

**24-1-06 3-AXIS DOUBLE COLUMN MACHINE(S)**

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### 1. GENERAL SYSTEM DESCRIPTION

- The contractor shall provide and install a singular double column vertical milling machine with an option for an additional double column vertical milling machine with specification outlined in this RIPD. The contractor shall be responsible for all necessary components to provide a fully functioning and safe operating system. The machines shall be installed at RIA-JMTC. The machine(s) shall be in accordance with this document.

### 2. STANDARDS AND PUBLICATIONS

#### 2.1 Clarification

Any ambiguities, questions, requests for clarification or discrepancies between sections of this purchase description, drawings, national or industry standards discovered by the contractor in reviewing this purchase description shall be reported by the bidder in writing to the contracting officer BEFORE THE DATE SCHEDULED FOR CLOSE OF BIDDING/receipt of proposal. Submission of a proposal or bid shall be construed as evidence that such examination has been made. Therefore, later claims for labor, material, or equipment required, or for difficulties encountered, which could have been foreseen had such reasonable examination been made, may be denied.

#### 2.2 National Standards and Specifications

The following specifications in effect on the Date of Invitation for Bid/Request for Proposal form a part of this purchase description. In the case of conflicting requirements, the more stringent shall apply.

- 2.2.1 Occupational Safety and Health Act of 1970 (OSHA).
- 2.2.2 American Society of Testing and Materials (ASTM).
- 2.2.3 American Society of Mechanical Engineers (ASME).
- 2.2.4 American National Standards Institute (ANSI).
- 2.2.5 National Electrical Manufacturers Association Standards (NEMA).
- 2.2.6 Electronic Industries Association (EIA).
- 2.2.7 Institute of Electrical and Electronics Engineers (IEEE).
- 2.2.8 American Code for Information Exchange (ASCII).
- 2.2.9 American Welding Society (AWS).
- 2.2.10 American Gear Manufacturers Association (AGMA).
- 2.2.11 National Fire Protection Association (NFPA).
  - 2.2.11.1 NFPA-70 National Electrical Code
  - 2.2.11.2 NFPA-79 Electrical Standard for Industrial Machinery.
- 2.2.12 International Standards Organization (ISO).

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### 3. DESIGN

#### 3.1 Ownership

3.1.1 This equipment is a standard product of the manufacturer and shall require either no change or minor design changes to meet requirements of these specifications. Therefore, ownership of the design will remain with the manufacturer.

#### 3.2 General Design Standards

3.2.1 DEVIATION FROM PRODUCT: Modifications to the manufacturer's standard design to achieve requirements as specified in this document are only permissible as dictated by good design practice. For example, mounting a 20-hp motor in a power train designed and normally using a 10-hp motor would not be acceptable.

3.2.2 UNITS OF MEASURE: Dimensions and capacities in this purchase description are given in the English-US (in-lb) system. All dials, gauges, and drawings shall be in the English-US system or both the English-US and the metric systems, unless otherwise specified in this document.

3.2.3 ID DATA PLATE: The equipment shall include a main data plate which will include the following data as a minimum requirement (additional information is acceptable): Manufacturer Name, Manufacturer's Dunns and Bradstreet Number, Manufacturer's Model Number, Manufacturer's Serial Number, Year of Manufacture, Contract Number, Machine Weight. This information is necessary for compliance with the governments Unique Identification Program (UID).

3.2.4 DATA PLATES: All instruction, data, and identification plates and labels attached to this equipment and its controls shall be manufactured of corrosion and oil resistant metal or plastic material. All wording shall be in the English language using plain, bold face lettering. Lettering shall be permanent and have a contrasting background.

3.2.5 ITEM UNIQUE IDENTIFICATION (IUID) REGISTRATION: The contractor shall register the equipment in the IUID Registry (as one single system). IUID registration requires the contractor to input Cage Code, Model Number, and Serial Number into a Government Database to allow for asset and inventory tracking. IUID Registry of the equipment shall be performed at <http://dodprocurementtoolbox.com/site/uidregistry/>. Training for IUID is available in <https://wawftraining.eb.mil>. IUID registration of this equipment is required prior to final payment in the Wide Area Work Flow (WAWF). The contractor shall also affix a machine readable 2-dimensional (2-D) matrix representing the IUID registry to the machine. The IUID 2-D matrix may be included on the ID Data Plate outlined in paragraph 3.2.4.

3.2.6 UTILITY CONNECTION: Equipment supplied to the Rock Island Arsenal will have single point shut-off for each utility supplied to a system. This means that equipment constituting a single system shall be wired to a single main electrical disconnect point, plumbed to a single pneumatic shut-off valve, etc... This will be referred to as the "point of first connection". Each type of power source may have only one point of first connection. E.g. (1) pneumatic shut-off valve, (1) water supply shut-off valve, (1) electrical disconnect, etc... Each point of first connection shall be clearly labeled on the system and shown in the safety lockout portion of the documentation package. These points must be located on a stationary component

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and positioned such that they will not create a hazard to personnel during normal operation of the system. The first connection points shall be accessible from the shop floor without the use of ladders, steps, or stools. Access cannot be hampered by operation of the system.

3.2.7 UTILITY CONNECTION LABOR: Rock Island Arsenal shall provide only such labor and materials as will be needed to connect facility utilities to each point of first connection of the system. The supplier will be responsible for all connections beyond the point of first connection for each utility.

3.2.8 UTILITIES AVAILABLE: Rock Island Arsenal shall be responsible for providing the following:

3.2.8.1 Connection of 460-V, 60-Hz, 3-Ph AC electrical power to the fused or breaker type disconnect switch required in the ELECTRICAL DISCONNECT paragraph of this purchase description. Connection does not include filters, surge protection, or any peripheral equipment necessary to make the equipment functional.

3.2.8.2 Connection of approximately 80-psi compressed air to a single point for each system, if needed. Connection does not include filters, dryers, or any peripheral equipment necessary to make the equipment functional.

3.2.8.3 Connection of approximately 65-psi water to a single point for each system, if needed. Connection does not include filters or any peripheral equipment necessary to make the equipment functional. If water is required, the contractor shall be responsible for installing a back-flow limiting device sufficient to prevent possible contamination of the water system. This is necessary to maintain IEPA compliance.

3.2.8.4 Connection of 1.5-in diameter natural gas pipe to a single point for each system, if needed. Connection does not include filters or any peripheral equipment necessary to make the equipment functional.

3.2.8.5 If, due to contractor caused problems, the equipment or components of the equipment must be moved or removed and replaced, by RIA after initial placement, the contractor shall be billed for such work at current RIA labor and overhead rates.

3.2.9 ELECTRICAL DISCONNECT: The equipment shall be equipped with a manual, fused or breaker type disconnect switch, readily accessible to the operator, which will deactivate the entire equipment. It shall be located no more than 6-ft 7-in from the floor to the highest point the control device. It shall be capable of being locked in the de-energized state (OFF) only.

3.2.10 CONDUIT: Flexible conduit is not permitted in exposed areas. All wires, cables, and hoses will be enclosed by rigid, oil-proof protection, except where flexibility is necessary for operation of the equipment. Flexible wires, cables and hoses shall be arranged to prevent draping or tripping hazards.

3.2.11 SERVICE ACCESS: Components subject to periodic adjustment, replacement, or servicing shall be readily accessible. Meaning that experienced personnel can access the part after no more than 30-min of labor. If any special tools or equipment are necessary to access these components, said equipment will be supplied as part of the system and provided with a proper storage location within the system.

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3.2.12 DEFLECTION: The system shall recover from distortion and deflection at no load. The machine and its components shall be sufficiently rigid that work piece finish and tolerances are not impaired by machine vibration.

3.2.13 NEW EQUIPMENT: The equipment furnished under this purchase description shall be new and unused.

3.2.14 COMPONENT ENVIRONMENT: Under no circumstances shall a component be used in an application not recommended by the component manufacturer. Components shall not be subjected to conditions of operation beyond the recommendations of the manufacturer, such as excessive heat, lack of lubrication, over-loading.

3.2.15 REPLACEMENT COMPONENTS: All replaceable components shall be manufactured to definite standards for tolerance, clearance, and finish, enabling components to be field installed without further machining.

3.2.16 CASTINGS AND FORGINGS: All castings and forgings shall be free of defects, scale, and mismatching. No process such as welding, peening, plugging, or filling shall be used for reclaiming any defective part for use in this equipment without the prior written consent of the contracting officer.

3.2.17 SURFACE BUILDING AND COATINGS: Welding, brazing, soldering, coating or plating shall be employed only where specified in the original design. These operations may not be employed as a means of reclaiming a defective part.

