



PROJECT 23-08-02

MODEL-BASED ENTERPRISE (MBE) MATURITY INDEX UPGRADE

FINAL REPORT

November 2025

Lead Organization:

SteelToad Consulting LLC

5200 Research Park Dr

Baltimore, MD, 20228

Andy.Cooper@steeltoad.com

301-660-3963

Additional Project Participants:

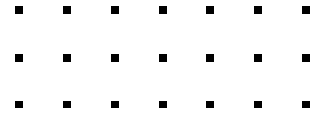
None



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Final Report



This MxD-23-08-02 Final Report encapsulates the full project lifecycle of the MBE initiative, documenting its strategic objectives, execution phases, and key deliverables. It highlights the successful development of the MBE Maturity Index and Guidebook, which were shaped by stakeholder workshop engagement, iterative refinement, and MBE industry assessment benchmarking. The report details accomplishments such as monthly project reviews, MBE workshop and assessment integrations, and mid-project evaluations, while also addressing challenges encountered and lessons learned. It concludes with recommendations for sustaining momentum, scaling adoption, and leveraging the project's outputs to drive continued innovation in model-based enterprise practices. During the project, SteelToad provided the following deliverables and activities.

Kickoff Meeting Summary

SteelToad held an MxD kickoff meeting to start the formal launch of the project, bringing together all key stakeholders to align on objectives, scope, timelines, and roles. Discussions focused on establishing a shared understanding of the Model-Based Enterprise (MBE) goals, reviewing initial deliverables, and confirming communication protocols. Action items included finalizing the scheduling of recurring check-ins to ensure consistent progress tracking.

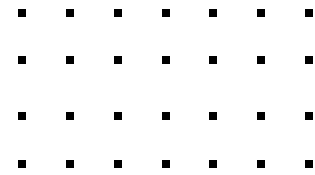
Monthly Program Review

SteelToad provided monthly program reviews, providing a structured forum for assessing project Major Accomplishments, Deliverables Burndown, Risks Management, Issues, Project IP (Intellectual Property), Foreign Entities, Project Spend Plan vs. Actuals, and ensuring alignment with milestones. Each monthly report included updates on task completion, resource allocation, and any deviations from the planned schedule. These monthly reviews facilitated agile decision-making and allowed the team to proactively address challenges, ensuring the project remained on track and responsive to evolving needs.

Safety Accident/Incident Report

During the project reporting period, no safety incidents were identified and documented.

MBE Maturity Workshops and Assessment



The table on the following page provides a comprehensive summary of all completed MBE workshops and assessments conducted to collect actionable feedback for improving the MBE Index tool. In total, eight workshops and assessments were carried out, generating 311 individual comments from participants across multiple organizations and MBE roles. These comments covered a wide range of observations, including clarity of lexicon definitions, usability of the tool interface, alignment with industry practices, and suggestions for content improvements for MBE best practices. To ensure systematic analysis, all workshop and assessment feedback was consolidated into a master aggregated workbook and linked by Category, Topic, and Facet to the core structural elements of the MBE Index. This enabled tool authors to quickly pinpoint tool areas requiring refinement, clarity, prioritization, and enhancements based on recurring themes, and maintain traceability between assessment participants' input and subsequent revisions. The structured approach ensured improvements were data-driven and aligned with user feedback, supporting the overall goal of creating a robust and user-friendly MBE Maturity Index tool.

Outcome

SteelToad successfully facilitated eight Model-Based Enterprise (MBE) Maturity Index tool workshops and assessments across multiple small, medium and large organizations to evaluate the tool's effectiveness and usability. These workshop and assessment sessions provided an interactive environment for participants to apply the MBE Index, share insights, and identify areas for improvement. This comprehensive approach allowed the MBE tool development team to prioritize improvements based on recurring themes and user needs, strengthening the tool's value as a practical resource for organizations pursuing digital transformation.

