INTELLECTUAL PROPERTY

(This section must be signed)

Individuals **outside your company**, including the companies listed above and other third parties, potentially including your competitors and others in your industry, may receive and/or review award submissions. All information submitted should address the program's management, leadership, and processes in a manner that you are comfortable sharing with third parties freely and without restriction, and may not include any classified or proprietary information or materials. Do not include any materials marked Confidential or Proprietary or bearing any similar legend. All responses and other submissions, whether in whole or in part ("Submissions"), shall be deemed not to be confidential, proprietary, and/or nonpublic information of any sort for any purpose.

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Thank you for participating,

Gregory Hamilton
President
Aviation Week Network

Acknowledged, agreed, and submitted by

_____ 06/07/2023_____
Nominee's Signature Date

Nominee's Name (please print): Kurt Palmer _____

Title (please print): Director, Boost Glide Hypersonics _____

Company (please print): Lockheed Martin Missiles and Fire Control _____

NOMINATION FORM

Name of Program: Air Launched rapid Response Weapon (ARRW) _____

Name of Program Leader: Kurt Palmer _____

Phone Number: (407)-356-2566_____

Email: kurt.palmer@lmco.com _____

Postal Address: _____

_____

☒ Customer Approved

- Date: 06/06/2023 _____
- Customer Contact (name/title/organization/phone): Lt Col Cheronda Spann
- EBX Agile Weapons Division, (813) 842-6764 _____

☐ Supplier Approved (if named in this nomination form)

- Date: _____
- Supplier Contact (name/title/organization/phone): _____

PLEASE REFER TO PROGRAM EXCELLENCE DIRECTIONS AS YOU COMPLETE THIS FORM.

EXECUTIVE SUMMARY: Make the Case for Excellence
Value: 10 points
Use 12 pt. Times Roman typeface.

What is the vision for this program/project? What unique characteristics and properties qualify this program for consideration?

On Dec 9, 2022 the Air-launched Rapid Response Weapon (ARRW) program successfully achieved all test objectives associated with the first All-Up Round Test Flight (ATF-1) demonstrating the technical maturity of the United States' first air-launched hypersonic weapon and proving to our adversaries that the hypersonics technology gap is closing.

"The ARRW team successfully designed and tested an air-launched hypersonic missile in five years," Brig Gen Jason Bartolomei, Program Executive Officer for the Air Force's Armament Directorate. "I am immensely proud of the tenacity and dedication this team has shown to provide a vital capability to our warfighter."

As a Section 804 Rapid Acquisition program, ARRW serves as a prime example of the Air Force and Lockheed Martin's ability to accelerate development and testing, in order to rapidly deliver an operational capability to the warfighter and close the technology gap between the U.S. and other key nations. This gap was highlighted by China's successful test of their own hypersonic system in August of 2021, an event the Chairman of the Joint Chiefs of Staff General Mark Milley famously called "a near Sputnik moment", and by reports that Russia has used hypersonic weapons in Ukraine. The ARRW program provides significant security to the Nation and to the safety of Warfighters by ensuring our adversary's high-value, time-critical assets are held at risk in contested environments from significant stand-off distances.

The ARRW program used optimized and custom metrics to drive technical maturity and discovery earlier in the design phase. By doing this, the program was able to minimize cost and schedule impacts associated with design changes, which is a critical component in any accelerated development program. Over its course of development, the ARRW program faced many challenges regarding Volatility, Uncertainty, Complexity, and Ambiguity (VUCA). Challenges arose around volatility as a result of competition for test resources, in uncertainty due to COVID-19, in complexity due to operating in a previously under-studied flight region, and in ambiguity due to unknowns in technology limitations. In each case, the ARRW program addressed these challenges based upon the core go-fast tenets of partnership, open communication, flexibility, and agile/timely decision making. In order to meet ARRW's aggressive schedule, the team developed and implemented Digital Transformation (DX) tools which helped to reduce cycle times by nearly half, drive commonality, and increase consistency.

The ARRW program consists of team members across the corporation, including key talent at the Lockheed Martin Skunkworks team. Our team members are the heart of the program and the driving force behind its success. As such, the ARRW Program seeks to provide a challenging and rewarding growth-focused environment where open communication is fostered across internal, customer, and supplier forums and where team members are encouraged to ask "how can we do better". By leveraging the diverse talents, strengths and expertise of the entire ARRW team the program will address one of our nation's most challenging problems – to ensure the Air Force has an initial hypersonic leave behind capability by the end of the year, and provide our Warfighters with the most advanced and capable air-launch hypersonic strike capability on the planet.

