

AVIATION WEEK

# Program Excellence Awards 2022

November 2, 2022

The Watergate Hotel • Washington, DC

Nomination Form

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(This section must be signed)

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Thank you for participating,



Gregory Hamilton  
President  
Aviation Week Network

Acknowledged, agreed, and submitted by



Nominee's Signature

18 May 2022  
Date

Nominee's Name (please print): Missy MacDonald / Tom Barker

Title (please print): Program Manager / Value Stream Leader

Company (please print): Collins Elbit Vison Systems

### NOMINATION FORM

Name of Program: F-35 Helmet Mounted Display System (HMDS)

Name of Program Leader: Missy MacDonald (Collins) /Tom Barker (Elbit)

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☒ Customer Approved

- Date: 25 May 2022
- Customer Contact (name/title/organization/phone):  
Adam Haynes / Subcontract Program Manager / Lockheed Martin / 682-610-6596 / 817-229-4748

☐ 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 pts)

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

(12 pt. Times New Roman) LIMIT YOUR NARRATIVE TO THIS PAGE.

The F-35 Helmet Mounted Display System (HMDS) provides the primary interface between the pilot and the advanced systems on this 5th generation fighter jet. It is a highly complex system which integrates multiple custom parts from a diverse and broadly dispersed supply chain and which must perform with high accuracy and reliability to ensure the allied forces air dominance is sustained. Our vision is to support the warfighter through our customer Lockheed Martin with a high quality, innovative helmet system, delivered on time.

Collins and our Collins Elbit Vision Systems (CEVS) joint venture partner Elbit Systems of America, take great pride in the trust placed in us by Lockheed Martin and the Joint Program Office in selecting us as suppliers for this critical system. According to Matt O'Brien, Sr. Director at Collins Aerospace, "Teamwork, collaboration, implementation of predictive metrics and other tools and systems were the key tenants employed to achieve breakthrough results and getting our performance to the level we demand of ourselves and what is expected by our customers." Collins uses predictive metrics to ensure the operational excellence of the program. These metrics are cadenced regularly with our partner, suppliers, and customer and include defects per unit, production lead time, and delivery performance.

The result of our focus on predictive metrics was 200% improvement in our Lockheed Martin supplier Diamond rating, multiple consecutive months of green or blue delivery performance, and a >30% reduction in the defects per unit across the period of performance considered for this award. Per Lockheed Martin's lead Supplier Relationship Manager, CEVS' Diamond rating is in the top 20% of F-35 suppliers.

The team successfully manages the challenges of volatility, uncertainty, and complexity through innovative tools and systems. Our focus is on early identification of risk, developing and deploying effective mitigation strategies and monitoring performance of our factory and suppliers continuously with the goal to identify impacts and begin working corrective actions before they affect product quality or deliveries to our customers. At Collins, this focus is provided by our product BEST (Better Every Single Time) team who meet weekly to review performance metrics, issues, risks, and status of corrective actions and through the Tier cadence system which assesses, addresses, and elevates production status and risk. Elbit uses a similar process that includes supplier metrics, a Six Sigma issue resolution process, and Root Cause and Corrective Action (RCCA).

Other tools and systems include coordinated communication systems, a joint quality team, RCCA assessments, the Continuous Improvement Projects process, and the 9S problem solving methodology. These tools and systems drove improvement in our quality and delivery scorecard from our customer Lockheed Martin. At both Collins and Elbit, a key focus is ensuring that everyone feels valued for their contribution and has the chance to be heard throughout the organization. The BEST team, Integrated Program Teams, and Tier cadences allow personnel to develop and take ownership of their product and actions, while gaining visibility and exposure to expertise, leadership, and tools.

CEVS' suppliers are part of our extended family. We leverage their skills and technologies to support our vision, using proactive manufacturing optimization, quality tools, and supply chain strategies.

The combined HMDS team has been highly successful at using our unique and innovative skills and characteristics to deliver program excellence. In the past 12 months, the customer diamond rating has moved steadily upward and confirms our maxim to do the right thing every day and the results will follow. The CEVS F-35 HMDS team is committed to delivering the best every day for our customers and pushing boundaries to exceed their expectations.

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.