3.2.18 FASTENING DEVICES: All screws, pins, bolts, and similar parts shall be installed in such a manner as to prevent change in tightness. Those devices subject to removal or adjustment shall not be swaged, peened, staked, or otherwise permanently deformed. They shall not be installed using permanent bonding adhesives.

3.2.19 CLEANING AND DEBURRING: All surfaces of castings, forgings, molded parts, stampings, and welded components shall be cleaned and free from sand, dirt, fins, flash, scale, flux, and other harmful or extraneous materials. All edges shall be either rounded or beveled unless sharpness is required to perform a necessary function. Except as specified herein, the condition and finish of all surfaces shall be commensurate with the manufacturer's commercial practice.

3.2.20 PAINTING: All unfinished surfaces of the equipment shall be painted with a lead free and chromium free commercial grade of metal primer and a minimum of one finish coat. The color shall be in accordance with the manufacturer's standard commercial practice, or as necessary to maintain compliance with OSHA regulations, as applicable.

3.2.21 LUBRICATION: Components specified as requiring lubrication by the original manufacturer shall have an appropriate means of providing said lubrication included in the design of the machine.

3.2.21.1 The lubrication points will be labeled on the lubrication drawing provided as part of the maintenance documentation and will also be labeled on the machine at the lubrication point and on any access panel covering the lubrication point. These labels will include as a minimum standard, the specific type of lubricant, the quantity to be used, the frequency for

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change, and the maintenance manual reference for detailed instructions. The lettering shall be English and the units shall be English standard (i.e. pints, quarts, and gallons)

3.2.21.2 If an automatic circulation system is used, it shall be complete, including, but not limited to the following: reservoir, valves, nozzles, filters, pumps, sight gages, and other components as necessary to make the system completely functional.

3.2.21.2.1 A system allowing blockages or inadequacies to go undetected is unacceptable. The system shall be interlocked to the machine control, providing an alarm that lubrication failure has occurred. The system shall not initiate immediate shutdown of the affected function during a cutting cycle. It shall allow completion of the cycle and shutdown in an orderly sequence.

3.2.21.2.2 The reservoir shall be sized to allow no less than 80-hrs of machine run time before requiring refill. It shall also have a means provided for draining and cleaning. A means shall be provided to enable the operator to determine the fluid level.

3.2.21.2.3 All filters shall be either cleanable or replaceable.

3.2.21.2.4 All pumps shall be self-priming.

3.2.22 FILTRATION/REGULATION: Equipment requiring filtered or regulated energy sources shall be supplied with the components necessary to perform this function. E.g. the equipment shall be supplied with a Filter, Regulator, Lubricator (FRL) device, if filtered, lubricated, regulated pressurized air is required for the efficient, proper operation of the equipment. These devices shall be located on the equipment side of the lockout devices at the points of first connections.

3.2.22.1 Equipment which requires compressed air shall have a regenerative type desiccant or refrigerated compressed air dryer capable of drying air down to 35°F pressure dew point, minimum, from air entering the equipment at 110°F, and capable of supplying air to the rated standard cubic feet per minute (SCFM) of the equipment. The unit shall purge condensate automatically. In the case of the latter, the refrigerant used shall not be a Class I or Class II, ozone depleting substance. The air dryer shall be connected and/or piped to the equipment by the contractor.

3.2.22.2 Equipment which requires a high quality constant power source shall have proper isolation and/or power conditioning equipment for the power service designated in this description. All electrical equipment shall have a power factor (ratio of real power to apparent power) of no less than 80%, as read at the equipment main disconnect. Equipment with a power factor of less than 80% shall be fitted with suitable power factor correction capacitance, sized on the basis of the equipment inductive AC load.

3.2.23 HYDRAULICS: The machine will be equipped with a hydraulic system and the system shall be complete with, but not limited to, pump, valves, piping, cylinders, pressure controls, filter, and reservoir. All components necessary to make the system completely functional shall be provided.

3.2.23.1 If the duty cycle of the system under maximum usage will cause the hydraulic fluid to exceed 120°F in temperature, a suitable air-cooled heat exchanger shall be provided

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to maintain fluid temperature at or below that temperature. The exchanger shall be equipped with changeable fiberglass filter(s), unless permanent type filters are supplied.

3.2.23.2 The system shall have adequate capacity to provide sufficient pressure and flow to perform all hydraulic operations under all normal machine operating conditions.

3.2.23.3 Protection shall be provided to prevent damage to components.

3.2.23.4 Safeguards shall be provided to alert the operator of temperatures and pressures above/below design limits. If safe limits (within design limits) are exceeded, the system shall automatically shut down.

3.2.23.5 Anti-surge devices or circuits shall be incorporated to ensure uniformity of motion under varying loads.

3.2.23.6 The hydraulic reservoir shall be provided with means for draining and cleaning.

3.2.23.7 Means shall be provided to enable the operator to determine fluid level.

3.2.23.8 Each hydraulic system shall include a filter, which shall be either cleanable or replaceable.

3.2.23.9 All pumps shall be self-priming.

3.2.24 COOLANT: The machine will be equipped with a coolant system and it shall be equipped with external flood coolant capabilities, as a minimum. Machines using cutting tools shall be equipped with both through the tool and external flood coolant capabilities. Coolant on/off shall be a machine control function.

3.2.24.1 The coolant systems shall include all necessary components necessary to provide completely functional systems, with sufficient capacity to give satisfactory service and provide adequate pressure and flow under normal operating conditions.

3.2.24.2 Coolant troughs and chip screens shall be provided around the machine table base to trap, direct, and return the coolant to the reservoir. An easily removable strainer shall be provided in the return line to the reservoir. "Easily removable" is defined as being removable after no more than 5-min of work by experienced personnel.

3.2.24.3 All machine coolant systems and their components shall provide drip-proof coolant delivery to the coolant point of discharge. In addition, the machine shall be designed and constructed to prevent coolant from escaping the confines of the machine or leaking to the floor when producing work-pieces of a size within the dimensions of the machine table.

3.2.25 CHIP REMOVAL: A chip conveyor is required and it shall be an automatic, reversible chip removal unit shall be provided, by the contractor, capable of conveying various types of ferrous and nonferrous chips from the entire work area of the machine to a suitable container outside of the machine without manual aid.

3.2.25.1 The unit shall be of watertight construction.

3.2.25.2 The conveyor belt shall be equipped with a master link, easily disconnected, allowing the belt to be removed for maintenance purposes. All pillow block bearings shall be mounted for ease of replacement. Pillow block bearings shall be fitted with external

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lubrication fittings. The system shall allow manual movement of the conveyor belt for maintenance.

3.2.25.3 The conveyor shall facilitate draining of excess coolant back to the sump before chips are discharged.

3.2.25.4 The height of the discharge chute from the floor shall be not less than 49.5-in.

3.2.25.5 The chip removal unit shall be installed in a manner facilitating collection of chips from the entire work area without interfering with normal operation of the machine.

3.2.25.6 As a minimum, the chip removal unit shall be provided with an on/off switch or buttons, stop button, and reversing switch.

#### 3.2.26 MOTORS:

3.2.26.1 All motors shall be rated for continuous duty.

3.2.26.2 Motors shall not operate in an overload condition during normal operation of the equipment and shall be equipped with overload protection.

3.2.26.3 Each motor shall bear an identification plate containing the identity of the manufacturer, model number, serial number, input voltage, amperage, horsepower, phase, frequency, duty cycle, and frame size or mounting identification.

3.2.26.4 Motor starters and controls shall operate at no greater than 120-VAC. It is preferred that they operate at 24-VDC.

3.2.26.5 Motor starters shall provide drop-out protection. This means that, in the event of a loss of power, the equipment shall be re-energized only by the deliberate action of the operator. Manual or mechanical motor starters shall not be deemed acceptable.

3.2.27 DIALS AND GAUGES: All scales, dials, and gauges shall be manufactured of corrosion and oil resistant material. All wording shall be in the English language using plain, bold face lettering. Lettering shall be permanent and have a contrasting background.

3.2.28 HANDWHEELS: Hand-wheels turned in a clockwise rotation shall produce a linear motion, of the controlled component, to the right, away, or upwards. If rotary motion is produced by the hand-wheel, clockwise rotation of the hand-wheel shall produce clockwise movement of the controlled component.

3.2.29 CONTROL LEVERS: Control levers shall move in the same direction as the motion of the controlled component.

3.2.30 FOUNDATION: The requirement for a separate foundation is permissible, if necessary to meet the specified alignment tolerances, to provide isolation, or to conform to a standard system configuration. The contractor shall describe the foundation requirements at the time of bid. RIA-JMTC shall be responsible for installation of the foundation based upon the drawings provided by the vendor.

