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Simulation as a Tool for Maintenance Manpower Planning:

A Study of the Embry-Riddle Fleet

Recommended track: Maintenance Planning Techniques

Massoud Bazargan and Robert N. McGrath
Department of Business Administration
Embry-Riddle Aeronautical University
600 S. Clyde Morris Blvd.
Daytona Beach, Florida 32114-3900
(386) 226-6703, fax 6696, mcgrathr@cts.db.erau.edu

Logisticians gain by the diversity of traditions that comprise the logistics field, but not without effort. While much of aerospace and defense logistics is grounded in various engineering disciplines, civilian logistics is grounded in operations management, operations research, and marketing. At least, these are the major academic fields that claim logistics as a responsibility. Such a broad spectrum of perspectives injects an unavoidable amount of fragmentation of not only thought, but of technique as well. This fragmentation will not dissolve of itself as the world globalizes and industrial segments converge. It will take sustained effort to develop interfaces.

For example, in the field of operations research, computer simulation has grown in popularity as a tool for advancing all levels of practise and theory. A credible body of literature exists and whole professional societies, and divisions within others, have appeared to advance the art. “Simulation” refers to a family of computer-based techniques whereby the basic features of a system may be analyzed and simulated.

Simulation modeling has become a very important tool for complex system analysis and decision-making. It has also been argued that simulation of maintenance functions is superior in approach than more traditional modes of analytical modeling and analysis. This is because of the complexities of maintenance operations, and the intrinsic uncertainties about parameters that describe arrivals, task sequences and job content, and the availability and deployment of resources.

The proposed paper will present a study of maintenance operations at the Daytona Beach, Florida campus of Embry–Riddle Aeronautical University. Embry-Riddle is a well-known for its flight and maintenance training programs. There, overall availability at the operational level has been a chronic problem, and management was interested in exploring the overall efficacy of maintenance. One reason was due to a projected increase in the size of the fleet. By association, areas in need of study included: (a) the efficiency of the extant maintenance labor force (in particular, cycle times seemed too high); (b) how much additional labor would be needed to handle the increased number of aircraft; and (c) how adversely the current waiting and cycle times would be affected by the increased flow.

To study the situation, discrete-event simulation modeling was adopted to examine performance measures such as aircraft cycle times and mechanic labor utilization. As a result, a new working schedule for the allocation of mechanics to various shifts was proposed and accepted by management, resulting in reduced aircraft downtime and improved labor utilization. Also examined was the impact of adding new aircraft to the fleet. Results of modeling indicated that resources could actually be reduced if scheduling were simply improved.