The Digital Manufacturing Institute

MxD
REQUEST FOR QUOTATION

sBLDC Assembly Line Design

26-13-05

Revision 1.0 Release Date: August 27, 2026

Contact: Joe Nichols
Sr. Project Engineer
joe.nichols@mxdusa.org

Technical Contact: Tony Del Sesto
Sr. Technical Fellow
tony.delsesto@mxdusa.org

MxD
1415 North Cherry Ave
Chicago, IL 60642

TABLE OF CONTENTS

I. Record of Change 3
II. Timeline project overview 3
III. Introduction 3
IV. Technical Summary 6
Problem Statement 6
Overview and Objectives 6
Requirements 7
Task 1. Process Definition 7
Task 3. Throughput Modeling and Performance Analysis 7
Task 4. Cost and Capital Estimating 8
Task 5. Support for Follow-on Solicitation 8
Compliance and Sourcing: 8
Deliverables 9
Out of Scope 9
Required and Preferred Experience 9
V. Program Requirements 11
Quotation 11
Period of Performance Requirements 11
Travel and Facility Access 11
Ownership of Deliverables 11
Funding Requirements 11
VI. Eligibility 12
Eligibility in Future Solicitations 12
MxD Membership is not Required 12
Government Entities 12
Notification of Participation Non-U.S. Citizens 12
VII. Quotation Evaluation 13
Evaluation Process 13
Evaluation Criteria 13
VIII. Submission Details 13
IX. Next steps 14
Notification 14
Final Revisions 14
Contract 14

I. RECORD OF CHANGE

Revision	Date	Sections	Description
1.0	August 27, 2026	N/A	Original

II. TIMELINE PROJECT OVERVIEW

Deadline for submissions to be received	September 17, 2026 | 5 PM CT
Follow up clarification meetings as needed	Throughout the submission phase
Feedback to participants	October 2, 2026
Period of Performance	3 months
Anticipated MxD Funding	N/A. The respondent to this RFQ must have a detailed, itemized breakdown of all mandatory and optional items quoted.
Minimum Cost Share Contribution	Cost share is not required; However, cost share is encouraged to support the Institute's mission and quotations with proposed cost share will be viewed favorably.

III. INTRODUCTION

MxD: The Digital Manufacturing Institute strengthens U.S. economic prosperity and national security by driving digital adoption in manufacturing. In partnership with the Department of Defense, MxD (also referred to as the Institute) equips U.S. factories with the digital tools and expertise required for modernization. MxD's core mission is to strengthen U.S. manufacturing global competitiveness to advance economic prosperity and national security by accelerating digital adoption, securing supply chains, and empowering the workforce.

MxD has invested over $400 million in more than 200 applied research and development projects in areas including design, product development, systems engineering, factory modernization, agile and resilient supply chains, workforce training, and cybersecurity.

MxD is also the DoD's National Center for Cybersecurity in Manufacturing. All MxD projects must take cybersecurity into consideration.

This RFQ is publicly available on the MxD website at https://www.mxdusa.org/solicitation-opportunities/. This public posting represents the official notification of a request to submit the required documents. Amendments to an MxD RFQ may be used to extend due dates, clarify procedural requirements, or modify technical requirements. If an updated RFQ is issued, the previous RFQ will be rescinded. Those interested in responding to this RFQ should carefully monitor the MxD website after an original posting, up to the time of the quotation submission date. Any revisions, amendments or updates will appear in the same section of the website as the

original solicitation. It is the responsibility of the Respondents to monitor the MxD RFQ updates and ensure that their quotation meets the solicitation requirements.

The Respondent to an RFQ is the non-Federal organization that submits a quotation in response to the RFQ. Submission to this RFQ is not a commitment for further business by either MxD or the DoD.

All responses to this RFQ are kept strictly confidential and are shared only with DoD authorized personnel in accordance with contractual requirements.

Due to the expedited nature of this RFQ schedule, Respondents are encouraged to meet with MxD project members and ask any questions for clarification purposes. Note that the responses to questions may be made public to all Respondents.

