TITLE: DEVELOPMENT OF AN INVENTORY PLANNING HEURISTIC FOR RAW MATERIALS ORDERING

KEY WORDS OF ASSIGNMENT:

- ✓ Development of dedicated scheduling heuristics
- ✓ Modeling of logistic processes
- ✓ Programming – Software development

APPRENTICESHIP ☐   **MASTER THESIS** ■

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

ArcelorMittal Gent is a steel production company which is situated alongside the canal Ghent-Terneuzen in the port of Ghent. It produces flat steel products, used amongst others in the automotive industry.

The raw materials department (GHV) is responsible for the logistics of the bulk materials from the port up to the plant. Briefly, large sea vessels and barges deliver bulk raw materials to the site. These materials need to be discharged as fast as possible onto conveyor belts and are transported to their storage location on the parks. If the plant demands some type of raw materials, a partially mutual trajectory of conveyor belts is used to reclaim the material. This results in a competitive usage of the infrastructure for unloading ship tasks and supplying the production needs. Ship discharging is then postponed, and the ship gets delayed.

The inventory planning model is part of a larger project to optimize the raw materials traffic, and to minimize the residence time of each ship in the port. Tactical planning of raw materials ordering is essential from this perspective. If too many ships arrive at the same time, congestion at the harbor increases ship delay and consequently the overall demurrage cost. If no ships are however moored at the quays, the entire raw materials infrastructure suffers from unwanted idle times.

A tactical planning of the inventory therefore should take the available free space of the stockyard areas into account, as well as the total stock costs and the required minimal safety stock levels. Moreover, the production demands should always be met. Lastly, large standstills and maintenances are known in advance. During these periods, some types of raw materials cannot be handled. This knowledge also needs to be incorporated into the inventory planning model.

In this master thesis, you will design and implement several optimization heuristics to schedule the desired ship arrival times in order to evenly spread to load on the port and to ensure that the ships can be discharged as fast as possible. You will test the heuristics using historical production data. You will assess the "best" heuristic based on its performance and on the computation time.

This master dissertation provides the opportunity to get hands-on experience in a state-of-the-art steel plant, to work together with industry specialists in optimizing techniques and to contribute to technological innovation.

OBJECTIVES:

- ➢ Implement several heuristics suitable for the problem
- ➢ Evaluate their performance using a set of realistic input data
- ➢ Make founded conclusions based on your computational results

EXPECTED COMPETENCES (KEY WORDS):

- ✓ General knowledge of optimization techniques
- ✓ General programming skills

NUMBER OF STUDENTS:

- ➢ 1

TARGET GROUP: BACHELOR/MASTER/… & SPECIALIZATION(S)

➢ 2nd master ING/IR

LOCATION:

➢ ArcelorMittal Gent Systems & Models (John Kennedylaan 51, 9042 Gent) + at home

PROMOTORS:

➢ Industrial: Roeland Schelfhout
➢ Academic: …………………………………………………………………………………………..

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