

HIGH VELOCITY MANUFACTURING

*A Step Above Just-In-Time
and Lean Manufacturing*



▪BUKER▪

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Over the years as companies strived to improve their business operations to World Class competitiveness or best of class performance, it became apparent there were three basic levels of understanding in striving for this new level of competitiveness. The first and most basic level was of frequent supplier deliveries. Companies began to work with their suppliers to get the right material in the right amount at the right time and at the right place. The focus was on getting the material to the factory just in time. This typically was accomplished by getting the supplier to warehouse material just in case the customer placed an order. In other words, the supplier carried the inventory.

The second step in the drive for World Class competitiveness was bringing manufacturing and logistics into the initiative. The focus was on everything it took to move from just in case to just in time deliveries. This meant solving numerous problems with the objective of receiving exactly the right material in the right amount at just the right time and in precisely the right place. To overcome these problems, companies began to work on problems dealing with poor habits such as housekeeping, work place organization and deficient processes that yield quality problems in terms of scrap and rework or substandard policies regarding preventative maintenance.

The third level of understanding of World Class competitiveness was a philosophy, a forever commitment to the continuous pursuit of excellence in all phases of the business. This means going beyond manufacturing and logistics. It means looking at order entry and administration, engineering and field service to name a few. The term used to describe this third level of understanding of competitiveness is High Velocity Manufacturing. High Velocity Manufacturing is way beyond parts and materials arriving “just in time” to be used, so inventory and space are not wasted and capital investment is used wisely. High Velocity Manufacturing is concerned about these issues but also about much more. High Velocity Manufacturing is defined as follows:

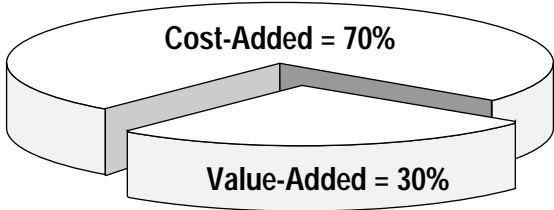
High Velocity Manufacturing is a strategy for achieving significant, continuous improvement in performance through the elimination of all waste of time and resources in the total business process.

Figure 1-1: High Velocity Manufacturing Definition

Two significant components of the definition of High Velocity Manufacturing are elimination of waste and continuous improvement. Elimination of waste means eliminating all activities that do not add value to the process. As an example, moving materials from one manufacturing operation to another is not adding value to the product but rather adding cost. One of the major or fundamental principles in running the business is the concept of cost-added versus value-added. Looking at the business, activities are divided into either cost-added or value added. The president of Hamilton Industries, a furniture manufacturer in Two Rivers, Wisconsin, appropriately defines cost-added and value-added: “cost-added” activities are those activities which, if the customer knew they went on in the operation, would not willingly pay for them. The typical factory consists of 70 percent cost-added activities and 30 percent value-added activities.

Fundamental Principle:

Cost-Added VS. Value-Added



Cost-Added = Waste

Figure 1-2: Cost-added vs. Value-Added

Another way to think of cost-added and value-added is to think of cost-added as motion and value-added as work. Thus, are the activities truly work or value-adding or are they motion, adding cost? Examples of cost-added activities are material movement, inspection, taking material out of one container and putting it into another, engineering change notices, rework and material storage. In a HVM environment, the goal is to reduce the cost-added activities so that the value-added activities become 90 percent of the total cost. This strategy lowers total cost significantly and enhances competitiveness and profitability. Recognizing cost-added activities in a company is not easy. Over the years the cost-added activities have been taken for granted and have become invisible. They are assumed to be the way a company has always done business. This mind set must be changed in High Velocity Manufacturing.

3-Step Rule for Reducing Waste

STEPS	REDUCTION
1. Reduce by 50%	50%
2. Reduce by 50% again	75%
3. Make it 10% of what it was	90%

Figure 1-3: 3 Step Rule For Reducing Waste

In reducing waste or cost added activities, the first step is to cut or trim the waste by 50 percent. Step two: reduce by 50 percent again which yields a 75 percent cumulative reduction. The final step is make it 10 percent of what it was for a cumulative reduction of 90 percent. A typical application of the three-step rule is the chronic waste existing in most manufacturing facilities - setup time. If a setup or changeover on equipment is presently two hours (120 minutes), step one would be to reduce the setup to one hour (60 minutes) or cut it in half. Step two would cut it in half again or now down to one half hour (30 minutes). Step three would be to make it 10 percent of what it was which means the setup time is down to 12 minutes. A dramatic improvement. Attacking waste in this manner requires a fundamental rethinking of setup activities. Superficial actions rarely result in the reduction of waste called for in the Three Step Rule.

