

Fishing Boat Outboard Motor

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Type: Design Problem
Student time: Semester
Location: Laboratory and take home

Summary

This design problem may be given to first-year engineering students after the fourth week of class. It introduces the student to reverse engineering, that is, how to evaluate components of a present design to determine how the overall system design may be improved. The project involves obtaining an outboard motor and dismantling it component by component. During the dismantling process, each component is sketched and its material and fabrication means are documented and costs are estimated. It is desirable to take photos during the dismantling process. The student is asked to conceive of better or less expensive ways of producing the part.

The student is expected to work in a group of four to six. This problem may be used as a starting point for further discussion of reverse engineering, creative design, economical tradeoffs, etc.

ABET Descriptors:

Engr Sci Content: First Year Engineering
Type: System
Elements: Evaluation
Features: Design methodology, creativity
Constraints: Start with commercially available outboard motor
Effort: Team

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First, after forming your group, you must select a commercially available outboard motor of about 10 hp or less that you would use on a small fishing boat. (More than likely a member of the group will donate his motor.) Become familiar with the motor by studying the owner's manual and visiting your local marine store.

Second, organize your group by electing a project leader. Assign each member a significant role to perform. Submit your project plan to your instructor within two weeks after assignment. The plan should indicate task, person responsible and scheduled completion date.

Dismantle the motor component by component. Photograph each component as you disassemble it. For each component, do the following: intelligently guess the material; estimate the cost of the component (material and labor); and describe how you would improve the component.

Submit a **group** final report two weeks before the end of the semester. The group report should contain the following: an introduction that includes a summary of the project, group organization and project plan; the body which is written by each team member and shows photographs of each component with a short description of its function and how it may be improved; and conclusions which show the overall cost of the motor.

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Engineering Notes:

Objectives/Comments

The objective of this project is introduce the student to working as a part of a group and to the process of reverse engineering. It is important that within two weeks after the project is assigned the group is organized and a project plan is presented to the instructor. It is desirable to have at least project reviews so that the students do not wait until the last week. If the instructor desires, he may substitute another product for the motor.

Expected Outcomes:

The success of the project will depend greatly on the project leader and how well the group works as a team. The introduction and conclusions parts of the report will be short. The body of the report where each group member contributes will give the instructor an idea of how well each member is performing.

Discussion/Follow-on:

The most discussion will result from student's ideas of how a particular component may be improved. Lively discussions may also result from guestimates of materials, fabrication and costs of individual components.

Follow-on courses such as thermodynamics, fluid mechanics and machine design and manufacturing will give the student a chance to revisit this project from other perspectives.