



Parallel process scheduling at NORMA

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Introduction

- NORMA has three heat treatment lines
 - Total of 151 different components
 - Components restricted to lines
 - Different producing parameters for components and lines
 - Next processing steps

Model Problem Formulation

- Given orders for a particular week
 - Processing all the components
 - A setup gap of 12 minutes
 - The processing parameter is a non increasing function
 - If component production ends a 15 minute break is needed before next component
 - Items that can only be processed on K1/K2/S1 line are processed on K1/K2/S1

Solution to Model Problem: Program no 1

- To solve, program no 1
 - Read in component production information
 - Read in weekly component order
 - Create three sorted lists of component orders sorted by the processing temperature
 - Repeatedly performs taking the highest temperature required to process for each line and updates the list
 - Program is Octave/Matlab based

Results

- Data given

Test set	Processing time, K1	Processing time, K2	Processing time, S1
1	110 hours	99 hours	109 hours

- Real data

Test set	Processing time, K1	Processing time, K2	Processing time, S1
1	118 hours	147 hours	103 hours

Solution to Model Problem: Program no 2

- To solve, program no 2
 - Model the problem in MIP
 - Binary variables for [components * time slots * lines]
 - Coded in JuliaLang with JuMP
 - Opensource solvers can be used
 - Currently being tested with Gurobi



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