Machine Scheduling Optimizer

User Manual

Chen Liwei (A0101217B)
Raymond Djajalaksana (A0195381X)
Ng Cheong Hong (A0195290Y)
Seah Jun Ru (A0097451Y)
Lee Boon Kien (A0195175W)

SYSTEM OVERVIEW

Our Machine Scheduling Optimizer is mainly targeting manufacturing area. While in this demonstration we cover a basic manufacturing process, our system can easily be extended and customized to any manufacturing process. It is a simple application that will create and plan the best machine scheduler for you to produced the desired components. The system will try to maximize your profit will creating such plan. All you need to do is just to fill in price and number of components to be produced.

USER INTERFACE

Our user interface runs using react js framework. Once our backend engine returns the computation of machine schedule optimization, the web application will show all the details of machine schedule process, including unit produced, profitability, and schedule visualization to help imagining the schedule process.

RECOMMENDED BROWSERS

The system supports the following Web Browsers:

- Internet Explorer 11
- Google Chrome Version 72 and above
- Safari Version 12 and above

REQUIREMENTS

- nodejs and npm should be installed. Otherwise please download and install from the following website: https://www.npmjs.com/get-npm
- To run the backend system, you can just run the binary file (src/go/main.exe). But it is also recommended to always install Golang version 1.12.4 or later. Please follow the installation in https://golang.org/dl/

INSTALLATION AND DEPLOYMENT

```
# 1. install all front end dependencies
cd SystemCode/comp  any-order-form
npm i react-scripts
npm install


# 2. Run both web app and backend system
start_server.sh # to start backend system
web_app.sh # to start web app
start.sh # to run both start_server.sh and web_app.sh
```

SAMPLE INPUT & SYSTEM OUTPUT

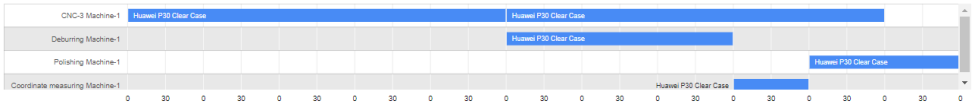
Scenario 1

<table>
<tr><td>Characteristic of sales</td><td>Received order on 3 type of casings and produced all orders</td></tr>
<tr><td>Input</td><td>Quick Scan: Off

<table>
<tr><th></th><th>Cost ($/unit)</th><th>Price ($/unit)</th><th>Order Received (unit)</th></tr>
<tr><td>Samsung S9 Silicone Case (Coloured)</td><td>1</td><td>3</td><td>1500</td></tr>
<tr><td>Huawei P30 Clear Case</td><td>1</td><td>2</td><td>2000</td></tr>
<tr><td>Samsung Galaxy Tab A.10.1 Case</td><td>1</td><td>2</td><td>1000</td></tr>
</table></td></tr>
<tr><td>System output:</td><td>Result
Total profit is $4176.74.
Components that cannot be produced within the month
• Samsung S9 Silicone Case (Coloured): 0
• Huawei P30 Clear Case: 0
• Samsung Galaxy Tab A.10.1 Case: 0
• Microsoft Surface Pro 5 Protective Case: 0
• Iphone X Normal Case: 0
• Iphone XS SE Case (Gold Colour): 0
• Iphone XS Colour: 0
• Ipad Pro 12.9 inch Case: 0
Batch No. 1
 

<table>
<tr><th></th><th>Samsung S9 Silicone Case (Coloured)</th><th>Huawei P30 Clear Case</th><th>Samsung Galaxy Tab A.10.1 Case</th></tr>
<tr><td>Units Produced</td><td>1400</td><td>1166</td><td>1000</td></tr>
<tr><td>Unit Profit</td><td>1.45</td><td>0.6</td><td>0.71</td></tr>
<tr><td>Cycle Time</td><td>5</td><td>6</td><td>7</td></tr>
</table></td></tr>
</table>

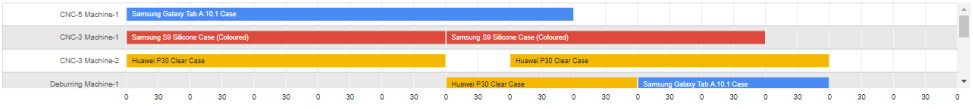
<table>
<tr>
<td></td>
<td>
Batch No. 2


<table>
<tr><th></th><th>Samsung S9 Silicone Case (Coloured)</th><th>Huawei P30 Clear Case</th></tr>
<tr><td>Units Produced</td><td>100</td><td>100</td></tr>
<tr><td>Unit Profit</td><td>1.45</td><td>0.71</td></tr>
<tr><td>Cycle Time</td><td>5</td><td>5</td></tr>
</table>
Batch No. 3


