

## Model formulations for the machine scheduling problem with limited waiting time constraints

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### Abstract

This study considers the machine scheduling problem with limited waiting time constraints. We examine the machine environment of the open-shop, job-shop, flow-shop, and permutation flow-shop, and uses makespan as a measure performance. Eight mixed binary integer programming models are developed to optimally solve these problems.

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*Keywords* : Scheduling, waiting time, integer programming, open-shop, job-shop, flow-shop.

### 1. Introduction

Most studies assume infinite waiting time between any two consecutive operations of each job [9]. There are many industries where the limited time constraint applies. For example, in a wafer fabrication process,

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