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MODELING FOR DYNAMIC WORK MOVEMENT

Jonathan Fulton[1], and Bryson White[1]

[1]The Boeing Company, North Charleston, SC, USA

ABSTRACT

Aerospace production systems are inherently complex, often involving thousands of tasks for a single aircraft. This complexity poses significant challenges in both the design and execution of the production system. Traditional analyses such as Excel and CCPM have limitations in handling this complexity. Dynamic work movement provides exceptional flexibility and adaptability, allowing tasks not strictly bound by their positional location to transition seamlessly to subsequent positions. This ensures continuous progress and minimizes delays. This project explores the development and implementation of a flexible Discrete Event Simulation (DES) model to address these challenges, providing scalable, flexible, and streamlined outputs.

1 INTRODUCTION

Aerospace production systems are inherently complex, often involving thousands of tasks for a single aircraft. This complexity poses significant challenges in both the design and execution of the production system. Production systems must be flexible to accommodate various model mixes and customer configurations. They must be level-loaded to prevent spikes in resource requirements. Dynamic work movement is a crucial method in this context, providing exceptional flexibility and adaptability. It allows tasks not strictly bound by their positional location to transition seamlessly to subsequent positions, ensuring continuous progress and minimizing delays.

2 BACKGROUND

Traditional analyses such as Excel and CCPM have limitations in handling the complexity of aerospace production systems. Initial Discrete Event Simulation (DES) attempts showed that 100% job completion in position was not feasible, leading to the development of more flexible solutions. Partnering with SIMIO, a final DES model was created with flexible tables on entities, providing scalable, flexible, and streamlined outputs.

3 TASK SEQUENCE DISCRETE EVENT SIMULATION

A task sequence is a structured network of interrelated statements of work, each executed in a specific order. This ensures that all tasks are interrelated and dependent on one another, guaranteeing correct and efficient process completion. By utilizing the default functionality within the software, the end user can capture complex precedence networks with resource requirements. However, this approach becomes challenging when the network spans multiple positions. Dynamic work movement and overflow analysis capabilities are difficult to manage with this traditional method.

4 DYNAMIC WORK MOVEMENT

Dynamic work movement is a transformative approach that allows tasks not fully completed at their designated position to transition seamlessly to subsequent positions within the workflow. This method ensures that delays are minimized and the entire process remains fluid and dynamic. It is particularly useful

for tasks not entirely bound by their positional location, providing remarkable flexibility and adaptability in the workflow process. By facilitating the movement of jobs that are behind schedule to follow-on positions, dynamic work movement ensures that the production process remains on schedule, thereby enhancing overall efficiency and productivity. The implementation of dynamic work movement significantly improves the flexibility and adaptability of the production system. It provides a scalable solution that can be easily replicated across different production lines and models. The streamlined process ensures continuous progress and minimizes delays, ultimately leading to a more efficient and effective production system. This approach also enhances the ability to handle variability and disruptions, ensuring that the production system can adapt to changing conditions and requirements.

5 VALUE

This methodology addresses disruptions and inefficiencies related to out-of-position work, thereby enhancing the overall accuracy of productive system models. It helps identify gaps in workforce skills, bottlenecks, prioritization, resource allocation, and production flow when analyzing a system holistically. Modeling dynamic work movement significantly improves the flexibility and adaptability of the production system, ensuring continuous progress and minimizing delays. Ultimately, this leads to a more efficient and streamlined approach to analyzing the production system, providing better insights on how to operate the business.