#### VALUE CREATION (Value: 15 pts)

Please respond to the following prompt:

➤ Clearly define the value of this program/project for the corporation

The F-35 Helmet Mounted Display System (HMDS) is a key product for Collins Elbit Vision Systems (CEVS), a joint venture between Collins Aerospace and Elbit Systems of America (Elbit). The helmet showcases CEVS as technology leaders and innovators. The team's success in delivering high quality products, on-time, has positioned CEVS for future helmet programs. Our strong execution of producing advanced systems provides a competitive edge in the market.

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

The F-35 Lightning II aircraft is a marquis product for Lockheed Martin. The HMDS is a required element for operational use of the F-35. CEVS's helmet execution helps keep the aircraft sold to the F-35 Joint Program Office (JPO). CEVS timely delivery of quality products ensures pilots can receive their new or repaired helmets on schedule, minimizing impact to flight schedules. This is even more important for F-35 partner countries, whose pilots have flown to the United States to receive their equipment.

➤ Clearly define the value of this program/project to members of your team

F-35 HMDS team members are part of a larger whole in supporting the warfighter. They are proud to be associated with the program, understand where and how the product is used, and how their individual efforts directly relate to the F-35's broader success. This is true across our production floor, engineering, program, and service center, as well as at our key suppliers and support functions. The cross-functional Better Every Single Time (BEST) and Integrated Program Teams (IPT) format provides team members exposure across functions and to senior leaders. The collaborative problem-solving efforts help foster an innovative, winning spirit, with pride of ownership and input.

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

The F-35 aircraft provides the United States and its closest allies with unparalleled capabilities in times of conflict while acting as a strong deterrent to our enemies in times of peace. Per Lockheed Martin, "As adversaries advance and legacy aircraft age, the 5th Generation F-35 is critical to maintaining air dominance now and for decades to come." The CEVS HMDS is the keystone human machine interface system of the F-35 platform. Additionally, the F-35 aircraft program drives multinational economic growth, enhances global partnerships, and supports geopolitical stability.

#### METRICS (Value: 15 pts)

Please respond to the following prompt:

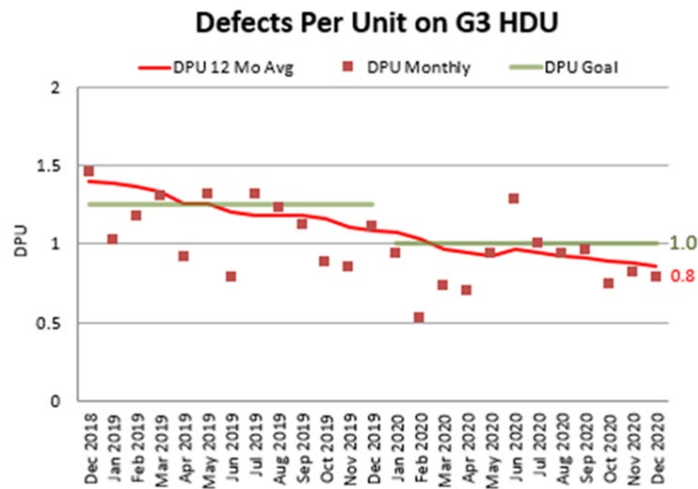
➤ What are your predictive metrics?

Predictive metrics are of critical importance to the F-35 program's success. A broad, cross-functional group of Collins and Elbit employees review and lean forward on quality, delivery, production, service, material, and customer metrics. Top metrics include defects per unit, production lead time, and delivery performance. Performance is reviewed in daily production team meetings, weekly BEST team meetings, monthly cadence reviews, bi-monthly customer satisfaction reviews, and quarterly CEVS Board of Directors meeting.

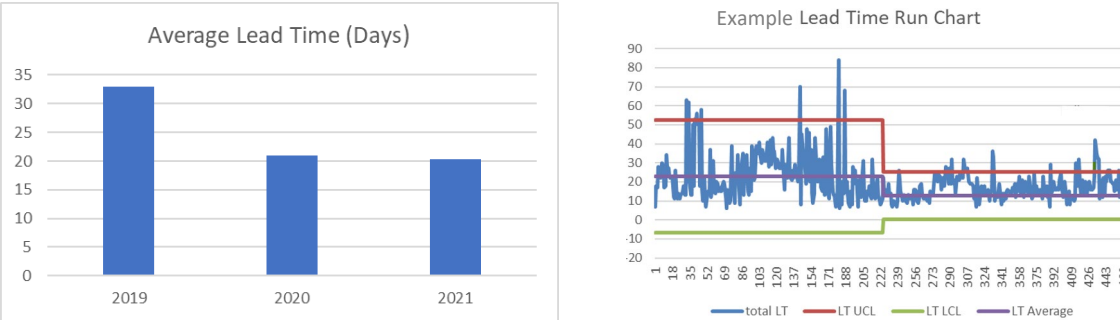
➤ How did you perform against these metrics?

