Module 2 – Practice Questions

Atlas Inc

Atlas Inc. is a toy bicycle manufacturing company producing a five-inch small version of the bike that Lance Armstrong rode to win his first Tour de France. The assembly line at Atlas Inc. consists of seven work stations, each performing a single step. Stations and processing times are summarized here:

- Step 1 (30 sec.): The plastic tube for the frame is cut to size.
- Step 2 (20 sec.): The tube is put together.
- Step 3 (35 sec.): The frame is glued together.
- Step 4 (25 sec.): The frame is cleaned.
- Step 5 (30 sec.): Paint is sprayed onto the frame.
- Step 6 (45 sec.): Wheels are assembled.
- Step 7 (40 sec.): All other parts are assembled to the frame.

Under the current process layout, workers are allocated to the stations as shown here:

- Worker 1: Steps 1, 2
- Worker 2: Steps 3, 4
- Worker 3: Step 5
- Worker 4: Step 6
- Worker 5: Step 7

AI1. What is the bottleneck in this process?

AI2. What is the capacity of this assembly line, in finished units/hour?

AI3. What is the utilization of Worker 4, ignoring the production of the first and last units?

AI4. What is the average labor utilization of the workers, ignoring the production of the first and last units?

AI5. Assume the workers are paid $15 per hour. What is the cost of direct labor for the bicycle?

Airline Check-in

AC1. Consider the baggage check-in of a small airline. Check-in data indicate that from 9 a.m. to 10 a.m., 255 passengers checked in. Moreover, based on counting the number of passengers waiting in line, airport management found that the average number of passengers

waiting for check-in was 35. How long did the average passenger have to wait in line?

Joe's Beer, Bait & Tackle

Joe's Beer, Bait, & Tackle Co. is a small chain of fishing tackle stores in northern Minnesota. In 2009, the company's revenue was $4,300,000 and its cost of sales was $3,200,000. Assume 52 weeks and 365 days per year.

JBBT1. Joe keeps only 5.5 days-of-supply of inventory on average because much of his inventory is live bait and micro-brew beer, both of which have a short shelf life. What is his annual inventory turns?

JBBT2. Given that he has 5.5-days-of-supply of inventory on average, how much inventory does Joe have on average (in $s)?

Process Analysis with Multiple Flow Units

Consider a process consisting of five resources that are operated eight hours per day. The process works on three different products, A, B, and C:

Resource	Number of workers	Processing time for A (minutes)	Processing time for B (minutes)	Processing time for C (minutes)
1	2	5	5	5
2	2	4	4	5
3	1	12	0	0
4	1	0	3	3
5	2	6	6	4

Demand for the three different products is as follows: product A, 40 units per day; product B, 50 units per day; and product C, 60 units per day.

PA1. What is the bottleneck?

PA2. What is the flow rate for each flow unit assuming that demand must be served in the mix described above (i.e., for every four units of A, there are five units of B and six units of C)?