DIRECTIONS

- **Do not exceed 10 pages in responding to the following four descriptions**.
  - Allocate these 10 pages as you deem appropriate, but it is important that you respond to all four sections.
- DO NOT REMOVE THE GUIDANCE PROVIDED FOR EACH SECTION.
- Use 12 pt. Times Roman typeface throughout.
- Include graphics and photos if appropriate; do not change margins.

VALUE CREATION

Value: 15 points

Please respond to the following prompt:

- **Clearly define the value of this program/project for the corporation; quantify appropriately**

The ARRW program provides significant value to Lockheed Martin, the U.S. Air Force, and the talented workforce on the team, while also contributing to the security of the US and the safety of Warfighters by ensuring the adversary's high-value, time-critical assets are held at risk in contested environments from significant stand-off distances.

Value to the Corporation: Serving as a cornerstone to Lockheed Martin's pursuit of a new hypersonic franchise, the ARRW program drew talent and resources from across the corporation to establish an agile, hyper-collaborative team with a shared mission. The ARRW program combines corporate-wide experience in design, manufacturing, integration, and testing to provide the U.S. Air Force with the first air-launched hypersonic strike weapon.

As a corporate-wide initiative, the ARRW program spans all four business areas (Aeronautics, Missiles and Fire Control, Rotary and Mission Systems, and Space), nine worksites across four time zones, and a host of dedicated suppliers. Engineering and design functions primarily occur in Orlando, Florida; King of Prussia, Pennsylvania; Grand Prairie, Texas; and Palmdale, California with each site utilizing their relative expertise to further the ARRW program. By leveraging the knowledge and expertise of subject matter experts from across the corporation, including more than 20 full-time fellows, ARRW has truly integrated elite talent to solve hypersonic engineering challenges.

Production and manufacturing support spans an even greater number of sites and includes: Palmdale, California; Denver, Colorado; Grand Prairie, Texas; Archibald, Pennsylvania; Camden, New Jersey; Courtland, Alabama; and Troy, Alabama. All-Up-Round assembly occurs at the advanced hypersonic production facilities in Courtland, Alabama. All Lockheed Martin hypersonic program facilities share this location, providing valuable cross-program lessons-learned, as well as tools and process improvements. Furthermore, ARRW has leveraged the expertise and experience of the AGM-158 family (JASSM/LRASM) of cruise missiles to assist in the standup of the Courtland facility.

The ARRW program demonstrates the power of collaboration, diversity, and a talented workforce, and clearly shows that Lockheed Martin is taking on the Nation's toughest technical challenges by leveraging cross business area expertise and through partnership with its DoD customers.

- **Clearly define the value of this program/project to your customer**

Value to the Customer: As a Section 804 Rapid Acquisition program, ARRW serves as a prime example of the Air Force's ability to accelerate development, testing, and fielding to meet an urgent national security need ARRW provides a unique air launched medium-range hypersonic operational capability. It complements the Conventional Prompt Strike / Long-Range Hypersonic Weapon and Hypersonic Advanced Cruise Missile hypersonic systems currently under development, and acts as a force multiplier for legacy systems affording increased employment options. The emergence of the Russian and Chinese hypersonic programs and the significant investments by adversaries to field this capability puts the U.S. military in an undesirable "catch-up" position. ARRW provides the U.S. the earliest production ready system, including initial leave behind assets by the end of the flight test series..

Additionally, the ARRW Program offers the Air Force unparalleled partnership and transparency. The ARRW program utilizes joint Change Configuration Boards (CCBs), co-led Integrated Product Teams (IPTs), joint Risk and Corrective Action Boards (CABs), co-led Failure Review Boards (FRBs), and more. The ARRW Program seeks to strengthen partnership with the U.S. Air Force in order to benefit the Warfighter.

