Product Design Specification (PDS)

Engineering World Health Aspirator (November 2007)

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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 and develop a set of instructions for 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 12 V batteries and/or manual 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

a. *Performance requirements:* 0-550 mmHg vacuum, 0-30 lpm flow rate
b. *Safety:* Must be safe for use on human surgeries and must have an autoclavable tip.
c. *Accuracy and Reliability:* Must be able to reliably provide suction throughout an entire surgery or operation (up to 8 hours)
d. *Life in Service:* 5 years
e. *Shelf Life:* 5 years
f. *Operating Environment:* Must be able to be stored and function under temperatures ranging from 4.5 to 45 degrees Celsius
g. *Size:* Less than 0.15 m^3 (2/3 by 2/3 by 1/3 m)
h. *Weight:* Less than 10 kg without battery.
i. *Materials:* Completely manufactured by locally available parts.
j. *Aesthetics, Appearance, and Finish*: Must be easily sterilized.

2. Production Characteristics

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

3. Miscellaneous

a. *Standards and Specifications:* Must provide safe regulated pressures within developing hospital environment.

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.