Direct all questions to both:

Joe Nichols
Sr. Project Engineer
joe.nichols@mxdusa.org

Tony Del Sesto
Sr. Technical Fellow
tony.delsesto@mxdusa.org

mxdusa.org
@mxdinnovates
info@mxdusa.org

1415 N. Cherry Avenue
Chicago, IL 60642
(312) 281-6900

TECHNICAL SUMMARY

IV. TECHNICAL SUMMARY

PROBLEM STATEMENT

Small, high-performance brushless direct current (BLDC) motors are essential to defense systems, including uncrewed aircraft systems, guided munitions, robotics and tactical vehicles. The capability to manufacture them, particularly the specialized machinery for stator winding, magnet assembly, and rotor balancing, resides largely in adversarial nations. This is a supply chain vulnerability that limits the Organic Industrial Base's ability to respond to surge demand.

A U.S. Army depot currently assembles BLDC motors on manual and semi-automated lines. Components are staged in bins and moved between stations by hand. Automated equipment exists at several stations, but loading and unloading are manual throughout, and one station carries a substantial majority of the direct labor content. Final performance testing is performed off the line. Separate parallel lines are maintained for different motor sizes because changeover between sizes on a single line is not practical with the current equipment.

The result is a conversion cost per motor well above commercially available equivalents, and a capability that cannot scale to meet demand. The depot requires a modernized, digitally enabled assembly line that reduces conversion cost, reduces direct labor, and can be replicated at other Organic Industrial Base sites.

OVERVIEW AND OBJECTIVES

MxD, as directed by DoD AGREEMENT NUMBER W911NF-24-3-0006, seeks an industry partner to perform process definition, conceptual line design and throughput modeling for a digitally enabled BLDC motor assembly line. The line concept is developed for a single motor size, the 3115.

This RFQ is the first in a planned sequence of solicitations for this effort. This RFQ covers engineering services only: defining the assembly process, designing the line concept, and modeling it to demonstrate that it meets throughput and performance objectives. Equipment procurement, fabrication, integration, installation and commissioning are not included and will be solicited separately. The output of this effort is intended to inform and de-risk that follow on solicitation.

The Awardee and its affiliates will not be eligible for award by MxD of the follow-on implementation contract.

The objectives of this effort are to:

- Define an assembly process that is achievable against material, quality, and cost constraints.
- Design a line concept for the aforementioned process that aligns with the depot’s facility and layout constraints.
- Recommend line automation and controls architecture so that a digital twin, supervisory systems and additional sensing can be integrated later without redesign.
- Demonstrate, through modeling, that the line achieves the required throughput.
- Estimate the conversion cost per motor and the overall capital cost of the line.
- Produce the specifications and requirements needed to support the follow-on implementation solicitation.

REQUIREMENTS

Current environment. The depot operates existing manual and semi-automated BLDC assembly lines. Stator cores arrive unwound; winding is performed on the line. MxD will provide the selected Respondent with a documented current state process flow, observed cycle times where available, and the depot's motor specification, subject to any release conditions. Respondents shall assume they are designing a new line. Existing equipment is provided as a functional reference for the operations performed and is not available for reuse.

The tasks below are expected to iterate rather than complete strictly in sequence. Modeling results are likely to inform the line concept, and the line concept may in turn refine the process definition. Respondents should plan accordingly.

Task 1. Process Definition

- Define the end-to-end assembly process, from receipt of finished machined components through final assembly, including additional processes, and end-of-line product quality testing.
- Include process parameters and inspection/test points.
- Confirm the process meets the depot's quality requirements and cost objectives.
- Define the requirements for incoming material packaging and quantities
- Identify where commercially available equipment meets the process requirement and where custom or engineered solutions are needed, including whether acceptable sources exist for each equipment type.