Top metrics include defects per unit, production lead time, material shortage forecasting, and delivery performance. The BEST/IPT teams closely examines any defects in the helmet production value stream

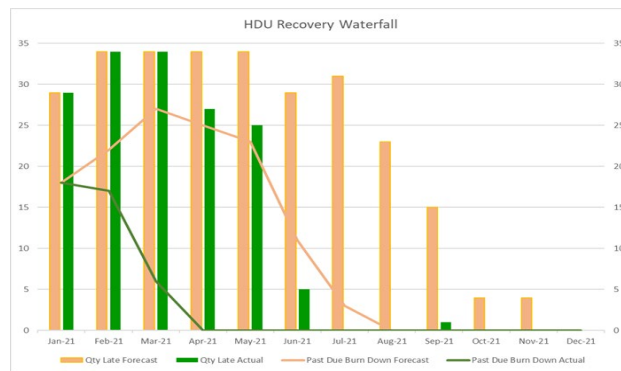
and creates projects and software updates to reduce defects. These projects and software updates also positively impact our capacity and efficiency in building and testing F-35 product. The internal defects are grouped by type and frequency and analyzed with Pareto charts. Resources are assigned to review root cause and corrective action and conduct projects. Projects are triaged based on impact to the program. The effectiveness of the corrective actions is tracked via reduction in the associated defect types, and ultimately results in a decreasing trend of defects per unit produced, shown here for 2019 - 2020.



The production team successfully worked to decrease production lead time through material availability tracking, efficient factory planning, and special projects. Manufacturing flow inhibitor (MFI) and shortage reports predict whether the factory will have material to build as planned. In the event of a shortage or delay in production, CEVS is able to project when material will arrive to efficiently plan the factory and effectively use resources. The units are then tracked through various stages of production, showing how recovery to customer obligations will progress. Monthly the team considers what product will ship and the manning required and makes personnel and timing adjustments as necessary. This allows the team to plan recovery efforts for any material or quality issue. Projects included subsystem uniformity, yield improvements, and software optimization. The team predicted these activities would reduce lead time by over 40%. In actuality, the projects together reduced average lead time by 62% from 2019 to 2021.



The team also uses predictive metrics for delivery for production, customer planning, and material shortage recovery. The chart below is a 2021 top level recovery from a particular material shortage. The orange bars and lines show a conservative prediction of the number late units and units incomplete at month end. The actual recovery in green occurred faster than predicted because the team was able to identify and close gaps, leading to faster build, shipments, and recovery.

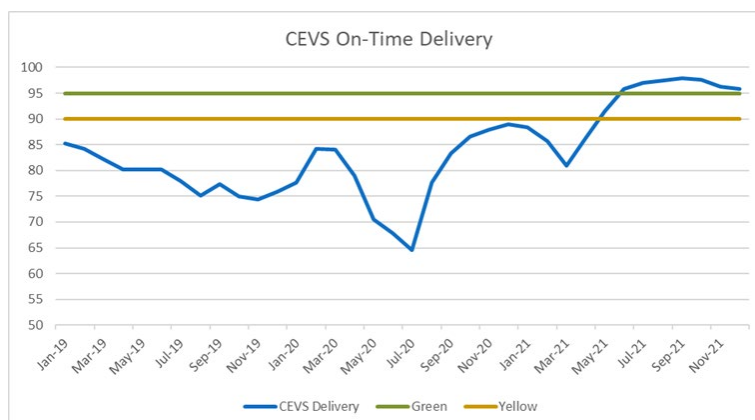


➤ How do your predictive metrics drive action toward program excellence? Please provide examples.

Our predictive metrics drive a constant focus throughout the team on supporting our customer Lockheed Martin. Metrics are reviewed at various meetings throughout leadership levels each week, discussing changes, drivers, and impacts. This keeps quality and on-time delivery first and foremost in everyone's minds. Specifically, predictive metrics drive customer excellence through factory planning, on-time delivery (OTD), and Lockheed Martin scorecard metrics.

