

**PURCHASE ORDER TERMS AND CONDITIONS
FOR MANUFACTURING MANAGEMENT PROGRAMS
MIL-STD-1528A**

APPENDIX '2'

1. The Seller, upon acceptance of this purchase order, shall establish and/or maintain a Manufactured Management Program for the product(s) to be manufactured under this purchase order in accordance with the following:
2. Definition
 - a. Critical Forms and Parts. Materials that represent high availability risks to peacetime production or surge and mobilization requirements. They include semi-processed and finished parts with potential risk to a program due to problems such as long lead time, foreign source or diminishing domestic manufacturing source.
 - b. Limited Production. The low rate, initial production of hardware in limited quantity which may be used in operational test and evaluation, for verification of manufacturing engineering adequacy and design maturity, or to establish a production base.
 - c. Manufacturing. The conversion of raw materials into products or components through a series of processes. It includes such major functions as manufacturing planning, tool design, scheduling, manufacturing engineering, material procurement, fabrication, assembly test, packaging, installation and check-out, product assurance, and determination of resource requirements throughout systems acquisition.
 - d. Manufacturing Engineering. That specialty of professional engineering which requires such education and experience as is necessary to understand and apply engineering procedures in manufacturing processes and methods of production of industrial commodities and products, and requires the ability to plan the practices of manufacturing, to research and develop the tools, processes, machines and equipment, and to integrate the facilities and systems for producing quality products with optimal expenditure.
 - e. Manufacturing Feasibility and Capability Assessment. An assessment conducted to identify potential manufacturing constraints and risks and the capability of the Seller to execute the manufacturing efforts.
 - f. Manufacturing Management. The techniques of planning, organizing, directing, coordinating, and controlling the use of people, money, materials, equipment, methods and processes, and facilities to manufacture systems.

- g. Manufacturing Management/Production Capability Review (MM/PCR).

The investigation conducted by the Buyer at prospective Seller facilities during the source selection process. The reviews are conducted to evaluate competing Seller's capability to meet all immediate and future production requirements of proposed systems by considering the Seller's current and projected business. The review includes an assessment of the potential impact on cost risk due to inadequate manufacturing facilities.
- h. Manufacturing Risk. The risk that a Seller will not be able to manufacture hardware that meet requirements within cost, performance, and schedule parameters.
- i. Manufacturing Technology (MANTECH). A program through which Sellers develop and carry out new or significantly improved manufacturing system processes, techniques, or equipment in support of DoD systems, subsystems, and
- j. Industrial Mobilization. The transformation of industry from its peacetime activity to the industrial program necessary to support the national military objectives. It includes the mobilization of materials, labor, capital production facilities, and contributory items and services essential to the industrial program.
- k. Producibility. Producibility is a design accomplishment that enables manufacturing to repeatedly fabricate hardware which satisfies both functional and physical objectives at an optimum cost. Producibility results from a coordinated effort by systems/design engineering and manufacturing/industrial engineering to create functional hardware designs that optimize ease and economy fabrication, assembly, inspection, test, and acceptance of hardware without sacrificing desired function, performance, or quality. A producible design includes complete design engineering and manufacturing planning consideration for the selection of material, tooling, facilities, capital equipment, test equipment, methods, processes, and personnel to be employed in the production hardware to that design. Production must be taken into account whenever the producibility of design alternatives is assessed. Effective hardware producibility supports reliability and maintainability requirements and is fundamental to life cycle cost objectives.
- l. Producibility Analysis. The comparison of alternative designs, materials, processes, and manufacturing techniques to determine the most economical manufacturing processes and materials to produce a product while meeting performance specifications and required production rates.
- m. Producibility Engineering and Planning. The engineering and production planning measures undertaken to ensure a timely transition from concept exploration to low risk, economical production.

