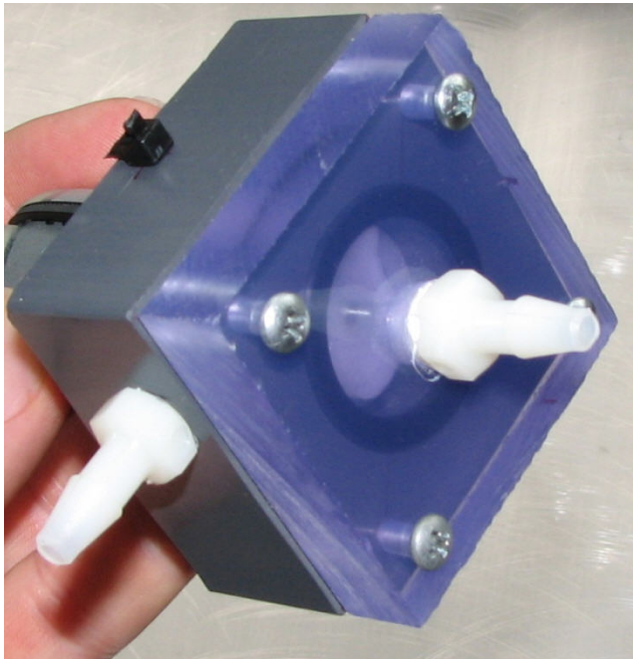
Fabrication and testing of a centrifugal pump



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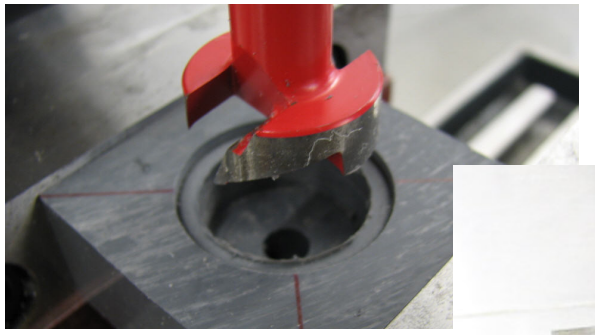
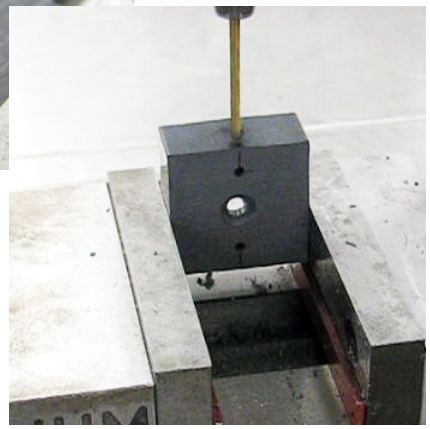
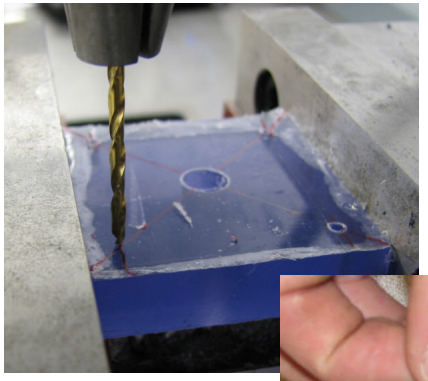