Predictive metrics allow the factory to plan personnel shifts and activities to align with material arrival, so that the team can execute efficiently. For example, material lead time challenges were overcome by adjusting resources to prebuild display units up to the point of missing material, so that they could be quickly completed once material arrived. Using predictive metrics, such as Material Flow Inhibitors, the factory can also better plan when to conduct preventative maintenance for existing equipment and when to commission new equipment. This allows the team to utilize potentially slower times to increase overall productivity. Additionally, predictive metrics allow the team to forecast recovery from material shortages or quality concerns.

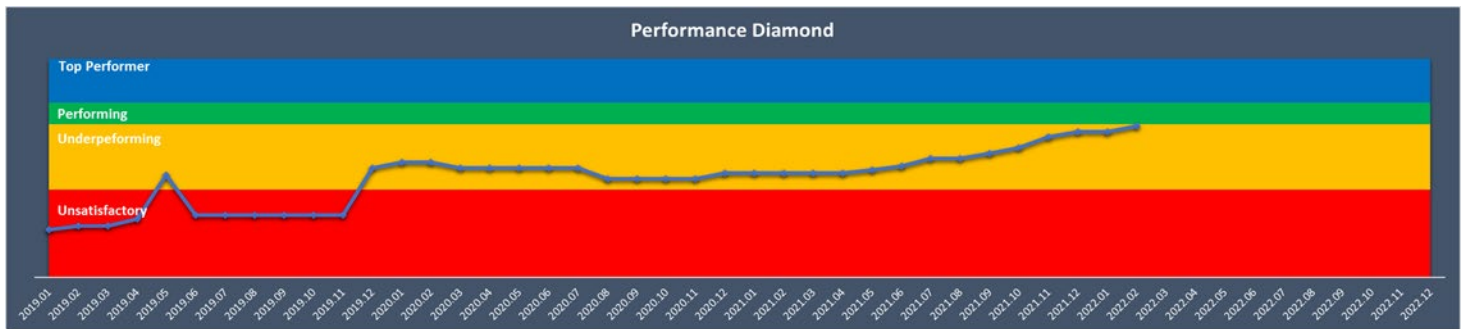
Our focus on program excellence and execution through predictive metrics has driven significant improvement in our OTD and customer scorecard metrics. The F-35 BEST and IPT teams monitor production and delivery daily, weekly, and monthly. A leading factor for improving OTD was our willingness to work very closely with Lockheed Martin to better understand the data and trends. In particular, the sustainment team discovered erroneous data had caused over 233 non-repairable items to be taking OTD hits. Once these non-repairable OTD findings were corrected or purged, performance scores increased and reflected actionable data points. Overall, OTD improved by 17% for the annual average and resulted in seven months of consecutive green or blue performance.



Lockheed Martin's scorecard uses a Diamond rating to assess the risk of a supplier not being able to meet expectations. The Diamond rating pulls in all metrics collected by Lockheed Martin for a supplier and determines a number and category to describe the supplier's overall performance. The rating indicates

predictability. Knowing that they can rely on CEVS to deliver quality material when expected allows Lockheed Martin to proceed with confidence in scheduling operations and F-35 builds efficiently to supply product to the warfighters.

In 2018 and earlier, CEVS's rating averaged below 1 in the "unsatisfactory" red classification. CEVS' improvement efforts began increasing our Diamond score in early 2019. By the end of 2021, CEVS' score increased by over 200% to 3.33, just below "performing." Per Lockheed Martin's lead Supplier Relationship Manager, CEVS' score is now in the top 20% of F-35 suppliers.



DEALING WITH PROGRAM COMPLEXITY (VOLATILITY, UNCERTAINTY, COMPLEXITY, AMBIGUITY, OR VUCA) (Value: 25 pts)

Please respond to the following prompts:

➤ 10 pts: Describe areas of VUCA faced by your program and why.

The F-35 HMDS program management challenges were primarily Volatility, Uncertainty, and Complexity. The program has low Ambiguity, as requirements and demand are known and shift slowly. The program is highly complex utilizing many custom components and sub-systems produced across a widely distributed supply chain with strong interdependencies. A realized risk at one supplier can ripple through the entire system if not properly mitigated and/or managed. Accordingly, the team must react with flexibility and resolve as situations change and evolve.

