for X (e.g. assembly, manufacturing, maintenance, reliability).** |  |  |  |
| **Evaluating product data and design from inspections and reports for conformance to design criteria, engineering principles, customer requirements, safety, and quality standards**  |  |  |  |
| **Developing prototypes of aerospace components** |  |  |  |
| **Developing new technologies for use in aviation, defense systems, and space exploration, often specializing in areas such as structural design, guidance, navigation and control, instrumentation and communication, or production methods** |  |  |  |
| **Planning and conducting experimental, environmental, operational, and stress tests on models and prototypes of aerospace and defense systems and equipment** |  |  |  |
| **Conducting tests to determine whether equipment, software, or procedures are operating as expected** |  |  |  |
| **Applying computer-aided design/computer-aided manufacturing/computer-aided engineering (CAD/CAM/CAE) principles to product design** |  |  |  |
| **Ensuring intellectual property rights are protected and avoiding infringement of the intellectual property rights of others** |  |  |  |
| **Setting realistic geometric dimensioning and tolerancing (GD&T) requirements taking temperature, climate, and environmental factors into account** |  |  |  |

1. Product Maintenance

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| **Competency Element** |  |  |  |
| **Planning and conducting routine maintenance checks and incorporate unscheduled, non-routine tasks.** |  |  |  |
| **Describing possible discrepancies and defects that could affect the safety or mission effectiveness of aerospace and defense products.** |  |  |  |
| **Applying inspection procedures involved in testing aircraft, missile, and other defense systems under simulated operational conditions.** |  |  |  |
| **Performing systems readiness tests and pre- and post-operational checkouts.** |  |  |  |
| **Utilizing Automated and Built In Test equipment/features.** |  |  |  |

1. Inventory Control & Distribution Support

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| **Competency Element** |  |  |  |
| **Facilitating delivery of priority spares and repair parts to minimize degrading operational availability of systems and equipment.** |  |  |  |
| **Responding to need for additional sources of supply and/or increases in required production capacity to satisfy spare and repair parts requirements.** |  |  |  |
| **Validating tech data used by procurement is complete, accurate, and reflects current requirements when determining best course of action to maintain equipment and/or acquire spare/repair parts.** |  |  |  |
| **Minimizing diminishing manufacturing sources and material shortages (DMSMS) impact; validate obsolescence management program to identify components or technologies likely to become obsolete, unavailable, or expensive during the life of a program and identify alternatives to satisfy program requirements to prevent an impact on production.** |  |  |  |
| **Developing effective measures to avoid the use of counterfeit parts and to exclude lead-free electronics from critical, high reliability applications.** |  |  |  |
| **Overseeing inventory control and distribution support** |  |  |  |

1. Technical Cost Estimating, Analysis, and Control

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| **Competency Element** |  |  |  |
| **Anticipating possible production program cost drivers under various circumstances; identifying significant production cost risks for contractor proposals, manufacturing plans, production schedules, etc.; ensuring mitigation strategies are developed; and managing affordability programs.** |  |  |  |
| **Utilizing learning and cost improvement curves in cost estimation. Assessing cost benefit analysis. Assessing the cost effectiveness of manufacturing the product design.**  |  |  |  |
| **Evaluating target and “should” costs for feasibility. Modeling current cost estimates and metrics.**  |  |  |  |
| **Analyzing work measurement data and comparing planned work and costs against actual work completed to provide program managers, contracting officers, and others with an objective estimate of program progress and cost to complete.** |  |  |  |
| **Validating the value engineering program to ensure effectiveness, reduce costs and to ensure the utilization of new and appropriate technologies.** |  |  |  |

1. Validation and Verification Techniques

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| **Competency Element** |  |  |  |
| **Conducting predictive analysis of results from equipment tests, inspections, and operational usage to statistically forecast the likelihood and criticality of failures, maintenance requirements, and if the need exists for manufacturing or design changes.** |  |  |  |
| **Conducting modeling and simulation (M&S) in the place of actual performance data when time and expense of buying and testing the item itself is not possible.** |  |  |  |

