

## Online Rescheduling in Semiconductor Manufacturing (Prof. J. Ota and Dr. M. Sugi)

Semiconductor manufacturing is mainly characterized by the production of diversity of products on different process flows. It is extremely difficult to solve manufacturing rescheduling problems in real time due to high occurring frequency of disturbances (about 1 time/1 minute). Along with the traditional performance measure on due date, schedule stability, represented by degree of unsimilarity (the variation of processing orders from the original schedule), is another important measure for rescheduling method. We have proposed a new online rescheduling system for semiconductor manufacturing by a dual rescheduling process as shown in Fig.1. Once a disturbance occurs in facilities, the rescheduling process revises the original schedule in real time by the transmission of disturbance information among the arcs on a disjunctive graph as shown in Fig.2 - it obtains a new feasible schedule with the high schedule stability. During the execution of manufacturing along the revised schedule, the improving process then performs a quick local search in an acceptable computation time (i.e. the minimal cycle time of disturbances) based on the permutations of processes on the semi-critical paths as shown in Fig.3, which obtains a good feasible solution on the compliance of due date. The proposed method is evaluated through the simulation of several semiconductor manufacturing problems with the actual size of about 200,000 processes in facilities. The results show that this method can effectively accommodate disturbances in less than 1 second, and obtain a better executable schedule in less than 1 minute, and that it is more effective for rescheduling (especially on the performance of schedule stability) by a comparison with conventional dispatching-rule based methods, some of which have been actually applied in many facilities (Fig.4).

*Keywords:* Online rescheduling, schedule stability, permutation, semiconductor manufacturing

### References

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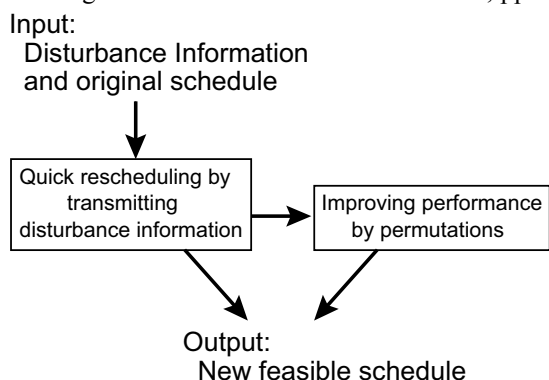


Fig.1 Online rescheduling system

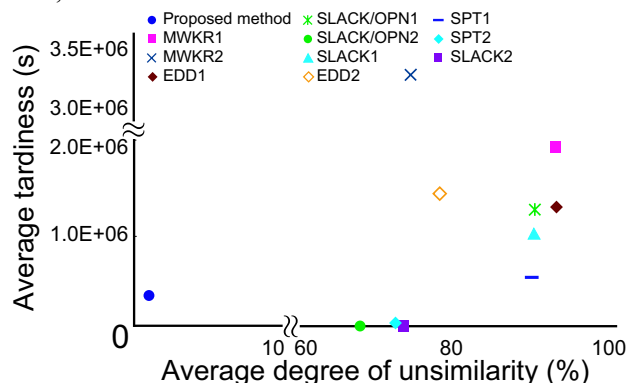


Fig.2 Comparison between traditional and proposed methods