Aircraft Stand Allocation with Associated Resource Scheduling

An aircraft turn-round refers to the set of processes taking place from when an aircraft parks at its arrival stand until the time it departs from its departure stand. When handling a turn-round, the different processes involved (arrival, disembarkation of passengers, cleaning, etc.) require different ground handling resources (taxiways, aircraft stands, gates, etc.) at different times. Each resource can be claimed by at most one turn-round at a time. The aircraft stand allocation problem with associated resource scheduling is the problem of allocating the required ground handling resources to handle a given set of aircraft turn-rounds. We develop a set packing-based model formulation of the problem which is both flexible in the sense that it can encapsulate any type of resource required during the handling of a turn-round and strong in the sense that conflicts that occur when two or more turn-rounds simultaneously claim the same resource are handled implicitly. To solve the model, a heuristic based on linear programming is developed. The heuristic iteratively solves a relaxed, restricted version of the problem, adding extra variables at each iteration if needed. The additional variables are identified by a cost-based partial enumeration of the possible variables for each turn-round and the heuristic stops when the first feasible solution is encountered. The heuristic has been tested on real data from Copenhagen Airport with a special focus on tactical day-to-day planning. The results show that the method generates high-quality feasible solutions within reasonable time for tactical planning.