APPLICATION OF VALUE STREAM MAPPING IN AN INDIAN CAMSHAFT MANUFACTURING ORGANISATION

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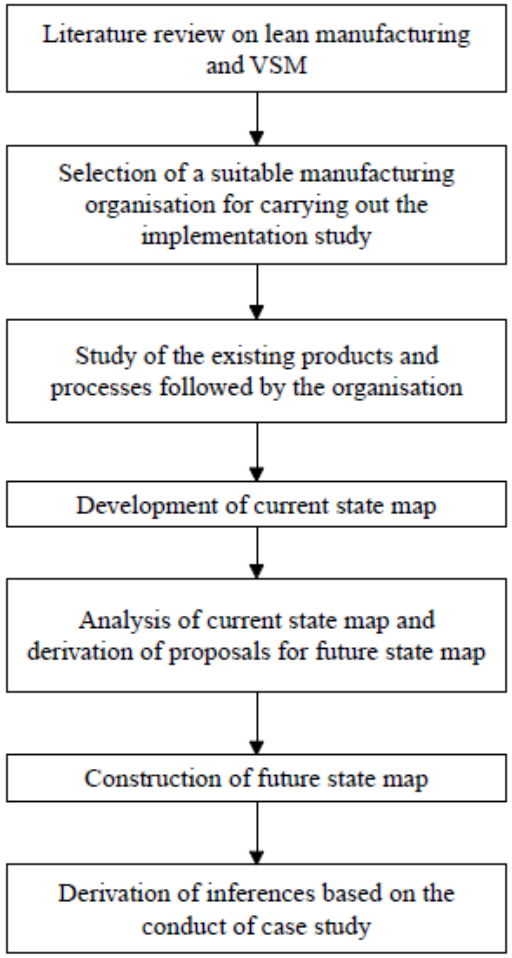
CASE STUDY: CEE YES CAM SHAFT



Literature Study: Was performed on two perspectives – application and principles of lean manufacturing and application of VSM. It concluded that though the lean manufacturing principles have been adopted across the world several years ago, in Indian context, most of the organizations have started or are yet to implementing lean concepts currently.

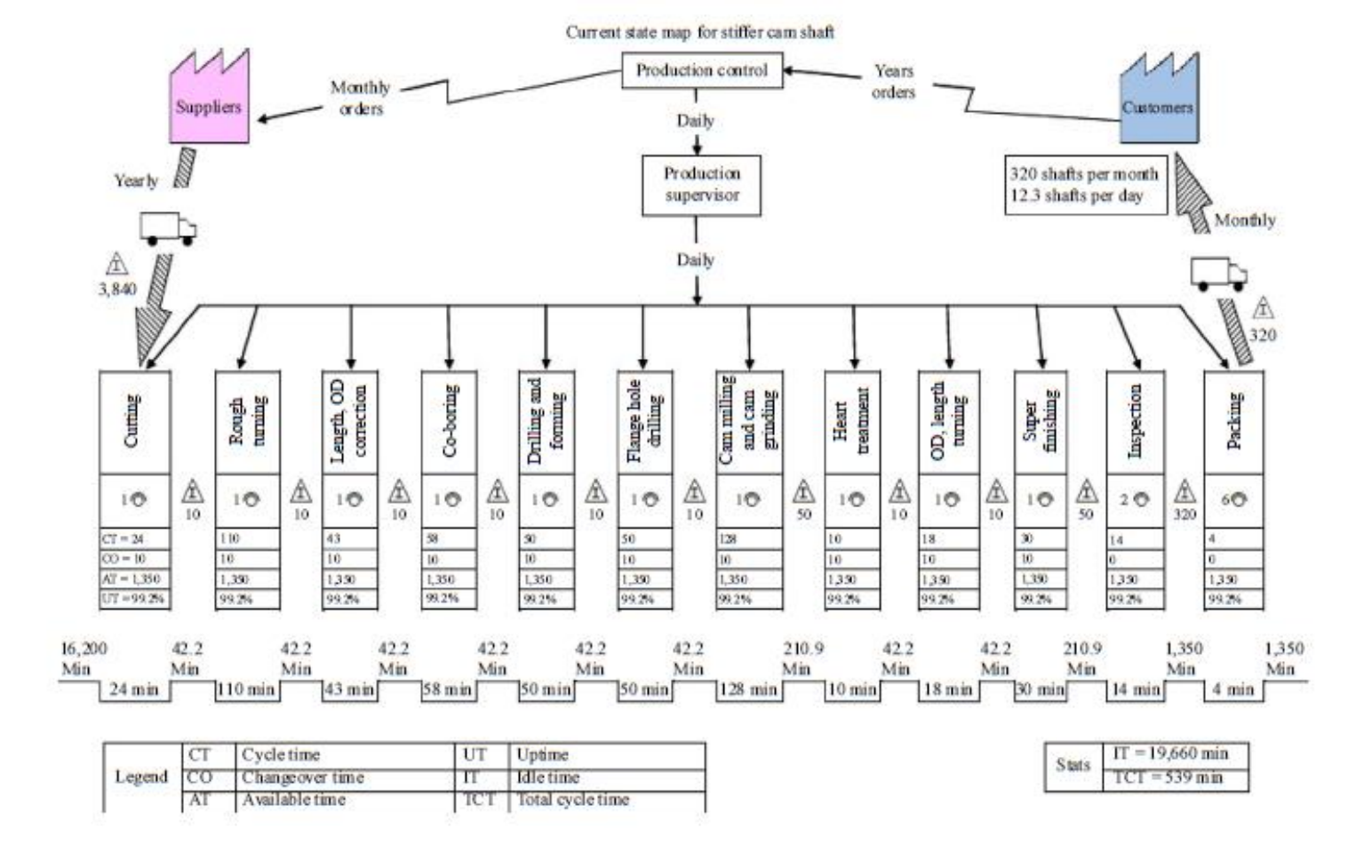
Case company: CeeYes Metal Reclamations, Tiruchirappalli, Tamil Nadu, India. It manufactures meter gauges, stiffer and conventional camshafts. The current annual turnover is about four crores Indian national rupees (INR). Prospective customers include Indian Railways and diesel locomotive works.

