

Case Study: Transforming UAV Flight Operations Scheduling with Balance Scheduler™



In the dynamic world of military operations, efficient scheduling is essential for maintaining readiness and optimizing resource utilization. This case study contrasts the legacy scheduling process of a 24/7/365 UAV flying unit with the innovative potential offered by Balance Scheduler™, a cutting-edge, AI-optimized and automated scheduling solution developed by Duality Systems.



THE PROBLEM

Prior to the integration of the Balance Scheduler™, the Air Force unit faced significant operational inefficiencies and challenges in managing UAV scheduling, which hindered overall mission effectiveness and resource utilization.

1. High Time Consumption: The scheduling process consumed about 160 staff-hours per week across 3 pilots and one contractor due to its manual, labor-intensive nature.
2. Operational Inflexibility: Manual scheduling lacked the agility to quickly adapt to operational changes, affecting mission readiness.
3. Resource Misutilization: Inefficient scheduling led to poor allocation of resources, increasing operational strain and costs.
4. Prone to Human Error: Heavy reliance on manual processes increased the likelihood of errors, impacting mission-critical operations.
5. Limited Scalability and Reporting: The system was not scalable for expanding operations and lacked effective visualization and reporting tools for strategic decision-making.



OBJECTIVES

The project aimed to transform UAV operations scheduling at the Air Force unit by adapting Duality Systems' commercially-available AI-optimized Balance Scheduler™, enhancing efficiency and operational readiness.

Key Goals:

1. Reduce scheduling-related man-hours from 180 hours per week to below a minimum of 30 hours per week; optimally less than 10 hours per week.
2. Reduce scheduling errors to less than 5 per month
3. Integrate/ingest info from ARMS for creation of Letter of X
4. Reduce Flight Authorization (FA) step process timeline by minimum 50%, optimally 75%, with additional capability of export to FA

Case Study, Continued



RESULTS: KEY GOALS MET OR EXCEEDED

Over the course of a 12-month collaborative development project, the Duality Systems team met or exceeded all original goals for the project:

1. **Dramatic Efficiency Improvement:** The Balance Scheduler™ slashed the time required to build schedules from a staggering 160 hours to approximately 15 minutes, with moderate scheduler involvement needed weekly for mission setups and adjustments based on aircrew requirements.
2. **Error Reduction:** The algorithmic solution reduced errors to nearly 0. Any mistakes that could occur would come from a scheduler changing values after the original schedule was produced.
3. **Data Integration:** The system now supports a bulk upload feature for ARMS information, enhancing bi-directional updates for the Letter of X. Further automation could be achieved with additional development and ATO approval.
4. **Process Realignment:** Initially targeted sub-processes within the scheduling algorithms have led to an overall reduction in FA errors, primarily through minimizing human interaction.



ADDITIONAL OUTCOMES

The team achieved additional successes over the course of the project, significantly increasing the ROI for Balance Scheduler™:

1. **Training and Currency Integration:** Integrated a proof of concept within Balance Scheduler™ that automatically prioritizes aircrew training and currency to maintain flight skills.
2. **Automated Paired Scheduling:** Implemented a feature for simultaneous scheduling of instructors and trainees, with future plans to add syllabus-based sequential scheduling.
3. **Mission Template Creation:** Enhanced efficiency by enabling the creation of templates for recurring mission types and sets.
4. **Secure Deployment:** Successfully deployed Balance Scheduler™ on AWS Gov Cloud, achieving DISA IL-5 security level, and prepared for ATO submission on DAF systems.



CONCLUSION

The successful development of Balance Scheduler™ for Air Force UAV operations exemplifies a significant leap in operational efficiency and resource management. By reducing scheduling times from 160 man-hours to just 15 minutes, minimizing errors, and enhancing system adaptability, this AI-optimized solution has set a new standard in military scheduling. Looking forward, Duality Systems remains committed to evolving this technology, ensuring it continues to meet the dynamic needs of military operations and further simplifies complex scheduling challenges. The Balance Scheduler™ not only streamlines processes but also empowers decision-makers with robust, secure tools, making it an indispensable asset for future defense applications.