### **3.3 Safety, Security and Environmental**

3.3.1 SECURITY: The RIA-JMTC is an Army installation subject to Department of Defense safeguards, various precautions, and plant protection measures. All of the below requirements will be necessary of contractors visiting RIA to satisfy requirements of this purchase

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description; Additional requirements will be placed on contractors requiring access to the Army Network, or Common Access Card (CAC), as specifically detailed below. At all times during the execution of this work, contractor personnel will maintain adequate plant protection devices to minimize espionage, sabotage, and other malicious destruction and damage. The contractor shall comply with all security requirements of the Rock Island Arsenal. Rock Island Arsenal island-wide Force Protection levels may be adjusted/changed at any time, which may cause possible delays and will directly affect procedures for accessing the island.

3.3.1.1 Access and General Protection/Security Policy and Procedures: The contractor and any associated subcontractor employees shall provide all information required for background checks to meet installation access requirements to be accomplished by the installation Director of Emergency Services. All contractor employees must comply with all personal identity verification requirements (IAW FAR clause 52.204-9) as directed by Department of Defense (DoD), Headquarters Department of the Army (HQDA), and any local policy. If the Force Protection Condition (FPCON) changes, the Government may require changes in contractor installation access, security matters, or security processes.

3.3.1.1.1 Access to RIA: Contractor and all subcontractor employees performing work at RIA shall comply with adjudication standards and procedures using the National Crime Information Center Interstate Identification Index (NCIC-III) and Terrorist Screening Database (TSDB) and any applicable installation, facility access screening and local security policies and procedures. The COR shall provide guidance to complete the Access Control Records Check request Form through the Rock Island Arsenal Directorate of Emergency Services.

3.3.1.1.2 Random Antiterrorist Measures Program (RAMP) participation: Contractor personnel are subject to RAMP security program (i.e. vehicle searches, wearing of ID badges, etc.). Contractor shall comply with any, and all instructions issued by the Rock Island Arsenal Police Department. The RAMP is discussed in the RIA-JMTC Anti-Terrorism Training.

3.3.1.1.3 During FPCONs levels of Charlie or Delta, services may be discontinued/postponed due to a higher National or local security threat. Services will resume when FPCON Level is reduced to Bravo, or lower. FPCON levels are described in Anti-Terrorism Level I Training.

3.3.1.1.4 Contractor personnel shall return all Installation Badges and access passes as soon as possible prior to contract completion. RIA-JMTC electronic keys and access passes are accountable items, shall be returned within 24-hours of no longer being needed. Items will be returned to the COR, or placed in a drop box at a RIA-JMTC access point.

3.3.1.2 Security Training: The contractor shall complete the following training:

3.3.1.2.1 Anti-Terrorism, Level I: All contractor employees, including subcontractor employees, requiring access to Army installations, facilities, or controlled access areas shall complete Anti-Terrorism (AT) Level I Awareness training. The COR will be provided a copy of the Rock Island Arsenal –Joint Manufacturing and Technology Center (RIA-JMTC) AT Level I Awareness Training and assure that the training is complete. The contractor shall sign a memorandum of record for each contractor employees and

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subcontractor employee to the RIA-JMTC Operations Center prior issuing any electronic keys, or access pass being authorized.

3.3.1.2.2 iWatch (See Something, Say Something) Training: The Contractor and all associated subcontractors shall complete iWatch Training. iWatch Training shall be provided during the Anti-Terrorism Training.

3.3.1.3 For Contractors requiring Common Access Card (CAC): Before CAC issuance, the contractor employee requires a favorably adjudicated National Agency Check with Inquiries (NACI) or an equivalent or higher investigation in accordance with Army Directive 2014-05. The contractor employee will be issued a CAC only if duties involve one of the following: (1) Both physical access to a DoD facility and access, via logon, to DoD networks onsite, or remotely or (2) Remote access via logon, to a DoD network using DoD-approved remote access procedures, or (3) Physical access to multiple DoD facilities or multiple Non-DoD Federally controlled facilities on behalf of the DoD on a recurring basis for a period of 6-months, or more. At the discretion of the sponsoring activity, an initial CAC may be issued based on a favorable review of the FBI fingerprint check and a successfully scheduled NACI at the Office of Personnel Management. Contractors needing a NACI or equivalent investigation or higher investigation will coordinate this investigation through their COR. Contractor personnel shall turn in CAC cards upon completion of their contractual obligations, or at the request by the COR, or at the request of the Contracting Officer.

3.3.2 FEDERAL MARIJUANA LAWS REMAIN UNCHANGED: Note: Rock Island Arsenal is under the exclusive federal jurisdiction of the United States. Under federal law, marijuana is still defined as a Schedule I drug, and possession and use of marijuana is still illegal. Any person using or in possession of marijuana on Rock Island Arsenal may be criminally prosecuted in federal district court. In addition, such individuals may be permanently barred from entering Rock Island Arsenal.

3.3.3 REAL ID: Starting 03-May-2023 all personnel entering Rock Island Arsenal will be required to show a Real ID form of identification.

3.3.4 FIRE PREVENTION AND PROTECTION: The contractor shall comply with all fire prevention measures prescribed in the installation Fire Regulations, a copy of which is on file in the office of the Contracting Officer. A written fire permit shall be obtained from the installation Fire Marshall for use of open flame devices, such as torches, portable furnaces, tar kettles, or gas and electric welding and cutting equipment, in, on, or within 15-ft of the building. The contractor shall be liable for any fire loss to the Government properly attributable to negligence on the part of the contractor, including failure to comply with fire prevention measure described by the terms of this purchase description.

3.3.5 INDUSTRY AND REGULATIONS: The equipment shall comply with the most current of all local, state, and federal laws and regulations listed in Standards and Publications.

3.3.6 MATERIAL EXCLUSIONS: The equipment shall not contain polychlorinated biphenyl (PCB), ozone depleting substances (Class I or Class II), or asbestos materials.

3.3.7 SAFETY REGULATION COMPLIANCE: The contractor shall comply with standard OSHA and RIA safety standards, including conforming to confined space work requirements when applicable.

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- 3.3.8 SAFETY LOCKOUTS: Each point of first connection shall be designed and constructed to allow the utility to be completely isolated from the equipment. This isolation shall be insured by application of a standard key locking padlock. The device(s) shall only be lockable in the de-energized (OFF) condition.
- 3.3.9 LOSS OF PRESSURE: Hydraulic and pneumatic circuits shall be designed such that loss of pressure, or pressure surges, shall not cause a hazard. Means shall be provided to prevent operation of the equipment with insufficient pressure, if such operation could cause a hazard.
- 3.3.10 TRAPPED ENERGY: Means shall be provided for the controlled release of stored energy. This energy may be in the form of, but not limited to, air and hydraulic pressure accumulators, capacitors, springs, counter balances and flywheels. When appropriate, a label shall be affixed to the stored energy source to identify the hazard.
- 3.3.11 WORKING RANGE: Hydraulic and pneumatic components shall be selected, which cannot be adjusted outside the safe working range of the circuit and/or equipment.
- 3.3.12 ACCUMULATORS: Gas charged accumulators operating above 200-psi charging pressure shall be charged with inert gas.
- 3.3.13 BRAKES: Braking systems shall be designed to “fail-on”. This means, energy supplied to the brake shall be used to disengage the brake. Loss of energy shall therefore cause the brake to activate.
- 3.3.14 EMERGENCY STOP: The system will incorporate a clearly identified, red, mushroomed, control button with a yellow backing plate at every operator work station. Upon momentary operation, any emergency stop button shall de-energize all machine motions and override all other controls without creating additional hazards. All motion stopped shall be restarted by the deliberate action of the operator (requiring manual reset). No other red mushroomed buttons shall be allowed on the equipment. It is preferred that there is no other red buttons of any type.
- 3.3.15 CONTROL GUARDS: Controls shall be guarded against accidental operation.
- 3.3.16 OPERATOR REACH: Controls shall be within reach and located such that the operator, when in the normal operating position, is not required to reach past moving parts, which may cause injury.
- 3.3.17 AUDIBLE NOISE: The equipment noise level during normal operation shall not exceed 85-dbs, “A” scale. Tests shall be conducted around the entire equipment 60-in to 65-in above the floor within 3-ft of any major sound source. Metal removal equipment shall comply with the standard noise requirement while making a midrange horsepower cut on rigidly clamped mild steel. The contractor shall furnish shields, baffles, enclosures, or other devices necessary to bring the equipment into conformance. Any such device shall not interfere with the proper operation of the equipment and shall be designed to preserve the visibility necessary for safe operation of the system.

