

Student(s)

Metin Arca Öz- 19267
Kaan Kalaycı- 19360
Erdem Yusuf Yıldırım- 19517
Rubi Can İçliyürek- 17949

Faculty Member(s)

BARIŞ BALCIOĞLU

Company Advisor(s)

Uğur Çoruh



ABSTRACT



Figure 1

We made our project in the quality control department of Torun Bakır Alaşımaları Metal Sanayi ve Tic. A.Ş which is a company using raw material of brass and making products upon demand. We did our project in GOSB (Gebze Organize Sanayi Bölgesi) facility which is the biggest facility that they have. In 2017, their revenue was around 70 million Dollars and this year they prediction is around 80 million Euros.

The problem of the company was the unnecessary time spent in the quality control department. The fact that the quality control department has a high processing time leads to delays in production. Their existing algorithm is FCFS and this rule does not always give good results. We purpose to change their system by employing the shortest processing time (SPT) algorithm. In order to demonstrate the efficiency, we have written a code in Python, which none of us knew before. With the help of the C ++ program we have seen before, we cannot say that we had a hard time learning this program. We have done a numerical study in the Python program to demonstrate the superiority of the SPT based algorithm.

OBJECTIVES

The objective of the project is to minimize the time in the quality control department. In order to achieve this goal, we have been in constant contact with our factory which visited many times. We tried to fully understand the existing system, such as whether the test machines were identical, which product is measured in order that the new approach we brought could fully meet their demands. Based on our preliminary results that orders jobs according to shortest processing time (SPT), we can already foresee that everything goes well and our project will result in a positive way.

PROJECT DETAILS

Our first experiment for one machine

FIFO

```
Enter the processing time of the processes:
10 20 7 13 30
```

Process	Processing Time	Waiting Time	Completion Time
0	10	0	10
1	20	10	30
2	7	30	37
3	13	37	50
4	30	50	80

Average Waiting time is: 25.4
Average Completion Time is: 39.4

Figure 2

SPT MODEL

Process	Processing Time	Waiting Time	Completion Time
3	7	0	7
1	10	7	17
4	13	17	30
2	20	30	50
5	30	50	80

Average Waiting time is: 20.8
Average Completion Time is: 35.4

Figure 3

Our final result for 5 CMM machines

OUTPUT

```
C:\Users\Arca\Desktop>python project.py
En iyi model:
Makine 1: [5, 15, 8, 16]
Makine 2: [10, 6, 9, 18]
Makine 3: [13, 3, 14, 19]
Makine 4: [2, 12, 11, 4]
Makine 5: [7, 1, 17, 20]
Toplam Sure: 81 90 96 134 150

FIFO Modeli:
Makine 1: [1, 10, 12, 14, 19]
Makine 2: [2, 7, 11, 17]
Makine 3: [3, 8, 13, 15, 18]
Makine 4: [4, 20]
Makine 5: [5, 6, 9, 16]
Toplam Sure: 114 87 104 160 86
```

Figure 4

DATA

Parca_ID	Sure
1	20
2	10
3	17
4	80
5	4
6	15
7	10
8	20
9	25
10	5
11	27
12	17
13	7
14	25
15	15
16	42
17	40
18	45
19	47
20	80

Figure 5

In order to realize the Python program that we did not know before, we conducted many experiments. After a thorough understanding of the program with these experiments (Created table including parts; created SQLite database table and added/deleted/updated values in the table) we first wrote the code for a single machine under the FCFS and SPT rules in the Python program. As you can see, it is clear that the SPT rule minimizes the mean waiting time. After seeing that we can conclude on a single machine, we have done some work to write the necessary codes on the 5 CMM machines as the company expected from us. First, we tried to see the desired task by typing it outside the code world. The results we found by writing on the paper showed that the SPT rule is also efficient for 5 machines. Then we found the above results by transferring the result we found on paper to the Python program. It is seen clearly from the above that we can get a 10 minute gain as a result of the program we write about a work that lasts about 3 hours. In a 24-hour-study, we expect this gain to be approximately 1 hour.



Figure 6



Figure 7

CONCLUSION

First the problem of the factory is identified. After understanding the problem, the solution strategies of the problem were considered. It was decided to use the Python program to implement the proposed solution. Our motivation was to reduce the testing time. We wanted to increase the efficiency of the firm by using some methods that we have learned theoretically in the lessons and Python programme. After learning the Python program, some experiments were conducted. It was a great chance for us to see that we can use some methods and information that we see theoretically in lessons.

REFERENCES

Heragu, S. (n.d.). *Facilities Design*.