TWELVE ELEMENTS OF HIGH VELOCITY MANUFACTURING

In our experience High Velocity Manufacturing should be looked at by a company through three management areas made up of 12 elements. These areas are Technology Management, People Management and Systems Management. Each area includes four elements of High Velocity Manufacturing. The Technology Management elements are Structured Flow Manufacturing, Small Lot Production, Setup Reduction, and Fitness For Use. The objective of Technology Management is a Responsive Business Environment. This means developing flexibility to respond to changes in individual customer demand, changes in marketplace conditions or to produce to customer orders of one or one thousand.

Three Key Management Areas In Any Manufacturing Business

- **Technology Management**
Objective: Responsive Production Environment
- **People Management**
Objective: Capability For Rapid Improvement
- **Systems Management**
Objective: Careful Application Of Resources

Figure 1-4: Three Key Management Areas in any Manufacturing Business

Structured Flow Manufacturing incorporates the concepts of continuous flow manufacturing. The focus is on flow and throughput to reduce the cycle time through manufacturing. It also should be noted that many companies have applied the concepts of Structured Flow Manufacturing to the office environment to shorten cycle time in the total business process. Structured Flow Manufacturing typically involves factory rearrangement or grouping technology into manufacturing cells for organized throughput.

Small lot production means producing the product in ever-decreasing lot or batch sizes until the theoretical lot size of one is reached. The ability to produce one at a time provides the opportunity to make every item every day. This in turn provides the flexibility of responding to customer requirements and meeting those requirements which otherwise could be met only through inventory.

Setup reduction or quick changeover is the process of minimizing equipment downtime between material changeovers. Setup time could be thought of as the elapsed time from the last good part of the previous job until the first good part of the new job is produced. The overall objective of reducing setup or changeover time is to facilitate small lot production.

Fitness For Use was coined by Dr. J.W. Juran in defining the principles of quality. Fitness For Use means understanding and meeting the customer’s precise needs. The basic principle is that at each step in the business process there is a customer. Not all customers are external to the business; there also are internal customers. Internal customers are the next work center in the manufacturing process. Another example would be design engineering handing off new products to manufacturing in which case manufacturing is the customer of design engineering.

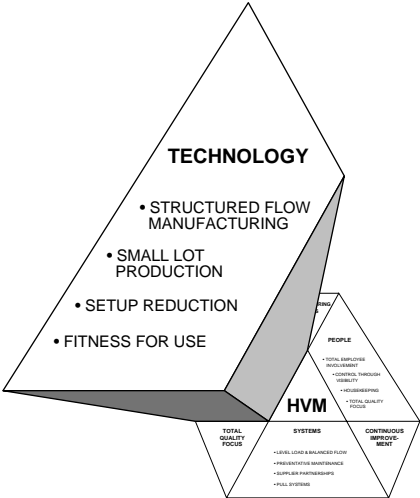


Figure 1-5: Technology Management

The elements of People Management are Total Employee Involvement, Control Through Visibility, Housekeeping, and Total Quality. The objective is “Capability for Rapid Improvement.” This means improvements transpire in the total business process on an ongoing or continuous basis. Continuous improvement is achieved through the involvement of people at all levels in the organization.

Total Employee Involvement is required to achieve the objective of “capability for rapid improvement.” Only by everyone being involved in the improvement process can a company achieve continuous improvement in its processes. Employee involvement and continuous improvement will be achieved through Small Group Improvement Activities (SGIA). SGIA is a teamwork structure created to focus on improvements by utilizing employee knowledge in the work area.

Control Through Visibility provides visual status of the production environment. The objectives in Control Through Visibility are to communicate goals, highlight problems and attack waste. Often times Control Through Visibility is looked at as an extension of basic housekeeping, the idea being that as unnecessary items are removed from the work area it becomes much easier to see and thus work on process problems.

Housekeeping or work place organization means a highly organized and efficient work place. Housekeeping sometimes is thought of as “everything in its place and everything having a place.” Organization in the work place will facilitate improvements in other elements such as setup reduction, pull systems and quality. Improvements in Housekeeping pave the way for waste elimination by reducing unnecessary movement or motion.

Total Quality is fundamental to High Velocity Manufacturing and can be defined as striving to continually reduce process variability. Variations in the process, be they quality problems, lengthy setup times or fitness for use issues, are considered to be a problem and must be improved continuously to achieve High Velocity Manufacturing. As process variability is reduced, Total Employee Involvement is required to redefine the customer at each point in the process in order to provide products and services that are “fit for use.”