- **Clearly define the value of this program/project to members of your team; quantify if possible**

Value to the Team: Due to the highly-collaborative environment, ARRW team members benefit from working a highly accelerated, multifaceted effort while interacting with and learning from individuals with different backgrounds across multiple business areas while also motivated by addressing an urgent national security need. ARRW is a unique capability that is a hybrid of every business units' expertise, but one that no business unit could accomplish on its own. Over the course of its mission, ARRW performs like a missile, in other areas more like a spacecraft, and at other times more like an aircraft. As a result, ARRW team members are able to gain experiences and insights across an array of disciplines and environments while working with a diverse group of individuals to broaden their skillset. Furthermore, the ARRW team feels a sense of pride and ownership, knowing they are contributing to an urgent national security need as the Nation seeks to close the hypersonics technology gap and narrow the lead currently held by both China and Russia.

- **Clearly define the contribution of this program/project to the greater good (society, security, etc.)**

Value to Security: ARRW is a hypersonic (Mach 5+), boost glide weapon developed for the U.S. Air Force to hold adversaries' high-value, time-critical assets at risk. ARRW's hypersonic speed significantly reduces adversaries' response time while ARRW's range keeps blue assets outside the adversaries' reach. As a Section 804 Rapid Acquisition program, ARRW serves as a prime example of the Air Force's ability to accelerate development, testing, and fielding in order to meet an urgent national security need. This need was highlighted by China's successful test of their hypersonic system in August of 2021 – an event the Chairman of the Joint Chiefs of Staff General Mark Milley famously called a near "Sputnik moment", and with more recent reports that Russia has used hypersonic weapons in Ukraine. ARRW provides the Air Force the earliest production ready system. The ARRW program's successful ATF-1 demonstration on Dec 9, 2022 validates the end-to-end technical maturity of the United States' first air-launched hypersonic weapon and proves to our adversaries that the hypersonic technology gap is closing.

ORGANIZATIONAL BEST PRACTICES AND TEAM LEADERSHIP

Value: 35 points
Use 12 pt. Times Roman typeface

Please respond to the following prompts:

- ***15 points:*** **Describe the innovative tools and systems used by your team, how they contributed to performance and why**

In order to meet ARRW's aggressive schedule, the team developed and implemented Digital Transformation (DX) tools; sought to provide a challenging and rewarding growth focused environment for its team members; communicated openly in a transparent manner across internal, customer, and supplier forums; and leveraged the strength and talents of the entire team.

Innovative tools and systems - In order to meet an aggressive schedule and to effectively work collaboratively across multiple worksites, the ARRW Program developed and implemented multiple Digital Transformation (DX) tools and processes. To drive commonality and ensure compatibility across multiple work sites using different design software, the team developed Standard Data Packages (SDPs) for digital 3D models and drawings. This enabled designers and engineers to quickly acclimate to information generated at different sites while ensuring the technical integrity of the transferred material. ARRW linked the Technology Maturity Metric (TMM), Production Maturity Metric (PMM), and program's risk database into the Integrated Master Schedule (IMS) and then automated the data pulls to ensure decisions were based on the most recent and accurate information. Finally, many of the routine software tasks such as software compilation, testing, and release were automated to reduce cycle times and improve standardization. To decrease manufacturing cycle times while increasing quality and uniformity, several DX tools and processes were implemented throughout ARRWs production facilities. Extensive use of digital screens, work instructions, models, and drawings allow technicians and manufacturing engineers to quickly gather, review, and utilize necessary information as well as enter and submit required data entries. The digital factory extends further through the use of blue light scanners as a means of quickly determining out of tolerance conditions, assisting with component fitment, and documenting the build state. Robotic automation was implemented in key areas such as Thermal Protection System (TPS) application to reduce cycle times, minimize waste, and increase consistency. Finally, while ARRW is a developmental program, extensive consideration and planning has been given to future production efforts. All flight test and tactical units have been built on production tooling using production processes and procedures.

Customer Engagement/Relations – A key aspect of the ARRW Program's success has been our partnership and transparency with our Air Force customer. A customer-focused approach is critical to understanding customer requirements and in ensuring a rapid and agile development program. As previously mentioned, the program holds joint Change Configuration Boards, co-led Integrated Product Teams, joint Risk and Corrective Action Boards, co-led Failure Review Boards , and more. This structure with continuous and transparent communication across all disciplines allows the program to identify and resolve issues early and quickly and ensures the team is proceeding in lockstep. In addition to items mentioned above the program holds many joint working groups across multiple disciplines. This Government/Industry partnership approach continues to drive Program Performance Excellence and Mission Success.

