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<div align="center">論 文 内 容 要 旨</div>

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学位論文題目	Overall performance effectiveness with customer demand and environmental consideration (顧客需要と環境要因による全体的なパフォーマンスの有効性)

内容要旨(600 - 1000 WORDS)

Overall equipment effectiveness (OEE) comprises of three elements called availability, performance ratio and quality ratio are mainly used to quantify downtime losses, speed losses and defects respectively. In ideal case, it encourages machine to operate all the time at the ideal speed and to produce no quality defect. In this study, it is implemented by an aerospace part manufacturing company which comprises of five workstations, namely layup process, autoclave, de-mold process, CNC trimming and NDT inspection, in its production system. Based on the observation, effectiveness of one workstation and transportation efficiency would affect the performance of other workstation they connect with. However, there is lack of integration between workstations and transporting activities under the implementation of OEE. This could be seen from the fluctuation of output at each workstation and inconsistent utilization of workstation whenever the transporting activities are not performed well whenever they are needed. Besides, other problems include the deviation of production from customer demand, and also the imbalanced capacity among processes which were are not quantified by OEE either. Consequently, this leads to inefficient material flow, over-production and excessive inventory level, as well as lack of interaction between workstations because the case company does not know where to initiate any corresponding improvement without the measure. First objective of this study is to study and quantify the impact of varying transportation efficiency onto the workstations in term of throughput and lead time of products. Besides, it aims to synchronize capacity available within production system and also to monitor the fulfillment of customer demand in terms of delivery time and production amount. The target of these objectives are shorter lead time and wait time, less throughput, minimal equipment utilization and less capacity incurred in achieving and fulfilling customer demand. Simulation approach is applied because it enables the study of system behavior under various parameters and scenarios without interfering the daily production of the company. The results prove that both transportation efficiency and performance of Autoclave workstation affect material flow and throughput rate of other workstations. Consequently, the performance of workstations they connect with are also affected. Besides, simulation also proves different production rate and imbalanced capacity througho

ut production system as sighted in site observation. Therefore, Overall Performance Effectiveness (OPE) which comprises of availability, performance ratio and delivery performance is proposed in this study. It considers customer demand, historical equipment utilization and Takt time of each workstation to promote reasonable utilization of resource. It prevents both over processing and overproduction issues which are invisible in existing OEE. In particular, availability promotes smooth material turnaround, reduces consumption of materials and minimizes deviation between production amount and customer demand. Performance ratio, on the other hand, ensures reasonable utilization and production pace by considering historical utilization and also customer demand required. Furthermore, delay propagation throughout production system and the aforementioned interrelationship between processes could be quantified by delivery performance (DP) of the OPE. The waiting time and lead time spent in each workstation are monitored under the DP. Responsibility of all workstations and transportation process in delivering demand on timely basis are encouraged. Last but not least, transportation process which serves as the connectors of manufacturing workstations is also quantified and monitored via the proposed Transportation Measure (TM). TM aims to reduce the queue length at destination and the corresponding waiting time with reasonable utilization of forklift. It also promotes less capacity investment in transportation and prioritizes its scheduling according to queue length or urgency of destination workstation. This is useful for the assignment of shared transporting capacity and also monitoring the impact of transporting activities onto the manufacturing processes. In short, all objectives are achieved and fulfilled. The newly proposed Overall Performance Effectiveness (OPE) and the quantification of Transportation Measure (TM) which affect each other help in promoting better delivery performance in terms of production amount and lead time. The effectiveness of entire production line is examined as a unity with joint responsibility under varying transportation efficiency and cycle time of each workstation. Both OPE and TM could be implemented together to optimize the production system. All of these are not quantified and provided by the OEE implemented by the case company. The proposed OPE and TM have resolved the issues which was invisible under the OEE implemented by the case company.