FLOW MANUFACTURING IN A JOB SHOP?
--- OH YES YOU CAN!

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This article will focus on how to develop a flow manufacturing process in a high-diversity, low volume, production environment --- a job shop.

The concept of flow manufacturing will be defined and illustrated. Further, an analysis of the typical manufacturing process in a job shop will be reviewed. The processes that are common will be presented along with a suggested flow manufacturing approach. You will be able to use the methodology presented in the "case example" to have the same exciting and dramatic impact on your business.

Introduction

In a world that is rapidly moving towards faster, higher quality production of products, the focus has been on manufacturers that produce products in a repetitive or process mode of operation. The good news is that progress has been tremendous in those companies. The bad news is that in the job shops of the world, it is virtually business as usual. Manufacturing in the United States is normally done with two distinct approaches: Scenic Manufacturing or Expressway Manufacturing.

Scenic Manufacturing

Scenic Manufacturing means that the material takes the scenic tour of the manufacturing environment. Companies that use the Scenic Manufacturing approach share some common tendencies:

- They normally are organized in a functional manner (all of the similar equipment is grouped together),
- Products are produced in a batch mode (the larger, the better),
- Work orders are used to capture cost and track progress,
- Material goes into and out of stock locations,
- Lead times are long,
- Routings are detailed and efficiency is reported by operation,
- Quality problems are hard to trace,
- Rework, scrap, and sorting is considered normal,
- The Bill of Materials is typically complex, and

- The focus for improvement is on specific operations,

Maintenance only happens when a breakdown occurs and a considerable amount of transportation is normally done.

The Scenic Manufacturing approach has a tendency to hide problems and waste that leads to a higher level of cost-added in the manufacturing process.

Expressway Manufacturing

Expressway Manufacturing means that the material is not side-tracked as it proceeds through the manufacturing process (no exit ramps). Companies that use the Expressway Manufacturing approach also share some common tendencies:

- They are organized in a structured flow manner (all of the equipment necessary is grouped in the sequence required to produce the products, a process orientation),
- Changeovers are a non-issue,
- Lot sizes can be large or small (but tend to be smaller),
- Quality continues to improve,
- Maintenance as well as housekeeping is done by the operators,
- Routings and Bills of Materials are simplified,
- Labor is reported as a team (if at all),
- Employees are involved in Small Group Improvement Activities to solve process problems (an attitude of using the people for what they have from the neck up dominates),
- Workers are multi-skilled and paid based on skills mastered, and
- Lead times are short.

The Expressway Manufacturing approach has a greater tendency to highlight the problems and waste that lead to a lowering of the level of cost-added in the manufacturing process.

The Job Shop Approach

A job shop manufacturer is defined as a high-diversity, low volume producer within a market segment. Examples might include a manufacturer who produces sheet metal fabrications, machines castings, machine and grind shafts, or produces modules. What the job shop sells is its "expertise" in producing its kinds of products. Unfortunately, the Scenic approach to manufacturing dominates the world of the job shops.

Which approach to manufacturing does your company use? The Scenic or Expressway?
In order to move your business from a Scenic Manufacturing approach to an Expressway Manufacturing approach, it is essential that the difference between operations and processes be clearly understood.

Understanding the Relationship between "Process" and "Operation"

The relationship between "Process" and "Operation" has not been clearly understood because of the tendency to use these words interchangeably and also because they blend into each other when one person carries out several operations. A "Process" is defined as the flow of products from one worker to another or, the steps which raw materials must follow to become finished product. An "Operation" is the specific, discreet step at which a worker performs work.

Production therefore consists of a network of processes made up of operations.

The Scenic Manufacturing approach focuses on "Operations" while the Expressway Manufacturing approach focuses on "Processes". Within the Scenic approach, improvements (cost-added reductions) only focus on improving the operation or a step in the process. Within the Expressway approach, improvements (cost-added reductions) focus on the entire process, raw material to work-in-process to finished goods.

The Expressway approach "naturally" exposes "waste" so that it can be attacked, and eliminated, thus allowing for the opportunity to reduce the cost-added.

According to F.B. Gilbreth in 1912, "A process is composed of four parts: Processing, inspection, transport and delay." Inspection, transport, and delay are all cost-added and easily identified when products are produced in a process mode. In the Scenic approach, inspection, transport and delay are casually accepted and mostly tolerated, thus the opportunity to reduce the cost-added is ignored and not appreciated.

Developing a Process Focus in Your Business

Once an understanding exists, as to the relationship of process and operation, you are now ready to investigate the application of the Expressway approach to your business. In the Scenic approach, each item has a unique routing, or has it? Upon investigation, you should start to see the similarities in the "Processes" of the products you manufacture. Now, not every product that you produce will fit the "model process" that starts to develop as a result of this investigation. The use of a Pareto diagram will allow you to identify the common processes so that the model process can be developed. One of the conventional wisdoms is that all parts must fit the "model process" in order to proceed. This is a false assumption. While not every product will fit the "model process", the majority will. It is that majority that we want to capitalize on. The best way to describe the approach to developing a process focus is through example.

Case Example A

"A" Company is a job shop. They produce modules (P.C. Boards) for the computer industry. The mix of products that are produced within their environment is in excess of two hundred

"different" modules. While some of the modules at a product level are similar, a majority of them are very different visually and in function. Upon investigation of the "Processes" through which the modules progressed, a "Model Process" emerged. The "Model Process" consisted of six steps or operations. They are: bake, surface mount, machine insert, wave solder, hand insert, and test. Naturally, some of the modules did not fit the "Model Process. " These modules either had additional steps or fewer steps in their process. However, the majority fit the "Model Process" and a structured flow was developed. For the modules that did not fit the "Model Process" the structured flow was still utilized for all of the operations that fit and "exit ramps" were opened to direct the modules to the "unique" production areas for the unique operations and then back on to the "Expressway" to be completed.

Initially, the results of developing and implementing the structured flow were not impressive. In fact, the overall output dropped. Many problems surfaced and management started to have doubts. They stuck to it and fixed the problems which led to the following results:

- Lead time reductions of 75%;
- Distance the product traveled reduced by 90%;
- Set-up time became a non-issue through the use of SMED (Single Minute Exchange of Die);
- Quality improved through faster feedback and the use of Poka-Yoka techniques;
- Employees became involved in solving the process problems in Small Group Improvement Activities on a daily basis, and;
- Reduction in lot sizes led to a 50% reduction in inventory.

Conclusion

The Expressway Manufacturing approach works. It will work in a job shop with a developed process orientation. The results can be dramatic and exciting. All that is required to be successful is a belief that "it" can be done. Think, "Yes you can."