

**EGR 107**  
**INTRODUCTION TO ENGINEERING DESIGN**

**TEST PLANS**

A plan is a detailed scheme for the accomplishment of a goal. It is laid out in advance, specifying what is to be done and how the goal will be accomplished. In addition, an engineering test plan indicates why each task is to be undertaken and it attempts to anticipate the use of resources - time, money, equipment, facilities, and people.

Please note that a list is not a plan. A simple tabulation of what is to be accomplished, without explicit elaboration of why the tests are being performed, how the tests are to be conducted, and a careful assessment of the resources needed, can not be considered to be an engineering test plan. Also, please note the following:

1. Tests require (1) a model or prototype, (2) a testing facility, (3) an arrangement of instruments suitable for measuring what occurs during the test, and (4) a test plan.
2. Some tests do not require construction of the entire prototype. Only those portions important to the evaluation of particular assumptions or claims are needed for many tests.
3. As a minimum, development of an engineering test plan should consider the following types of tests:
  - a. **Performance tests...** These tests show whether a design does what it is supposed to do - they prove the validity of the design... Pay particular attention to the design goal as defined in the project proposal and modified in subsequent documents.
  - b. **Quality assurance tests** (materials - subassemblies)
    - (1) Validate that the design will perform with the least desirable (weakest) material or sub-assembly or...
    - (2) Insure that only premium material or sub-assemblies are used.
  - c. **Life, endurance, and safety tests...** Investigate behavior over time or repeated loadings. Keep in mind that two combined loads may have a much more serious effect on the part than the arithmetic sum of the separate effects of the two loads (synergistic behavior). For example, consider a combination of pressure, temperature, and vibration...
  - d. **Human acceptance tests...** Does the design meet the physical, mental, and emotional requirements of the user? Consider anthropometrics, audio vs visual, colors, etc...
  - e. **Environmental tests...**
    - (1) How is the design influenced by its environment... (dust, temperature, pressure, salt air, etc.) Again note the synergistic phenomena ...
    - (2) How does the design influence its environment.. (Pollution, noise, vibration, etc.)
4. Keep in mind the explicit requirement of the design specifications and the implicit commitments of the feasibility and merit criteria presented in the preliminary design phase. Teams should identify their project goals, feasibility criteria, and merit criteria and they should make sure that their test plan addresses each of these elements. Ultimately, the test results presented at the critical design review should support all the associated requirements, promises, claims, and assumptions that guided the design process.

5. Readers of a test plan should have a clear understanding of the pass/fail criteria for each test. In other words, the plan must provide specific measures/standards for success.

The format shown below may not lend itself to all tests appropriate to a specific engineering design project; however, using this outline both for developing a test plan and reporting the results will serve as a valuable point of departure...

Type of Test: (performance, environmental, etc.)

Equipment Needed:

Location(s):

Date(s)/total time:

Personnel:

Test Objective:

Criteria for success:

Procedure:

This same format may be augmented with a "Results" paragraph after tests have been completed and the findings are being reported.