1. Supplier Management

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| **Competency Element** |  |  |  |
| **Determining whether it is more appropriate to make a product in-house or purchase from a supplier.** |  |  |  |
| **Tracking vendor delivery times to ensure supply availability.** |  |  |  |
| **Demonstrating familiarity with and providing inputs to DoD contractor performance appraisal systems and databases, including contractor performance assessment reporting system (CPARS), past performance information retrieval system (PPIRS), product data reporting and evaluation program (PDREP), and continuous process improvement management system (CPIMS) available to program for use in reporting and evaluating supplier on-time delivery and quality.** |  |  |  |
| **Assessing supplier performance and determining supplier capability to ensure prime control of subcontractors and vendors.** |  |  |  |
| **Ensuring contractor has adequate supplier base to support the life cycle of programs and contracts and to scale up to program requirements.** |  |  |  |
| **Assessing integration of contractor and supplier resources.** |  |  |  |
| **Determining whether the suppliers have the capacities to meet delivery and production schedules; assessing facility efficiency** |  |  |  |
| **Assessing whether the supplier base is complete, dependable, and integrated.** |  |  |  |

1. Promoting Producibility, Reliability, Safety, and Maintainability

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| **Competency Element** |  |  |  |
| **Developing a producibility, reliability, safety and/or maintainability improvement plan to mitigate risks, including incentives to improve contractor performance in the plan.** |  |  |  |
| **Assuring producibility, reliability, safety and/or maintainability principles applied early in the life cycle.** |  |  |  |
| **Assessing producibility, reliability, safety and/or maintainability of emerging concepts.** |  |  |  |
| **Managing and evaluating manufacturing process capability assessments.** |  |  |  |
| **Evaluating design trades on the basis of life-cycle cost impacts.** |  |  |  |
| **Reading and interpreting implications of technical data to assess potential implementation of new technologies in design platforms.** |  |  |  |

**TIER 6: Facility and Equipment Development**

1. Equipment/Tools Development

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| **Competency Element** |  |  |  |
| **Designing cutting tools, work holding tools, die/molds, and gages to meet functional requirements, determining operating guidelines, and testing whether requirements are met.** |  |  |  |
| **Designing machines to meet functional requirements, determining operating guidelines, and testing whether requirements are met.** |  |  |  |
| **Researching and applying appropriate preservation methods for equipment and tools.** |  |  |  |

1. Production System Development

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| **Competency Element** |  |  |  |
| **Conducting industrial base assessments.**  |  |  |  |
| **Determining facility infrastructure requirements for power, water, heating, ventilation, and air conditioning, etc. and analyzing the business case concerning options for facility location.** |  |  |  |
| **Managing the process for determining facility layout requirements and analyzing alternatives to meet those requirements.**  |  |  |  |
| **Interpreting product specifications to determine suitability for use of possible production facilities.** |  |  |  |
| **Analyzing capacities, comparing them to future needs, and suggesting options to close the gap.** |  |  |  |
| **Performing facility capability and capacity assessments for sustainment.** |  |  |  |
| **Creating detailed assembly plans including sequencing and identifying tooling, fixtures and equipment needs.** |  |  |  |
| **Benchmarking manufacturing capabilities against competitors and suggesting production practices, manufacturing system designs, and organizational changes to close the gap.** |  |  |  |
| **Establishing and documenting work flow processes and instructions.** |  |  |  |
| **Establishing and selecting tools and equipment based on a business case analysis of alternatives.** |  |  |  |
| **Demonstrating the ability of a production line to meet cost, schedule, and performance goals.** |  |  |  |
| **Ensuring that the facility achieves safety requirements by considering human factors, ergonomics, and other criteria contributing to hazards.** |  |  |  |
| **Managing waste disposal in a way that protects the environment.** |  |  |  |

1. Automated Systems and Control

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| **Competency Element** |  |  |  |
| **Establishing requirements for automation and determining whether it should be hard, flexible, or soft.** |  |  |  |
| **Establishing computerized control of automation.** |  |  |  |
| **Determining the role and use of computer networks in automation.** |  |  |  |
| **Determining the role and use of information technology and databases in automation.** |  |  |  |
| **Managing the use of enterprise-wide systems integration as it relates to automation.** |  |  |  |