Summary of Completed Workshops and Assessments

Company	Workshop	Total Comments Received	Workshop Status	Status	ATI	Location	Size	Scope
Belcan	6/10/2025	30	Workshop Completed	Completed	Delivered Comments	IL	Medium	Division
Finite Engineering	6/4/2024 6/5/2025	59	Workshop Completed	Completed	Delivered Comments	KS	Small	Enterprise Wide
Lexco Cable	7/17/2025 7/18/2025	17	Workshop Completed	Completed	Delivered Comments	IL	Small	Enterprise Wide
Rolls Royce 1	7/14/2025	17	Workshop Completed	Completed	Delivered Comments	IN	Large	Division
Rolls Royce 2	7/14/2025	27	Workshop Completed	Completed	Delivered Comments	IN	Large	Division
Tetra Molds	7/21/2025 7/22/2025	41	Workshop Completed	Completed	Delivered Comments	OH	Small	Enterprise Wide
Black & Veatch	8/25/2025 8/29/2025	104	Workshop Completed	Completed	Delivered Comments	KS	Large	Enterprise Wide
Rolls Royce 3	8/28/2025	16	Workshop Completed	Completed	Delivered Comments	UK	Large	Division

MBE Maturity Company Profiles

Each company engaged in this process did so voluntarily, without compensation, and provided constructive input to strengthen the overall deliverable. To recognize these contributions, the participating organizations were invited to include a one-page company profile in this public version of the report. These pages provide a brief overview of each company's services, capabilities, and experience within the model-based enterprise community. Including these profiles not only acknowledges their contributions but also introduces other stakeholders to firms that advance digital engineering practices. The following pages present the company profiles of those who contributed their time, expertise, and perspective. Their participation and openness in sharing lessons learned from their own digital transformation efforts were critical to improving the accuracy, usability, and long-term value of the MBE Maturity Index as a practical industry tool.



Belcan
www.belcan.com



BLACK & VEATCH
Black & Veatch
www.bv.com



Finite Engineering Associates
3D, LLC
www.finiteengineering.com



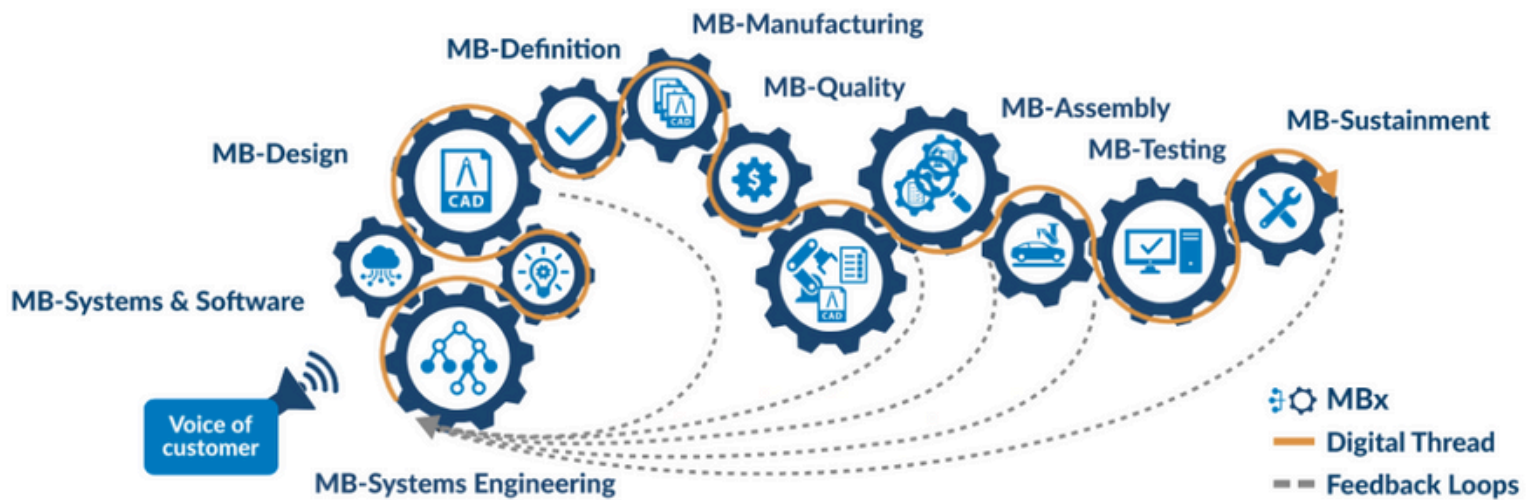
Lexco Cable
www.lexcocable.com



Rolls-Royce
www.rolls-royce.com



Tetra Mold & Tool, Inc.
www.tetramold.com



Belcan, a Cognizant Company, is a global supplier of design, software, manufacturing, supply chain, information technology, and digital engineering solutions to the aerospace, defense, space, government services, automotive, and industrial markets. We take a partnering approach to provide solutions that are adaptable, integrated, and differentiated, and we have earned the trust of our customers for more than 65 years.