Task 2. Line Concept Design

- Develop an assembly line concept that performs the defined process, documenting material flow, machinery, manpower and automation level by station, with the rationale for the automation selected.
- Document floor plan, facility and utility requirements, including power, compressed air and network provisioning, within the layout constraints provided by MxD.
- Identify equipment types with long lead times and flag any that could affect the implementation schedule.
- Develop a material handling plan for movement of parts between stations.
- Design the line to be digitally enabled, meaning a digital twin, supervisory systems and additional sensors can be integrated later without redesigning the line or its controls. Specifically:
    - Sensors for in-situ quality monitoring
    - Preventative maintenance prediction abilities
    - Facility and utility requirements identify where network cabling and connection points are needed, and the space, power and cooling required for any computing hardware located at the line.

Task 3. Throughput Modeling and Performance Analysis

The modeling approach is proposed by the Respondent and shall be justified against the required analysis below. MxD does not require a specific modeling tool or method. Respondents should propose an approach proportionate to the analysis required. The overall equipment effectiveness objective will be provided to the selected Respondent with the detailed process inputs.

- Model the proposed line to demonstrate it achieves a target operating capacity of 1,000 motors per 8-hour shift and meets the overall equipment effectiveness objective. Report the effect of varying key process inputs.
- Review and document takt time and bottlenecks across the proposed stations.
- Document assumptions for scrap, downtime, availability and other factors affecting the overall throughput.

Task 4. Cost and Capital Estimating

- Estimate the conversion cost per motor achievable under the proposed process, using a basis provided by the depot.
- Provide a rough order of magnitude capital estimate, itemized by station and major equipment item.
- Identify the principal cost drivers and any tradeoffs between capital investment and operating cost.

Task 5. Support for Follow-on Solicitation

- Determine the implementation requirements, including machinery specifications, sufficient to support MxD in developing the follow-on solicitation and procuring equipment.

Compliance and Sourcing:

- **Sourcing preference**. All equipment in the line concept shall be newly sourced. Domestic sourcing is required where a capable U.S. source exists. Where no capable domestic source exists, allied-nation sourcing is acceptable. Respondents shall document the sources identified for each equipment type, including country of origin, where no domestic source was found, and the basis for that conclusion.
- **Country restrictions**. Equipment manufactured or assembled in an ITAR covered country shall not be proposed. All equipment must not contain integrated circuits or software developed or manufactured in ITAR covered countries. See https://www.pmddtc.state.gov/ddtc_public?id=ddtc_public_portal_country_landing.
- The line shall operate as a standalone, air gapped system with no external network connectivity and no cloud dependence. The line concept shall not assume connection to depot networks. The design should not preclude future connection to the depot's industrial control network, but no such connection is in scope.

Deliverables

- Process definition, including process parameters, inspection and test points, and documented constraints and assumptions.
- Assembly line concept design package, including process flow, station definitions, machinery, manpower requirements, and layout.
- Facility and utility requirements.
- Lead time assessment for proposed equipment types, identifying long-lead items.
- Material handling plan between stations.
- Model and results in an inspectable and transferable form, with assumptions documented and any required licenses or tools identified.
- Throughput, takt time, and overall equipment effectiveness analysis.
- Conversion cost per motor estimate and rough order of magnitude capital estimate.
- Implementation requirements and machinery specifications to support the follow-on procurement.
- Identify workforce capability needs for machine operators and equipment maintenance

Out of Scope

- Equipment procurement, fabrication, integration, installation and commissioning.
- Motor product design, product qualification and environmental qualification, which remain the responsibility of the depot.
- Component manufacturing and finishing operations, which are performed before parts reach the assembly line.
- Transportation and storage of the finished motors and material prior to the assembly process.
- Design of the line to run motor sizes other than the 3115 and documentation of how the line would be adapted to other sizes. Both are products of the implementation phase.
- Definition of the digital use case. What is modeled, what data is collected, and for what purpose will be defined by MxD and the depot and is not in scope for this RFQ. The Respondent designs a line capable of supporting that work, not the digital application itself.

Required and Preferred Experience

Respondents shall demonstrate capability in the following:

- Manufacturing process definition and development.
- Industrial engineering and production line optimization.
- Automation and controls engineering.
- Manufacturing process modeling and throughput analysis.
- Experience operating an existing line.

