Decision Support System to Aid Decision-Makers to Support JSF Production

A2446 — Simulation-based Decision Support System for JSF Production

Objective

Lockheed Martin Aeronautics Company (LMAC) is in the process of ramping up production on the F-35 Joint Strike Fighter (JSF). Much analysis and planning has been performed in support of this ramp-up of production, including the development of a detailed Enterprise Production Model (EPM). The model enables LMAC to analyze the system and identify potential production issues that will have a negative impact on the baseline production plan. Although LMAC has this capability, it is extremely time-consuming to perform the significant number of simulation runs to find the issues and even more time-consuming to perform the experimentation required to develop a model-based contingency plan. The objective of this project is to implement a simulation-based Decision Support System (SBDSS) to aid the analyst and other decision-makers by semi-automating the experimentation performed with the simulation model. An optimization routine, or integrated search procedure, will be incorporated into the SBDSS that perturbs decision variables within the underlying simulation model in order to identify the best configuration and execution of the production system. Furthermore, the SBDSS will include stochastic variation when optimizing, thus accounting for risk levels when proposing an optimal or near optimal solution.

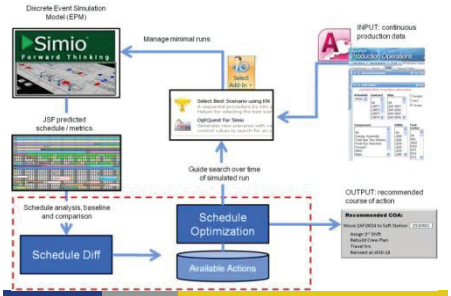
Payoff

The long-term benefit of a SBDSS will be manifested in advanced planning techniques while a short-term benefit will be seen in reductions in the number and length of production delays. Two types of cost savings are expected from this project: (1) decreased downtime (cost avoidance) and (2) decreased re-planning (cost savings).

SBDSS implementation is expected to reduce lost days by approximately 50%. The cost avoidance due to workstation delays being decreased is projected to be $3.67M/year. Cost savings due to expedited re-scheduling reviewing is projected to be $173K/year. This results in a five-year net present value ROI of 18.6:1.

Implementation

The project's transition and implementation are expected to occur in phases as follows: (1) nine months after project commencement, the prototype SBDSS, integrated with the existing EPM will be demonstrated to LMAC and project stakeholders. SBDSS-drive decision variable manipulation will be demonstrated and test scenarios identified in Phase I will be executed to illustrate the connectivity between the SBDSS and the EPM. (2) 18 months after project commencement, Corrected Operative Schedule SBDSS demonstration and End User Transition (EUT) will occur. The SBDSS, enhanced with the capability to improve the operative schedule will be demonstrated to LMAC and project stakeholders. (3) 24 months after project commencement, a full-scale SBDSS demonstration will occur. The fully developed SBDSS will now provide a dashboard for insight into baseline schedule risk and alterations made to the operative schedule. All developed software tools and documentation will be delivered to LMAC who will be responsible for conducting full- scale implementation of the technology. Full implementation of technology is expected at the conclusion of the project – March 2013.



PERIOD OF PERFORMANCE:
February 2011 to February 2013

PLATFORM:
Joint Strike Fighter

AFFORDABILITY FOCUS AREA:

CENTER OF EXCELLENCE:
iMAST

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TOTAL MANTECH INVESTMENT:
$500,000