

Energy efficient liner shipping berth scheduling and stowage planning

Line Reinhardt, Roskilde University

Abstract

Energy efficiency involving reduced fuel consumption and better capacity utilization is an important part of reaching the reduced emission goals both for MGO and for alternative fuels as the alternative fuels will be limited. Liner shipping operations work on a (weekly) schedule and cargo often has at least one transshipment before reaching their destination. This makes changes to a liner shipping schedule difficult to even out while still considering the different challenges which must be satisfied by the company.

The problem has been modeled with a mixed integer model and it is shown that significant fuel consumption can be saved solving this model. For capacity utilization the problem is solved manually at companies, by people with lots of training and knowledge. However, the capacity usage could be improved using optimization methods.

Thus a representative model for the liner shipping stowage problem including all of the important details is presented. To test this model a benchmark suite has been constructed based on real-life data. A heuristic method based on large neighborhood search has been constructed to solve the problem. Although the solutions have strong potential for improvement it finds a good feasible solution for all instances.