

Donner company case study essay sample

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The three-year old Donner Company has positioned itself within both the small volume, customized printed circuit boards market as well as the large volume printed circuit boards market. With 750 competitors in the US, and a market that is volatile, Donner's engineering expertise to anticipate and resolve design problems enabled it to maintain its competitive edge.

However, this competitive advantage is jeopardized by poor on-time delivery and high rate of product return, in addition to planning and manufacturing problems that caused unstable bottlenecks and improper utilization of labor. These problems began to impact the overall performance of the firm in terms of operations, productivity and quality.

Following is a detailed analysis of the current conditions of the company: its standard process flow, its capacity, its competitive edge and its biggest problems.

1. What is the normal process flow of the production system at Donner?
What orders would you schedule on the CNC drill? On the CNC router?

Normal Process Flow:

I- Preparation Stage

Artwork generation

Inspect and Gear

Punch Tooling Holes

II- Image Transfer

Pinning panel to drill table

Drilling Holes whether manually or with the CNC drill

Drill Press

Metallization

Washing, scrubbing and coating with DFPR

Alignment of Customer Artwork and exposure to UV

Electroplating and Tin Plating

Chemical Etching of DFPR and Copper layer

Etching and Stripping of Tin

III- Fabrication

Soldermask Silk screening

Solder Bath

Reduction to finished profile by CNC routing or punch press

Inspection, Testing, Packaging and Shipping

From the information provided in exhibit 2, we can identify and calculate the breakeven point (the number of orders) to decide when to use the CNC drill vs. manual drill and the breakeven point to decide when to use the automated CNC router vs. manual punch press. CNC drill

Consider Order size = Q

If manual press is used, then the time taken to drill the holes of Q orders is equal to $15 + Q \times 0.08 \times 500 = 15 + 40Q$

If CNC is used, then time taken to drill the holes of Q orders is equal to $240 + Q \times 0.004 \times 500 = 240 + 2Q$

Hence it is clear that CNC should be used only when the time taken by CNC driller is less than the time taken manually, so we can determine the breakeven point when the use of CNC driller becomes more plausible.

$$15 + 40Q \geq 240 + 2Q$$

This inequation yields $Q = 5.92$

Hence for Order sizes 6 or above, CNC drilling should be used and for order sizes below 6, manual drilling should be used. CNC router

Consider order size = Q

If punch press is used, then the time taken to reduce the size of Q orders is equal to $50 + 1 \times Q$

If CNC router is used, then the time taken to reduce the size of Q orders is equal $150 + 0.5 \times Q$

Hence it is clear that CNC should be used only when the time taken by CNC router is less than the time taken by punch press, so we can determine the breakeven point when the use of CNC router becomes more plausible.

$$50 + Q \geq 150 + 0.5Q$$

This inequation yields $Q = 200$

Hence for Order sizes 200 or above, CNC routing should be used and for order sizes below 200, punch pressing should be used.

2. What design decisions did Plummer make in setting up the process? What operating decisions must be made on a daily basis?

The design decisions taken by Plummer in setting up the process are basically the replication of the Master Artwork with a standard panel size of 12” by 18” and 8 images per panel. On one hand, Plummer took the decision also to incorporate the computer numerically controlled (CNC) Micronic Jr. High Speed drill in the drilling and profiling processes. On another hand, an additional design decision that Plummer took is the use of the DFPR method, the UV exposure, the electroplation, the soldermask silkscreening and the solderbath technique.

The operating decisions that must be made on a daily basis are: 1-

Estimating the labor and material costs to prepare the bid for the customer

2- Preparing detailed material specifications, number of circuits, delivery

date and sequence of operations 3- Deciding whether to use manual drilling

vs CNC drilling

4- Deciding whether to use punch press vs CNC router

5- Preparing the necessary computer control for the CNC equipment 6-

Securing the missing supplies in case of a delay

7- Determining how many small rush orders should be sent into processing

8- Allocating the employees on the different operations on hold

3. What is the monthly capacity of Donner for different order sizes?

Drilling process

a) Manual Drill is used for order size less than 6

b) CNC Drill is used for order size greater than 6

Profiling process

- a) Punch Press is used for order size less than 200
- b) CNC Router is used for order size greater than 200

Let's consider order sizes of 8, 80 and 800 (Since a typical panel consists of eight circuit boards).

Assuming normal 8 hours working days – 5 days a week, we can say that a month consists of 9600 working minutes.

The monthly capacity of Donner for an order size of 8 boards is 124 boards $((9600/615.05) \times 8)$.

The monthly capacity of Donner for an order size of 80 boards is 714 boards $((9600/1074.5) \times 80)$.

The monthly capacity of Donner for an order of 800 boards is 1430 boards $((9600/5369) \times 800)$

4. How does Donner compete? What are the biggest problems Donner is facing, if any?

Donner's competitive edge

Many aspects in Donner company' operations strategy contributed in maintaining its position as an industry leader despite the 750 competitors in the US market.

1. Operators were cross-trained and able to perform different functions in different departments; this being a major advantage; the ability to deploy

employees to perform different functions in different areas when needed, for example to meet unexpected customers' changes or to meet the deadlines for rush orders.

2. Donner promises its customers 3 weeks delivery on orders of 1000 boards or less, and 5 weeks on orders larger than 1000 boards, not to forget rush orders (orders of 8 boards or less) that are delivered after 4 days only. This remarkable speed of delivery is a competitive advantage that other competitors can't copy easily.

3. Another strategy that Donner adapted to stay competitive in its field is the cost-saving strategy. Donner reduced enormously its fixed costs by operating in a plant that was carefully chosen by management to minimize installation costs, preserving the life of expensive machinery and isolating the operation's diverse environment. After being in the same location for a year and a half, neither the machines nor the graphic equipment exhibited any signs of corrosion.

4. Donner is a firm managed by talented engineers, inspecting regularly design errors, anticipating, investigating and solving manufacturing problems and even correcting prototype flaws.

Problems and Difficulties

It is obvious that the company is suffering from several problems related to its manufacturing process, labor, quality and delivery. Following is a highlight of each of Donner's problems: 1. Operating Problems

The main problem in operations is the instability of bottlenecks. It is roughly impossible for Donner to identify a bottleneck and work to improve its efficiency since bottlenecks vary regularly according to differences in orders (order sizes, circuit designs...). Moreover, the rush orders and the client's last minute modifications in the design disturb the production process shifting bottlenecks from one operation to another.

2. Productivity Problems

Because of the operating problems, it is normal to encounter productivity problems. With frequent down times and order changes, machines are idle for longer than expected. Furthermore, the sequential process flow currently utilized at Donner can cause a significant idle time for workers (Example of the plater who spends 15% of her time walking between the desk and the tanks).

3. Quality Problems

Donner did not implement valid quality control methods to inspect the raw material or unfinished products. The company depended mainly on the individual operators' experience to perform informal examination.

Consequently defective products were returned and needed to be corrected. Re-works resulted in pulling operators from their current jobs to begin re-works on the returned boards, which in turn caused lack of productivity and bottlenecks making Donner's problems act as a vicious cycle hard to manage.

4. Delivery Problems

Because all these processes are interconnected, and especially because of the high rate of returns and re-works, Donner failed to meet its delivery

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dates because re-works required pulling operators away from their current functions causing delays in manufacturing and finishing the work in progress.

All these issues that faced Donner had a significant impact on Donner's financial status when sales decreased in September threatening Donner's position in the marketplace.