- n. Production Readiness. The degree to which a hardware program is ready to proceed into production. A hardware program is ready for production when a producible design is complete and the managerial and physical preparations necessary for initiating and sustaining a practical manufacturing effort allowing production commitment to be made without causing unacceptable risks of impact to schedule, performance, cost, quality, reliability, maintainability, or other established thresholds.
- o. Production Readiness Review (PRR). A formal examination of a product to determine if the design is ready for manufacturing, if manufacturing engineering problems have been resolved, and if the Seller has adequately planned for the production phase. The review may be conducted incrementally.
- p. Strategic and Critical Materials. Materials that would be needed to supply the military, industrial, and essential civilian needs of the United States during a national emergency, and are not found or produced in the United States in sufficient quantities to meet such need. These materials are carried in the National Defense Stockpile. Strategic and critical materials include any material in short supply, limited domestic production, or otherwise posing a risk to a production program.
- q. Surge. The accelerated manufacturing of selected items with existing facilities and equipment in a peacetime environment (no declared national emergency).
- r. Surge or Mobilization Rate. The number of systems over time that would be required to meet accelerated requirements under surge or mobilization conditions. This rate must be provided by the Buyer to the Seller.
- s. Work Measurement. A system of collecting data on work hours and manufactured units to be determined the relationship between standard hour content of work performed and actual work hours expended.

3. Industrial Material Management

- a. Critical Forms and Parts. The Seller shall identify all critical forms and parts used, or planned to be used, in the system, and shall document them in accordance with requirements specified in the contract. For foreign supplied parts and components, the Seller shall develop realistic and practical plans and procedures for securing adequate supplies for surge mobilization needs under ware and contingency conditions.
- b. Diminishing Manufacturing Sources and Material Shortages (DMSMS).
The Seller shall regularly check the Government-Industry Data Exchange Program (GIDEP) data base for DMSMS items, during design, development, and production phases, and shall determine if any of these items are in, or planned for use in the system. The Seller shall seek to develop or qualify alternate sources for DMSMS items. As a last resort, Sellers shall utilize engineering change procedures.

- c. Strategic and Critical Materials. The Seller shall identify all strategic and critical materials used or planned to be used, in the system. The Seller shall develop realistic and practical plans and procedures to conserve strategic and critical materials, apply manufacturing procedures to minimize waste and scrap, and employ reclamation procedures.

4. Design Analysis for Manufacturing

- a. Producibility Analysis. The Seller shall develop a comprehensive, well-defined producibility analysis effort as a prerequisite to entering FSD. The Seller shall develop a producibility element of his manufacturing plans, which:
 - 1. Delineates the responsibilities of all disciplines and functions involved in producibility analysis.
 - 2. Provides procedures and criteria for selecting candidate items for producibility analysis.
 - 3. Prescribes techniques for producibility analysis.
 - 4. Identifies criteria used in producibility analysis. Adequate producibility of the design shall be addressed at system requirement review, system design review, preliminary design review, critical design review, and production readiness review. The full-scale development phase shall include provisions to attain producibility of the design using cost-effective manufacturing methods and processes. Resource requirements for producibility analysis, long lead procurements and limited production shall be identified and programmed.
- b. Producibility Criteria. Producibility criteria based on all design characteristics shall be developed and documented during the earliest program phase, and shall be updated iteratively as the design is developed. Design conformance with the criteria shall be addressed in the manufacturing feasibility and capability assessments at each major design review.
- c. Design Analysis. Manufacturing, process, and method analysis of each major element of the design shall be conducted during the design process and shall be documented and traceable. This analysis shall consider surge and mobilization support needs and shall address:
 - 1. Material section: critical and strategic material conservation, avoidance of dependence on foreign sources, constraints on surge and mobilization responsiveness, and standardization of materials and components, and material lead time.
 - 2. Production tooling, special tooling, and test equipment concepts.
 - 3. New or unique processes.
 - 4. Sequencing of assembly events, ease of assembly.
 - 5. Test and inspection instrumentation concepts.
 - 6. Manufacturing and test software.
 - 7. Tooling and facility utilization.
 - 8. Work methods to be used in rate production.
 - 9. Production quantity and rate.