### **3.4 Responsibilities**

- 3.4.1 SITE INSPECTION: Any site inspections and/or measurements, which must be taken in order to determine the suitability of the proposed location or to perform the design of the system, are the sole responsibility of the contractor. This may begin prior to completing the

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bidding process. Rock Island Arsenal will support this function through the POC (point of contact) by guiding personnel, facilitating security registration, and providing general assistance. The contractor will be responsible for providing any and all equipment necessary for this process.

#### 4. COMPONENT SPECIFICATION

Equipment: The supplier shall furnish all equipment normally considered by him to be standard for his machine unless identified in this requirement to be of specific manufacture. The following equipment shall be provided in addition to the equipment specified in other sections of this purchase description, which may not be standard. The inclusion of standard equipment in this paragraph is inadvertent and should not be construed to allow duplication.

##### 4.1 Dimensions:

4.1.1 DOOR ACCESS: The equipment shall be shipped either assembled or disassembled to pass through a door 12-ft wide by 12-ft high, and shall not exceed 25-ft in length.

4.1.2 COMPONENT WEIGHT: The maximum weight of any one piece shall not exceed 25,000-lbs.

4.1.3 INSTALLED FLOORSPACE: When installed complete, the equipment shall be contained in an area 15-ft long and 30-ft long, excluding the operator's area. Maximum height shall not exceed 10-ft. Width is defined as front to back from the operator's normal operating position.

##### 4.2 X-Axis

4.2.1 AXIS DEFINITION: The X-Axis represents the horizontal movement of the bed/work table perpendicular to the spindle face.

4.2.2 FEED RATES: The system shall provide a maximum rapid traverse feed rate of not less than 944-ipm. This shall be program controlled. The program increments shall be no greater than 1-ipm.

4.2.3 CONTAMINATION: Wipers shall be provided for all linear axes, capable of sweeping ways clean of extraneous material in either direction of movement. Also, each axis shall be provided with a cover system that will prevent large contamination reaching the guide blocks, rails, and drive systems.

##### 4.3 Y-Axis

4.3.1 AXIS DEFINITION: The Y-Axis represents the horizontal travel of the spindle on the rail overhead perpendicular to the movement of the table.

4.3.2 FEED RATE: The system shall provide a maximum traverse rate of not less than 944-ipm. This shall be program controlled. The program increments shall be no greater than 1-ipm.

4.3.3 FABRICATION: The frame shall be stress-relieved, and internally ribbed and braced to minimize vibration and distortion which may be imposed during full horsepower cuts. The height of any bearing supporting surfaces shall be such that the moving load is fully supported and shall not overhang the frame in any position within the machine's rated travel.

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4.3.4 BEARINGS: The frame shall be supported on no less than (2) hardened, preloaded linear guides. These shall be replaceable, maintenance-free, lubed-for-life bearings and rails or lubricated from a centralized, automated system as described in section three of this purchase description. An alternative to linear guides is scraped ways. All slide surfaces shall be steel, hardened to a minimum of 60 Rockwell C and ground. Way linear axis shall be provided with adjustable, preloaded, recirculating roller bearings to support and guide the sliding elements or scraped box ways. Gibs shall not be deemed acceptable.

4.3.5 CONTAMINATION: Wipers shall be provided for all linear axes, capable of sweeping ways clean of extraneous material in either direction of movement. Also, each axis shall be provided with a cover system that will prevent large contamination reaching the guide blocks, rails, and ballscrews.

#### **4.4 Z-Axis**

4.4.1 AXIS DEFINITION: The Z-Axis shall be defined as the vertical movement of the spindle headstock and represents the distance between the face of the spindle and the top face of the workpiece.

4.4.2 FEED RATES: The system shall provide a maximum traverse rate of not less than 590-ipm. This shall be program controlled. The program increments shall be no greater than 1-ipm.

4.4.3 BEARINGS: The frame shall be supported on no less than (2) hardened, preloaded linear guides. These shall be replaceable, maintenance-free, lubed-for-life bearings and rails or lubricated from a centralized, automated system as described in section three of this purchase description. An alternative to linear guides is scraped ways. All slide surfaces shall be steel, hardened to a minimum of 60 Rockwell C and ground. Way linear axis shall be provided with adjustable, preloaded, recirculating roller bearings to support and guide the sliding elements or scraped box ways. Gibs shall not be deemed acceptable.

4.4.4 CONTAMINATION: Wipers shall be provided for all linear axes, capable of sweeping ways clean of extraneous material in either direction of movement. Also, each axis shall be provided with a cover system that will prevent large contamination reaching the guide blocks, rails, and ballscrews.

#### **4.5 Machine**

4.5.1 CONSTRUCTION: The machine shall be of heavy construction throughout and all parts shall be of such size and strength to properly sustain the maximum allowable loads imposed upon them with an adequate safety factor with minimum wear. The machine shall be free from chatter and vibration when rough or finish machining metal parts at rated horsepower with the proper tools, speeds, and feeds. All weldments and casting shall be fully stress-relieved, high tensile cast iron.

4.5.2 STABILITY: All axes shall be provided with means of holding axis components in place to permit accurate cuts under full horsepower without drifting. Servo control shall be utilized, preventing measurable, undesired motion, without distortion.

4.5.3 COUNTERBALANCE: Vertical traveling machine components (Z-Axis) shall be counterbalanced, relieving the ball screws to allow high accuracy and extended durability of the

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system. All Z-Axis spindle head and spindle functions shall be numerically controlled by the CNC control.

4.5.4 LINEAR AXIS CONTAMINATION: Way wipers shall be provided for all linear axes, capable of sweeping ways clean of extraneous material in either direction of movement.

4.5.5 WORK ZONE: The system shall include safety barriers and/or devices necessary for protection of the operator while allowing for loading/unloading of the table.

4.5.6 HARDWARE: All necessary leveling wedges, bolts, nuts, and foundation hardware required for the installation shall be furnished by the manufacturer.

4.5.7 DRIVE MECHANISM COOLING: All linear axis shall include active cooling of the drive mechanism (e.g. ball screws) to minimize thermal growth and wear.

#### **4.6 Spindle**

4.6.1 SPINDLE LUBRICATION: The spindle head shall be provided with a separate, positive means of lubricating the components housed within it.

4.6.2 FABRICATION: The spindle shall be machine from alloy steel, precision ground and fitted in the spindle head assembly. It shall be mounted in a minimum of three, duplex mounted, Class 7 or better, angular contact bearings. Bearing preload shall be adjustable.

4.6.3 SPINDLE NOSE: The spindle nose shall be hardened to a minimum of 60 Rockwell C and ground.

4.6.4 TOOL HOLDER: The spindle nose shall provide positive tool-holder location for tooling meeting the requirements of ISO Standard 7388/1, size CAT-50 with the additional requirements for Big Plus. This tapered socket will be an integral feature of the driven spindle and will not be removed as an attachment. Positive, pullback and retention of the tool-holder shall be provided. Provision shall be made to allow manual loading of tool holders into the spindle nose, as well as automatic loading, using the tool changer.

4.6.5 FLOOD COOLANT: The system shall include a flood coolant through the spindle for clearing of chips during cutting and cooling of the tool to reduce wear and extend the tool life. The rate of coolant shall be at least 20 gallons per minute.

#### **4.7 Tool Changer**

4.7.1 MOUNTING: The tools changer shall be solidly mounted with vibrations sufficiently dampened to ensure proper alignment with the spindle, and ability to change tools during cutting cycles without transferring vibrations into the machine tool or work-piece. If the tool changer is floor mounted, means shall be provided for securing the unit to the foundation. All necessary leveling devices and hold down bolts required for the installation shall be provided by the manufacturer. Apparatus for precision locating and holding the unit in place shall be provided by the manufacturer. If the tool changer is mounted on the machine, the manufacturer shall provide means to allow safe access to the magazine and changing of tools.

4.7.2 CONTROL: The tool changer system shall be capable of tool selection automatically by MDI and by command in the parts program. If outside air is blown through the control for cooling purposes, the air must be filtered. If the cabinet is air conditioned, note the environmental restriction against ozone depleting chemicals. The control shall be designed to

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allow it to operate satisfactorily in ambient temperatures of 32°F through 110°F and relative humidity of 5% through 90%.

#### **4.8 Control**

4.8.1 CONSTRUCTION: The control shall be a solid state, soft wired, Electronic Industries Association, computer numerically controlled (CNC) system utilizing large scale integrated (LSI) circuits for data processing and control. The control shall be a micro-processor based hardware designed to support an operating system which shall allow loading and editing a program while another program is being executed, and shall be specifically designed for application to CNC. The control shall be a multi-blocked, buffering, contouring system capable of driving all axis simultaneously. Plug-in circuit boards shall be coded to facilitate identification and location in the control and shall be arranged as convenient plug-in elements of quick disconnect modules with minimum connectors. Built-in test points, test procedures and instructions shall be provided for isolation and identification of defective components and circuitry.