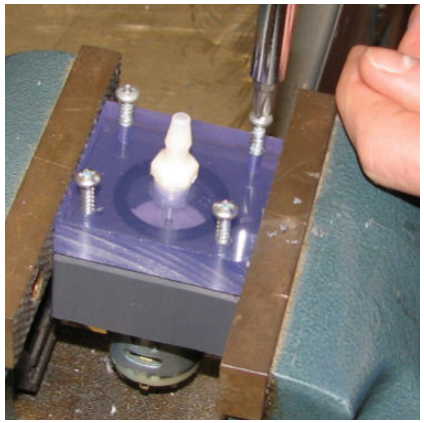


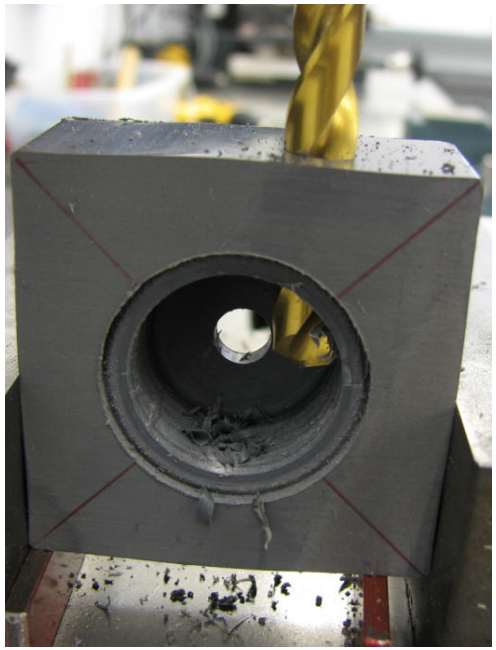
mostly involves drilling holes

Pump fabrication

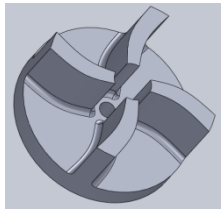
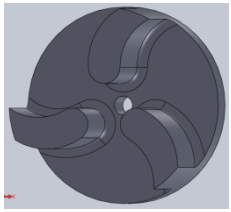
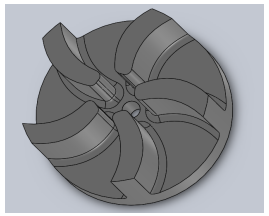
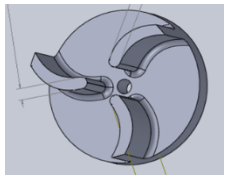
teams of two students



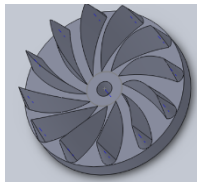
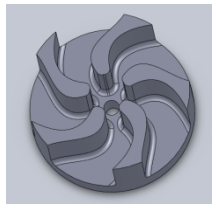


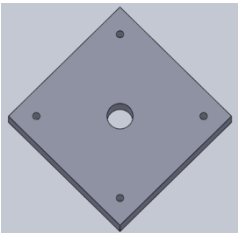


SolidWorks models

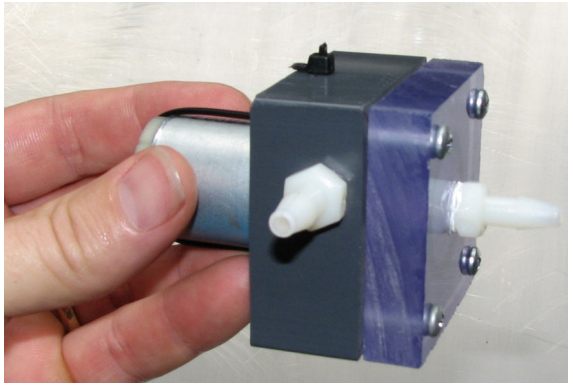





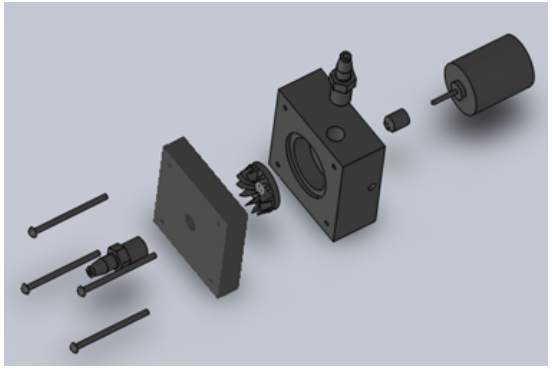
impeller
(your own design)

