

Appointment System

Presenter: Don Sweeney

This study evaluated ways of reducing congestion at locks. The study uses a MicroSaint discrete event simulation model. The study was initially sponsored by the Institute of Agriculture Policy who sought to increase the carrying capacity on the inland waterways.

The current system of moving barges through lock relies on a first in first out approach. Such a system tends to result in long waiting times during peak demand periods. Several alternative demand management strategies had previously been reviewed to see if they would be suitable for reducing waiting times at locks. Strategies such as the introduction of congestion fees would burden the weak barge industry. Small scale measures of reducing congestion were found to be more appropriate. The use of an appointment based system was identified to be the most promising due to its minimal burden on the barge industry and taxpayers.

As part of this investigation, a model was developed to simulate barge movement through the lower five locks of the Upper Mississippi system. The model used for this study was a first-cut, discrete-event simulation model (using MicroSaint) that was used to model locks 20 to 25 of the Upper Mississippi River (5 lower, most congested locks of system). The other model being developed is the very detailed team model that will be used for the final analysis.

Three classes of traffic were defined for the model: multi-cut commercial tows, single-cut commercial tows, and everything else. The study modeled the river as a closed system with a finite number of barges. The vessels are fed into the system based on historic data and are then allowed to operate in a closed system. Three types of lockages were considered:

- Direction of travel (up bound or down bound).
- Class of traffic (multi-cut, single cut, etc.)
- Lockage type (fly, turn back, and exchange).

The model application uses a Graphical User interface to ease data manipulation and an animation screen for visual effects. It is the Corps' intention to introduce some GIS features to the application.

The simulation model developed was shown to be an effective way of evaluating potential benefits of introducing an appointment-based system. A simple prioritization scheme of selecting the tow that will lock the most quickly was shown to industry cost approximately \$4,000,000 per year.

Questions and Issues:

- One attendee indicated that the industry stipulates that they have fog, high current, problems with paperwork, and that they can not even get a lock within a day on upper end of system. The question presented was, how precise will they have to be to get locking times and whether there was anything to the contention that can not make these appointments.

- Some participants wondered whether some barges have GPS systems these days. It was agreed that high-end vessels tend to have GPS systems.
- On the question of whether the study team planned to introduce/analyze recreational vessels, the presenter responded in the affirmative.
- The differentiation of vessels into various vessel classes was of interest to symposium attendees.
- One participant suggested that the study team take a look at gaming to determine what would happen for example when one uses small tows that use less horsepower.
- It was noted that if one was to enforce the current rules in the model, the results would be reduced delay times.