ter ended before the students could test the apparatus, but test results by two students after the end of the semester showed the apparatus performs as desired.

The class toured the Dow Chemical facility in Midland, Michigan, and were permitted to see up close the process equipment they were learning about in class. Tours such as this are valuable because they give the students a sense of the size of some of the equipment and they instill confidence when the students see processes in operation.

Future offerings of the course may include a laboratory in place of, or in combination with, the out-of-class design project. A list of equipment and possible experiments that could be included in the lab is given in Table 3.

The NSF GOALI program provided travel funds to take the students to Midland and for one of the authors (KJ) to travel from Midland to Akron to teach the students. Future funding may not be available, however; hence, travel will be scaled back and the course will have to be modified. A set of course notes have been developed that will be useful, and plant tours should be possible with industries in the local Akron area. The course may not be team-taught in the future, but companies can be supportive by encouraging their engineers to give seminars on selected topics. Other options include sending video tapes by industrial engineers to the class, or using distance learning facilities if available.

The eight undergraduate and three graduate students felt they received an exceptional experience in this course. They thought the blend of academic and industrial instructors made the class more interesting and gave it a practical application and design flavor that complemented their theoretical training. They strongly voiced their opinion that better textbooks are needed on this subject.

Asked on a course feedback questionnaire if they would recommend the course to other students, some responded

- *"Yes. The class gave a valuable overview of solids processing with a lot of practical application."*
- *"Yes. It provided a well-rounded look at solids processing while still covering the topic."*
- *"Definitely. The topic is really fascinating because there doesn't seem to be enough known about it."*

CONCLUSIONS

The course described here is team-taught by academia and industry and has a mix of theory and practical design in addition to lectures and hands-on experience for the students. The course is still evolving, but we feel it covers many of the important topics in solids processing that engineers need to know before going to work in today's chemical process industries.

We were fortunate to have the support from NSF and the Dow Chemical Company that allowed one of the authors (KJ) to travel to Akron. The travel and time commitments are not practical in most cases, but the benefits to the students made the effort worthwhile enough to justify the effort to find industrial engineers in the local university communities who are willing to contribute to the course.

ACKNOWLEDGMENT

The National Science Foundation, Grant CTS-9613904, the Dow Chemical Company, and the AirMaze Corporation funded this work.

REFERENCES

1. Ennis, B.J., J. Green, and R. Davies, "The Legacy of Neglect in the U.S.," *Chem Eng. Prog.*, **32**, April (1994)
2. Prescott, J.H., "A Knowledge Crisis in Solid-Fluid Separation," *Chem Engr.*, **81**(7), 26 (1974)
3. Tiller, F.M., "Separation and Purification: Critical Needs and Opportunities," *Fluid/Particle Separation J.*, **1**, S10 (1988)
4. Chase, G.G., "Closing the Education Gap in Fluid-Particle Processes," *Fluid/Particle Separation J.*, **6**(1), 1 (1993)
5. Nelson, Jr., R.D., R. Davis, and K. Jacob, "Teach 'Em Particle Technology," *Chem. Eng. Ed.*, **29**(1), 12 (1995)
6. Pratsinis, S., The University of Cincinnati, personal communication, November (1996) ❐

ChE new books

- *Kirk-Othmer Encyclopedia of Chemical Technology,* Vol. 19, 4th ed., Pigments to Powders, Handling; John Wiley & Sons, 605 Third Avenue, New York NY 10158; $295 (1996)
- *Kirk-Othmer Encyclopedia of Chemical Technology,* Vol. 20, 4th ed., Power Generation to Recycling, Glass; John Wiley & Sons, 605 Third Avenue, New York NY 10158; $295 (1996)
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- *FORTRAN Programs for Chemical Process Design, Analysis, and Simulation,* by A. Kayode Coker; Gulf Publishing Company, Houston, TX 77252-2608; 854 pages (1995)
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- *Fluid Mechanics,* by David Pnueli and Chaim Gutfinger; Cambridge University Press, 40 West 20th St., New York NY 10011-4211; 482 pages, $49.95 (hardback), $34.95 (paperback) (1997)
- *Alternative Fuels,* by Sunggyu Lee; Taylor & Francis, 1900 Frost Road, Suite 101, Briston PA 19007-1598; 485 pages, $79.95 (1996)
- *Green Technology and Design for the Environment,* by Samir Billatos and Nadia Basaly; Taylor & Francis, 1900 Frost Road, Suite 101, Briston PA 19007-1598; 296 pages, $39.95 (1996)
- *Antioxidative Stabilization of Polymers,* by Shlyapnikov, Kiryushkin, and Mar'in; Taylor & Francis, 1900 Frost Road, Suite 101, Briston PA 19007-1598; 243 pages, $49.95 (1996)