**“CUSTOMER-DRIVEN
SOLUTIONS
THAT ARE FLEXIBLE,
SCALABLE AND
COST-EFFECTIVE.”**

BELCAN’S MODEL-BASED ENGINEERING SERVICES:

Digital transformation is reshaping industries by driving efficiency, innovation, and quality. Model-Based Engineering (MBE) plays a crucial role in enabling this shift by replacing traditional document-centric workflows with trusted digital models that span the entire product lifecycle, enhancing agility and reducing errors. Belcan has embraced this evolution through its Digital Engineering Solutions Team, offering tailored support in areas like Model-Based Systems Engineering (MBSE), Model-Based Definition (MBD), Digital Twins, and Digital Threads. With deep expertise and a flexible approach, Belcan helps customers at any stage of their MBE journey, delivering strategic and impactful engineering solutions.

TOOLING EXPERTISE:

- Model-Based Systems Engineering (MBSE)
- Model-Based Definition (MBD)
- Digital Twin Development
- Digital Thread Integration
- MBE Strategy Development
- and Discovery Pilots
- Program Execution Support

CONTACT:
Mike Werkheiser
Director of Model-Based
Engineering
Phone: 860-299-6250
mwerkheiser@belcan.com
Website: [contact us:](#)





Black & Veatch
www.bv.com

Overview

At Black & Veatch, we see the world not just as it is, but as it could be. Coal plants reborn as renewable energy hubs. Coastlines transformed to take on flood threats. Safe power and clean water sourced closer to home. Local workforces building a low-carbon future. Infrastructure that protects the planet and empowers all people. That's bolder vision. That's Black & Veatch.

Model-Based Enterprise Project Participation

While MBE maturity assessments are commonly utilized across the government and industry, it has been determined that there are several barriers to the broad adoption of the current Model-Based Enterprise (MBEE) Maturity Index – specifically in the manufacturing sector. The existing spreadsheet-based interface, limited guidance on actionable next steps, and lack of clarity around costs and benefits add to the lack of adoption -especially with smaller organizations.

Black & Veatch was among the organizations that volunteered to participate in a Model-Based Enterprise Maturity Index Assessment, providing comprehensive and diverse feedback across all relevant phases of the process. SteelToad gathered valuable data from all three Rolls-Royce business areas, to support targeted enhancements to the MBE maturity tool.

finite

ENGINEERING

ASSOCIATES 3D, LLC

Finite Engineering Associates 3D, LLC, founded in 2002, is a premier mechanical engineering solutions provider specializing in 3D machine design, heavy equipment development, and manufacturing support. Based in Overland Park, Kansas, Finite serves as an extension of clients' engineering departments, bringing experienced engineering resources, diverse knowledge, and advanced technical capabilities to tackle challenging projects.

ENGINEERING SPECIALTIES

- Structural Analysis & Design
- Hydraulic Systems Design & Troubleshooting
- Heavy Equipment & Mining Machinery
- Pressure Vessel Design
- Weldment Design (D1.1)
- Fork Truck & Material Handling

CORE SERVICES

- New Product Development (NPD)
- Custom Product Development
- Mechanical Engineering Services
- Engineering Support
- Advanced Analysis
- 3D Modeling & Design
- Laser Scanning & Reverse Engineering
- Technical Documentation

CAD SOFTWARE

- SolidWorks (Certified)
- Autodesk Inventor
- AutoCAD
- Creo (Pro Engineer)
- All platforms: 2D/3D modeling

PROJECT MANAGEMENT

- PMP Certified
- CSM Project Management
- DFSS Green Belt
- Stage-Gate Development
- Cross-functional Teams
- Smartsheet Certified

INDUSTRY STANDARDS

- ASME Section VIII
- API-650 & API-620
- DOT Standards
- NACE Certifications
- AWS D1.1 Welding
- CE Marking Compliance

SPECIALIZED TOOLS

- Scene (Faro) 3D Scanning
- ReCap Premium
- Microsoft Office
- Adobe Creative

ANALYSIS SOFTWARE

- SolidWorks Simulation (Expert Level)
- Inventor Nastran (Expert Level)
- Abaqus (Advanced Analysis)
- Compress (Pressure Vessel Design)
- Autodesk Mechanical Simulation