10. Process yield and stability and the impact of process variability product quality. This analysis will be submitted as specified in the contract prior to each formal design review. Analysis shall identify the most economical ways to manufacture the product at the required rate, and shall indicate capability and capacity factors related to the design.
 - d. Manufacturing Integration in the Design Process Manufacturing engineering shall be integrated into the Seller's system engineering (design management) system. Manufacturing engineering shall have a formal, traceable part in the engineering decision-making process relating to hardware design, and shall act as the formal manufacturing management interface with the system engineering entity. System engineering practice shall assume application of producibility criteria developed as part of the manufacturing feasibility and capability estimate. Factors listed in paragraph 4.c shall be applied iteratively during design development as an element of the manufacturing engineering contribution to the system engineering process.
 - e. State-of-the-Art Reviews. The Seller shall perform periodic analysis of the manufacturing methods, processes, techniques, equipment, and materials planned for use in production. This may be accomplished by reviewing state-of-the-art advances in manufacturing technology with the Manufacturing Technology Division Division of the Air Force Materials Laboratory, Wright-Patterson AFB OH 45433, to encourage the use of the latest and most efficient manufacturing technology. Information available from the Defense Technical Information Center (DTIC), Cameron Station, Alexandria, Virginia 22314, commercial sources should be considered as well.
5. Manufacturing Operations Management
- a. Production Scheduling and Control. The seller shall establish a production scheduling and control system which:
 1. Schedules all planned production activities.
 2. Identifies key production milestones required to attain production goals.
 3. Assesses and determines production lead time requirements on Seller and Government furnished materials.
 4. Conducts and applies analysis required for economical lot release economical order quantities.
 5. Tracks components and assemblies throughout the production cycle to assure production schedules are attained.
 6. Provides inputs to engineering change management relative to effectiveness for production incorporation.
 7. Assures engineering change incorporation is accomplished.
 - b. Work Measurement System. The government shall have full access to the documentation, data, and reports generated by any Seller work measurement system.

- c. Manufacturing Surveillance. The Seller shall maintain an effective, timely, and responsive manufacturing surveillance operation which:
 - 1. Identifies factors which may adversely impact product quality, delivery, performance, or cost. The manufacturing surveillance system shall collect and analyze data of the following types or from the following sources; minimum:
 - a. Yield rates for manufacturing processes.
 - b. Yield rates for test operations at all levels of fabrication and assembly.
 - c. Scrap data.
 - d. Rework data, including data on out-of-station work. Additional indicators should be selected to reflect the health of the entire manufacturing management program. Data shall be collected and used to identify problem areas and be in sufficient detail to permit effective investigation of corrective action. The system shall provide for documented traceability for data through verification of corrective action implementation and effectiveness.
 - 2. Notifies the Buyer of anticipated contract delivery schedule delinquencies, production difficulties or delays which may adversely impact the program.
- d. Control of Subcontractors and Vendors. The Seller's procedure to provide continuous management visibility and control of subcontractors, vendors, and suppliers shall assure that requirements paragraphs 3, 4, and 5 of this Appendix are flowed down and effectively implemented. These procedures shall specify Seller review of subcontractor manufacturing management plans, systems, and production facilities to assure visibility of producibility problems, identification and resolution of production risk, production program surveillance, and timely reporting of production difficulties which would impact the program. Routine use of Seller manufacturing organization specialized disciplines to assist in the selection and management of subcontractors, vendors, and suppliers, is necessary to perform this requirement. Government representatives may attend these reviews as observers. Order status of long lead or critical items shall be reviewed on a recurring basis. The Seller shall assure that subcontractors and vendors initiate timely Requests for Special Priorities Assistance, as appropriate.