The following experience is preferred:

- Electric motor assembly, and small BLDC motor assembly in particular.
- Prior work with Department of War facilities or the Organic Industrial Base.
- Manufacturing modeling and simulation.
- Line design for facilities operating on restricted or air-gapped networks.

mxdusa.org
@mxdinnovates
info@mxdusa.org

1415 N. Cherry Avenue
Chicago, IL 60642
(312) 281-6900

PROGRAM OVERVIEW

V. PROGRAM REQUIREMENTS

QUOTATION

While the format of the quotation is flexible, it must clearly include requirements compliance, respondent qualifications, and cost factors. Reference section VII Quotation Evaluation for more information.

Neither MxD nor the U.S. Government has any responsibility for costs associated with development, submissions, or pre-award negotiations for this quotation and subsequent contract.

PERIOD OF PERFORMANCE REQUIREMENTS

Period of performance is 3 Months from award contract. Respondents may propose a shorter period of performance with justification; however, it may not exceed 3 months.

TRAVEL AND FACILITY ACCESS

All travel requirements and associated costs needed for execution of the objectives and deliverables must be included in the quotation. Travel will be required to secure U.S. Army facilities. Access to the facilities will require U.S. citizenship and a security background check.

OWNERSHIP OF DELIVERABLES AND INTELLECTUAL PROPERTY

The contract will be structured as a work-for-hire agreement. It is expected the solution to meet the objectives will be a commercially available solution. Intellectual property developed under this award, if any, will be the property of MxD and the DoD. Any existing, background intellectual property (IP) remains the property of the IP owner.

FUNDING REQUIREMENTS

MxD reserves the right to fund all, some, or none of the quotations received under issued RFQs. Final award amounts will be determined accordingly based on quotations received, subsequent evaluations, and final agreement between MxD and the Awardee.

Cost share is not required for this contract. However, cost share is encouraged to support the Institute's mission.

MxD recognizes the difficulty in completing a final quotation without additional information or site visits for certain projects. Therefore, **clearly document and explain all assumptions used to generate the quotation**.

If down selected, the Respondent will have the opportunity to gather additional details and revise the quotation. The Respondent must then submit substantiating documentation for costs (including any cost share). MxD will complete a comprehensive cost analysis (including cost reasonableness and cost realism) prior to contract award.

Neither MxD nor the U.S. Government has any responsibility for costs associated with development, submissions, or pre-award negotiations for this quotation and subsequent contract.

VI. ELIGIBILITY

ELIGIBILITY IN FUTURE SOLICITATIONS

This RFQ is for engineering services only. The work product developed under this contract, including the process definition, line concept design and supporting analysis, is intended to inform a separate and subsequent competitive procurement for the implementation of the line.

The Awardee and its affiliates will not be eligible for award by MxD of any contract for the implementation of the work product developed under this contract. Implementation includes equipment supply, fabrication, installation, integration, commissioning and associated services

MXD MEMBERSHIP IS NOT REQUIRED

This RFQ is open to the public. MxD membership is not required to submit an RFQ.

GOVERNMENT ENTITIES

Federally Funded Research and Development Centers (FFRDCs) and Government entities (Government/National laboratories, military educational institutions, etc.) are subject to applicable direct competition limitations. They cannot propose to Project Calls in any capacity unless they address the following conditions:

- FFRDCs or Government entities may not exclusively team on any specific proposal team.
- FFRDCs must demonstrate that the proposed work is not otherwise available from the private sector and must also provide a letter on letterhead from their sponsoring organization citing the specific authority establishing their eligibility to compete with industry and propose to solicitations utilizing Government funding.
- Government entities must clearly demonstrate that the work is not otherwise available from the private sector and provide written documentation citing the specific statutory authority and, where relevant, contractual authority, establishing their ability to propose to solicitations utilizing government funding.

Government agencies interested in participating in MxD RFQs as a respondent or subcontractor should notify MxD in advance of the RFQ submission. For RFQs utilizing federal funding, special agreements and considerations may need to be implemented to enable participation.