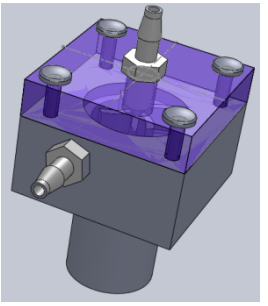





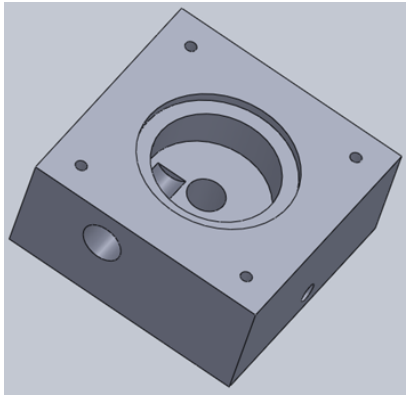
faceplate



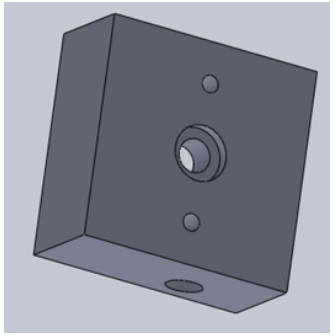


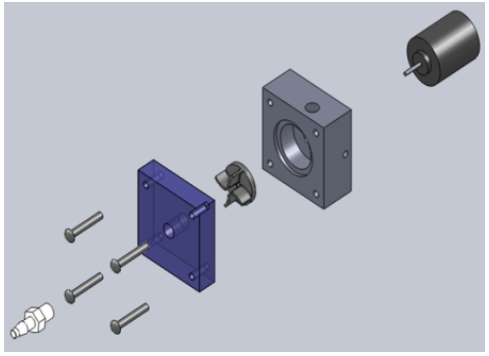


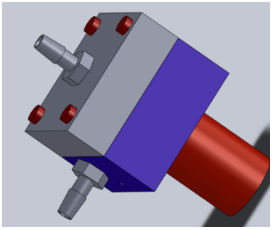
other parts &
pump assembly



pump body

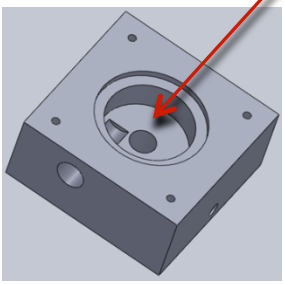


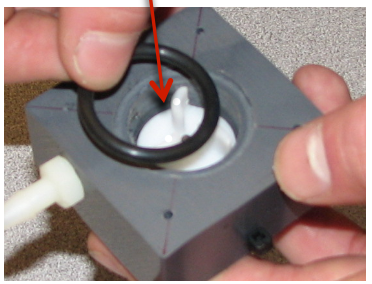


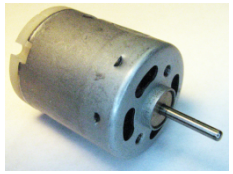


Impeller must fit in pump body

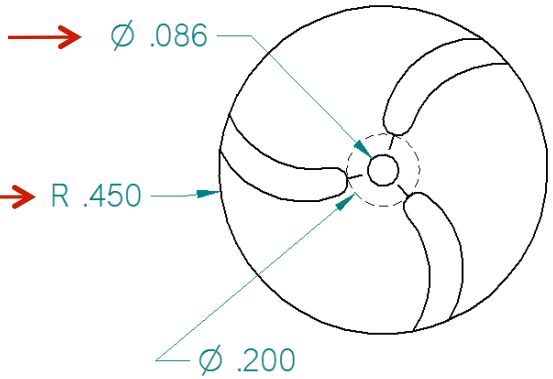
impeller cavity in pump body

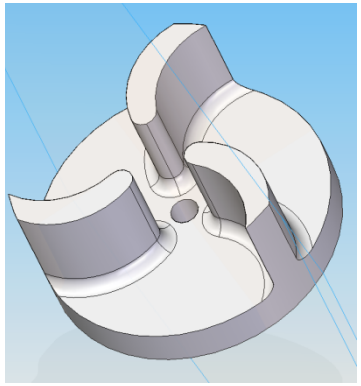






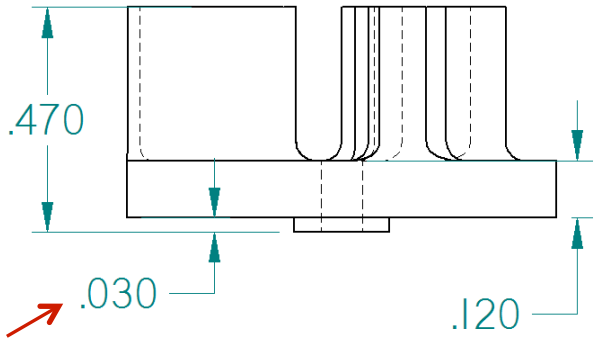
slightly smaller than motor shaft to allow a press fit

