

## **The Parallel Between Product Development and Production and Building Design and Construction**

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A revolution has occurred in the way manufacturing companies develop and produce new products. The dramatic changes in the manufacturing process are similar to the changes the building construction industry has made in going from plan and specification to design-build. But, if the parallel is followed further, design-build can be taken to another level.

### **What Manufacturers Have Learned**

#### **New Product Development:**

In the past, manufacturers developed new products in a series of steps with minimal cross-communication between functional divisions of their company. Those steps would typically be as follows:

1. Idea for new product (marketing)
2. Detailed specifications for the new product (marketing)
3. Initial design concept (product engineering)
4. Final design (product engineering)
5. Production design/tooling (manufacturing engineering)
6. Vendor selection and preparation for production (purchasing, manufacturing engineering)
7. Prototype
8. Production

In the new product development process, manufacturers create a team consisting not only of the functional divisions within their own company, but including their principal vendors. And the steps are paralleled to the extent possible. The new process looks something like this:

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|------------------------|--|
| 1.                     | Product idea (marketing)   |
| 2./3./4. (in parallel) | Product definition, design concept, and manufacturing concept are generated by the team. The team consists of marketing, engineering, manufacturing, and key vendors. Further, it includes input from key customers. |
| 5./6./7. (in parallel) | Final product designs/production process/vendor selection and prototype.   |
| 8.                     | Production   |

Results are dramatic, and typically can be:

- \*Development time cut in half
- \*The end product more cost effectively meets customer needs

The two keys to the effectiveness of the new process are (1) working in teams, as opposed to functions working in their own “closets”, and (2), utilizing key vendor partners as part of the design team. The value of tapping into the knowledge base of vendors cannot be underestimated.

### **Product Production:**

The old manufacturing process was based on mass production concepts developed nearly 100 years ago. Here are some of the elements of the old process:

- Bill of material consisted of parts and sub-assemblies
- Sub-assemblies were built in optimized stock run sizes
- Parts and components were ordered from vendors with purchase orders as needed to maintain minimum stock levels. Successful vendors were selected through a bidding process conducted annually.

Demand Flow Manufacturing is the new technology now being used by progressive manufacturers. Key elements of Demand Flow are:

- Vendors become supplier partners, and are responsible for management of component supply, and supply them “on-demand”.
- Decisions on buying components are no longer based on price, but on total cost, including impact on production, operating cost, quality, delivery, etc.
- Quality becomes a given; inspection comes from the supplier and is no longer done by the manufacturer.
- The product bill of material is “flat” .... that is, there are no sub-assemblies.
- Components are sole-sourced with supplier partners .... the same supplier partners who participated in the product development process.
- Products are built on demand, not to stock.
- No purchase orders are issued; suppliers simply bill the manufacturer on a monthly basis.

The results are substantial:

- Production time (cycle time) can be reduced by an average of 75%.
- Product costs are generally reduced by 10 to 20% or more.
- Dramatic improvement in inventory turns.
- Quality is improved substantially.

- Component outages are reduced to near zero, enabling the manufacturer to meet customer requirements more reliably.
- Factory space is reduced by an average 30% to 50%.

### **How Does this Relate to Design-Build Construction?**

Many of the principles of the team approach to new product development and Demand Flow Manufacturing can be applied to the construction process. Most notably, increased supplier involvement in the design concept stage, and as part of the construction team, is one of the most important elements. New processes take advantage of the value that a supplier can add. Suppliers are no longer viewed as vendors of a commodity, but rather are brought into the picture as true partners in the design and production of the end product.

Many other industries have applied these principals of total cost vs. first cost (price), supplier partners vs. vendors, and concurrent development vs. separate entities working independently. The construction industry, on the other hand, has not yet fully adopted these principals.

Design-build, as it is generally construed today, is a substantial improvement over the old plan and spec process. But taken to the next level, by bringing supplier partners into the early design stages, and making them an integral part of the construction team, can further optimize project first cost, operating cost and total cost, the meeting of construction schedules, and improvement of the end construction product.