Some notable VUCA areas during 2019-2021 were:

- Volatility – local, country-wide, and global impacts and disruptions on labor and logistics due to COVID-19; natural disasters; and changes in labor pool conditions and turnover all impacted Collins, Elbit, and our suppliers.
- Uncertainty – the “normal” level of uncertainty in 2019 gave way in 2020 to a rapid transition to a combination of a remote professional workforce combined with a social distanced hands-on, factory team. Rules and guidance varied greatly by area, infection levels, and government requirements. COVID-19 restrictions eliminated most in-person meetings in 2020 and 2021 and created new challenges to maintain coordination with customers, partners, and suppliers. Our complex global supply chain was rocked with shut-downs, labor shortages, and loss of productivity due to social distancing.
- Complexity – the HMDS is a highly complex system. CEVS ships six types of Line Replaceable Units (LRUs), several of which have multiple sizes. The most complex LRU has four subsystems in a precision mounting structure. Each LRU must mate seamlessly before being “installed” on a uniquely shaped human being. Normal dimensional variation and stack up effects are magnified as the various LRUs and subsystems come together – potentially impacting optical performance, electronic performance, and product fit. Any deviation or change in inputs could cause issues across the system if not properly managed.

➤ 15 pts: Explain how your team responded to these challenges.

The F-35 BEST and IPT team's cross-functional structure and CEVS' Tier process for elevating concerns allowed us to react to and address the challenges. Having an existing methodology and forum for examining and reacting to events and challenges allowed us to be more flexible. The team was fortunate to have completed one of the periodic Program Risk Reviews with the Joint Program Office and Lockheed Martin in January of 2020. The actions from the review included a renewed focus on improved planning and coordination across the program team. Specific actions regarding supply chain risk assessment and mitigations were also included which prepared us well for the changes to come in 2020.

- Volatility

CEVS uses a series of Tier meetings and cadences to help manage volatility. The meetings and cadences assess, address, and elevate production status and risk. By meeting throughout the week at levels from the factory floor to senior leadership, CEVS can quickly react to issues that arise and identify a root cause / corrective action plan to keep the program moving. Examples include material shortages and weather volatility.

A material shortage of Relay Optics Assembly (ROAs) occurred in 2020. Tier meetings on the factory floor tracked Helmet Display Unit (HDU) Work in Process (WIP) with and without ROAs. The Subcontracts Program Manager provided daily tracking information on ROAs shipping from our supplier. Models showed predicted timing of HDUs moving through build, test, source inspection, and shipping and were refined by actuals. Program Managers across production and service coordinated on allocation of ROAs to allow CEVS to address the most pressing customer needs. Additionally, Manufacturing rearranged the product flow to decrease the impact to cycle time caused by delayed parts and better support our customer. Build status and any challenges flowed up the internal chain and also out to our customer Lockheed Martin. This allowed us to react quickly to any changes in supply, factory, or customer need. The team uses the same process for any other shortages. Subcontracts addressed volatility within the supply chain by increasing their outlook timeframe. Instead of reviewing upcoming needs and operation over the next 60 days, they increased to a six month and beyond look. This allowed them to get ahead of volatility in materials and labor forces.

Our worksites in Iowa, New Hampshire and Oregon also experienced extreme weather volatility on top of the worldwide COVID-19 pandemic. A derecho (inland hurricane) hit our Iowa location in summer 2020, destroying buildings and homes. Then in September 2020, unprecedented forest fires in Oregon caused evacuations and smoke closures. Oregon also experienced a crippling ice storm in February 2021, causing power outages and unsafe road conditions. In all these situations, employee availability varied greatly from one day to the next as they focused first on the safety of their homes and families. The factory was closed during unsafe conditions. Team members worked overtime and weekends to catch up builds and testing. Cross-trained personnel allowed production leadership to shift emphasis to areas with higher manning. Iowa and Oregon personnel shifted program management tasks across the organization based on what site was available. The broader F-35 team's flexibility enabled us to maximize product output and minimize any disruption to our customer.

- Uncertainty

COVID-19 was a prime source of uncertainty throughout the world in 2020 and 2021. Collins and Elbit quickly switched to contactless communications with our customer and suppliers through strong secure communications channels. Meetings such as Quarterly Business Reviews normally held in person were shifted to virtual meetings. An example was the Program Risk Review (PRR) held "at" our Oregon factory in January 2021. The prior PRR involved over 50 people physically located in a conference room.

Instead, everyone met over Zoom and discovered the material could be covered in as great a depth as in person. The only element missing was a physical factory tour.