- ***10 points:*** **Define the unique practices and process you used to develop, lead and manage people?**

Leadership, Personnel Development and Engagement – The ARRW programs success is directly attributable to the dedication and commitment of the team's individuals working collaboratively across

typical boundaries and in partnership with our Air Force customer. The ARRW program drew talent and resources from across the corporation to establish an agile, hyper-collaborative team with a shared mission and then empowered them to make timely, data-driven decisions. Part of empowering individuals is encouraging them to ask questions and then actually taking the time to address them. One example of this came during early glider builds. The technicians had questions around why gliders had slight variations in instrumentation, why was it so important not to touch certain materials, why were some tasks critical but not others? In response to these types of questions, the "ask the Engineer" series was created. Each month, an engineer from a representative discipline would give a short briefing answering a common question related to the system. This not only enabled the technicians to understand the needs of the program and feel a stronger connection to the larger team, but also enabled them to provide valuable directed feedback on vehicle design and manufacturing processes and procedures. Furthermore, ARRW leadership regularly seeks to mentor and develop rising talent through growth opportunities and stretch assignments. Leadership actively looks to build cross trained individuals which not only has the benefit of increasing the bench strength of the overall team but also increases team morale and sense of ownership. Furthermore, growth opportunities extend beyond the immediate ARRW program needs and reaches across other programs within Lockheed Martin portfolio through short term assignments. This helps to foster the sharing of best practices and lessons learned across programs.

The ARRW program actively seeks to reward hard work, commitment, and the willingness to take ownership through several mechanisms including focused recognition, monetary awards, and internal Lockheed Martin campaigns. The ARRW program also seeks to go beyond these and empower team leaders and members to acknowledge their counterparts across the entire team spectrum including suppliers and Air Force customers. Team challenge coins are regularly awarded regardless of level, discipline, or organization to those who have gone beyond simply doing their job or to recognize accomplishment of a milestones. For team members who make lasting contributions to the program or help to overcome major obstacles a director's coin and plaque is awarded. Director's coins are limited to one hundred in quantity, and each is numbered and corelated to a team plaque at the entrance to the Program area.

- ***10 points:*** **How did you leverage skills and technologies of your suppliers?**

Leveraging Supply Chain Capabilities and Technologies – To augment our partnership approach to supply chain management, the ARRW program has leveraged extensive communications and team approaches to help our supply chain teammates successfully meet the demands of the fast-paced program. As mentioned previously, program awards and successes are shared across our supplier partners. This includes communicating subsystem performance results from major test milestones including flight test. Our supply chain partners were selected based on their technological capabilities and past performance on other programs. While many suppliers can trace their products back to proven Lockheed Martin programs, due to the unique nature of ARRW, many bring state-of-the-art, one-of-a-kind technology to the program in the areas of materials and high temperature technologies. As a result, the ARRW program assembled a world-class supply chain team and are leveraging their expertise to provide the Warfighter with the most capable air-launched hypersonic strike weapon. Examples of leveraging supplier skills and technology include: 1) working with our aeroshell supplier to improve production tooling and reduce manufacturing cost and complexity, 2) collaborating with our material suppliers to optimize thermal coating performance and robustness, 3) working with our casting supplier to overt employee furloughs and mitigate future schedule risk, and 4) collaborating with our suppliers to quickly identify root cause and corrective actions during FRBs. ARRW's partnership approach to supply chain management has created a dedicated supply base willing to support the nation's needs.

DEALING WITH PROGRAM COMPLEXITY
(VOLATILITY, UNCERTAINTY, COMPLEXITY, AMBIGUITY, or VUCA)
Value: 25 points
Use 12 pt. Times Roman typeface

Please respond to the following prompts:

- ***10 points:*** **Describe UNIQUE areas of VUCA faced by your program and why. (Please avoid the issues surrounding Covid-19 pandemic, which was faced by all programs.)**

- ***15 points:*** **Explain how your team responded to these challenges. What changes did you make, what were the results?**

Despite significant volatility, uncertainty, complexity, and ambiguity due to a host of challenges ranging from the uncertainty of a global pandemic to the complexity of developing the first of its kind weapon system, the team was able to take lessons-learned along the way to successfully demonstrate the end-to-end system four years after award based upon the go-fast principles of partnership with the Air Force and suppliers, open communication, flexibility, and timely/agile decision making.