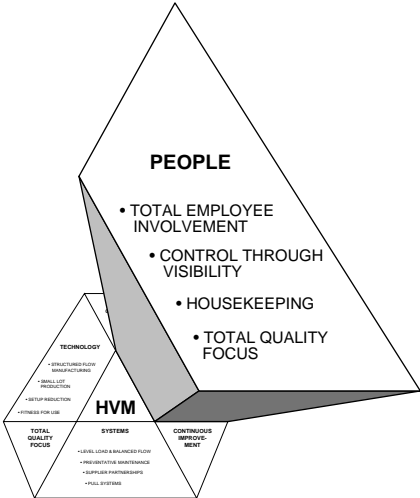


Figure 1-6: People Management

The Systems Management elements are Level Load and Balanced Flow, Preventative Maintenance, Supplier Partnerships and Pull Systems. The objective is Careful Application of Resources which means using all company resources wisely. This can be achieved in High Velocity Manufacturing by extending equipment life, eliminating over-production and developing efficient production processes through the use of Pull Systems.

Level Load and Balanced Flow means organizing production processes for scheduled throughput. Leveling and balancing become control mechanisms. The objective is to achieve synchronous production through repeatability and predictability in process cycles.

Preventative Maintenance in High Velocity Manufacturing means developing reliable tools of production that run flawlessly. Equipment is in a constant state of readiness with the benefits being extended life of equipment, equipment eliminated as a cause of defects, and prevention of major equipment repairs. The four stages of Preventative Maintenance are breakdown maintenance, preventative maintenance, productive maintenance, and total productive maintenance.

Supplier Partnerships will be a total management and company commitment to a cooperative relationship with suppliers. This cooperative relationship will focus on achieving lowest total cost by working on non-price areas of the relationship. The cornerstones of the relationship will be long-term commitments, shared goals and frequent fact-based communications. Pull Systems, often referred to as Kanban, are the mechanisms that activate the production processes. The objectives of the Pull System are three-fold: (1) keep the time of producing material as close as possible to the time of using material; (2) maintain accurate and rapid feedback on what really is needed in the work area; and (3) provide local control over stocking levels in the area.

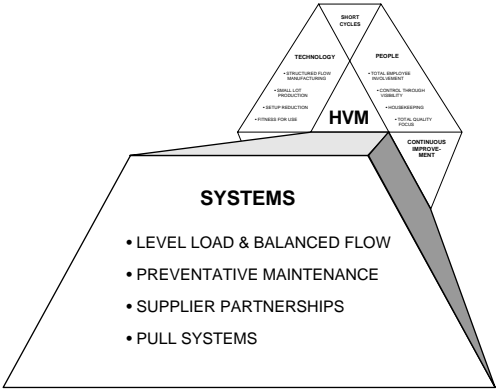


Figure 1-7: Systems Management

Each manufacturing environment that Buker, Inc. has worked with has all 12 of the High Velocity Manufacturing elements in place to one degree or another. It should be noted that the degree of application of the 12 elements in each company can and may be different. For example, in a traditional job shop manufacturer there could be tremendous application of structured flow manufacturing for improved throughput, thus leading to cycle time reduction, while another company that is a process manufacturer already may understand the importance of structured flow manufacturing, but may need to focus on preventative maintenance and setup reduction.

Whatever the type of manufacturer or manufacturing process one thing is certain: Working the issues in any company utilizing the 12 elements results in short manufacturing cycles, continuous improvement and a total quality focus.

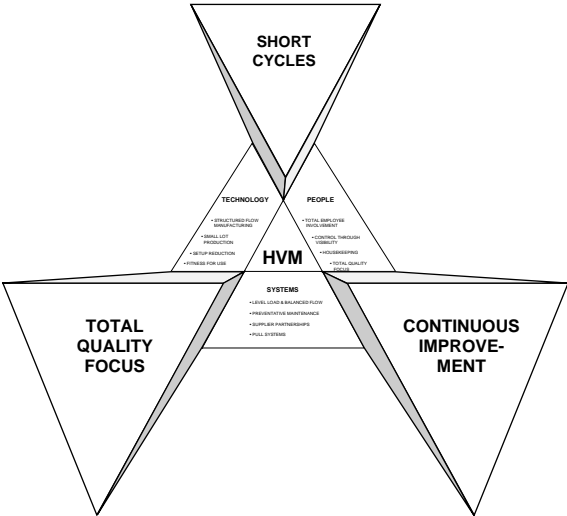


Figure 1-8: Short Manufacturing Cycles

The result of achieving short manufacturing cycles, continuous improvement and a total quality focus is High Velocity Manufacturing. High Velocity Manufacturing then is the result rather than the beginning. As companies continue to improve in all elements they achieve a level of precision and exactness that is characterized as High Velocity Manufacturing.