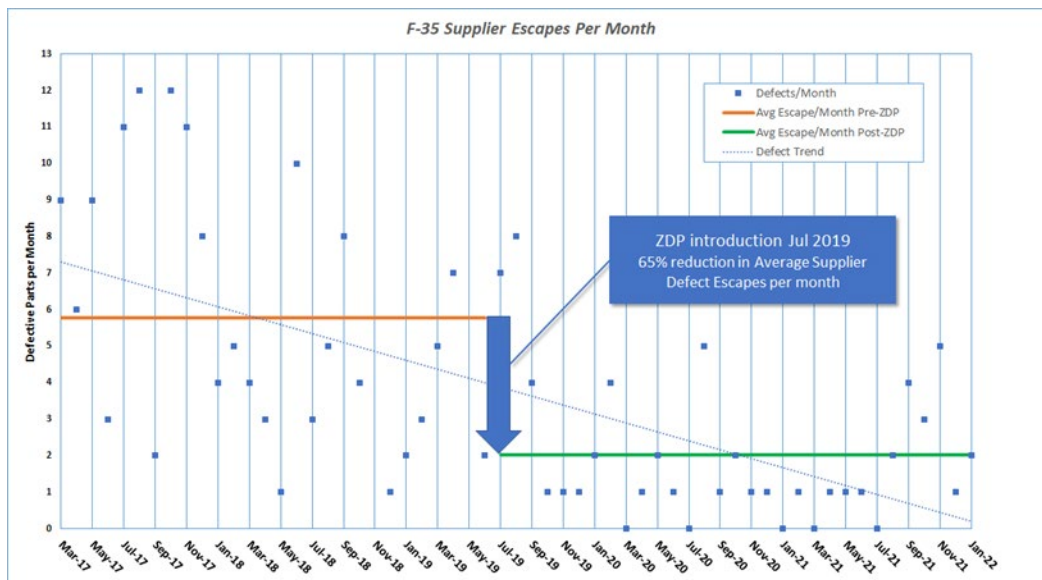
All factories quickly reconfigured production and workspaces to ensure the safety of employees. This included appropriate social distancing, barriers between individuals, safety devices, and health monitoring stations. The F-35 program shifted from having production, service, engineering, and program management under one roof to only production and service on site. Everyone else was dispersed to home workspaces. The tier structure moved to virtual and continued to support the product and personnel. Production cross-trained across processes and programs for greater flexibility in the event of personnel absences. The factory teams were able to pull in experienced assemblers and technicians from other programs that were producing at lower capacity. As a result of successfully managing this uncertainty, F-35 production did not slow during the pandemic.

- Complexity

The greatest F-35 HMDS challenge was and is the Complexity of both the product and the supply chain. CEVS and Lockheed Martin have put specific focus on improving the communication across the program team and ensuring effective cadences to ensure information is flowing and teams work in coordination. Specific examples of how CEVS managed complexity include software update management, Zero Defect Plans (ZDP™), Root Cause and Corrective Action reports (RCCA), and Continuous Improvement Projects (CIP).

Software is crucial for effectively testing the HMDS before shipping units to the field. Collins and Elbit are continuously evaluating opportunities to increase capacity, reduce test time, and increase test efficiency and accuracy. This sometimes results in ideas for updates to the test software which can be disruptive to the factory if the development, validation, and deployment are not carefully managed. The F-35 team formalized the process for testing and releasing software updates to better manage the complexity and ensure consistent results across all test stations and increased test station availability. This resulted in more efficient software rollouts, allowing an increased schedule of releases with less disruption to the production floor.

Collins and Elbit introduced the Zero Defect Plan (ZDP™) Methodology to the F-35 supply chain in mid-2019. The objective was to introduce a more proactive, data-centric product quality methodology, leading to a more agile and efficient quality system and sustainable quality improvements. CEVS' Supply Chain Quality organization coached and mentored F-35 suppliers in tools and methods like escape data analysis, First Article Inspection, Manufacturing Process Review and Process Failure Mode Effects Analysis (PFMEA). Particular focus was placed on driving 'read-across' activities to ensure that quality escape corrective and detection actions were applied to similar parts and processes. Results of ZDP™ implementation were dramatic. In the two and a half years since introduction of ZDP™, the average number of supplier escapes per month has improved by 65% as compared to the two years prior to ZDP™.