Over its course of development, the ARRW program faced many challenges regarding Volatility, Uncertainty, Complexity, and Ambiguity (VUCA). Challenges arose in volatility as a result of competition for test resources, in uncertainty due to COVID-19, in complexity due to operating in a previously under-studied flight region, and in ambiguity due to unknowns in technology limitations. In each case, the ARRW Program addressed challenges through partnership, open communication, flexibility, and agile/timely decision making.

Volatility: Strangely enough, Hypersonics being a national priority has driven volatility into the ARRW schedule as a slew of new hypersonic programs competed for test range windows and test asset availability. This volatility was further compounded by the requirement for the ARRW program to operate to a zero margin schedule. Operating to a zero margin schedule requires trust and open communication between Lockheed Martin, our Air Force customer, the 412th test wing, Point Mugu Sea Range, and future test sites. As roadblocks and challenges arose during test asset fabrication, the partnership and transparency with the Air Force enabled the team to quickly and jointly develop mitigation plans and potential options. Decisions were quickly adjudicated resulting in schedule impacts measured in hours or days versus weeks or months. As test windows and asset availability shifted due to competing program needs and discovery, the test community regularly communicated range dates ensuring range availability was considered when making schedule/technical risk decisions relating to flight test. Furthermore, both Lockheed Martin and the 412th remained flexible to the timing and location of required ground tests to maximize efficiency and minimize schedule impacts. This mutual trust, open communication, and flexibility has enabled the ARRW team to execute a timely and successful flight test program. Even during test failures, this environment has enabled the ARRW program to quickly implement Corrective Actions and return to flight in an expedited fashion providing significant data and risk reduction to the program as demonstrated by the execution of three test flights in both 2021 and 2022 and a projected four flights in 2023 that expands the envelope and assesses the full performance and capability of the weapon.

Uncertainty: Like many other programs, ARRW experienced significant challenges and uncertainty due to the COVID-19 pandemic. Zoom calls replaced face-to-face meetings. Agility and open communication became critical as COVID outbreaks threatened schedules by sidelining entire teams. Preventing material shortages and supplier shutdowns became just another part of the day. Once again, the ARRW team overcame by relying on our core go-fast tenets. One example which highlights how these tenets positively

impacted not only the ARRW program, but several other DoD programs revolves around the supplier of a major cast structural component.

The ARRW program received notice that the predominately commercial foundry which cast the critical path component, was going to furlough their entire staff for six weeks without pay due to a State's mandate for non-national critical businesses to shut down during the height of the pandemic. Furthermore, the foundry's primary business supporting commercial industry would result in further delays upon restart as they focused on their primary commercial customers. The ARRW Program in cooperation with the foundry quickly evaluated options and settled on a mutually beneficial path forward. The ARRW program agreed to leverage the fact that it was associated with a critical national imperative with the foundry enabling it to overt a shutdown. Additionally, ARRW agreed to accelerate hardware deliveries from one unit per month to one unit per week expediting the unit build out and eliminating future schedule risk. The foundry for its part was able to avert the employee furlough and continue to pay its employees many of which sent letters of gratitude to the ARRW program for enabling them to continue to provide for their families during uncertain times. Furthermore, the foundry was authorized to process additional Lockheed Martin orders which prevented supplier delays for both the F-22 and F-35 programs.

Complexity: If the complexity of working a development program across four different business units, nine different work locations, and across four different time zones during a global pandemic were not challenging enough, the team had the additional complexity of developing a first of its kind air-launched hypersonic weapon which launches as a missile, boosts like a rocket, ejects a delivery vehicle which glides much like the space shuttle, and finally terminates with a warhead detonation incurring all the unique challenges of each system. In order to handle the extreme temperatures and harsh environments, ARRW required a brand-new suite of materials and innovative design solutions to mitigate the associated thermal growth. The aerodynamic, structural, and thermal design teams developed new methods to model the unique characteristics of the material system as well as to generate and apply combined thermal, inertial, and pressure loads to predictive models. Not only did the team have limited data associated with these materials, but the team also had limited data on the hypersonic flight regime. While ARRW took advantage of highly sophisticated modeling and simulation tools to seek understanding of the expected flight performance, ultimately test data was required to validate the design and material properties at temperature. This too posed a challenge, as many of the nation's test facilities are geared towards either the supersonic flight regime or high Mach space flight requiring the team to develop new test procedures as well as new test evaluation criteria. Often, this required repeated simulation, testing, evaluation, and refinement to validate predictive tools with test data. Finally, new handling procedures, assembly processes and inspection methods were required to prevent damage during fabrication as well as to ensure the quality and robustness of the system. In order to mitigate risk, the team adopted a rigorous Test-Like-You-Fly (TLYF) methodology which sought to drive First-Time Events to ground testing; however, ultimately the system must be tested in flight and on Dec 9 the ARRW team successfully demonstrated the validity of the technology through a successful end-to-end flight test achieving all test objectives.