Case Product: Stiffer Camshaft. Due to higher demand from customers

Background of Case Study: A cross-functional team with two executive members were formed, who studied the manufacturing process for one month.

320 shafts are required by customer every month and there are 12 processes involved in manufacturing of camshaft

DEVELOPMENT OF CURRENT STATE MAP



The available production time is calculated as follows:

$$\text{Available time} = \text{Total production time} - \text{Planned down time}$$
$$\text{Available time} = (60 \times 8 \times 3) - (30 \times 3)$$
$$= 1,350 \text{ minutes}$$

Uptime is calculated by dividing the actual operating time by available time:

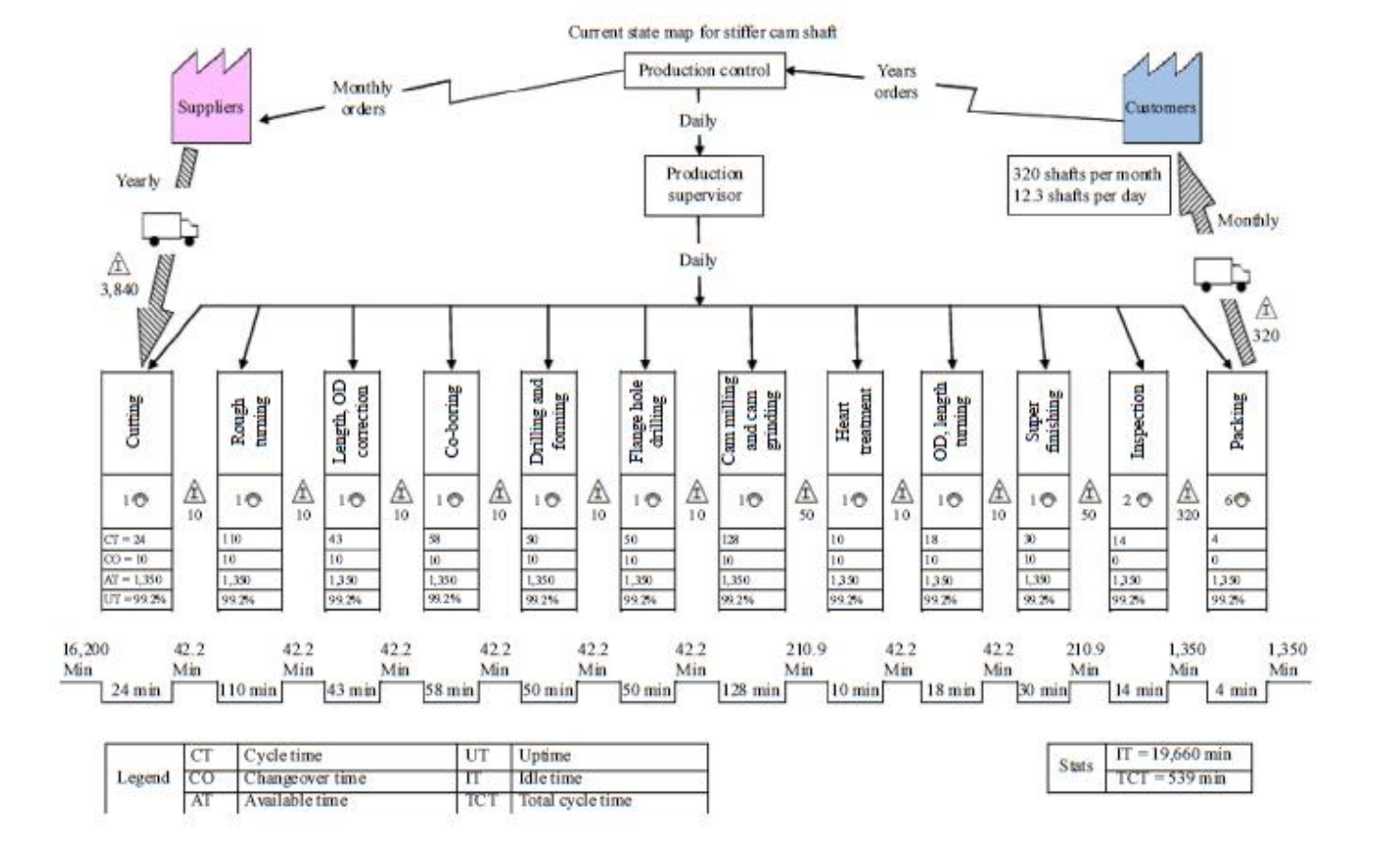
$$\text{Uptime} = \frac{\text{Actual operating time}}{\text{Available time}} = \frac{\text{Available time} - \text{Changeover time}}{\text{Available time}} \times 100\%$$
$$\text{Uptime} = \frac{1,350 - 10}{1,350} \times 100$$
$$= 99.2\%$$