4.8.2 CABINET: The control shall comply with NEMA Standard-12 and shall be sealed against dust and shop environmental conditions that might adversely affect performance of the system.

4.8.3 MODULAR BOARDS: Static logic circuits shall be on modular, plug-in, printed circuit boards.

4.8.4 INPUT METHODS: The control shall be designed to operate from memory loaded from USB Port (no less than 2-ports); from Manual Data Input (MDI) using the keyboard; and from Ethernet Port. The control shall be capable of accepting EIA RS-274D part programs meeting ASCII Standard:

4.8.4.1 KEYPAD: The control shall be provided with one alphanumeric keypad with an oil-tight switch panel. The keyboard shall be provided with tactile and/or audio response for entry verification unless individual key responses are immediately displayed on the color display. All keys, dials, and switches shall be functionally grouped.

4.8.4.2 SERIAL PORT: The control shall be provided with an EIA Standard RS-232C serial port and plug for data input and output devices. This port is used for connection of U.S. government DNC systems. This system is used for importing of CNC programs into the machine control.

4.8.4.3 ETHERNET PORT: The Ethernet port shall be capable of connection of a laptop style PC when necessary for troubleshooting and for loading of software and CNC programs.

4.8.4.4 USB PORTS: The system shall include no less than (2) USB-2.0 data ports. These ports shall be capable of being used to load CNC programs into the machine control or for connection of a printer to the machine control.

4.8.5 DISPLAY HARDWARE: The control station shall be provided with on color display measuring a minimum of 15-inches diagonally across the face of the display.

4.8.6 DIAGNOSTIC: The control shall include a diagnostic system for monitoring the control during operation and for locating malfunctions when troubleshooting. It shall bring the machine to a controlled stop should a malfunction occur during operation. The system shall give fault

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data in understandable code or message form on the color display, which shall identify a problem at board level in the control and identify program errors.

4.8.7 MEMORY: The control shall be provided with a minimum of 20-Gigabytes of usable part program storage. Control memory shall be non-volatile. (hard disk drive).

4.8.8 SECONDARY MEMORY: The control shall be provided with a secondary storage device with a minimum capacity of 256-megabytes of user NC part programs and associated data. (RAM).

4.8.9 PROGRAM SIZE: The control shall be capable of executing programs up to 32-megabyte (MB) in size.

4.8.10 FILE MANAGEMENT: CNC operational characteristics shall include providing file management of more than one part program, either within the control or auxiliary file storage device. In any case

4.8.11 EDITED PROGRAM ID: It shall be possible to indicate which part program has been edited.

4.8.12 POWER RECOVERY: The control shall recover from power outages. Upon power resumption, the control shall automatically reload/reboot the executive and bring itself back, by operator initiation, to a state where the operator can initiate part program load and restart. For safety purposes, this recovery shall only begin after operator initiation.

4.8.13 MODES: Provision shall be made to allow operation in automatic, single block, Manual Data Input (MDI) and manual modes.

4.8.14 STEP MODE: It shall be possible to MDI in symbolic RS-274D data format and execute the statement in a record by record mode of operation, that is, one line at a time. If the MDI mode interrupts an automatic or single block mode, provision shall be made to re-enter at the point of interruption.

4.8.15 FAULT INTERRUPT: The control shall ensure that the machine functions occur in the proper order and shall initiate protective action should a faulty condition develop. Typical action resulting from incompatible commands could be ABORT or Pause, with warning output to the display. Axis travel limits shall be stored in the control as software limit switches.

4.8.16 DATA DISPLAY: The control shall display such data as, but not limited to: Mode of operation (auto, single block, MDI, and manual); tool offsets; machine position; subroutine index; active program name; indicator of an edited program; list the active block and the next 2 blocks; fixture offsets; "distance to go" screen; tool numbers displayed as logical tool numbers; and operator messages, including diagnostics. The control shall include a 3-dimensional animation of the programmed tool path to allow program verification prior to cutting metal.

4.8.17 MOTION CONTROL: The control shall be capable of five-axes positioning and full contouring; helical (rise per radian) programming; grid and polar patterning of features; pattern rotation; scaling; and inverting X, Y, or X and Y axes to produce mirror image movements without any required change in the original program commands.

4.8.18 CUTTING PATH: The control shall be capable of being programmed to generate a continuous cutter path by eliminating axis deceleration at the end point and continuing on the next programmed command. (High Speed Look Ahead feature)

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4.8.19 DRY RUN: The control shall be provided with a dry run mode to minimize time needed for program prove out.

4.8.20 SIMULATION: The system control shall include a 3-D tool path simulation on the color display to minimize the time needed for program prove out.

4.8.21 FEED RATE UNITS: Feed rates shall be programmable in both inch and metric.

4.8.22 SPINDLE ORIENTATION: Spindle orientation shall be provided with the ability to stop within one degree of any given radial position. The spindle orient location of zero shall be positioned with the master key pointing in the plus X machine axis direction when looking out of the spindle.

4.8.23 SYNCHRONIZED TAPPING: The system shall be capable of controlled orientation of tap lead start into a hole.

4.8.24 RESOLUTION: Input and interpolator resolution shall be no greater than 0.0001-in for linear axes and 0.0001° for rotary axes.

4.8.25 COORDINATE SYSTEMS: The control shall be capable of accepting programming based on Cartesian or Polar coordinate systems.

4.8.26 SUBROUTINES: The control shall be capable of accepting subroutines and canned cycles. The subroutines shall be callable an unlimited number of times and shall be capable of containing as many as nine work variables. Canned cycles shall include, but shall not be limited to, bore, bore no-drag, countersink, drill, drill deep, drill thru, face, ream, and tap.

4.8.27 EDITING: A block delete and record delete feature shall be included in the control to allow specific routines to be bypassed. The control shall be capable of editing two different programs simultaneously. This will allow the operator to control the running program and edit the next program to be executed.

4.8.28 JOG: The operator shall have the capability of jogging linear axes incrementally in steps of 0.001-in, 0.01-in, 0.1-in, and continuous. Metric jog shall be in increments of 0.01-mm, 0.1-mm, 1.0-mm, and continuous.

4.8.29 ACCELERATION CONTROL: The control shall be capable of controlling acceleration and deceleration of axes feed rates and traverse moves, maximizing axes movement speeds, while reducing stress to the machine.

4.8.30 PROGRAM INTERRUPT: A power feed retract/auto return feature shall be provided, allowing the operator to stop an executing cycle, retract the tool away from the part, and return the tool to the exact point of interrupt, where the cycle shall continue automatically. Return of the tool shall be in a "retrace back to the interrupt point" and "point to point". It shall be possible for the operator to change the angle of the re-entry vector at any point and power feed to another position in which case the programmed tool path shall resume automatically when the tool point reaches the interrupt point.

4.8.31 RAPID FEED OVERRIDE: The control shall be equipped to provide manual rapid traverse override, allowing positioning moves in a cycle to be slowed. It shall be possible to override from 0%-100% of the programmed value, as a minimum, unless a feed hold is provided. If a feed hold is provided, override shall be from 1%-100% of the programmed value, as a minimum, or a button by be provided which will override the rapid traverse a fixed amount

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based on a machine parameter. The button shall be capable of reducing the rapid traverse to no more than 100-ipm.

4.8.32 MANUAL FEED OVERRIDE: The control shall be equipped to provide manual feed rate override from 1%-100% of the programmed value, as a minimum, unless a feed hold is provided. If a feed-hold is provided, override shall be from 1%-100% of programmed value, as a minimum. This shall be by potentiometer or tool table data override, as elected by the operator.

4.8.33 MANUAL SPEED OVERRIDE: The control shall be equipped to provide manual spindle speed override from 50%-120% of the programmed value, as a minimum.

4.8.34 PROGRAM DWELL: The control shall be capable of accepting a programmed dwell of a minimum of 99.99-sec.

4.8.35 PROGRAM PAUSE: An optional stop feature shall be provided which will allow the machine to be brought to an automatically controlled stop within the part program cycle. It shall be possible for the operator to enable or disable the optional stop. If the same part program is going to be continued, all the operator shall have to do is push the cycle start button.

4.8.35.1 At a program stop or optional stop command, the operator shall be able to change the active state of the block delete feature. When the process is then resumed, the control shall execute or bypass specific records and routines, depending on the active position of the block delete switch.

