

Lesson 25. Advanced ProModel Review

Problem 1. A Marine Corps maintenance facility services the Lycoming T53-L-13 turboshaft engines for a squadron of 10 single engine UH-1E Huey helicopters. Due to the budget sequestration, you have been commissioned to determine (1) the minimum number of enlisted personnel and (2) the number of spare engines required to maintain the helicopter's engines so that 7 or more of them are available for operational duty at least 80% of the time. You are given the following information.

- Huey engines are taken out of service either because they fail while in use, or because they have been in use for the maximum flight time before overhaul. In either case the ensuing procedure is the same.
- Suppose that engine reliability records indicate that the overall distribution of times to failure for Huey engines under normal conditions is approximately normal distributed with a mean of 350 hours and a standard deviation of 95 hours. The maximum flight time before the engine must be overhauled is 600 hours.
- The failed engine is removed from the helicopter and replaced with a spare engine, if available. Enlisted personnel attached to the squadron do the removal and refitting. If no spare engine is available then the helicopter is grounded until a serviced engine becomes available. Assume that engine removal requires two enlisted marines working 8 ± 2 hours and that engine refitting requires two enlisted marines working 12 ± 2 hours. Refitting engines always takes priority over removing them.
- The removed engine is always sent to a remote facility for repair and overhaul by a team of specialists. Suppose that shipping time between the squadron and the remote repair facility is 10 ± 1 hours each way.
- Engine maintenance specialists at the remote site work in teams of 2. Assume that repair time for a team working on one engine is uniformly distributed between 1 and 9 days.

Some new and useful ProModel modeling concepts to look for

- Splitting an entity into different entities using routing rules
- **Priorities** for resources ensure that certain processing tasks occur before others:

USE <resource>, <priority> FOR <time>

- <priority> is a number from 0 to 999; higher value = higher priority
- The **JOIN** statement requests a specified quantity of a designated entity type to the current entity

JOIN <number> <entity>

- The current entity waits until enough entities to fill its request have been routed to the current location with a JOIN rule
- The joined entities can be output as a different entity using routing rules