Aging Aircraft: How Will They Affect Maintenance Workloads?

Since the end of the Cold War, lower defense budgets and higher costs for military aircraft have compelled the Air Force to keep its aircraft fleets in service for unprecedented lengths of time. To ensure safety and to preserve force size, the Air Force will need to invest more funds and personnel in maintenance. Until now, there has been no mechanism to predict how much additional maintenance aging aircraft will require.

As part of an ongoing study of the effects of aging aircraft on Air Force budgets and force planning, RAND Project AIR FORCE developed a mathematical model to calculate how maintenance requirements increase over an aircraft’s life. Preliminary findings include the following:

- As expected, maintenance requirements rise as aircraft grow older. Aircraft undergo various types of maintenance, which may be performed on the flightline, at the base, or in the depot. The number of man-hours necessary to perform each category of maintenance increases over the life of the aircraft. The only exception is periodic inspection, which is performed at regular intervals and does not change. This finding suggests that maintenance requirements will continue to rise as long as older fleets are kept in service.

- Complex aircraft require more late-life maintenance than simpler aircraft. Larger aircraft have more complex machinery. Therefore they take longer to inspect and service. A cargo plane will not only require more maintenance than a fighter aircraft at any given age, but the amount of service it needs will rise at a faster rate over time.

This research suggests that the Air Force should prepare itself for significant changes in maintenance requirements. In recent years, corrosion and wiring deterioration have unexpectedly increased the demand for inspections and maintenance of older aircraft. Further concerns may yet emerge. The Air Force should hedge against potential upturns in maintenance workloads. A possible strategy is to set a “trigger point” for maintenance workloads at which the Air Force would begin to purchase new aircraft rather than bear the expense of additional maintenance.

PAF is currently using this model is to predict the cost and manpower implications of rising maintenance needs among specific fleets. Air Force decisionmakers will be able to use this data to adjust future budgets, to acquire additional manpower and maintenance capacity, and to set trigger points for replacing older fleets.

This research brief summarizes the findings of Project AIR FORCE work that is fully described in Aging Aircraft: USAF Workload and Material Consumption Life Cycle Patterns, Raymond A. Pyles, RAND Corporation, MR-1641-AF, 2003, 193 pp., ISBN 0-8330-3349-2.