4.8.35.2 When at the completion of a program block, in single block mode, the operator shall be able to adjust tool table values, fixture offsets, and tool length and radius compensation values without clearing or resetting the control, using cycle start to make the changes effective. It shall be permissible to require pressing a second, designated pushbutton in conjunction with cycle start.

4.8.35.3 Following a program stop or active optional stop command or completion of a record in single block mode, the operator shall be able to enter both MDI and EDIT modes. When the EDIT mode is active, the operator shall be able to add, change, and delete programmed instructions. When the MDI mode is active, each command entered shall be executed as a single block cycle mode command. The operator shall be able to exit the MDI and EDIT modes and restart the auto cycle mode of the interrupted program at the next programmed record, by using a search or a sync feature.

4.8.35.4 A programmed stop or active optional stop command shall bring the machine to an automatic controlled stop within the part program cycle to allow a manual function by the operator. The operator shall be able to adjust tool table values, fixture offsets, and tool length and radius compensation values without clearing or resetting the control. The operator shall be able to restart the cycle from programmed stop or active optional stop location and the applicable offsets and compensation values shall be effective.

4.8.36 GRID OFFSET: The control shall be capable of accepting and acting on grid offset information, allowing the operator to redefine the absolute coordinates of the point to which the machine is to be grid aligned, when that point is not specified by the machine tool builder.

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4.8.37 WORK-PIECE COORDINATE SYSTEMS: The control shall be capable of utilizing (100) sets of work-piece coordinate systems. This allows the programming of multiple fixtures with individual coordinate systems.

4.8.38 CUTTER COMPENSATION: Two offsets shall be provided to allow cutter radius compensation and tool length compensation for every tool in the tool changer. Programming of a third, fourth, and fifth axis shall not affect the operation of the cutter compensation. It shall be possible to use cutter compensation in linear and circular interpolation, absolute and incremental modes, positioning mode, and with canned cycles. The control shall be capable of storing offset dimensions of at least +/-99 inches in the offset memory. Provision shall be made in the control software for programmable cutting tool gate length and radius tables sufficient in number to accommodate two for each tool changer position. The control shall be capable of measuring the amount of time a particular tool is cutting, comparing this time with programmed tool time, and selecting a redundant tool from the tool changer for the next cut for that type tool.

4.8.39 TOOL NUMBER DISPLAY: The current tool and the standby tool numbers shall be displayed on the color display the total time they are in that state. The numbers shall change in the color display only when the status of the tools changes. Tool numbering shall contain at least (8) digits for identification of individual tools.

4.8.40 TOOL SEARCH: During a sequence search mode, if the searched for tool is already in the spindle, the control shall then begin execution of the part program. If the tool the operator is sequence searching for is in a tool storage location, the control shall put both the tool in the spindle and the standby tool away and put the correct tool into the spindle without any other operator intervention.

4.8.41 TOOL OFFSET TABLES:

4.8.41.1 Shall provide offset tables for speed and feed overrides for each individual tool.

4.8.41.2 Shall have cutter diameter compensation (CDC) offset table; the CDC value must be a diameter value and must be able to be adjusted by both the operator and probe cycle. With cutter compensation active, the control shall allow unlimited Z axis movement.

4.8.41.3 Shall have tool trim adjustment table for fine adjustment of the tool. These values shall be algebraically added to the tool gauge length table and have a range of at least +/- .0999. The table must be accessible by both the operator and a probe cycle.

4.8.42 MACHINE COMPENSATION: Machine compensation shall be provided including, but not limited to, the following:

4.8.42.1 Backlash compensation, making it possible to compensate for lost slide motion in axis drive trains.

4.8.42.2 Axis error compensation which shall automatically insert cutter path corrections to compensate for slide positioning errors in linear axes.

4.8.42.3 Spindle growth compensation (thermal compensation). The system shall maintain repeatability regardless of the type, speed, and horsepower being utilized. If the system requires additional features to compensate for growth caused by temperature variation, it shall be the sole responsibility of the contractor to know and provide necessary equipment.

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4.8.42.4 The system shall include a method of detecting excessive vibration at the spindle and adjusting the spindle speed and/or feed rates to reduce the vibration of the cutting tool.

4.8.43 LOAD MONITOR: The control shall display the real-time loads exerted by the spindle and the axis drive motors. In the event that a load exceeds the rated capacity of the system, the machine shall automatically shut-down. The recovery procedure shall be the same as for a power interruption.

4.8.44 ADAPTIVE CONTROL: The control shall include an adaptive control system capable of monitoring machining operations such as, but not limited to, milling, boring, drilling, and tapping. The system shall automatically adjust the machining operation based on the actual cutting conditions that are determined by material hardness, work-piece composition variations, depth of cut, cutting speed, and other variables. Should circumstances arise such as, but not limited to, a broken tool which cannot be compensated for, the control shall automatically shut the machine down, displaying a message on the operator display. The system shall compare measured parameters such as torque on the spindle drive motor with programmed reference values read from the part program, and provide modified feed-rate and/or spindle speed commands to the machine control system. The cutting process shall be performed at the maximum permissible feed-rate without damage to the cutting tool or the machine tool. All required program commands for the adaptive control system shall be documented including illustrations and program examples.

4.8.45 TOOL LIFE MANAGEMENT: The system shall be capable of managing the tool life by two separate methods. Individual tools shall be capable of being monitored by either system. For example, the cutter in pocket #14 may use load monitoring for life management while the 1/4-in drill in pocket #18 uses the usage control for management.

4.8.45.1 The system shall be capable of using the "Load Monitor" to determine when a tool has reached its useful life by comparing the torque requirements to predetermined limits. This shall be used for larger tools where torque requirement fluctuations may be great enough to allow determination of the wear on a given tool.

4.8.45.2 The second method of management shall be that the control shall record the usage of the tool (e.g. time or number of uses or surface footage). After reaching a preset limit, the tool shall not be used again until it has been inspected and/or replaced.

4.8.46 TOOL LENGTH DETECTION: The system shall include a method for automatic tool length measurement. This shall also be capable of determining that a tool is broken.

4.8.47 TOOL PROBING: The system shall include a tool probe which can be used to measure the tool length and automatically update the tool offset table. This feature shall be accessible through G-code programming or through MDI request.

4.8.48 PART PROBING: The control shall include a probing system capable of checking machining operations such as, but not limited to, surface sensing in any of the designated machine axes, check bore size and location, probe datum or calibration, tolerance testing, load and adjust fixture offsets, load and adjust tool radius compensation, load and adjust tool length compensation, load and adjust tool trim compensation, and program conditional branching based on probe readings. This shall be of Renishaw manufacture in order to maintain commonality with the large number of existing probes at RIA.

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4.8.49 PROBE DOCUMENTATION: All required program commands for the probing system shall be documented including illustrations and program examples.

4.8.50 OPERATOR DISPLAY: The control shall have operator displays for the following information, as a minimum:

- 4.8.50.1 Mode of operation (i.e. auto, single block, MDI, and manual).
- 4.8.50.2 Machine status (i.e. power on, in cycle, idle, end of cycle, in hold, in E-stop).
- 4.8.50.3 Control status (i.e. manual spindle override, manual feed-rate override, in edit, program transfer active).
- 4.8.50.4 Machine position.
- 4.8.50.5 Programmed position.
- 4.8.50.6 Tool offset
- 4.8.50.7 Program listing
- 4.8.50.8 Subroutine index.
- 4.8.50.9 Program edit
- 4.8.50.10 Current active block
- 4.8.50.11 Next two blocks
- 4.8.50.12 Fixture offsets
- 4.8.50.13 Operator warning and informative messages, and diagnostics
- 4.8.50.14 Distance to go
- 4.8.50.15 Time to go
- 4.8.50.16 Active origin value
- 4.8.50.17 Active tool length value.

4.8.51 OPERATOR PANEL FUNCTIONS: The operator's control panel shall be equipped with the following functions, as a minimum:

- 4.8.51.1 Emergency stop
- 4.8.51.2 Fault
- 4.8.51.3 Control on/off
- 4.8.51.4 Data Reset
- 4.8.51.5 Grid or Target Point Align
- 4.8.51.6 Zero Shift
- 4.8.51.7 Single Block
- 4.8.51.8 Optional Stop
- 4.8.51.9 Spindle Speed Percent

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- 4.8.51.10 Feed Rate Percent
- 4.8.51.11 Rapid Override
- 4.8.51.12 Auto Restart
- 4.8.51.13 Dry Run
- 4.8.51.14 Spindle Neutral
- 4.8.51.15 Spindle Stop which shall activate the spindle brake
- 4.8.51.16 Over-Travel light or message.

4.8.52 PASSWORD PROTECTION: The control shall include a password protection system to all locking of the program editing and machine parameter functions. This protection system shall include the ability to disable the feature using the password.

