FY-38 August 05, 1996
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Design of a Portable Waterjet Oral Hygiene Appliance

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Type: Design Problem
Student Time: Six weeks
Location: Classroom/Home

Summary

Most oral hygiene appliances that use the water jet system are typically not very portable. These machines consist of a water reservoir and an electric motor that drives a pump which delivers a jet of water of adjustable speed via a flexible tube Although they are very convenient and simple to operate at home, they are bulky and generally unsuitable for use during travel . The purpose of this design project is thus to create a conceptual design of a light and truly portable oral hygiene appliance that uses a jet of water to cleanse teeth and gums. It is recommended that portability of the appliance be achieved by removing the water reservoir and replacing it with a pipe that would connect to the water faucet. Also, the user should have the flexibility of being able to connect the appliance to 220 Volts as well as 110 Volts electrical outlets.

ABET Descriptors

Engr Sci Content:	First Year Engineering
Type:	System, component
Elements:	Conceptualization, synthesis
Features:	Creativity, open-ended, design methodology
Constraints:	Time, resources
Effort:	Team

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Description and Requirements:

Most oral hygiene appliances that use the water jet system are typically not very portable. These machines consist of a water reservoir and an electric motor that drives a pump which delivers a jet of water of adjustable speed via a flexible tube Although they are very convenient and simple to operate at home, they are bulky and generally unsuitable for use during travel .

You are to create a conceptual design of a light and truly portable oral hygiene appliance that uses a jet of water to cleanse teeth and gums. You have to achieve portability of the appliance by removing the water reservoir and replacing it with a pipe that connects to the water faucet. Also, you must design the appliance such that the user has the flexibility of being able to connect it to 220 Volts as well as 110 Volts electrical outlets.

The class will be divided into working teams of 3-4 students per team. A design review meeting will take place with the instructor after three weeks while the final written report will be due in six weeks at the time of an oral presentation. The report should document the specifications of the design, the functional roles and diagrams/sketches of each component used, and the final configuration with any alternative designs that may be feasible. The inclusion of a cost analysis section based on information obtained from vendors would also be appropriate. Each team member will participate in the oral presentation by having individual presentation responsibilities as determined by the team . The project will be subjected to an evaluation by the instructor as well as to a review by peers.

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Engineering Notes:

Objectives/Comments:

This project is intended to encourage team efforts to satisfy a design objective with time and resource constraints. The instructor should compare the reporting formats used with accepted Engineering Report Formats and the sketches submitted with industry drawing practice. The instructor must also determine if the student team has indeed made a comprehensive market search for current technologies available.

Expected outcomes:

Group interactions and effective time management on the part of the student teams should be encouraged. The student teams should go through the design process by first defining the needs and outlining design specifications and requirements. The student groups should search the market for what is available and consider design alternatives that are deemed feasible. The students should be required to write a report on the project and also to make a presentation to their instructor and to their peers.

Discussion/follow-on:

The potential for this project in follow-up courses such as Statics, Dynamics, Fluid Mechanics, and Capstone Design, where a greater depth of design, analysis, and conceptualization will be needed, should be kept in mind. Follow-on activities could include generation of possible alternative designs such as combinations offering waterjet as well as tooth-brush usage.