Skateboard Assembly Cycle Time – High School
Student Worksheet

Table 1: Base Case versus Methods Improvement

<table>
<thead>
<tr>
<th>Station #</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Case</td>
<td>33.1</td>
<td>27.6</td>
<td>28.2</td>
<td>12.3</td>
<td>41.1</td>
<td>33.3</td>
<td>36.6</td>
</tr>
<tr>
<td>Methods Improvement</td>
<td>34.9</td>
<td>23.8</td>
<td>25.0</td>
<td>7.8</td>
<td>39.7</td>
<td>29.6</td>
<td>34.0</td>
</tr>
<tr>
<td>Percent Change (nearest 100(^{th}) of a %)</td>
<td>-5.44%</td>
<td>13.77%</td>
<td>11.35%</td>
<td>36.59%</td>
<td>3.41%</td>
<td>11.11%</td>
<td>7.10%</td>
</tr>
</tbody>
</table>

**Percent Change Formula =**

1) Determine a method for computing the overall percent change of the assembly line.

   Add the total time for each method and calculate the percent change between those times.

2) Compute the Overall Percent Change after for Methods Improvement: \(8.20\%\)

Table 2: Base Case versus Adding Labor

<table>
<thead>
<tr>
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<tr>
<td>Adding Labor</td>
<td>27.3</td>
<td>23.3</td>
<td>24.2</td>
<td>6.1</td>
<td>18.7</td>
<td>26.5</td>
<td>29.5</td>
</tr>
<tr>
<td>Percent Change (nearest 100(^{th}) of a %)</td>
<td>17.52%</td>
<td>15.58%</td>
<td>14.18%</td>
<td>50.41%</td>
<td>54.5%</td>
<td>20.42%</td>
<td>19.40%</td>
</tr>
</tbody>
</table>

3) Compute the Overall Percent Change for Adding Labor: \(26.67\%\)

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4) What are the benefits of reducing Cycle Time?

It would cost the company less money since the products would be assembled at a faster rate.

5) When can a reduction in Cycle Time NOT improve revenue for the manufacturer?

When the product’s quality is being compromised because operators are performing their assigned tasks too quickly, therefore making mistakes or not being thorough

**Cost Analysis**

6) What are some costs of running a skateboard manufacturing company?

Materials, Labor, Utilities, Rent/Lease, Equipment, etc.

7) If the Total Manufacturing Cost (C) for the company equals the cost of each employee’s Hours (h) at Minimum Wage ($7.25/hour) plus the Fixed Manufacturing Costs (FC) of the facility, write a linear equation for Total Manufacturing Cost (C) in terms of h and FC.

\[ C = 7.25h + FC \]

8) What is the relationship between Hours worked (h) and Total Manufacturing Costs (C)?

The more Hours worked the more the Total Manufacturing Costs would be.
9) Assume the Fixed Manufacturing Costs (FC) for a small skateboard company are $4,500 per month and the company’s budget for the Total Manufacturing Cost (C) per month is $17,000.

a) What is the maximum number of hours (per month) that can be worked by their employees, who earn $7.25/hr? Round your answer to the nearest whole hour.  

$$1724 \text{ hours}$$

b) If each employee workers 40 hours/week, or 160 hours/month, what is the maximum number of employees that can be hired? 

$$10 \text{ employees}$$

c) The company would like to give every employee a 10% raise from $7.25/hr. Would this translate to a 10% increase in the Total Manufacturing Cost per month?  

No

Justify your answer.

A 10% raise in hourly wage would be $7.98/hr.

<table>
<thead>
<tr>
<th>Before the raise</th>
<th>After the raise</th>
</tr>
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<tr>
<td>$C = 7.25 + 4500$</td>
<td>$C = 7.98h + 4500$</td>
</tr>
<tr>
<td>Using $h = 160 \text{ hours (1 month)}$</td>
<td>Using $h = 160 \text{ hours (1 month)}$</td>
</tr>
<tr>
<td>$C = $5660.00$</td>
<td>$C = $5776.80$</td>
</tr>
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</table>

The percent change in monthly costs would be 2.06%

d) The company has reevaluated its Fixed Manufacturing Costs and realized they only spend $4,000 per month. They would like to increase the rate of pay for their employees to $7.75/hr.

Would the Total Manufacturing Cost for the month be more or less?  

Less

Justify your answer.

$$C = 7.25(160) + 4500 \quad \text{C} = 7.75(160) + 4000$$

$$C = \$5660 \quad C = \$5240$$

For how many hours worked for the month would the Total Manufacturing Cost be the same?

Answer may be determined graphically or algebraically.

$$C = 7.25h + 4500 \quad 7.25h + 4500 = 7.75h + 4000$$

$$h = 250 \text{ hours}$$

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