Root Cause Corrective Action process (RCCA) allows CEVS to reactively manage complexity and build a stronger process going forward. When some helmets experienced cable harness failures at the Collins factory and in the field, the team conducted an RCCA to determine and resolve the situation. The combined Collins, Elbit, Lockheed Martin, and supplier teams used a 9S approach, pulling in cable harness design and manufacturing expertise and best practices from all parties. The team discovered that the supplier's manufacturing process under some conditions could cause continuity failures during system builds. The RCCA eliminated an intermittent failure mode that impacted ~20% of HMDS over a three-month period. The decrease in rejections led directly to an increased Quality score. It also instilled confidence in our customer in CEVS' ability to manage complexity internally and with suppliers.

Continuous Improvement Projects (CIPs) are used to manage and reduce complexity through proactively addressing concerns within the factory. When visors unexpectedly failed testing at Collins, the team adopted a two-pronged approach, looking for any variation or changes within the Collins build and test processes and within the supplier's build and inspection processes. The extended team worked together on the RCCA. They conducted a series of Designs of Experiment (DOE) and production test runs, ultimately identifying a particular injection molding press as the source of variation. They documented the optimal setting values and established tighter production parameters for that operation. The results were a return to expected pass rates at final visor inspection and a more repeatable and reliable process with reduced system complexity.

#### ORGANIZATIONAL BEST PRACTICES AND TEAM LEADERSHIP (Value: 35 pts)

Please respond to the following prompts

➤ 15 pts: Describe the innovative tools and systems used by your team

The innovative tools and systems that CEVS' F-35 HMDS teams use include the cross-functional BEST team, coordinated communication systems, a joint quality team, RCCAs, IPTs, the CIP process, and the 9S problem solving methodology. These tools and systems drove improvement in our quality and delivery scorecard from our customer Lockheed Martin.

The BEST team concept within Collins is innovative. The acronym itself – Better Every Single Time – drives an atmosphere of continuous improvement and focus. Similar to Elbit's IPTs, the team is cross-functional, including program management (product line, service, and new product introduction), production management and planning, quality (production, system, supply chain), procurement and

subcontracts, and engineering (industrial and system). Representatives meet weekly to review program status, predictive metrics, and projects. The teams together use metrics to determine where to focus time and resources.

CEVS, Collins and Elbit have set up systems to coordinate with each other and with our customer Lockheed Martin. Internal to CEVS, examples of these systems include Board of Directors meetings, regular cadences, quality reviews and summits. With Lockheed Martin, CEVS has regular cadences for product lines of balance (LOB), Business Operations Reviews, Failure Review Boards, and Quality action reviews. The extended teams' extensive coordination and strong relationships allow open, honest, and efficient flow of information among parties.

Collins and Elbit have evolved into a true CEVS Quality team, despite being competitors outside the joint venture. The quality team holds monthly CEVS Quality meetings to share best practices and discuss common issues as well as monthly joint Voice of the Customer meetings with Lockheed Martin. The CEVS Quality team works together on Supplier Corrective Action Responses to Lockheed Martin. The strong trust and cohesion have helped CEVS achieve a green Quality score 22 times in 2020 and 2021 after being red for the entirety of the previous three years.

Collins and Elbit conduct full RCCA analyses on all returned units and works with Lockheed Martin in a biweekly triage meeting to ensure effective resolution of issues. These results are shared with the F-35 BEST/IPT Teams to build familiarity with various problem-solving techniques and to highlight different issues which can occur in our products. This also allows us to efficiently conduct read-across exercises to proactively address issues identified both within and outside the F-35 HMDS program.

The BEST/IPT teams and factories regularly align and prioritize opportunities for improvement. Continuous Improvement Projects (CIPs) are initiated to address risk to product quality, delivery, or general lean continuous improvement. Each CIP is championed by a qualified project manager who executes one of several formal problem solving methodology to effectively mitigate root cause, close the gap and ensure effectiveness of success.

The 9S methodology provides an approved aerospace industry process for root cause analysis and problem solving. The methodology is designed to protect the customer, identify root cause through best practices (such as 5Why, Ishikawa, PFMEA, and DOE), define and implement permanent corrective actions, verify effectiveness, and standardize the improvements across the business. An example is improvements in helmet shell build work instruction, which eliminated possible confusion for operators and increased yield. The 9S methodology has helped make improvements to the process of calibrating F-35 test equipment, as well as reduced turnbacks in the manufacturing process which helps improve quality and delivery metrics.

➤ **10 pts: Define how you developed, led and managed people**

At CEVS, a key focus is ensuring that everyone feels valued for their contribution and has the chance to be heard throughout the organization. Some examples include the Collins Management System, the source inspection process, the tier management process, the BEST team format, and sustainment processes.

