

## A&M Course Simulates Difficult Dredging Conditions

The January 15-17, 2007 Cutter Suction Dredge Simulator short course attracted nine participants from dredging companies Alan Ritchie Materials, Camden Shipping, Mini-Dredge, and Weeks Marine.

The course instructors were Peter deJong, president of Digital Automation and Control Systems (DACs) and Dr. R. E. Randall, director of the Center for Dredging Studies at Texas A&M University.

The course demonstrated the fundamentals of hydraulic dredging with a cutter suction dredge. Topics included cavitation, deposition of sediment in the pipeline, pipeline length limitations, pump power limitations, different sediments (fine sand, medium sand, stiff clay), channel currents, and swing winch limitations. A 24-inch spud carriage and fixed spud dredge were simulated in this year's course, but other size dredges can be modeled.

Three simulators interface actual controls for a cutter suction dredge to a personal computer, and each participant spends approximately 30 minutes on the simulator for each of five exercises. Day One included presentations on dredge hydraulics, cutting and dredge advance, explanation of simulator exercises and



Phillip Burgmeier of Weeks Marine working at Simulator #2.



2007 Cutter Suction Dredge Simulator Class with instructors, from left, Pete deJong, instructor; Phillip Burgmeier, Weeks Marine; Robin Novak, Mini-Dredge; Alberto Saavedra, Weeks Marine; Beverly Grissom, Camden Shipping; Chad Bragg, Weeks Marine; Michelle Bunting, Camden Shipping; Mark Wilson, Weeks Marine; Ricky Caylor, Alan Ritchie Materials; James Bullock, Weeks Marine; Bob Randall, instructor.

files, and simulator demonstration in the morning. In the afternoon, the participants began working on the simulators and completed exercise 13 (24-inch two-spud cutter suction dredge with no limitations), critique of exercise 13 for each participant, and exercise 12 (double the pipeline length; easy-to-plug pipeline).

Day Two started with a review of exercise 12 results with each participant, exercise 8 (no ladder pump – cavitation limited maximum production), critique of exercise 8, exercise 14 (changed from sand to clay and added the ladder pump – experienced difficulty of dredging clay), reviewed exercise 14, and completed exercise 15 (fine sand was used to demonstrate high production dredging.) Day 3 included a review of exercise 15, and the participants were



Robin Novak of Mini-Dredge working at Simulator #1.

then given their choice of exercise they wanted to attempt or one they wanted to repeat. The exercise of choice was critiqued.

The participants reported that the simulators modeled the cutter suction dredge very well. Data are recorded while the participants are using the simulator. Parameters such as slurry density, slurry velocity, pump suction



Beverly Grissom of Camden Shipping at Simulator #3.

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and discharge pressure, pump power and speed, cutter power and speed, swing speed, digging depth, production, and time are recorded while the participants are operating the simulator.

These data are plotted for the 30-minute exercise and reviewed with the participants as a group. The critiques provide feedback to the participants, and suggestions are given for improving the production performance and avoiding plugging the pipe and cavitating the pump. All participants are encouraged to try to maximize production while taking into consideration the limitations inherent in each exercise (e.g. no ladder pump, very long pipeline, different sediment). Figure 1 shows a summary of the production performance for each participant and each exercise. Generally, the participants showed reduced production as limitations were imposed (Exercise 12 long pipeline, Exercise 8 – cavitation due to no ladder pump, Exercise 14 – clay). Exercise 15 was fine sand with a 5000-meter pipeline and a ladder pump, and very good production was attained.



Each participant chose one exercise for critique by the group. Chad Bragg chose Exercise 15.

The next Cutter Suction Dredge Simulator short course is scheduled for January 14-16, 2008. The course fee is \$1500 and a brochure and application

may be obtained by contacting Dr. R.E. Randall (r-randall@tamu.edu, 979-845-4568) or from the web site, <http://oceaneng.civil.tamu.edu>.

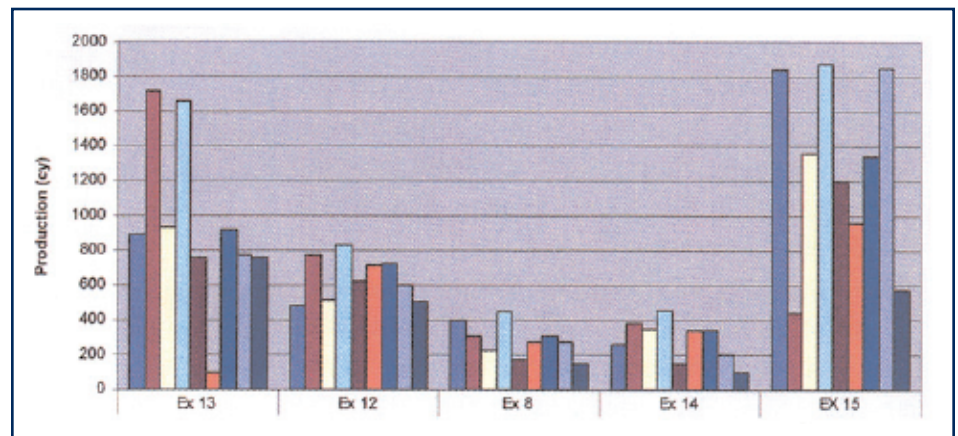


Fig. 1. A summary of the production performance for each participant and each exercise. Participants showed reduced production as limitations were imposed.