

# Product Design Specification

## Engineering World Health Aspirator (February 2007)

Lucas Vitzthum - Team Leader  
Nick Harrison - Communications  
Tyler Lark - BSAC  
Fan Wu - BWIG

### Problem Statement

Most developing world hospitals do not possess operating suction machines. The main problems are the lack of available spare parts, the cost of a replacement unit, and dependence on consistent electricity. The objective of this project is to design a suction machine that can be manufactured from locally available materials (and therefore repaired using locally available materials and expertise).

### Client Requirements:

- Device should run on batteries, electrical power (when available) and hand (or foot) power.
- Should provide the broadest range of applications possible.
- Device should include autoclavable suction tips.
- Must be completely manufactured from locally available materials for under \$100.

### Design Requirements

#### 1. Physical and Operational Characteristics

- Performance requirements:* Must perform at a level acceptable for surgery and have a variable level of pressure.
- Safety:* Must be safe for use on human surgeries and must have an autoclavable tip.
- Accuracy and Reliability:* Must be able to reliably provide suction throughout an entire surgery or operation.
- Life in Service:* Must last long enough to be economically viable and worth the time and energy to build. Locally repairable.
- Shelf Life:* Storage in third-world hospital conditions.
- Operating Environment:* The system will be used for surgery and operations.
- Size:* Must not interfere in operating room procedures or with staff.
- Weight:* Able to move in and out of operating room
- Materials:* Completely manufactured by locally available parts.
- Aesthetics, appearance, and Finish:* Must be clean.

#### 2. Production Characteristics

- Quantity:* Create instructions to build locally in any desired quantity.
- Target Product Cost:* <\$100 in locally available materials.

### **3. Miscellaneous**

- a. *Standards and Specifications:* Vacuum pressure range of 0 – 550 mmHg and a flow rate range of 0 – 30 lpm.
- b. *Customer:* Needs to run and power device with varying electricity and limited resources.
- c. *Competition:* Medical aspirators are widely available in developed countries. Our goal is to provide a cheap alternative that can be locally built and repaired in third world countries.