

ME19b.

PROJECT.

Jan.4

Due Feb.1, 2007

PROJECT A.

In the handouts, you are supplied with some basic (but very incomplete) information on a large number of commercial and experimental blood pumps of the rotary variety (note there there are also a number of blood pumps of the displacement variety that will not be included in this review). Some of these blood pumps are integral to current artificial hearts and some have undergone clinical implant trials in humans. The class will be subdivided into workgroups of up to three students and during class one of these rotary blood pumps will be assigned to each group.

The task of each of the groups will be to study its assigned rotary blood pump and attempt to determine the following using the internet or whatever other means the group wishes to employ. The following tasks should be attempted:

- Determine the fundamental design parameters of the device, its size (impeller diameter?), rotational speed, flow rate, pressure rise, power consumption and any others that seem pertinent to that device.
- Prepare sketches showing the basic components of the device.
- Evaluate relevant non-dimensional pump design parameters such as the specific speed and the cavitation number. Comment on the appropriateness of the design for that specific speed.
- Comment on some of the favorable features of the design.
- Attempt to determine the problems that this particular blood pump has experienced and might experience.
- Imagine you are working for the National Institute of Health (NIH) and overseeing the technical management of this development project, then compile your list of specifications (both requirements and constraints).
- Prepare a written report on your findings.

NOTES

- Note that this project is open-ended but the intention is for you to devote no more than 6 hours of homework time to the project.
- I recognize that some of the required information may be difficult (if not impossible to obtain); some engineering design processes must proceed without key pieces of information. Perhaps you could simply make an educated guess as to the missing piece of data. Or you could work backward to determine what that missing information should be.
- Some of the assigned blood pumps may no longer exist. I will retain a number of back-up pump designs which your group could pick up if the first assigned pump is essentially non-existent.
- A note on the context of the assignment. I am a member of an NIH Panel overseeing a program whose object is the development of artificial hearts for infants. That is where I will be on Jan. 18. I will report to the class on some of the issues facing this panel of surgeons and engineers.