118e Looking to the Unit Operations Laboratory as a Source of Chemical Engineering Design Projects

Samuel A. Morton III

A significant difficulty in teaching a chemical engineering design course is the development of meaningful capstone projects. As such programs mature, collaborative relationships with local industries and alumni can provide a steady stream of projects that will satisfy the ABET Criterion 4 requirements. In situations where the individual tasked with the capstone course is new faculty or new to teaching design these project generating relationships may not exist. In order to solve this dilemma the instructor may elect to reuse previous years' projects, consult with colleagues for ideas, or generate original projects.

Should the instructor elect to generate the projects, there are critical concerns related to time constraints, project complexity, and the availability of project specific information. These generated projects need to be of appropriate length for the students to complete in the course timeframe as well as commensurate to the educational level of senior undergraduate students. For the new professor such projects can be very difficult to generate and the significant time requirement for project creation can be cumbersome to balance with the additional requirements of teaching, research, and service.

The unit operations laboratory is a potential source of projects, for which there is significant student familiarity, expertise among the faculty, and ready access to equipment and information. These laboratories often have separate and distinct processing units, many of which have seen significant use and could be in need of redesign and updating. The students will have normally operated the particular processing units during the course of their engineering education and will have first hand knowledge of the operability issues associated with these units. If such an approach is taken the student team(s) can be tasked with investigating the functionality of the process as well as developing possible avenues for improvement. If successful these projects have a dual benefit: (1) the students perform activities similar to industrial process improvement and (2) the department will have a proposed redesign of an existing unit operation experimental apparatus.

The purpose of this presentation is to provide a discussion of several successful examples of unit operations laboratory improvements through senior capstone design. It is the hope of the author that other chemical engineering departments and faculty could utilize the methods presented.