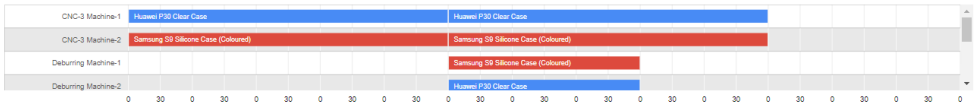
<table>
<tr><th></th><th>Huawei P30 Clear Case</th></tr>
<tr><td>Units Produced</td><td>734</td></tr>
<tr><td>Unit Profit</td><td>0.71</td></tr>
<tr><td>Cycle Time</td><td>5</td></tr>
</table>
</td>
</tr>
<tr>
<td rowspan="4">Analysis of system output</td>
<td>Features</td>
<td>Output</td>
<td>Explanation of system’s output</td>
</tr>
<tr>
<td>Profit</td>
<td>$4176.74</td>
<td>Based on the units produced and unit profit, the factory is able to achieve the optimum profit of $4176.74 after optimizing the schedule.</td>
</tr>
<tr>
<td>Outstanding component</td>
<td>0</td>
<td>The factory is able to manufacture all the orders received within the month</td>
</tr>
<tr>
<td>Recommended machine schedule</td>
<td>Refer to the graph attached above</td>
<td>Based on divide and conquer method, the system recommends to carry out the manufacturing in 3 batches.</td>
</tr>
</table>

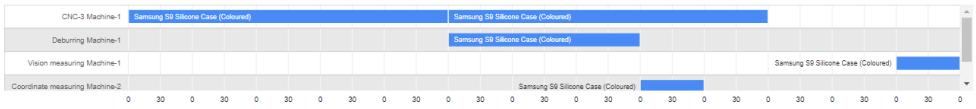
Scenario 2

<table>
<tr><td>Characteristic of sales</td><td>Received order on 3 type of casings with outstanding orders</td></tr>
<tr><td>Input</td><td>Quick Scan: Off

<table>
<tr><th></th><th>Cost ($/unit)</th><th>Price ($/unit)</th><th>Order Received (unit)</th></tr>
<tr><td>Samsung S9 Silicone Case (Coloured)</td><td>1</td><td>3</td><td>3000</td></tr>
<tr><td>Huawei P30 Clear Case</td><td>1</td><td>2</td><td>2000</td></tr>
<tr><td>Samsung Galaxy Tab A.10.1 Case</td><td>1</td><td>2</td><td>1000</td></tr>
</table></td></tr>
<tr><td>System output:</td><td>Result
Total profit is $6147.3.
Components that cannot be produced within the month
• Samsung S9 Silicone Case (Coloured): 126
• Huawei P30 Clear Case: 0
• Samsung Galaxy Tab A.10.1 Case: 0
• Microsoft Surface Pro 5 Protective Case: 0
• Iphone X Normal Case: 0
• Iphone XS SE Case (Gold Colour): 0
• Iphone XS Colour: 0
• Ipad Pro 12.9 inch Case: 0
Batch No. 1
 

<table>
<tr><th></th><th>Samsung S9 Silicone Case (Coloured)</th><th>Huawei P30 Clear Case</th><th>Samsung Galaxy Tab A.10.1 Case</th></tr>
<tr><td>Units Produced</td><td>1400</td><td>1166</td><td>1000</td></tr>
<tr><td>Unit Profit</td><td>1.45</td><td>0.71</td><td>0.56</td></tr>
<tr><td>Cycle Time</td><td>5</td><td>6</td><td>7</td></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td colspan="3">Batch No. 2
 

<table>
<tr><td></td><td>Samsung S9 Silicone Case (Coloured)</td><td>Huawei P30 Clear Case</td></tr>
<tr><td>Units Produced</td><td>834</td><td>834</td></tr>
<tr><td>Unit Profit</td><td>1.45</td><td>0.71</td></tr>
<tr><td>Cycle Time</td><td>5</td><td>5</td></tr>
</table>
Batch No. 3
 

