

## **Bi-criteria scheduling with controllable processing times**

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In the current literature, the process planning and scheduling levels are linked through timing data. After calculating locally optimal process parameters that minimize the manufacturing cost, the processing time is then passed to the scheduling level as data. In reality however, the time it takes to process each part can be controlled (albeit at higher cost). Since it is well known that scheduling problems are extremely sensitive to processing time data, a controllable processing time enables the decision maker to generate alternative schedules with varying manufacturing cost and scheduling performance, and hence brings additional solution flexibility in finding solutions to the scheduling problem. In practice, the relative importance of cost and time objectives for the decision maker may vary over time. If the workload is heavy, scheduling related objectives become more important. If it is relatively light, the manufacturing cost is very important. Therefore, we propose new methods to generate a set of nondominated solutions for this bi-criteria problem. Processing time controllability and nonlinear cost functions complicate the scheduling problem; therefore we use the recent advances in conic mixed-integer programming to model these problems.

A flexible manufacturing cell consisting of a number of CNC machines and a material handling robot is called a robotic cell. The cycle time of the cell is affected by the robot move sequence as well as the processing times of the parts on the machines. Thus, one is faced with a tradeoff between these two competing measures of cycle time and manufacturing cost. In this presentation, my main aim is to show the effectiveness of controlling processing times for both the predictive and reactive nonidentical parallel CNC machine scheduling, and robotic cell scheduling problems.

**Monday, September 21, 2009**  
**3108 Etcheverry Hall**  
**3:30pm-5:00pm**

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