Ambiguity: Typically, ambiguity is a bad thing for development programs resulting in schedule delays and cost overruns; however, the ARRW Program and Air Force took a different approach and resisted the fear of the unknown to maximize the operational capability of the ARRW weapon system. While the ARRW program was established with typical requirements in terms of size, weight, speed, range, and relevant "ilities" many of the available trades between requirements and the limits of the technology were relatively unknown. Instead of fearing this ambiguity, the team acknowledged that it existed and agreed to openly communicate current requirement projections regardless of shortfalls, but to also openly communicated margins, safety factors, and conservatism. Some requirements were unambiguous such as the requirement to be carried by a B-52 (size and weight), but others were held fixed with the agreement to reassess as test data became available. This approach was pursued to prevent the team from settling for and ultimately achieving an 80% solution. Instead, it pushed the team to question assumptions, seek data, and re-evaluate

conservative estimates. As a result, the ARRW weapon system is currently on track to meet or exceed requirements in both speed and range.

METRICS
Value: 15 points
Use 12 pt. Times Roman typeface

Please respond to the following prompts, where predictive metrics indicate items that provide a view of how yestrday's actions and today's actions will affect the future timeline, cost or other requirement.

Provide charts/graphs that illustrate performance to these metrics:

- **What are your predictive metrics?**
- **How did you perform against these metrics?**
- **How do your predictive metrics drive action toward program excellence? Please provide examples.**

The ARRW program used optimized and custom metrics to drive technical maturity and discovery earlier in the design phase. By doing this, the program was able to minimize cost and schedule impacts associated with design changes, a critical component in any accelerated development program.

The ARRW program implemented an optimized set of standard metrics focused on tracking and providing status on earned value management (cost, schedule, and technical), risk management, supplier performance, hardware discrepancy count and aging via a Corrective Actions Board (CAB) dashboard, and analytics, all of which were tracked weekly and reported monthly.

In addition, the ARRW program utilized custom metrics centered on technical maturity, production readiness, risk mitigation, and rapid implementation of Corrective Actions (CAs). These custom metrics included:

- Percent Drawing Release & Number of Configuration Change Board (CCB) Requests: Tracks maturity and stability of system design. Nearly 96% of all drawings were released and 100% part selection was complete by System Critical Design Review (CDR).
- Component/Subsystem Design Verification Testing (DVT) Completion: Assesses component/subsystem maturity level and validates robustness of the design early in the design cycle. Team completed 70% of all DVT by System CDR.
- Closure of First Time Events (FTEs): Validates system readiness, drive Test-Like-You-Fly (TLYF) methodology, and evaluates risk posture. Team actively sought to burn down all known first-time events during ground testing in order to avoid/reduce findings during costly flight test events. Team actively tracked and managed 129 FTEs on a monthly basis.
- Technology Maturity Metric (TMM): Rollup of design reviews, DVT, FTEs, mission success events, and test events associated with overall system maturity and risk posture. TMM tasks are linked to Integrated Master Schedule (IMS) prompting automated real time updates. Team actively tracked and managed TMM on a monthly basis.
- Production Maturity Metric (PMM): Rollup of facility readiness, Manufacturing Readiness Level (MRL) Manufacturing Maturation Plan (MMP), Production Failure Modes Effects Analysis (PFMEA), production tooling, production test equipment, work instructions, SAP readiness, and training associated with overall production readiness. PMM tasks are linked to IMS prompting automated real time updates. Team actively tracked and managed PMM on a monthly basis.
- Failure Review Board (FRB) Status (Open, Under Review for Closure, Closed): Tracks average FRB closure time and corrective action implementation to minimize cost and schedule impacts and ensure

timely return to testing. RELM Database connected to Lockheed Martin, Air Force customer, and all suppliers enabled notification of failures within 24hrs. FRB status tracked on a weekly basis enabling ARRW team to average under 60 days to close major FRBs.