CONTACT

Jasen Sappenfield

P.E. Co-Founder

4551 W. 107th Street, #375
Overland Park, Kansas 66207

Phone: (913) 681-8282

Email: info@fea3d.com



**NAME YOUR
CHALLENGE.
WE'LL HANDLE IT.**

When your in-house engineering team needs to focus on other priorities, or you haven't yet found the right outsourcing partner,

Finite Engineering

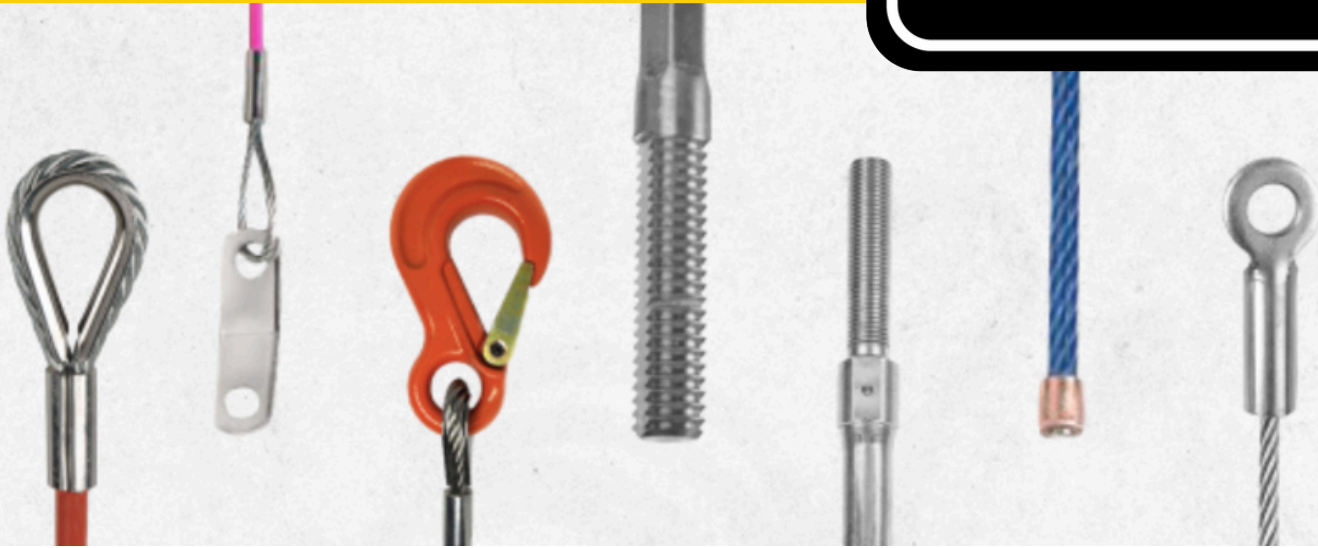
is your dedicated engineering solution.



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LEXCO CABLE

LEXCO



Lexco® Cable is a leading manufacturer of wire rope, cable, and bungee cord assemblies. Since 1952, we have provided top-quality cable products, offering robust and flexible solutions for both standard and custom applications. As a family-owned business, we pride ourselves on expanding our capabilities, delivering outstanding product performance, and offering unmatched personal attention through responsive and conscientious customer service. At Lexco, we can fabricate any wire rope assembly, bungee assembly, or cable control you design. We prioritize our customers by offering quick turnarounds, on-time delivery, and low order minimums.



INDUSTRIES

- Military
- Aerospace
- Marine
- Construction
- Automotive
- OEM
- Lighting
- DOW Contractors
- State and Local
- Architecture
- Fitness
- Towers
- Agriculture
- Safety



CAPABILITIES AND SERVICES

- Wire Rope Assemblies
- Labeling and Laser Etching
- Swaging and Crimping
- Distribution and Fulfillment
- Engineering and Quality
- Extruding and Coating
- Pull-Testing:
 - Proof loading
 - Pre-Stressing
 - Destructive Testing
- Manual and Automatic Cutting
- Coiled Cable
- Die Casting
- CNC
- Re-reeling
- FAI Inspections

At Lexco Cable, we are united by a culture that prioritizes product quality and continuous improvement. We value collaboration with vendors, customers, and team members to create positive and beneficial relationships. Our dedication to detail ensures that every Lexco product meets or exceeds expectations.