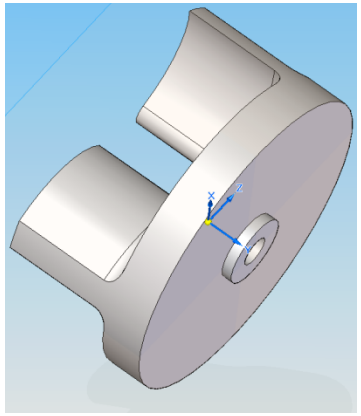




inside radius of impeller cavity is 0.50 inch; making the impeller radius 0.45 inch leaves a 0.05 inch clearance

the target depth of the impeller cavity is 0.5 inches; if this dimension is too large, the impeller will rub on the face plate

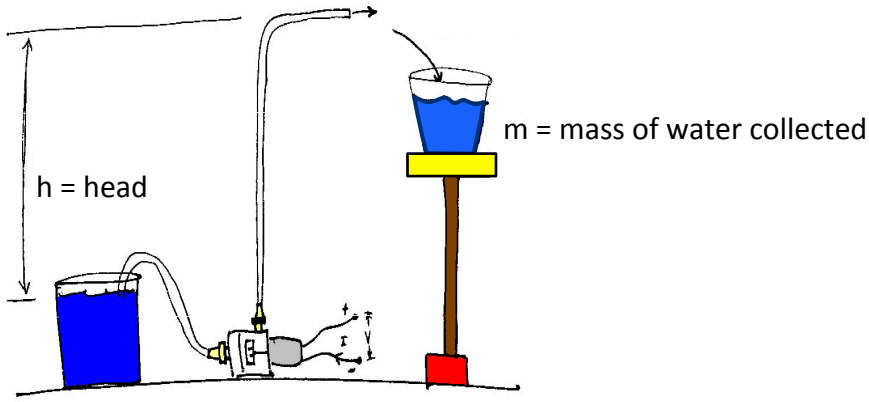




making a little offset here keeps the impeller from rubbing against the bottom of the impeller cavity

Pump testing

- See how high your pump can pump water
- Measure electrical current and voltage as well as the mass of water collected at several more heights (or pump heads) up to a maximum of 72 inches
- Generate a plot of pump head versus flow rate
- Generate a plot of pump efficiency versus pump head



head or height that water is pumped (in)	electrical current needed to power pump (A)	voltage across pump leads (V)	length of time that water is collected (s)	mass of water collected over 20 seconds (g)
height 1			20	
height 2			20	
… height 8 (or more)			20	



What to turn in

1. A title page
2. A concise, well-written executive summary that includes . . .
   a. A couple of introductory sentences describing the project
   b. The maximum pump head (meters)
   c. The peak flow rate (liters per minute)
   d. Typical voltage (V) and current measurements (A)
   e. The peak efficiency (%) and the head (meters) at which the peak efficiency occurs
3. Photos of you and your partner(s) during pump fabrication and testing
4. Your Excel spreadsheet containing the raw data and computed values:
5. A detailed hand calculation using engineering format showing all calculations for a data point in your Excel spreadsheet (include units!!)
6. A plot of pump head versus (meters) flow rate (liters per minute)
7. A plot of pump efficiency (%) versus pump head (meters)

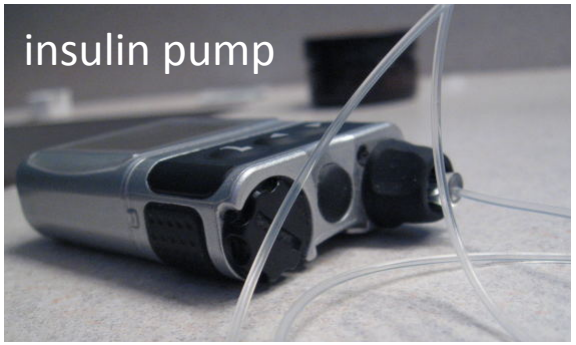
Be sure to put the items in the order listed (1, 2, 3, . . . 7) and do a clean job of presenting your work. A good part of your grade will be based on how well your executive summary is written. Don't forget to use units in your table, calculations and plots.

Who uses pumps?

http://mrg.bz/3INZgw

http://mrg.bz/yLmny1

http://mrg.bz/2zyazk



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