

Operations Management

Date: 3.6.2008

Marks: 100

Time: 11.00 am to 2.00 pm

Section-I

Case study

Volvo Truck Corporation

Marks:20

Volvo truck Corporation is a vertically integrated multinational organization, manufacturing the full range of commercial vehicles from cars to trucks and buses. VTC has an engine plant at Skovde (Sweden) which has three distinct production environments: process, manufacturing and assembly. The process environment is in the foundry area, which is a capital-intensive single-flow process implementing a just in time (JIT) system. Maintenance workers have to be highly mobile so that they can quickly be at a system breakdown point when a problem occurs. Teams are linked to distinct process areas-melting, forming, cleaning, core making, heat treatment, etc.-with each having around 50 employees with one supervisor, split into a number of what they call 'semi autonomous work teams. The operator is not greatly responsible for the quality, maintenance, productivity, and decision making, with total responsibility devoted to the supervisors. The units have no team leaders, nor do they meet in any form of quality circle, although they do have some job rotation within or rather between phases.

At Skovde, the manufacturing environment is linked to automated production in a multi machine set up. The finished shafts and casings are transferred from the foundry to either the D factory where they are machined into crankshafts, transmission covers and camshafts or to the A factory where they are machined into cylinder heads and cylinder blocks. In both the plants, teams are organized around specific production lines and shifts with a philosophy of job rotation; payment is linked to the achievement of competences, providing a more cost-effective production environment. In a functionally flexible environment and with the machines running themselves, operators are released to perform indirect tasks associated with material supply, quality, and housekeeping and task allocations within the teams. Operators are responsible for some control and programming functions, product quality, machine set-ups and retooling-which reduces down time, ordering of material as well as machine operations, and also planning their own work. It is the team which is looking to define and make its own 'continuous improvements and it is the teams, rather than the managers, which are responsible for solving quality problems.

The truck engine assembly at Skovde has a dual production strategy in place, with all common operations being carried out on an automatic flow line. At the end of the automated element production, the engines go into one of the 12 docks in which the customized elements are added manually. The flow line system is automated, with manual loading and unloading at the start and end of the process, and with units carried from machine to machine by a roller system. Each unit is loaded onto the carrier system, which contains a computerized sensor that records information every time an operation is carried out.

This linked to a computer which sends a message out material by automatic carriers to the relevant station. There is a loose, task rotating structure that is fluid enough to allow operators to wander around the system helping each other.

VTC has its Umea plant situated in Northern Sweden, Which cuts, presses, assembles and paints cab parts to be delivered to assembly plants in Sweden, Belgium and Scotland. Production is based around a series of short flows- a combination of flow line and dock technology with each flow consisting of four stations organized sequentially in a square formation. There are two operators per station with a floating ninth person who also acts as the team leader and an operator replacement as and when required. The position of the team leader is appointed and not rotated. He continues to operate as a blue-collar worker and to spend some of his time in helping reduce the number of supervisors by being responsible for the introduction and use of new short flows, deciding when to get rid of people and who to get rid of, and juggling labor shortages. In other words, he carries out some of the more mundane traditional supervisory functions. The plant manager observes that "We cannot expect a guy to be a craftsman when he is doing the same job 15 or 20 times a day. If you expand the work it will give the operator value. I am not talking about doing the usual work for two hours instead of 30 minutes; I am talking of adding more complicated work outside the usual work by expanding frontiers' (Thompson & Wallace 1996)

Question:

1. Why does VTC have different sets of responsibilities for operators in the process, manufacturing, and assembly departments of its Skovde plant?
2. In which department of the Skovde plant do you find the approach to job design the best?
3. In your view, is it right to appoint a team leader like it is done at VTC's Umea plant? Is the concept of a floating ninth person suitable in a facility?

Section –II

Each question carries equal marks:

Attempt any four from the five questions:

Q1.a) what do you understand by operations scheduling? What are the problems faced in the absence of scheduling?

b) Seven jobs to be processed on four machines M1, M2, M3 and M4 in the order M1, M2, M3, M4. Sequence the given jobs using Johnson's method and find the overall processing time.

Jobs:	A	B	C	D	E	F	G
M1:	3	8	11	4	5	10	2
M2:	1	0	3	7	5	2	5
M3:	4	5	8	3	1	0	6
M4:	12	15	10	8	10	13	9

Q2.a) What is meant by the capacity of a facility? In what ways can the capacity of a facility be measured? Why is capacity requirements planning required for a facility?

b) Mr. Pam runs a mail order business for gym equipment. Annual demand for the TricoFlexers is 16,000. The annual holding cost per unit is Rs2.50 and the cost to place an order is Rs 50. What is the economic order quantity?

Q3. a) What are the differences between products and services? What are the similarities between them?

b) Explain the various qualitative methods of demand forecasting. In which situations can qualitative methods be useful?

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- Q4.a) Define quality and quality control? How is quality control different from total quality control?
b) What is Six Sigma? How is it implemented?

Q5.a) the number of customer complaints received daily by an organization is given below:

Day:	1	2	3	4	5	6	7	8	9	10	11
Complaints:	2	3	0	1	9	2	0	0	4	2	0

Day:	12	13	14	15
Complaints:	7	0	2	4

Does it mean that the number of complaints is under statistical control? Establish a control scheme for the future?

b) Write short notes on:

a) principles of motion economy

b) flow process chart