Cutting cycle time : 24 minutes.
Changeover time between successive products: 10 minutes
3 shifts per day (each shift of 8 hrs. duration with 30 minutes lunch break (inclusive))
Inventory between cutting and rough turning: 10 units.
Changeover time between cutting and rough turning: 0 minutes
Total cycle time : 539 minutes
Total idle time : 19,660 minutes.

The following proposals were made to eliminate waste and the following industrial impact were observed

5S – the concept of 5S is found vital at the following stages of operations namely cutting, rough turning, cam milling, cam grinding, heat treatment and packing.	5S has been recommended for the operation stages mentioned in the previous section because currently the environment prevailing in those stages is cluttered. Development and deployment of effective 5S policy will enable the clean maintenance of shop floor.
Introduction of stage inspection – stage inspection after the following operations namely cutting, length and outer diameter (OD) correction, boring, drilling and forming, flange hole drilling, heat treatment, OD and length correction and super finishing	Currently, inspection has been carried out at the final stage. Two operators are needed for performing inspection. The cycle time for inspection is about 14 minutes. The final inspection has been transformed to stage inspection. This has significantly eliminated the inspection operation.
Reduction of work in process (WIP) – WIP between super finishing and inspection stages has been cut down as a result of implementing the stage inspection concept.	Owing to the elimination of final inspection, WIP has been reduced by 50 units in the value stream of the product line.
Utilization of jigs and fixtures with adequate fool proofing at the co-boring, drilling and forming and flange hole-drilling stages.	Jigs and fixtures used are not incorporated with fool-proofing measures effectively. Steps have been taken to ensure adequate fool-proofing measures for jigs and fixtures, which is an important concept of lean production system.
Automatic storage and retrieval system to be implemented at co-boring, drilling and forming, flange hole-drilling operations	Certain operations characterized by higher handling time and more efforts are being spent by the operators for handling. In order to overcome this disadvantage, implementation of automatic storage and retrieval system has been planned.
Introduction of information technology (IT) enabled logistics system.	Logistics system gains vital importance because certain operations are being outsourced by CeeYes. Currently manual logistics is being adopted at CeeYes. This must be transformed into IT-enabled logistics system for enabling the electronic tracking of various activities associated with logistics and supply chains.

DEVELOPMENT OF FUTURE STATE MAP



Improvements noted:

- Idle time has been decreased from 19,660 to 19,449 minutes.
- Total cycle time has been reduced from 539 to 525 minutes.
- Reduction of work-in-progress inventory from 4,660 to 4,610 units.
- On time delivery improvement from 70 to 85 percent
- Reduction (4 percent) in defects has been achieved.
- Increase (1.72 percent) in uptime has been realized.

Manufacturing organizations have to adopt new manufacturing paradigms due to product complexity and market turbulence. VSM helped managers of CeeYes to identify and eliminate waste in manufacturing, resulting in cost reduction.