

## TITLE: JOB SCHEDULING BASED ON REINFORCEMENT LEARNING

### KEY WORDS OF ASSIGNMENT:

- Job Scheduling
- Reinforcement Learning
- Crane automation

SUMMER APPRENTICESHIP

MASTER THESIS

WORK/SCHOOL APPRENTICESHIP

PROJECT

### CONTENT OF ASSIGNMENT (POSSIBLY ILLUSTRATED WITH PICTURES/DRAWINGS):

The site of ArcelorMittal Gent contains multiple yards where slabs or coils are stored under the reach of (mostly automatic) overhead cranes, as demonstrated in the picture below. The yard in the picture acts as a buffer between two production lines where the coils remain in the yard until they reach the ambient temperature. Once sufficiently cooled, they can be selected for the next production step.



A yard with 1 overhead crane

The overhead cranes are responsible for bringing material in the yard and delivering material to the next production line via trains, transfers, production chains, ...

A system is responsible for scheduling the work of the overhead cranes in such a way that obstruction between multiple cranes in the same yard is minimized and the material flow through the yard is maximized. This is done by solving a job scheduling problem. The result is a sequence of pickup and place commands that are executed by the cranes.

In this thesis we want to investigate the possibility of solving the job scheduling problem using reinforcement learning techniques.

### OBJECTIVES:

- Develop a model for the job scheduling problem
- Train the model based on historical industrial data
- Compare the performance of the model with the system that is currently being used

### EXPECTED COMPETENCES (KEY WORDS):

- Programming (Python, C#, F#, ...)
- Basic knowledge of machine learning concepts

- Knowledge of TensorFlow, Keras, Gym, ML.Net, Jupyter notebook is a plus

**NUMBER OF STUDENTS:**

- 1

**TARGET GROUP: BACHELOR/MASTER/ ... & SPECIALIZATION(S):**

- Master of science in engineering (computer science, operations research, ...)

**LOCATION:**

- ArcelorMittal Gent, John Kennedylaan 51, 9042 Gent + at home

**PROMOTORS:**

- Industrial : Freek Boeykens, Pieter Bellens, Sander Vrijders
- Academic : .....

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