

Massachusetts Institute of Technology
DEPARTMENT OF MECHANICAL ENGINEERING

2.611 SHIP POWER and PROPULSION

Frigate Propulsion Plant Design Project, Fall 2006

General

The main purpose of the project is to provide students with experience in the selection and preliminary design of a propulsion power plant. The projects are to be conducted by teams of two students. The teams should conduct an availability analysis of one of the plant designs selected in Project 2. The Analysis should be thorough enough to provide the student with a solid understanding of the process of determining overall system availability, but simple enough that good engineering approximations should suffice for general plant information.

Final Phase

In the final phase of the project, the main components of the power and propulsion system should be evaluated.

Your final report should contain the following:

- a. A summary presenting reliability/availability data for your selected (single) design (This should be the best of your two designs selected in Project 2).
- b. A description of your final design and the approach used to select the best of the contending systems. A paragraph discussing key design features that led to one plant over another will suffice.
- c. Simple arrangement diagrams of your proposed engine spaces (include support equipment as discussed below). Consider all aspects for arrangements, including survivability.
- d. Summaries of your final design calculations.

In Project two, cost, size, and combination permutations of the main components were analyzed. In this project, reliability and availability of the main components (with ancillary equipment) are analyzed. (Professor Carmichael's Reliability and Availability equations should be used to perform this analysis).

Example systems that should be included in the reliability/availability analysis are:

- All engines (power and/or propulsion)
- F/O system
- L/O system
- Propulsion motors (if necessary)
- Reduction gear
- Propellor/Shafting
- Sea water system

Ensure that proper equations are applied for systems that are either in parallel or series, and remember that availability and reliability will increase with each redundant piece of equipment (but, so will price). Availability of your selected propulsion systems should be computed based on the operation of the complete system, including ship service power. The reliability should be computed for a cruise period of 30 days (720 hours).