<table>
<tr><td></td><td>Samsung S9 Silicone Case (Coloured)</td></tr>
<tr><td>Units Produced</td><td>640</td></tr>
<tr><td>Unit Profit</td><td>1.45</td></tr>
<tr><td>Cycle Time</td><td>5</td></tr>
</table></td></tr>
<tr><td rowspan="4">Analysis of system output</td><td>Features</td><td>Output</td><td>Explanation of system’s output</td></tr>
<tr><td>Profit</td><td>$6147.3</td><td>Based on the units produced and unit profit, the factory is able to achieve the optimum profit of $6147.3 after optimizing the schedule.</td></tr>
<tr><td>Outstanding component</td><td>Samsung S9 Silicone Case (Coloured): 126</td><td>Due to limited time and machine, 126 nos. of Samsung S9 Silicone Case (Coloured) remained as outstanding component.</td></tr>
<tr><td>Recommended machine schedule</td><td>Refer to the graph attached above</td><td>Based on divide and conquer method, the system recommends to carry out the manufacturing in 3 batches.</td></tr>
</table>

Scenario 3

<table>
<tr><td>Characteristic of sales</td><td>Received order on 5 type of casings with outstanding orders</td></tr>
<tr><td>Input</td><td>Quick Scan: On

<table>
<tr><th></th><th>Cost ($/unit)</th><th>Price ($/unit)</th><th>Order Received (unit)</th></tr>
<tr><td>Samsung S9 Silicone Case (Coloured)</td><td>1</td><td>3</td><td>1200</td></tr>
<tr><td>Huawei P30 Clear Case</td><td>1</td><td>2</td><td>800</td></tr>
<tr><td>Samsung Galaxy Tab A.10.1 Case</td><td>1</td><td>2</td><td>1000</td></tr>
<tr><td>Microsoft Surface Pro 5 Protective Case</td><td>1</td><td>4</td><td>700</td></tr>
<tr><td>Iphone X Normal Case</td><td>1</td><td>5</td><td>500</td></tr>
<tr><td>Iphone XS SE Case (Gold Colour)</td><td>2</td><td>4</td><td>1000</td></tr>
<tr><td>Iphone XS Colour</td><td>2</td><td>5</td><td>600</td></tr>
<tr><td>Ipad Pro 12.9 Inch Case</td><td>2</td><td>6</td><td>1000</td></tr>
</table></td></tr>
</table>

System output:

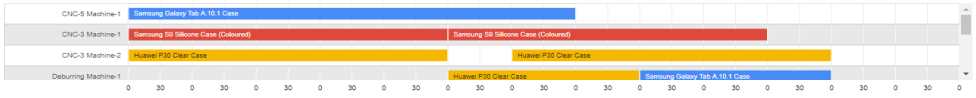
Result

Total profit is $6147.3.

Components that cannot be produced within the month

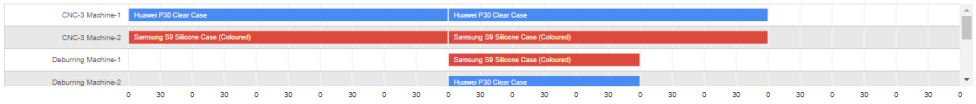
- Samsung S9 Silicone Case (Coloured): 126
- Huawei P30 Clear Case: 0
- Samsung Galaxy Tab A.10.1 Case: 0
- Microsoft Surface Pro 5 Protective Case: 0
- Iphone X Normal Case: 0
- Iphone XS SE Case (Gold Colour): 0
- Iphone XS Colour: 0
- Ipad Pro 12.9 inch Case: 0

Batch No. 1



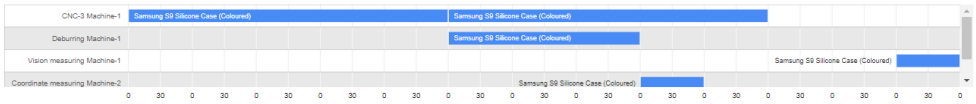
	Samsung S9 Silicone Case (Coloured)	Huawei P30 Clear Case	Samsung Galaxy Tab A.10.1 Case
Units Produced	1400	1166	1000
Unit Profit	1.45	0.71	0.56
Cycle Time	5	6	7

Batch No. 2



	Samsung S9 Silicone Case (Coloured)	Huawei P30 Clear Case
Units Produced	834	834
Unit Profit	1.45	0.71
Cycle Time	5	5

Batch No. 3



	Samsung S9 Silicone Case (Coloured)
Units Produced	640
Unit Profit	1.45
Cycle Time	5

Analysis of system output

Features	Output	Explanation of system's output
Profit	$6147.3	Based on the units produced and unit profit, the factory is able to achieve the optimum profit of $6147.3 after optimizing the schedule.
Outstanding component	Samsung S9 Silicone Case (Coloured): 126	Due to limited time and machine, 126 nos. of Samsung S9 Silicone Case (Coloured) remained as outstanding component.
Recommended machine schedule	Refer to the graph attached above	Based on divide and conquer method, the system recommends to carry out the manufacturing in 3 batches.