PROCESS BASED SHIPYARD SHOP LEVEL SIMULATION MODELING AND ANALYSIS

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ABSTRACT

When Manufacturing Logistics Simulation Application, which are widely used in other manufacturing industry such as DELMIA QUEST and Siemens Plant Simulation, is used in shipyards, it often difficult to keep using. Because existing Manufacturing Logistics Simulation Application is not developed considering shipyards, it was difficult to flexibly reflect the shipyard production environment. To solve this problem, this study created a simulation model based on shipyard's schedule plan and production plan.

1   INTRODUCTION

When commercial Manufacturing Logistics Simulation Application, which is widely used in Digital Manufacturing area, is used for shipyard production simulation, it is often difficult to use more 1 time. Digital Manufacturing, which started from automobile and airplane manufacturing areas, was developed with the assumption where equipment is fixed and use of space is limited but in the case of shipyards, equipment and personnel are deployed fluidly and space also continuously changes depending on time. Therefore, existing Digital Manufacturing principle is difficult to understand by shipyard workers and it is difficult for workers to make modifications even after the simulation model is developed.

2   MODELING CONCEPT OF SHIPYARD MANUFACTURING SIMULATION

Manufacturing data, which is actually managed on variable basis in a shipyard, is process data.   As ship or Offshore Plant produced in a shipyard is a very large-scale product, schedule is managed closer to a similar-scale civil engineering project than airplane or automobile manufacturing. In the case of shipyard, appropriate level process data is managed from top management to bottom site. Shipyard production sim-
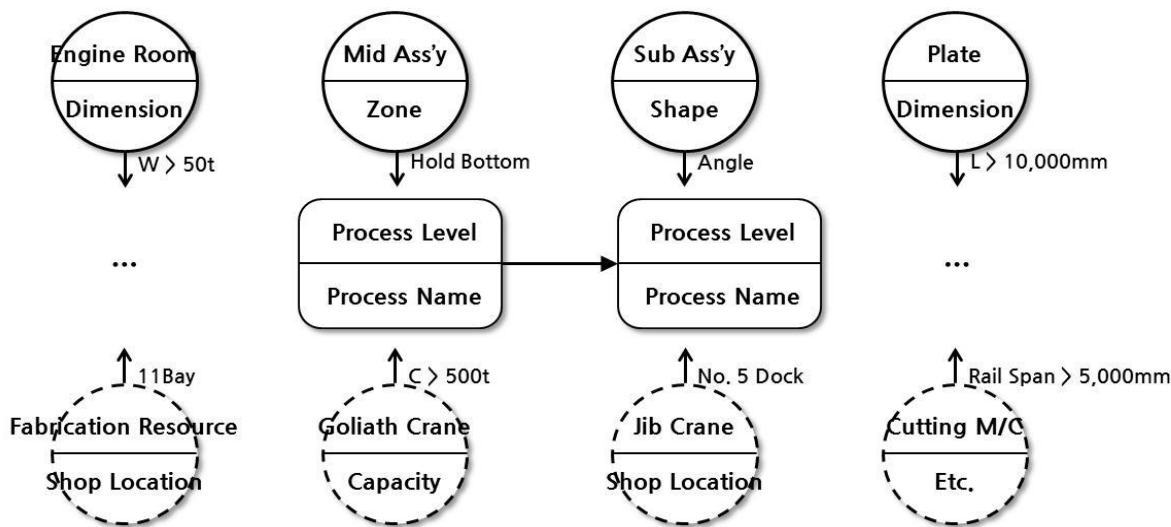

Figure 1: Concept and Example of Process based Simulation Model

ulation modeling method proposed in this study was based on process and defined by connecting facility used when executing process with product data used as parts during execution. As simulation is performed and process is executed, connected facility and product are consumed.

As this study selected and performed simulation lower shop level of shipyard, schedule data used at shop level of target shipyard was the subject of this study. Target shipyard used Work Order and Work Package as production schedule at the shop level. Based on defined methodology, example of modeling 1 shop of the target shipyard is as follows(Figure 1).

3   AN IMPLEMENTATION OF DIGITAL SHIPYARD AND AN EXAMPLE OF RESULT

Meaningful data has to be obtained from the site after performing process based shipyard production simulation in order for the simulation to have engineering significance. As simulation was performed based on process, basic result can only lead to virtual result of process which was the subject of the simulation. Schedule result for process at Work Order and Work Package level was obtained from this study and output was in Schedule Bar Chart format which is the most familiar type of production schedule result.

Basically, shop level simulation result was checked in Schedule Bar Chart format but person performing simulation is not simply seeking to know just the schedule. Schedule Bar Chart can be used to check how much the simulation replicates actual state while simulation was confirmed to be able to obtain meaningful results and it can then be used for the purpose of checking actual load occurrence. This study created a screen to be able to check load by equipment and shop which is used as important decision-making index in the target shipyard. This results are validated by comparison with actual results from 2011.

4   CONCLUSION

As existing Manufacturing Logistics Simulation Application cannot model production environment of shipyard to be easily understood by field user, simulation modeling methodology was created based on process data which is actually used by workers and target shipyard was selected to obtain results by using actual shipyard data. The simulation was able to obtain production schedule at the most basic Work Order level and check load of significant equipment by time slot. Based on this result, this study was able to confirm that it was possible to implement a Digital Shipyard that can be effectively used by field users.
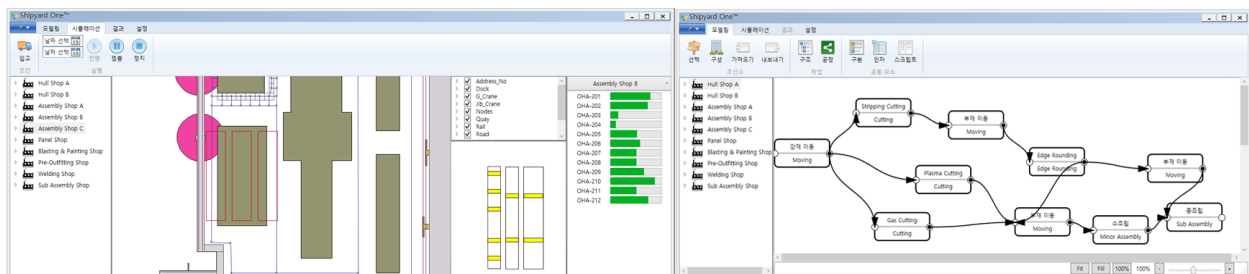

Figure 2: Screen Shots of Executing the Process Based Simulation for Shipyard

REFERENCES

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