Minimizing total flow time in the single-machine scheduling problem with periodic maintenance

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As we observe, the numerical example proposed by Chen (2006) is incorrect because the author does not follow the steps of their proposal heuristic algorithm to illustrate example 1. According to Step 1(i) of the heuristic algorithm proposed by Chen, we should have three batches each with a total processing time of $T=8$. For instance, the first batch may contain the first three jobs, the second batch may contain the next three jobs, and the third batch may contain the next three jobs. According to Step 1(ii), we then have another batch with a total processing time of $T-4=4$. If the heuristic algorithm performs exactly as we have just done, then the initial schedule, σ_π , after Step 1 can be presented as shown in Table 1.

After Step 3, we obtain $F(\sigma_\pi)=164$, see Table 2.

It can be checked that the schedule presented in Table 2 is the final schedule. In other words, Steps 4–7 of the heuristic algorithm will not change the schedule.

Moreover, Knödel (1981) does not indicate the method of grouping jobs as stated in Step 1(i) of the heuristic, see Knödel (1981) for details.

Response to Xu and Xiong

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Using Steps 1–3 of the heuristic, we can obtain many schedules. One of the schedules is the one presented in Table 6 (in the original article).

J_i	J_3	J_4	J_9	J_5	M_1	J_8	J_6	J_{10}	M_2	J_1	J_2	M_3	J_7
p_i	1	2	2	3		1	3	4		3	4		5
C_i	1	3	5	8		11	14	18		23	27		35
$F(S)$	1	4	9	17		28	42	60		83	110		145

In order to facilitate a better understanding of the heuristic, we chose an initial table (Table 2, in the original article) to match the steps of the heuristic. This

Table 1 Initial schedule after Step 1 of the heuristic for example 1 (in h)

J_i	J_1	J_2	J_3	M_1	J_4	J_5	J_6	M_2	J_7	J_8	J_9	M_3	J_{10}
p_i	3	4	1		2	3	3		5	1	2		4
C_i	3	7	8		12	15	18		25	26	28		34
$F(S)$	3	10	18		30	45	63		88	114	142		176

Table 2 Initial schedule after Step 3 of the heuristic for example 1 (in h)

J_i	J_3	J_1	J_2	M_1	J_4	J_5	J_6	M_2	J_8	J_9	J_7	M_3	J_{10}
p_i	1	3	4		2	3	3		1	2	5		4
C_i	1	4	8		12	15	18		21	23	28		34
$F(S)$	1	5	13		25	40	58		79	102	130		164

References

- Chen WJ (2006). Minimizing total flow time in the single-machine scheduling problem with periodic maintenance. *J Opl Res Soc* **57**: 410–415.
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is because the schedule with some potential positions (Theorems 2 and 3 can be applied) is usually produced in our testing.

Therefore, Table 1 (in the Viewpoint contributed by Xu and Xiong, ...) constitutes one of the above-discussed schedules. We think that Table 2 (by Xu and Xiong ...) is not the final schedule and can be improved by using the heuristic.

Finally, we need to remark that we (not Knödel, 1981) use the bin-packing technique to group jobs; this technique was just mentioned but not used by Knödel.

Reference

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