**4.9 Ranges and Capacities**

4.9.1 Table:

4.9.1.1 X-Dimension (minimum)	120-in
4.9.1.2 Y-Dimension (minimum)	60-in
4.9.1.3 Payload Capacity (minimum)	11,000-lbs

4.9.2 Linear Axis:

4.9.2.1 X-axis Travel (minimum)	120-in
4.9.2.2 Y-axis Travel (minimum)	60-in
4.9.2.3 Z-axis Travel (minimum)	39-in
4.9.2.4 Spindle Face to Pallet Surface	0-in to 47-in
4.9.2.5 Rapid Traverse, X,Y-axis (minimum)	944-ipm
4.9.2.6 Rapid Traverse, Z-axis (minimum)	433-ipm
4.9.2.7 Cutting Feed-Rates, X,Y,Z-axis (minimum)	394-ipm

4.9.3 Spindle

4.9.3.1 Spindle Speed Range (minimum range)	10-rpm to 10,000-rpm
4.9.3.2 Spindle Horsepower – 25%ED (minimum)	40-hp
4.9.3.3 Spindle Horsepower (continuous) (minimum)	35-hp
4.9.3.4 Spindle Torque	460 ft-lb

4.9.4 Tooling

4.9.4.1 Tool Holder Taper	CAT50 with Big Plus
4.9.4.2 Number of Tools in Magazine (minimum)	120
4.9.4.3 Maximum Tool Diameter – All Pockets Used (minimum)	4.92-in
4.9.4.4 Maximum Tool Diameter – Alternate Pockets Empty (minimum)	8.27-in

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4.9.4.5	Maximum Tool Length (minimum)	14.9-in
4.9.4.6	Maximum Tool Weight (minimum)	44-lbs

**4.10 Accuracies**

4.10.1 Bidirectional accuracies over full travel, using compensation factors programmed into the control shall be within the following as defined by ISO 230-2 standard:

4.10.2 X-AXIS

4.10.2.1	Bi-Directional Accuracy of Positioning (A)	0.0005-in
4.10.2.2	Bi-Directional Repeatability of Positioning (R)	0.00016-in

4.10.3 Y-AXIS

4.10.3.1	Bi-Directional Accuracy of Positioning (A)	0.0005-in
4.10.3.2	Bi-Directional Repeatability of Positioning (R)	0.00016-in

4.10.4 Z-AXIS

4.10.4.1	Bi-Directional Accuracy of Positioning (A)	0.0005-in
4.10.4.2	Bi-Directional Repeatability of Positioning (R)	0.00016-in

**4.11 Additional Accessories**

4.11.1 THROUGH SPINDLE COOLANT: The unit shall include the capability for through spindle coolant. The coolant pressure shall be at least 580 psi. The tank size shall be at least 264 gal.

4.11.2 CHIP CONVEYOR: The unit shall include a chip conveyor sized appropriately for the system, capable of chip removal rate consistent with the operation of the system.

4.11.3 VISUAL PROBING SYSTEM: The system shall integrate Renishaw's probing hardware and Inspection Plus software with the Visual Programming System. This shall include both the spindle probe for part checking and a tool setting probe. This shall improve the automated setup and inspection processes. Basic, everyday language in a conversational format shall guide the operator through the process, step by step. The operator shall input basic information in response to the prompts, and the control will do the programming. In addition to tool and part setups, the use of macros, which shall be included, and advanced programming methods shall allow for such operations as in-process tool and part inspection, first-off part measurement, and automatic compensation for thermal changes.

4.11.4 ADDITIONAL AXIS CAPABILITY: The unit shall come prewired to accept an additional axis.

4.11.5 VISUAL PROGRAMMING SYSTEM: The system shall include a graphical interface for creating simple G-code programs. The operator shall select the operation desired (e.g., bolt-hole circle or pocket milling), and then choose a part template from the display. The system will prompt the operator to fill in required data. (e.g. part dimensions, speeds and feeds, etc.) The system shall then generate the G-code program for the operation. The system shall allow the

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operator to modify the existing templates or create new templates. Using a conversational interface, the operator shall be able to insert correct G code commands, such as “spindle forward”, from a menu, into the program.

4.11.6 LIGHTING: The system shall include adequate lighting within the work area of the machine.

## **5. INFORMATION TECHNOLOGY SYSTEMS AND SUPPORT**

### **5.1 Installation IT Support:**

5.1.1 PERSONNEL: RIA-JMTC IT Support Staff will be engaged in the event any interaction with RIA-JMTC information systems or associated computing devices is required. RIA-JMTC will not provide the technician credentials to access the workstation. Access to the workstation will be provided by the RIA-JMTC IT Support Staff escort. Removable Media e.g., CD/DVD/USB/SD/External hard drive will be scanned prior to use. Programs and software must be ran from RIA-JMTC approved/provided media or CD/DVD(s). Contractor Devices will not be allowed to connect to the RIA-JMTC network nor will they be allowed to connect to RIA-JMTC equipment other than to scan and transfer media.

### **5.2 INSPECTION/FINAL ACCEPTANCE:**

5.2.1 LICENSING: The software/ hardware license shall not have an internet connection. A license dongle or license file must be provided for offline use.

### **5.3 Media/ Devices**

5.3.1 REMOVABLE MEDIA: Removable media consists of the following: CD, DVD, USB, SD, and External Hard Drives. Removable media shall be scanned prior to use. Programs and software must be ran from RIA-JMTC approved/ provided media or CD/ DVD(s).

5.3.2 CONTRACTOR DEVICES: Contractor Devices will not be allowed to connect to the RIA-JMTC network and they will not be allowed to connect to RIA-JMTC equipment other than to scan and transfer media.

5.3.3 NON-GOVERNMENT OWNED SYSTEMS OR DEVICES: The contractor shall comply with AR 25-1 and AR 25-2. The contractor shall not install or connect non-Government-owned computing systems or devices to Government networks without a government representative coordination and obtaining the proper authorization from the appropriate Information System Security Manager (ISSM), ensuring that all software has a Government Assess Only Authorization. The non-Government-owned computing systems or devices include, but are not limited to, personal or Contractor-owned thumb drives e.g., memory sticks, flash drives, Universal Serial Bus (USB) drives, jump drives, pen drives, removable or external hard drives, Personal Digital Assistants (PDA), PC Cards/Express Cards, MP3 players, cell phones, digital media, floppy disks, compact disc (CD)/digital video disk (DVD) burners, optical recordings, photo flash cards, laptops, or any devices that can store data.

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### 5.3 INFORMATION ASSURANCE AND ACCREDITATION:

5.3.1 Non-Government-Owned computing systems or devices: The Contractor shall comply with AR 25-1 and AR 25-2. The Contractor shall not install or connect non-Government-owned computing systems or devices to Government networks without the COR's coordinating and obtaining proper authorization from the appropriate Information System Security Manager (ISSM), ensuring that all software has a Government Assess Only Authorization. The non-Government-owned computing systems or devices include, but are not limited to, personal or Contractor-owned thumb drives e.g., memory sticks, flash drives, Universal Serial Bus (USB) drives, jump drives, pen drives, removable or external hard drives, Personal Digital Assistants (PDA), PC Cards/Express Cards, MP3 players, cell phones, digital media, floppy disks, compact disc (CD)/digital video disk (DVD) burners, optical recordings, photo flash cards, laptops, or any devices that can store data.

5.3.2 System Accreditation and Re-Accreditation: The Contractor shall assist in providing system accreditation documentation such as required artifacts and shall answer technical questions required for registration for accreditation. All documents shall be IAW Chapter 5, and Appendices D and E, AR 25-2, Information Systems Security (dated 3 August 2007) and DOD Instruction 8510.01, Risk Management Framework (RMF) Program or future DOD regulation that supersedes these regulations. The Contractor shall assist in performing yearly reviews of the accreditation, or whenever changes/additions are made to the system. The Contractor will assist in preparing risk assessments, as required.

## 6. APPROVAL/SHIPPING

### 6.1 Shipping

6.1.1 RESPONSIBILITY: The contractor is responsible for delivery of the equipment to the Rock Island Arsenal. Adequate preserving of equipment surfaces, packing, marking, and skidding of materials for shipment shall be the responsibility of the contractor. If special lifting devices, such as hooks or eyes, are required for ease of handling, they shall be supplied with the equipment. Any special devices shall be returned to the contractor upon request only if they will not be required for future movement of the equipment, and at the contractor's expense.