NOTIFICATION OF PARTICIPATION NON-U.S. CITIZENS

The Project Award shall be granted only to U.S. companies, firms, organizations, institutions, or other entities organized or existing under the laws of the United States, its territories, or possessions (as defined in Section 120.15 of International Traffic in Arms Regulations, 22 CFR § 120 et. seq. (“ITAR”)).

It is a requirement that work related to the Award must be completed in the U.S. by people legally authorized to work in the U.S. All proposed participation by non-U.S. Citizens must be disclosed to MxD on Attachment 1 Non-U.S. Citizens at least 60 days prior to proposed participation. Written approval of non-U.S. Citizens must be received by the Awardee from MxD prior to commencing work.

VII. QUOTATION EVALUATION

Evaluation Process

An MxD Evaluation Board (EB) will review and evaluate each submitted quotation. The EB may consist of recognized experts from industry and academia and key government stakeholder representatives (when appropriate). MxD representatives, such as the Director of R&D Projects, the Director of Engineering, and technical subject matter experts may participate in and lead EB meetings.

All members of the EB must agree to a statement of personal and organizational conflict of interest and must agree to a non-disclosure, if not already covered by an MxD NDA.

Through its deliberations, the EB will determine "selectability" of each quotation. Selectability determination is based on quotation evaluation criteria below. Through this process, the quotations are down selected.

Evaluation Criteria

Each quotation is evaluated by a specific set of criteria. Below are the quotation evaluation criteria for this RFQ:

Quotation Evaluation Criteria
Requirements Compliance • *Quoted solution clearly addresses all objectives and tasks identified in RFQ* • *Clear identification of assumptions, risks, and mitigations* • *Complete and clear itemization of all requirements* • *Program management plan meets requirements in the RFQ*
Respondent Qualifications • *Respondent is highly qualified to accomplish objectives and tasks with clear delineation of roles and responsibilities* • *Respondent has unique capabilities that are directly associated with the target technology and tasks* • *Respondent has the ability to travel to U.S. Army facilities, where access to the facilities will require U.S. citizenship and a security background check.*
Cost Factors • *Quoted costs are reasonable and realistic for the proposed work effort* • *Quoted costs are competitive relative to other commercial offerings* • *Value is maximized through inclusion of optional cost share and objectives*

VIII. SUBMISSION DETAILS

Each Respondent must submit their quotation (including Attachment 1) no later than 5:00PM Central Time, September 17, 2026. All submissions must be submitted electronically to MxD's submission form, LINK HERE. **Please complete the form and hit SUBMIT in order to fully submit your proposal/quote.**

IX. NEXT STEPS

NOTIFICATION

MxD will notify all Respondents of that status for their quotation by October, 2, 2026. This notification will include decision of the EB. If the quotation has been accepted for award, instructions for next steps will be reviewed with the selected Respondent.

FINAL REVISIONS

MxD reserves the right to negotiate the cost and scope of the proposed work with a Respondent that has been down selected prior to award. The selected Respondent(s) and subcontractors, if any, who intend to pursue selection may be required to participate in the revision process prior to award.

CONTRACT

Final contract vehicle and contract terms will be negotiated at the time of contracting. Down selection of a quotation does not constitute agreement to quoted terms by either MxD or the DoD.

mxdusa.org
@mxdinnovates
info@mxdusa.org

1415 N. Cherry Avenue
Chicago, IL 60642
(312) 281-6900

Attachment 1

Certification of Non-U.S. Citizens

___ There is NO participation by Non-U.S. Citizens proposed for this effort.

___ The following Non-U.S. Citizen is participating in this effort.

Non-U.S. Citizen Name, Contact Info	Country of Citizenship	Primary Employment Location	Employer	US Work Authorization (Visa, Green Card, Etc)	Justification*

*The Justification section should clearly outline the rationale behind the individual's request for participation, the type of data they will have access to, and other pertinent information regarding their skill set/expertise.