**MSBA7004 Assignment 1: Kristen Cookie Company**

#Assumptions made:

1. Baked cookies remain on the baking tray during cooling.
2. The baking tray is still occupied when roommate is packing the cookies.
3. Kristen has more than 1 baking tray. (at least 2)

**Q1.**

Process Flow Chart

Activities:

1. Wash mixer’s bowl and beaters from previous batch and mix ingredients (Mix)
2. Spoon cookies onto tray (Spoon)
3. Put cookies in oven and set thermostat and timer (Set)
4. Bake cookies in oven (Bake)
5. Put cookies aside for cooling (Cool)
6. Pack cookies (Pack)
7. Accept payment (Payment)

Mix

Spoon

Set

Bake

Cool

Pack

Payment

**Q2.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Resources** | Mixer  Kristen | Baking Tray  Kristen | Oven  Baking Tray  Roommate | Oven  Baking Tray | Baking Tray# | Baking Tray#  Roommate | Roommate |
| **Flow Time**  **(min)** | 6  (for 1-3 doz) | 2  (per doz) | 1  (per doz) | 9  (per doz) | 5  (per doz) | 2  (per doz) | 1  (per order) |

|  |  |  |
| --- | --- | --- |
| **Resources** | **Unit load (min/doz)** # | **Capacity rate (doz/hr)** |
| Mixer | 6 (Mix) | 10 |
| Baking Tray | 19  (Spoon + Set + Bake + Cool + Pack) | 3.16 \* 2  (assume 2 baking trays#)  =6.32 |
| Oven | 10 (Set + Bake) | 6 |
| Kristen | 8 (Mix + Spoon) | 7.5 |
| Roommate | 4 (Set + Pack + Payment) | 15 |

Therefore, the bottleneck resource is **oven** with lowest capacity rate.

**Q3.**

For a rush order with 1 dozen cookies, flow time = 6+2+1+9+5+2+1 = 26 mins

Refer to Q2, since the bottleneck is oven, the cycle time is 10 mins.

If the order is larger than 1 dozen, total time to produce k dozens

= flow time + (k-1)\*cycle time

=26+(k-1)\*10

**Q4.**

Refer to Q2, time used for Kristen: 8 min/doz, time used for roommate: 4 min/doz.

**Q5.**

A Gantt chart is prepared for 3 cycles of order (of 1 dozen):

A colorful lines and squares

Description automatically generated with medium confidence

Red: Cycle 1

Orange: Cycle 2

Green: Cycle 3

From the chart we can see that 1 mixer is sufficient to handle multiple cycles of order.

Whereas at least 2 baking trays are needed to handle multiple cycles of order.

With 2 baking trays, tray 1 could be used to handle cycle 1, then would have 1 min of idle time, and could be put into use for cycle 3. Similarly, although not shown in the chart, tray 2 could also have 1 min of idle time after handling cycle 2, and before being put into use for cycle 4.

**Q6.**

Since the bottleneck is the oven, we may rent/purchase another oven to increase the capacity rate of this resource. If one more oven is available, while we only have 2 baking trays, then the bottleneck will become baking trays.