CONTACT US

David Karbin, Vice President, Lexco
7320 W Agatite Ave, Norridge, IL 60706

david@lexcocable.com

Direct dial: 708-697-7316

Main: 800-626-6556 (x316)

Website: www.lexcocable.com

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Participating Business Areas

- Rolls Royce US Helicopter Design
- Rolls Royce US Ground Support Equipment Design
- Rolls Royce UK Manufacturing

Overview

Rolls-Royce has led innovation for more than a hundred years – powering, protecting and connecting the modern world. Today, the company is working on a multi-year transformation to unlock their full potential, building on its distinctive strengths to create a high-performing, competitive, resilient and growing Rolls-Royce. Rolls-Royce continues to design, build and maintain systems that provide mission-critical power to customers.

Model-Based Enterprise Project Participation

While MBE maturity assessments are commonly utilized across the government and industry, it has been determined that there are several barriers to the broad adoption of the current Model-Based Enterprise (MBEE) Maturity Index – specifically in the manufacturing sector. The existing spreadsheet-based interface, limited guidance on actionable next steps, and lack of clarity around costs and benefits add to the lack of adoption -especially with smaller organizations.

Rolls-Royce was among the organizations that volunteered to participate in a Model-Based Enterprise Maturity Index Assessment, providing comprehensive and diverse feedback across all relevant phases of the process. SteelToad gathered valuable data from all three Rolls-Royce business areas, to support targeted enhancements to the MBE maturity tool.

TETRA MOLD & TOOL INC.



IATF 16949/ITAR CERTIFIED

Tetra Mold & Tool, Inc. is a U.S.-based, full-service injection molding partner with over 55 years of experience. We provide complete lifecycle solutions — from design, engineering, and prototyping through precision mold building and plastic part production. Our in-house capabilities include 3D printing, prototype molding, short runs, and high-volume injection molding, giving customers a single source for reliable, cost-effective solutions. Proudly supporting defense, aerospace, medical, and commercial industries, we deliver quality, efficiency, and on-time results every step of the way.

CORE CAPABILITIES:

Tooling Expertise:

- Precision mold design and build
- Advanced CAD/CAM engineering & Moldflow analysis
- Prototype and bridge tooling
- CNC machining and EDM
- Mold repair, maintenance, and engineering changes

Production Expertise:

- 3D printing for rapid prototyping
- Prototype injection molding
- Low-volume molding
- High-volume injection molding
- Scalable solutions from prototype to production
- Additional services: Assembly, ultrasonic welding, SPC, PPAP, FAI, DFM, DFA

CONTACT US:

Tetra Mold & Tool Inc.
51 Quick Rd, New Carlisle, Ohio
45344

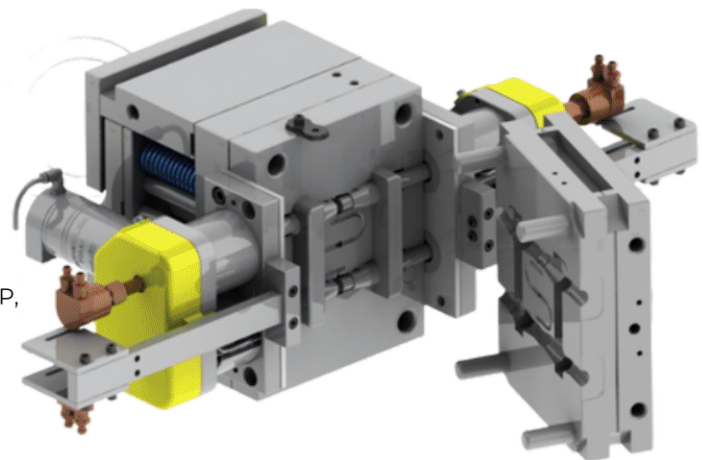
Phone: 937-845-1651

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**“Working together for quality,
customer satisfaction and on
time delivery.”**



MBE Maturity Index Guidebook

Based on feedback gathered from MBE workshops and assessment comments, SteelToad developed the fifty-six-page Model-Based Enterprise (MBE) Maturity Index Guidebook to help organizations understand the MBE Maturity Index tool and leverage it to accelerate their digital transformation journey. Four iterative drafts of the Guidebook were produced, incorporating over 40 stakeholder comments. The Guidebook was structured to align with the MBE Maturity Index tool, enabling seamless navigation between the tool and its supporting explanations. Each major section corresponds to key elements of the Index, such as categories, topics, and facets, along with definitions, context, and practical instructions for application. Internal navigation features allow readers to quickly access relevant content without reviewing the entire document sequentially.

