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A COMPARISION OF IWOBS AND MEESA TECHNIQUES FOR MAKESPAN AND AVERAGE PROCESSING TIME CONSTRAINTS IN JOB SHOP SCHEDULING

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Abstract- Job Shop scheduling is a decision-making problem. Generally, the Job Shop Scheduling Problem (JSSP) occurs in the job scheduling process in some machines or resources at a certain time. Many researchers expanded various models of the JSSP from the mid-50s and developed several algorithms to solve it. In Job shop Scheduling decreasing the average processing time of individual jobs, improving the malespan of the overall job shop and Energy conservation are the key factors to be considered. In this paper Modified Energy Efficiency Scheduling Algorithm (MEESA) and Improved Whale Optimization with Buffer Setup time (IWOBS) two new techniques adopted were compared.

Keywords: MEESA, Scheduling, Optimization, Resources, JSSP.

INTRODUCTION

Job Shop Scheduling proposed the makespan, lateness minimization and less energy consumption with the help of optimization, heuristic and scheduling algorithms.In the IWOBS it consists of three operators which help to identify the optimum buffer to reduce the lateness parameter in job shop scheduling. As well as it proposed another heuristic algorithm called genetic. It has a fitness-based selection process to optimize the solutions. The best of solutions are found from the tested solutions to solve the given set of problems. Buffer is one of the temporarily stored data which helps in whale optimization algorithm. In existing works, three types of buffers are used to scheduling problem but they are not efficient enough to handle the job operations. To address this issue, proposed the setup time buffer to process the job operations. Finally, optimized the best buffer with less time in IWOBS technique is found.

The tabu movement is applied at 3rd iteration because the condition is optimal than the previous one and also that is less than the θ value. The optimum buffer is found at 3rd iteration. The jobs are delivered with less time compared than existing buffers. In the MEESA algorithm, modified scheduling algorithm and the energy efficiency is used to determine the makespan and effective energy efficiency. MEESA contains two sub-parts like analysing effective rate and modified scheduled aware mechanism. Job shop scheduling improves the

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efficiency rate, energy efficiency, makespan, and product efficiency. The makespan and energy level in job operation had been reduced this work because the proposed work had a machine-based operating mechanism and initial time setup which makes to optimize the makespan time according to the energy consumption of the machine. The efficiency of two proposed technique named IWOBS and MEESA were analysed in this paper by comparing with each other. The following parameters are taken for the comparison,

- Average Processing Time
- Makespan

AVERAGE PROCESSING TIME

The average processing time parameter is used to measure the period of one or more inputs during which are transformed into finished products by a manufacturing procedure. It has a cost accounting term that defines the amount of time a job is sitting ideal before the order is processed or the machine is setup. Machines need to be set up many times for specific jobs before the orders run and custom parts need to be ordered from outside vendors. This amount of time between when the customer places an order and when the manufacture actually produces the product at a particular time.

Number of Processing jobs	Average processing time (minutes)	
	IWOBS	MEESA
J2	4	6
J1	3	5
J4	7	9
J3	5	7
J5	9	11

Table 1 Average processing time of IWOBS and MEESA algorithm.

Table 1 contains the average processing time values of both IWOBS and MEESA. When both techniques have different processing time values while performing the number of jobs.

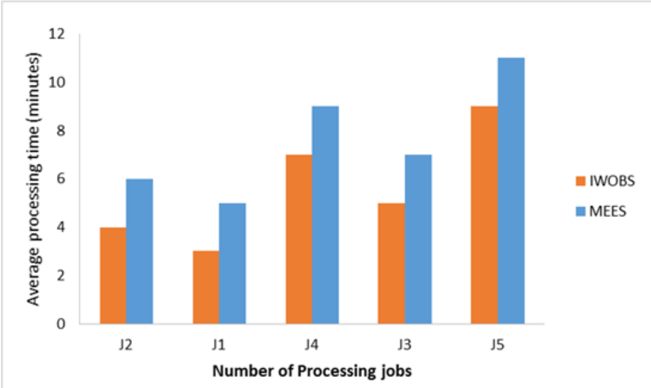

Fig. 1 Compares the Average Processing Time IWOBS And MEESA

Fig. 1 represents the average processing time in comparison between IWOBS and MEESA algorithms. This comparison proved that the IWOBS attain the lowest processing time than MEESA because IWOBS have a setup time and it is used to set the time in buffers, after that each job runs their process with a certain time. After the completion of the process, the job can be delivered with less time than MEESA.

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MAKESPAN

The makespan parameter is used to calculate the overall completion time of the job. Both IWOBS and MEESA technique calculates the Makespan in seconds. The amount of time, from start to finish for completing a set of jobs, i.e. the maximum completion time of all jobs.

Total Energy	Average processing time (milliseconds)	
	IWOBS	MEESA
7500	527	512
8000	548	530
8500	557	540
9000	569	550
9500	586	565
10000	612	590
10500	624	600

Table 2 Makespan of IWOBS and MEESA Algorithm

Table 2 contains the average processing time values of both IWOBS and MEESA. When both techniques have different energy values while performing the total energy values

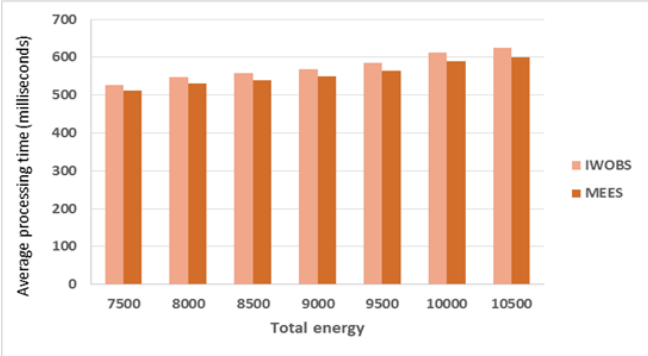

Fig 2 Compares the Makespan between IWOBS and MEESA

Fig. 2 represents the makespan time comparison between IWOBS and MEESA. The results outperformed the MEESA algorithm to achieve the lowest makespan time than IWOBS. Because the MEESA had a ranking and optimizing time schedule. This schedule is used to minimize the makespan in job shop scheduling and determining the earlier finish time of each job.

CONCLUSION

In Job shop Scheduling decreasing the average processing time of individual jobs, improving the malespan of the overall job shop and Energy conservation are the key factors Modified Energy Efficiency Scheduling Algorithm (MEESA) and Improved Whale Optimization with Buffer Setup time (IWOBS) two new techniques adopted were compared in this paper and found that IWOS works fine with decreasing the Average processing time of a particular Job and MEESA works fine with improving the overall makespan and energy consuming factors in a job shop.

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