HIGH VELOCITY MANUFACTURING

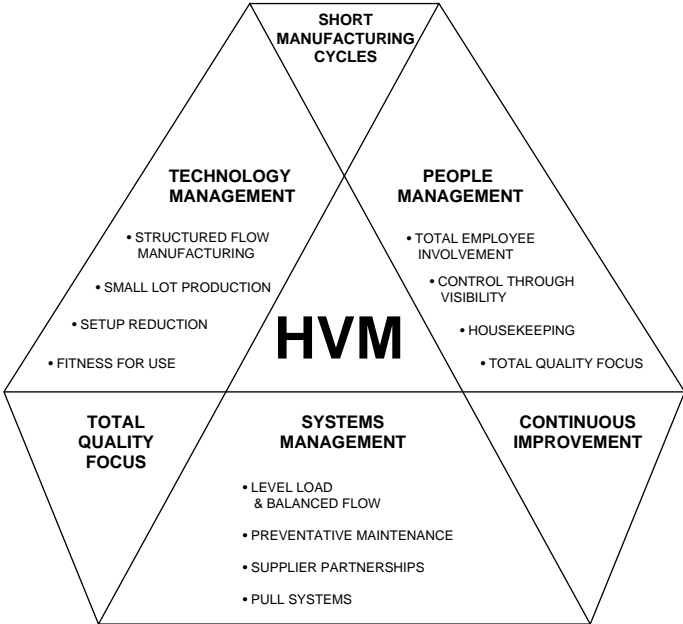


Figure 1-9: High Velocity Manufacturing

High Velocity Manufacturing Results:

Much has been written about the fantastic improvements that companies have been making over the years through High Velocity Manufacturing implementation. If someone had told me 20 years ago when I started my manufacturing career that improvements we view as commonplace today under High Velocity Manufacturing were possible I would have viewed them as wishful thinking at best and more likely preposterous!

As an operating manager, I always had been accustomed to budget time once per year when we outlined our goals and objectives. In any and all departments improvements in performance of 5-10 percent were the normal objectives. Goals of 5-10 percent improvement typically were thought of as reasonable and most certainly did not knock us out of our comfort zone as managers. Improvements of 5-10 percent were viewed as being able to fine-tune what we were doing; similar to making a small adjustment in the carburetor on an automobile: a little fine-tuning or adjustment to make the car run better.

The point is we always were fine-tuning what we already were doing. No one thought of improvements of 50-75-100 percent because these kinds of improvements would mean radically altering the way we did the work. This is precisely what High Velocity Manufacturing is about: radically altering our thinking and, thus, the work.

The average improvements we at Buker, Inc. have seen are represented in the figure below:

High Velocity Manufacturing Results

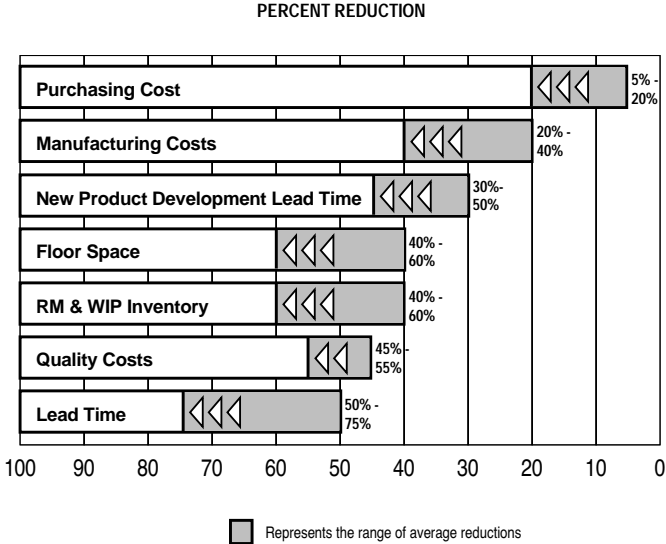


Figure 1-10: High Velocity Manufacturing Results

To achieve these results means revolutionary change in the way a company does business. It means developing a disciplined, watchful company culture, one that distinguishes cost-added from value-added activities in all areas of the business, and attacks waste of time and resources whenever and wherever found. That disciplined culture requires adopting revolutionary new attitudes, new attitudes that having problems is good news, because acknowledging them means they can be solved. High Velocity Manufacturing is the beginning of a new world for manufacturers that brings continuous change and continuous improvement. Once a company accepts the challenge of High Velocity Manufacturing it becomes a forever commitment.