Designed as both a reference and a working manual, the Guidebook can be read in full during initial orientation but is primarily intended for targeted use. Organizations may consult specific sections as needed to clarify definitions during an assessment, understand facet application, or review examples when creating a roadmap. This navigation approach minimizes search time and promotes consistent use of the Guidebook as a companion resource to the Index throughout the assessment process.

The MBE Guidebook table of contents includes:

- Introduction
- About the Maturity Index
- Document-Centric
- Product, Part-Centric
- Lifecycle Part-Centric
- Enterprise Part-Centric
- Tailoring Guidance
- Tailoring the Assessment
- MBE Maturity Index Assessment Phases
- Organization Scope Definitions
- Scope Setting
- Assessment Schedule
- As-Is Ratings
- Target Setting
- Conceptual Framework
- Roadmap Guidance
- Roles and Responsibilities
- Sustaining Adoption and Continuous Improvement
- MBE Maturity Index Tool Vocabulary
- Contact Information

Outcome

Based on workshop and assessment comments received, SteelToad developed the Model-Based Enterprise (MBE) Maturity Index Guidebook as a supplemental resource to encourage broad adoption and effective utilization of the MBE Index tool. The Guidebook serves as a practical companion, offering clear guidance on how to perform an assessment, detailed definitions, and real-world examples to help organizations understand the tool's structure and apply it effectively in support of their digital transformation initiatives. Designed for flexibility, it functions both as a comprehensive reference and a working manual, enabling any-sized (small, medium, large) organization to navigate the MBE Index with confidence and consistency. By providing structured explanations and actionable insights, the Guidebook ensures organizations can integrate the tool into their MBE processes seamlessly, fostering improved decision-making and accelerating progress toward a fully model-based enterprise.

Mid-Project Report

SteelToad provided a mid-project report as a comprehensive overview of progress to date, including completed milestones, budget status, and stakeholder engagement. Key achievements include the development of the draft MBE Maturity Index and the initial guidebook framework. Challenges such as data integration complexities and resource constraints were noted, with mitigation strategies underway. By documenting completed milestones, such as the development of the draft MBE Maturity Index Guidebook, the report validated that the project was on track and meeting its core objectives. It also provided transparency on budget status, stakeholder workshop, and assessment engagement, fostering confidence in project governance. Overall, this deliverable strengthened collaboration, supported informed planning for the second half of the project, and reinforced accountability across the team.

Workshop Summary and Feedback Integration Report

SteelToad performed Model-Based Engineering (MBE) Maturity Index Tool workshops as structured, collaborative sessions designed to help organizations assess and improve their adoption of model-based engineering practices. The workshops introduced companies and participants to the MBE maturity index tool as a framework to evaluate their current state of MBE implementation across various dimensions such as tools, processes, integration, workforce skills, and organizational governance and culture.

Through guided discussions, real-time scoring, hands-on activities, and benchmarking exercises, workshop participants identified MBE strengths, gaps, and opportunities for growth. The goals were to capture participants' comments on how best to improve the MBE tool, create a clear roadmap for advancing MBE capabilities, align engineering practices with digital transformation goals, and foster more efficient, integrated, and model-centric development environments.

Deliverables Burndown

This was blank.

Risks Management

List any risks that have been identified this past month.

Risk Impact Area	Risk Description
Stakeholders	None
Funding	None
Technology Transition Plan	None
Resources/ Expertise	None
Milestones/ Schedule	None
Business Case	None
Design- Hardware	None
Design- Software	None
DMDII Future Factory Equipment	None
DMDII Future Factory IT	None
DMDII Future Factory Facilities	None
Other	None

Issues

Identify any issues your organization is experiencing and what actions you are taking to overcome those issues.

- None

Project IP & BIP

List any BIP used and any Project IP created during this reporting period.

Deliverable/ Project Outcome	BIP Required to utilize Project IP OR Project IP	BIP/IP Owner	Type of IP	Rights Post- Project for Participants	Rights post- Project for Members	Rights post- Project for UI LABS	Rights post- Project for Government	*Other Explanation

Foreign Entities

List any potential participation by foreign entities or Non-U.S. citizens that has not been approved by MxD.

- None



Contact Information

☎ (833) 333-8623

✉ team@steeltoad.com

🌐 www.steeltoad.com