The Collins Management System (CMS) is a robust system to effectively run the business through clear decision making and accountability. CMS consists of a standard set of tools specifically developed for Collins Value Stream IPTs. These resources and tools assist in running the business and developing team members. The CMS enables Collins to organically grow and retain our Value Stream Leaders, creating a stronger leadership cadre for the future.

Collins' source inspection team is a great example of personnel development within the F-35 team. Source inspectors are the eyes of our customer, Lockheed Martin. They act on Lockheed Martin's behalf to inspect every F-35 shipment, from nape pads to HDUs. Source inspection results in hundreds of delivery documents and thousands of individual units passing through the source process. Until recently, that source inspection included a specific sign-off from Lockheed Martin. Early in 2019, the team identified that source inspection was a source of variation and excess time in the broader process. Collins hired dedicated source inspectors, created cross training to ensure each inspector had a solid baseline knowledge level, created a dedicated space for inspections, and conducted several Lean quality events to improve the processes. Collins communicated to Lockheed Martin our willingness to improve and demonstrated our improvements by increasing our customer acceptance rate from 99.30% to 99.95%. This effort resulted in Lockheed Martin granting Collins full delegation for source. This is a significant achievement for source inspectors and provides customer recognition for their skill set and expertise.

The F-35 tier process allows personnel to develop and take ownership of their product and actions. The structure starts on the factory floor with the cell lead meeting with cell members on productivity, improvement suggestions, defects, safety, and other concerns in Tier 1 meetings. The cell leader then provides the pertinent information to the production manager in the Tier 2 meetings. The Tier meetings go up to the Site level, giving each team member the chance to convey concerns and receive feedback. Site level data is further elevated and rolled up across the enterprise.

The BEST structure shares the program vision and strategy with the cross-functional team members. This allows the team to act in alignment with goals and objectives. The exposure to different fields of expertise and aspects of the program develops team members and leaders. Regular cadences give the opportunity for team members to present to a wide audience, showcasing their knowledge and accomplishments, as well as learning from executive comments and suggestions. Team members are exposed to problem-solving, risk-management, and analysis, enhancing their knowledge and skills.

The sustainment team conducts regular service material tracking meetings. The tracking is tailored to a the CEVS/Lockheed Martin "stand operating procedure" (SOP). In 2019 the combined CEVS and Lockheed Martin teams developed a standard way of conducting business. This tailored reporting enables open communication for all involved and helps resolve issues in a timely manner.

➤ *10 pts: How did you leverage skills and technologies of your suppliers?*

F-35 subcontract suppliers are uniquely qualified to build components and subsystems for the highly technical HMDS. The Collins and Elbit Subcontracts teams leverage their skills and technologies to optimize material supply and efficiently address any issues as they arose. An example is a key F-35 optical assembly supplier who implemented cutting edge methodologies and manufacturing processes into their F-35 product flow line. Their latest manufacturing control methods, optical processing expertise, technology investments, and strong cross-training program have resulted in 18 months of defect-free products. Other examples include F-35 suppliers contributing extensive knowledge in their specialized manufacturing methods and materials. They coordinated closely with CEVS to optimize their components to achieve highest yields and optimum performance during system testing. F-35 suppliers were consulted in the definition of cosmetic inspection criteria that are reasonable for the relevant manufacturing processes and materials.

Joint CEVS/supplier improvement teams worked to proactively optimize manufacturing process parameters using statistical methods and Design of Experiments. When non-conformances did occur, teams of experts from CEVS, supplier, and sub-tier suppliers pursued rigorous RCCA and CIP efforts to understand and eliminate the causes and apply lessons-learned via 'read-across' activities.

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In addition to ‘dialing in’ product configurations, the supply base actively managed sub-tier supply chain risk in the form of buffer stock and sub-tier supplier optimization. Suppliers willingly invested in inventory, workforce cross-training, work transfer and equipment to best support the F-35 program. Suppliers supported the F-35 program by pursuing creative solutions in identifying alternate sources for materials in short supply. Networking among the supply chain resulted in the identification of surplus inventory at one company that could be transferred to another experiencing a shortage.

Close collaboration with the global supply base allowed the F-35 team to closely monitor and mitigate supply chain risks resulting from pandemic effects, geopolitical situations, electronics market perturbations and material obsolescence. Constant communication allowed CEVS to maintain regional situational awareness and take preventative actions across the broader market.