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SIMULATION OF INTRA & INTER YARD MOVEMENT OF SEMI FINISHED & FINISHED MATERIAL: A CASE STUDY OF GREEN FIELD PROJECT OF AN INDIAN STEEL INDUSTRY

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ABSTRACT

Tata Steel Limited is setting up an integrated steel plant (green field project) in the state of Odisha and it will produce 3 MTPA (Phase-I) of HR Coils and sheets at the operational stage. All the products will get stored at Common Product Despatch Yard (CPDY) which will have facilities for outbound movement of material by rail as well as road. The above arrangement involves lot of intra/inter-yard movements of semi-finished and finished material. Anticipating future problems of material handling and space utilization, a simulation study was conducted to check the adequacy of infrastructure of CPDY to handle the material and achieve the desired throughput. The result helped in identifying the possible constraints during the post commissioning stage and ways to tackle the same. This case study shows the applicability of simulation modeling for evaluation of logistics issues in Greenfield project.

1 INTRODUCTION

The purpose of designing and developing a logistic simulation model was to test adequacies of infrastructure already planned and suggest ways to debottleneck any constraints found in the chain through the model. It also aimed to find out infrastructure requirements in terms of rate of material movements in order to have smoother outflow of material at all stages.

The key deliverables were to find out optimal no. of cranes, transfer cars and trailers loading point in each bay. In addition, management also wanted to know the optimal storage space for in-process inventory in yard, rake turn round time (time between receipt and release at CPDY) and daily requirement of rakes/trailers for peak & average load condition.

Figure 1 shows an overall view of 3D Simulation model built using Delmia QUEST. Figure 2 show Schematic Diagram of Material flow between Inter/Intra yard movement of finished & semi-finished products.

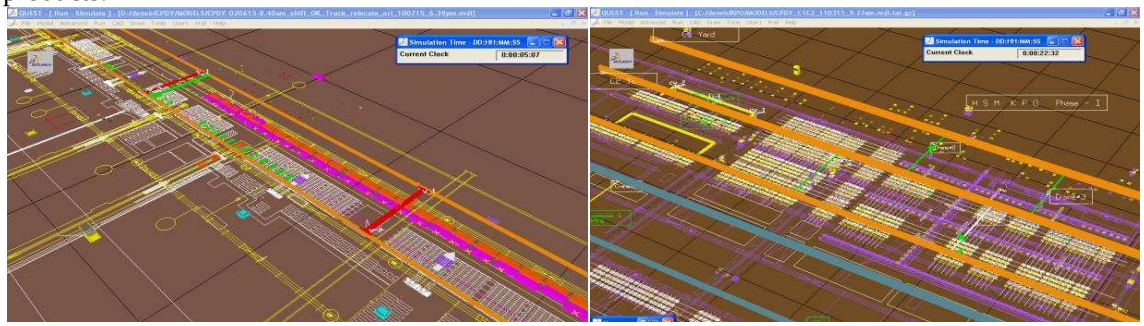

Figure 1: 3D View of Simulation Model With Delmia Quest

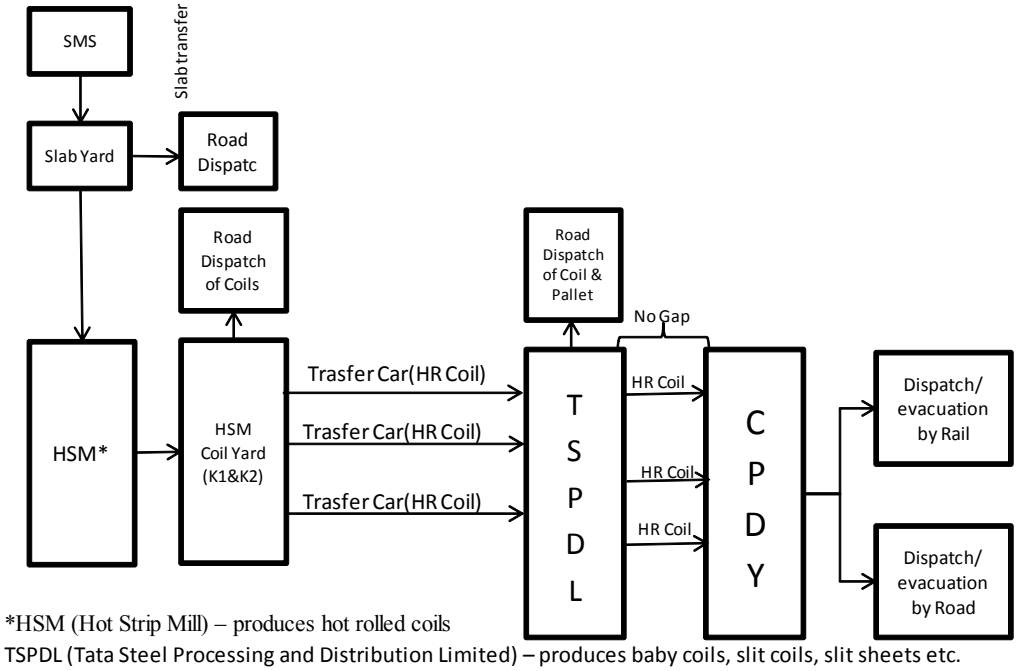

Figure 2 : Schematic Diagram of Material flow

2 METHODOLOGY

To check the adequacy of infrastructure which was already planned we used Discrete Event Simulation (DES) methodology. The reason for using simulation as a tool was to understand the interference and utilization of cranes in intra yard and maximum number of trip of transfer cars between inter yard movement .The layout of Intra/Inter yard, no. of EOT(Electric Overhead Travel) cranes in each respective yards, arrival pattern of empty rake, rake configuration, tonnage of finished goods dispatch by road and rail, etc were collected from project team. The arrival pattern of empty rake was validated with similar operational steel plant. The various logics like priorities for loading Transfer car in HSM bay and loading of empty wagons in CPDY as per configuration were mapped in the model in consultation with Intra/Inter yard project team.

The variables considered for output evaluation were: No. of coils & sheet/packets unloaded from transfer cars, no. of rakes dispatched from CPDY and utilization of EOT Crane.

3 RESULTS AND CONCLUSION

The model was run with three options at HSM (K1& K2 bays) and six options for CPDY. For each option, results of simulation run were recorded and following were the recommendations:

1. The Length of yard is proposed to increase by 50% to manage the desired inventory level.
2. The number of cranes for Intra/inter yard have been evaluated and necessary changes done.
3. To unload the desired number of coils in the yard minimum and maximum waiting time have been proposed for the transfer car in the CPDY end.