

## Large-scale Transportation System in Container Terminal

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The explosive growth in recent years in the volume of containers has resulted in heavier workloads at seaports and it is necessary to construct an efficient container terminal management system. For this issue, we deal with an efficient transportation system in a general domestic container terminal shown in Fig. 1.

Compared to other foreign terminals, a large amount of transportation between terminals and inland (land side operation) is a feature of container terminals in Japan. Under the existing circumstances, the departure times of each ship are cannot be changed because they are determined in advance based on the number of managed containers or next destination. To keep the constraint of the departure time, terminal authorities give high priority to transportation between ships and terminal (sea side operation). In consequence, long lines of land side chassis waiting at the entrance gates cause the traffic congestion around terminals.

We have propounded a solution to reduce the waiting time of land side chassis as possible keeping the constraint of the departure time. On this occasion, it is important and difficult to control the balance between sea side operation and land side operation. For well-balanced terminal operation, we have considered TCs (Transfer Crane) which conduct both sea side operation and land side operation as most important working machine. The TC selects which operation to conduct according to the state of progress of sea side operation. To be concrete, if sea side operation does not have time to spare, it is given priority. On the other hand, if sea side operation has enough time, the TC selects next operation according to the proposed scheme in which the TC finds all feasible management orders of the chassis in the range of information that the TC can obtain at that point and then determine next operation on the basis of the order with the highest efficiency. The average waiting time of land side chassis has reduced compared to the present method in which sea side operation always taking precedence through simulation (Fig. 2).

*Keywords:* Transportation System, Container Terminal, Transfer Crane (TC), Scheduling

### References

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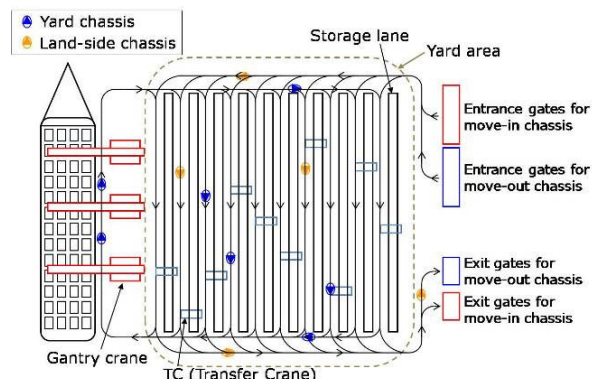


Fig. 1 General view of container terminal

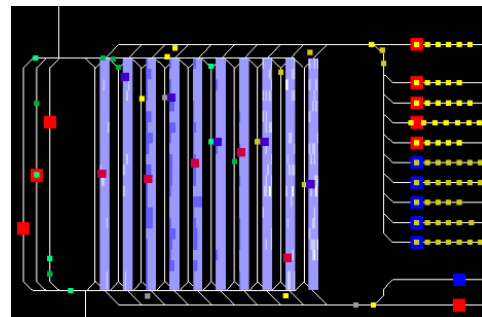


Fig. 2 Simulation for container terminal system