**Process Flow Analysis @ ABC shirt company (Inspired from HBS Executive Shirt Company Case)**

ABC shirt company produces shirts with minimum variety. The set of operations carried out in the manufacturing of shirts is given in Table 1. Shirt patterns are cut on a computer-controlled cutting machine, which currently simultaneously cuts 60 layers of cloth (of the same or multiple colors). Setting up the machine is a laborious process---(it takes 1.5 minutes to carefully roll out each layer of fabric on the cutting table. Patterns for 8 shirts are laid out parallelly at the same time on the cutting machine. Thus, for each shirt pattern laid out, pieces for 60 shirts would be cut simultaneously. Once the fabric is laid out, it takes 30 minutes to cut all pieces for 8 patterns of 60 layers. 4 cutting machine operators are fully utilized for this operation.

After cutting, the shirts are batched, and the batch size is 60 shirts. The batches are then sent to sewing, wherein 24 workers perform different sewing operations. 4 material handlers carry out the movement of work in process items. A total of 40 direct workers (performing all the operations from cutting to packing) are present in the system. All the workers work 8-hour shift, 5 days a week, 20 days per month. The workers are paid Rs. 300 per hour on regular shift and Rs. 450 per hour on overtime. Table 2 gives the other cost structure, and Table 3 gives the activity time for different operations. Currently the monthly demand for ABC shirts is 16000 shirts.

Table 1: operations and WIP

|  |  |  |  |
| --- | --- | --- | --- |
| Type of operation | Number of workers | Number of Machines | Average WIP  (number of 60-shirt batches) |
| Cutting | 4 | 1 | 16 |
| Sewing | 24 | 24 | 144 |
| Inspection | 4 |  | 12 |
| Ironing | 4 | 4 | 12 |
| Packaging | 4 |  | 12 |

Table 2: Cost structure

|  |  |
| --- | --- |
| Raw materials | Rs. 350 |
| Total labor (direct +indirect (including material handling and supervisory labor)) | Rs. 225 |
| Other indirect costs (excluding inventory carrying cost) | Rs. 225 |
| Wholesale price | Rs. 1250 |
| Retail price | Rs. 2500 |

Table 3: labor content

|  |  |  |
| --- | --- | --- |
| Operation | Labor content (minutes/shirt) | Number of workers |
| Sewing\_part1 | 3.90 | 8 |
| Sewing\_part 2 | 2 | 4 |
| Sewing\_part 3 | 3 | 8 |
| Sewing\_part 4 | 1.5 | 4 |
| Inspection | 1.8 | 4 |
| Iron | 1.7 | 4 |
| Packaging | 1.75 | 4 |

Evaluate the ABC shirt company and address the following questions:

1. What is the cycle time?
2. What is the WIP in the system?
3. What is the manufacturing lead time?
4. Is the current configuration capable of meeting the current demand?
5. Can the system can accommodate another 2000 shirts per month?
6. What is the direct labor utilization?
7. What is the direct labor cost per shirt?
8. What is the labor productivity?
9. What is the total average cost per shirt?

You can make reasonable assumptions wherever required for the analysis of case.