6.1.2 SHIPPING SCHEDULE: Be aware, the Rock Island Arsenal will only off-load equipment arriving between 6:00 am and 12:00 am (noon), local time on Mondays through Thursdays except holidays. For information concerning holidays, the contractor should consult the contracting officer. There is no place to stage transporting vehicles awaiting the arrival of contractors. All equipment shall be delivered at the same time, meaning the same day (multiple trucks are acceptable) unless pre-authorized to deliver on multiple days by the RIA-JMTC contracting officer.

6.1.3 RECEIVER: All shipments to Rock Island Arsenal including installation tools and/or replacement parts, as well as the original shipment of the equipment, shall be marked "ATTN: Mr. Kris Davis or Mr. Joe Carpentier, TARA-COT-P". Items not correctly marked are subject to being returned at the vendor's expense.

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6.1.4 ARRIVAL INSPECTION: Upon receipt of equipment at Rock Island Arsenal, a preliminary inspection shall be performed to determine condition and/or count. This inspection shall be performed by Rock Island Arsenal personnel.

#### **6.2 Installation**

6.2.1 SITE PREPARATION REQUIREMENTS: The contractor shall be solely responsible for any necessary site inspections required for determining the specifications of work that must be completed prior to final system installation. The contractor will then provide detailed information of any preparation work that the vendor must perform prior to system installation to Rock Island Arsenal.

6.2.2 SITE PREPARATION EXECUTION: The contractor will be solely responsible for site preparation except as specifically excluded in this document. This includes but is not limited to excavation, foundation work, and surface preparation. This work may be performed through the use of a sub-contractor, but the specification, supervision, and certification of the work remains the responsibility of the primary contractor.

6.2.3 PREPARATION EXECUTION SUPPORT: Rock Island Arsenal will support the preparation portion of the installation by providing utilities to the points of first connection.

6.2.4 LABOR AND MATERIAL: The supplier is solely responsible for providing all labor, materials, hardware, tools, and equipment necessary for complete installation of this system except as specifically listed in this document as being provided by the Rock Island Arsenal.

6.2.5 SUPERVISION: Supervision of the installation process will be the responsibility of the contractor. Rock Island Arsenal shall retain the right to periodic inspection and evaluation of the process, as it deems necessary.

6.2.6 OFF-LOADING/PLACEMENT: Off-loading of the equipment from the delivery vehicle, and placement of the equipment in position for the installation is the responsibility of the contractor. The contractor shall not be allowed to use government equipment to accomplish this work.

6.2.7 OFF-LOADING/PLACEMENT OPTION: At the request of the contractor, Rock Island Arsenal will perform the off-loading and placement of the equipment.

6.2.7.1 Any special requirements or precautions to be observed shall be the responsibility of the contractor to provide.

6.2.7.2 The contractor or his representative may be present during this process; however, such person will be responsible for being present upon arrival of the equipment at Rock Island Arsenal. Off-loading and placement shall not be delayed to allow arrival of the contractor or his representative.

6.2.7.3 If, due to contractor caused difficulties, the equipment or components of the equipment must be moved, removed or replaced by Rock Island Arsenal after initial placement, the contractor shall be billed for such work at current Rock Island Arsenal labor and overhead rates.

6.2.8 LIABILITY: In any case, the equipment remains the property of the contractor, and the contractor shall assume all responsibility and liability for the equipment and the work

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performed upon it. The government shall be held harmless for any damage done to the equipment at any time up until final acceptance of the equipment by Rock Island Arsenal, except in the case of intentional damage and/or gross negligence on the part of Rock Island Arsenal personnel.

6.2.9 SET-UP: The contractor shall be responsible for set-up and connection of the equipment beyond connections of the utilities to the points of first connection.

6.2.10 SECURITY: The RIA-JMTC is an Army installation subject to Department of Defense safe guards, various precautions, and plant protection measures. At all times during the execution of this SOW, the contractor will maintain adequate plant protection devices to minimize espionage, sabotage, and other malicious destruction and damage. The contractor shall comply with all security requirements of the Rock Island Arsenal. Rock Island Arsenal Island-wide Force Protection levels may be adjusted/changed at any time, which may cause possible delays and will directly affect procedures for accessing the Island.

6.2.11 Delivery Hours or Service Hours: Service calls, equipment installation, training, and equipment delivery (where the contractor offloads) will only be allowed from 0600 – 1530, Monday through Thursday, except for Government Holidays. Deliveries of items where the contractor has opted for Government “off-loading option”, must be received before 1200 hours. These hours are subject to change, however, the Government will notify the contractor of such changes. The vendor will contact the designated COR to obtain an electronic key for their representative (i.e. delivery driver) in order to have access to the facility. Deliveries and service calls outside the normal hours stated above will be coordinated with the COR to address any emergency situations."

## **6.3 Completion**

6.3.1 Final acceptance of the equipment shall occur after the following:

6.3.1.1 Set-up completion by the contractor.

6.3.1.2 Successful completion of performance testing at Rock Island Arsenal.

6.3.1.3 Final inspection approval by the government representative or inspector. This is to verify full compliance with this description to include amendments and modifications to the final contract. The government representative shall perform any and all tests he deems necessary to insure compliance with this description and industry standards to include, but not limited to ease of control, convenience of operation, safe operation, and adequacy of lubrication devices.

6.3.1.4 All required training is complete.

6.3.1.5 Complete documentation packages are delivered.

## **7. TRAINING**

The contractor shall provide instruction in proper operation and maintenance of the equipment without additional cost to the government. Training shall be of sufficient duration that the recipients are able to demonstrate a reasonable level of competence as determined by the equipment installer and/or the inspector. Acceptance may be delayed as a result of inadequate training.

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### 7.1 Schedule

Training shall be coordinated with the Rock Island Arsenal. Daily training shall begin no later than 6:30 a.m. CST and shall continue until at least 2:15 p.m. CST. This is required to get full coverage of the 1<sup>st</sup> shift of operation at RIA-JMTC. If training does not begin until after the stated time, RIA-JMTC may at its option require additional training at a different time to compensate for the loss of training caused by the late start. This may include more time than what is represented by the delay (e.g. a 1-hr delay may require 2-hrs later to impart the knowledge lost).

### 7.2 Location

All training shall be performed at the Rock Island Arsenal. It shall be performed using the equipment purchased in this description.

### 7.3 Type

Each type of training shall be given independently. Rock Island Arsenal shall coordinate with the contractor to provide the proper personnel for each type of training. The following types of training shall be provided by the contractor.

7.3.1 OPERATOR: Training shall be provided by the contractor for (5) operators. This shall include instruction on the safe, efficient operation of the equipment delivered. The trainees supplied by RIA-JMTC shall be familiar with machine operation, but not necessarily with the style or type of controls provided with the equipment. (E.g. for a new CNC lathe, the operator will be familiar with CNC lathe operation, but may have no experience with a Fanuc control system.)

7.3.2 PROGRAMMING: If the equipment includes a programmable controller, programmer training shall be provided, separate from the operator training for (2) personnel. If programming is normally performed by the operator only, then this training may be combined with the operator training.

7.3.3 MAINTENANCE: Mechanical and electrical control and diagnostic maintenance training shall be provided by the contractor. This shall include information on troubleshooting and preventive maintenance procedures. This shall be provided for (2) personnel.

7.3.4 METHODS: Methods Training shall be provided by the contractor. The Methods Division of JMTC traditionally workload parts across various machines within the JMTC factory. The contractor shall provide a general overview of the machine capabilities during this training. This training shall define basic information such as material capable of manufacture with the machine, maximum and/or minimum part size, speeds and feeds, and accuracies of the machine provided. It shall also provide overview of the controls, instructions for basic edit commands, and accessing histories. This training shall be no longer than 4 hours, and provide training for 4 students.

## 8. SERVICE

### 8.1 Service/Support Requirements

The contractor shall have as a minimum, a verifiable service/repair capability which meets or exceeds the following requirements:

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8.1.1 STAFF: Staffed by qualified, English speaking personnel fully knowledgeable in the service/repair of the equipment offered.

8.1.2 TELEPHONE ACCESS: Telephone access to service/repair personnel shall be available for consultation during Rock Island Arsenal normal working hours. Rock Island Arsenal normal working hours are 8:00 am CST to 3:00 pm CST, Monday through Friday, except legal federal holidays.

8.1.3 ON-SITE RESPONSE: Physical, on-site response shall be possible within 48-hrs of notification that service/repair of the equipment is necessary.

8.1.4 MAINTENANCE PARTS: Parts necessary for periodic replacement such as belts, hoses, filters, and other parts normally considered as spare parts, by the manufacturer, shall be stocked and available for shipment.

8.1.5 PRIOR HISTORY: Said service/repair capability shall have been available to the general public prior to the issue date of this purchase description. Adequate proof of prior availability shall be provided upon request.