1. Production Line Restart/Shutdown

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| **Competency Element** |  |  |  |
| **Reviewing shut-down plans to ensure all key production elements (i.e. tech data, equipment, automated test equipment, tooling, etc.) are captured and retained.** |  |  |  |
| **Ensuring that critical knowledge is captured and retained to prevent "re-creating the wheel."** |  |  |  |
| **Planning for production line verification, first article test, process proofing, data management, and critical item control to ensure efficient restart of production line.** |  |  |  |
| **Managing production line restarts/shutdowns whenever they occur.** |  |  |  |

**TIER 7: Acquisition Planning and Support Competencies**

1. Acquisition Process

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| **Competency Element** |  |  |  |
| **Implementing an acquisition plan that is consistent with DoD Acquisitions Framework (5000.02) and key milestones as they relate to production, quality and manufacturing (PQM) functions** |  |  |  |
| **Implementing an acquisition plan that is consistent with how systems evolve from mission needs through development and production to deployment and disposal.** |  |  |  |

1. Manufacturing Planning

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| **Competency Element** |  |  |  |
| **Assessing and validating workforce size, workforce skill levels, training requirements, and maintaining timely and efficient responses to hiring needs to ensure successful production and quality management.** |  |  |  |
| **Assessing the skill set required for a project and how personnel might develop the requisite skills.** |  |  |  |
| **Documenting quality strategy in a quality plan for the program.** |  |  |  |
| **Developing a manufacturing plan for the program.** |  |  |  |
| **Constructing the manufacturing and quality elements of the test and evaluation master plan, the systems engineering plan, the integrated master schedule, and the integrated master plan based on program goals/objectives, identified risk, and entrance and exit criteria.** |  |  |  |
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| **Negotiating with labor unions.** |  |  |  |
| **Developing justification for plans and actions based on a business case analysis determination of a return on investment.** |  |  |  |
| **Complying with the ethics and social responsibility policies of the organization and profession.** |  |  |  |
| **Complying with all applicable laws, standards, and regulations.** |  |  |  |

1. Special Tooling and Test Equipment (STTE)

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| **Competency Element** |  |  |  |
| **Ensuring STTE conforms to requirements.** |  |  |  |
| **Monitoring STTE acquisition process.** |  |  |  |
| **Reviewing STTE final disposition.** |  |  |  |

1. Engineering and Logistics Interfaces

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| **Competency Element** |  |  |  |
| **Developing inputs to the System Engineering Plan.** |  |  |  |
| **Assessing actions taken to implement configuration management programs as a function of program phase.** |  |  |  |
| **Developing inputs to the Life Cycle Management Plan.** |  |  |  |

**TIER 8: Industry Sector Contracting Support Competencies**

1. Pre-Award Support Activities

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| **Competency Element** |  |  |  |
| **Determining, for both requests for proposal (RFPs) and contracts, contractor requirements and deliverables related to carrying out production, quality and manufacturing functions and responsibilities that are appropriate for the current phase of acquisition** |  |  |  |
| **Preparing a proposal that meets the established requirements** |  |  |  |
| **Developing source selection evaluation criteria related to manufacturing/production, quality management, manufacturing risk reduction and contractor past performance**  |  |  |  |
| **Demonstrating awareness of the existence, purpose, and relationship between the acquisition strategy, acquisition plan, and RFP to provide input into or validate the consistency of production and manufacturing requirements throughout a system's acquisition cycle.** |  |  |  |
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1. Source Selection and Contract Negotiation

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| **Competency Element** |  |  |  |
| **Using source selection evaluation criteria to evaluate contractor proposals as to how well they meet quality and manufacturing requirements.** |  |  |  |
| **Identifying risks associated with 1) gaps between contract proposal and requirements and 2) meeting production cost targets.**  |  |  |  |
| **Evaluating the adequacy of risk mitigation plans and processes in the proposal**  |  |  |  |
| **Identifying manufacturing-related strengths of proposals.** |  |  |  |
| **Guiding negotiations of contracts, contract modifications, and/or overhead rates through preparation of Technical Support to Negotiations (TSN) and providing contracting officers with an assessment of the adequacy, reasonableness, and necessity of proposed contractor labor and material charges.**  |  |  |  |

