

Applying advanced modeling and simulation technologies to MRO resource planning and scheduling

The depot maintenance environment, with its focus on large end item maintenance and remanufacturing, poses subtle and unique challenges to MRO planners and schedulers who have tended to view MRO through a classic production manufacturing lens. The emphasis and careful balance that must be struck between remanufacturing *and* sustainment in aircraft MRO environments requires new methods, techniques, and software support tools that provide life-cycle coverage for the multi-echelon planning and scheduling that characterizes large end-item MRO. KBSI, leveraging its extensive experience in the depot environment, has developed cutting edge methods and simulation technologies to meet the unique challenges of planning and scheduling in a number of U.S. Army and Air Force MRO environments.

Simulation for optimized scheduling

The Air Force's Oklahoma City Logistics Center (OC-ALC), seeking ways to streamline and speed their MRO processes at the sprawling Tinker Air Force Base, tasked KBSI, in the On-Demand Simulation Scheduling (ODSS), to develop advanced decision support technologies that aid in the daily management of workflow and personnel. WorkSim, a resource-constrained daily work-dispatching tool developed for ODSS, generates optimized daily dispatching schedules from process descriptions, helping users maintain status information about repair items, resources, maintenance events, and scheduled workloads. WorkSim also provides sophisticated experiment management and analysis support, allowing users to simulate schedules for user-defined conditions and metrics such as flow days for each aircraft, average flow days across all aircraft, total aircraft repaired in a given duration, etc. WorkSim schedules can be generated in either Microsoft Excel or Project, and schedules account for task precedence, resource requirements, and user-defined priority dates.

WorkSim was also applied at the Ogden Air Logistics Center (OO-ALC) who were looking for ways to help the workload transition team gauge the facility, manpower, and flow-time implications of expanding the current programmed depot maintenance (PDM) workload. In particular, OO-ALC was interested in determining the impacts of adding the A-10 maintenance workload to OO-ALC's current F-16 and C-130 workload. KBSI developed and applied a workload simulator—the Workload Transition Testbed (WTT) analysis tool—in successfully assessing the facility and manpower resources needed to support the A-10 workload and the projected flow-time impacts for each workload type. The WTT tool plugged into and utilized OO-ALC's existing planning data as the foundation for experiment definition and configuration, making it particularly easy for management and facility engineers to rapidly and reliably experiment with a wide range of resource, aircraft schedule, and repair requirements options—the type of automated support for analysis and decision making that was critically absent.

Simulation for MRO streamlining

U.S. Army Aviation, faced with maintaining the combat readiness of helicopters that are seeing more frequent, more widespread, and more wearing use, is investigating ways to streamline maintenance practices and logistics support. The Army's Utility Helicopter (UH) Program Management Office's helicopter RESET program, in keeping with the increased demands on aircraft, is mandating much deeper inspection, cleaning, and repair of returning combat aircraft, in addition to the standard Phase inspections. In short, the Army needs to do more, do it better, and do it more quickly.

KBSI, in a project under the Rotary Wing Aircraft Sustainment Program (RWASP) initiative, helped develop designs and technology for streamlining UH-60 Black Hawk disassembly, inspection, and reassembly at the Corpus Christi Army Depot (CCAD). KBSI applied its expertise in process modeling and analysis to the complete overhaul of the UH-60 aircraft and the development of streamlined MRO processes. Through a partnership with F Co. 1/160th SOAR (A), KBSI transitioned these findings to the RESET activities, developing a streamlined set of standard processes and a standard methodology for Phase/RESET (STIR) maintenance.

To augment the application of these standardized streamlined RESET processes, KBSI leveraged the WorkSim technology, applying WorkSim's advanced scheduling experiment and analysis support in seeking opportunities for dynamic planning, asset tracking, asset visibility, kit management, improved supply chain responsiveness, requisition processing, optimal resource dispatching, and work status tracking for UH-60 MRO. KBSI's RESET work with UH-60 Black Hawk maintenance have realized some astounding results. The streamlined processes have dramatically accelerated crew member training and created the basis for common metrics across teams, delivering predictable, repeatable, and visible results. Optimized scheduling allows planners to accurately utilize manpower, and turn around time (TAT) has been reduced by 20 to 30%, radically reducing the overall costs. Combat readiness? Each seven days of reduced TAT results in approximately ten additional aircraft available for the field.