1. Post-Award Support Activities

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| **Competency Element** |  |  |  |
| **Supporting "progress payment" and award fee plans and determination, through assessment of contractor delivery progress and production performance.** |  |  |  |
| **Demonstrating awareness of the purpose, process, importance of, and roles/responsibilities associated with the post-award conference.** |  |  |  |
| **Resolving improper business practices, conflicts of interest, and ethical problems** |  |  |  |
| **Analyzing and resolving issues regarding prime/subcontractor relationships, contract changes, amendments, modification, and contract change notices in order to set up a reasonable delivery schedule and ensure schedules are met.** |  |  |  |
| **Supporting contract administration activities** |  |  |  |

**TIER 9: Risk Management Competencies**

1. Audit/Review Planning, Execution, and Documentation

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| **Competency Element** |  |  |  |
| **Developing schedule for audits and reviews for both internal audit team and contractor to allow sufficient time to prepare, gain customer buy-in and achieve the intended purpose.** |  |  |  |
| **Communicating with contractor concerning all phases and schedules allowing sufficient time to prepare and gain customer buy-in and achieve the intended purpose** |  |  |  |
| **Developing audit criteria, applicable performance standards, and associated checklists to facilitate team's evaluation of performance and required supporting material and or data for a final report.**  |  |  |  |
| **Identifying audit team members with appropriate expertise in the product/process to be audited in order to obtain proper level of coverage.** |  |  |  |
| **Conducting quality audits/reviews and support all reviews and audits.** |  |  |  |
| **Documenting findings from audits/reviews to clearly identify audit scope, criteria, and findings.** |  |  |  |
| **Drawing conclusions from audit/review findings to determine whether the audited organization satisfactorily meets defined criteria and identify areas needing improvement, as well as areas of excellent performance.** |  |  |  |

1. Risk Identification

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| **Competency Element** |  |  |  |
| **Preparing manufacturing elements of in-process reviews, non-conformance material assessment, compliance reviews, and design reviews** |  |  |  |
| **Planning and conducting production readiness reviews (PRRs) and manufacturing readiness assessments (MRAs).** |  |  |  |
| **Identifying products with single, sole, or foreign sources or potential obsolescence issues to highlight potential risks to DoD supply.** |  |  |  |
| **Identifying and evaluating critical suppliers and schedules to ensure sub-contracted requirements support production schedules.**  |  |  |  |
| **Identifying and evaluating manufacturing maturity of critical suppliers and sub-contractors working with the primary DoD contractor to determine risks to production.** |  |  |  |
| **Assessing design maturity.**  |  |  |  |
| **Assessing a model based design for its completeness, stability, maturity, and its ability to meet requirements.** |  |  |  |
| **Assessing technology readiness** |  |  |  |
| **Assessing performance against Integrated Master Plan and Integrated Master Schedule.** |  |  |  |
| **Identifying metrics and management information requirements** |  |  |  |
| **Identifying best practices and conduct benchmarking** |  |  |  |
| **Assessing compliance to certification criteria.** |  |  |  |

1. Risk Analysis

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| **Competency Element** |  |  |  |
| **Performing risk assessments to determine severity of impact and likelihood of occurrence**  |  |  |  |
| **Applying decision analysis in the selection of risk mitigation options.** |  |  |  |
| **Applying the mechanics of problem solving tools and performing required calculations for various risk scenarios.** |  |  |  |
| **Using risk management software to predict, track, rate, and mitigate risk events, as well as identify critical path in order to determine probabilities of program completion dates and costs.**  |  |  |  |

1. Contingency Planning and Solutions Planning

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| **Competency Element** |  |  |  |
| **Identifying, analyzing and reporting product or system failures to address quality deficiencies reported by users after delivery of products by the contractor; investigate and determine mitigating actions for product quality deficiency reports (PQDRs).** |  |  |  |
| **Formulating appropriate risk strategies, and provide Program Managers with actionable recommendations** |  |  |  |
| **Identifying potential risks and determine how to mitigate, postpone, delay, or eliminate risks across the production life cycle.** |  |  |  |
| **Obtaining funding to mitigate risks.** |  |  |  |
| **Leading teams to resolve issues.** |  |  |  |
| **Mitigating threats to contractor's ability to meet schedule and contractual requirements through analysis of potential issues and recommendations to minimize risks to program.** |  |  |  |