

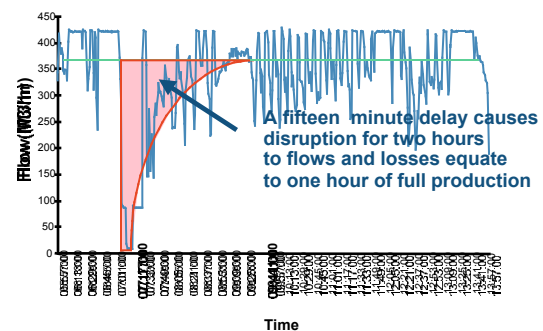
## A New Approach for The Millennium: Holistic Manufacturing™

By Stephen F. Hardy - President, HMC

Since the beginning of the industrial revolution, man has been searching for ways to "make a better mousetrap." It is the essence of a free market, that competitive businesses strive to develop new processes in order to improve the quality of the products or to reduce their cost of producing them. Throughout the 1900's we saw the implementation of mass production, computer technologies, just-in-time production and total quality management. Each of these has made significant advancements to the manufacturing process during the last century.

However, business in the 21st Century is moving at an even faster pace. Production requirements are more varied, customer demands are higher, and competition is coming from every part of the world. Manufacturers need new technologies and new processes just to stay in business, let alone succeed. And whichever production model a company employs they must still deal with the fact that the production process is not static. The variability inherent in the manufacturing process is the most frequent cause of production slowdowns and poor efficiency. Product changeovers, maintenance, raw material availability, operator training, and packaging variations all impact the productivity of the production line. Reducing this variability can create significant leverage on the entire production process and will most likely result in substantial improvements in output, productivity and efficiency.

Even small disruptions propagate throughout the process, with lasting impact.

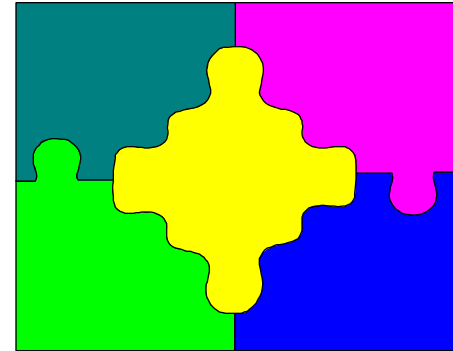


To help manufacturers cope with these new demands, HMC has developed a new approach for the new millennium called Holistic Manufacturing™. This new approach helps companies scientifically identify and reduce significant sources of production variability while at the same time enabling them to build a better framework to minimize them or keep them from re-occurring. As such, it is therefore NOT just a procedure or specific process, but rather a new, comprehensive, methodology of identifying and minimizing production variations. It is an approach that has yielded incredible results over the past few years, and promises to revolutionize the manufacturing process.

## What is Holistic Manufacturing™?

**Holistic Manufacturing™** is an approach that brings together both technology and human systems to identify and reduce production variability. New technologies are often implemented into the manufacturing process with substantial immediate results, only to lose their steam after several weeks or months. Production slowly goes back to the way it used to be and management is left wondering what happened.

Typically, this regression is due to the human system, which has not been modified. So when production problems start to occur again (and they always do), they are dealt with in the "old" way, which often defeats the purpose of the newly implemented technology. **Holistic Manufacturing™** looks at both technology and human systems and works with the 'entire' manufacturing process, including the people as well as machines, to identify and solve production issues. Giving a company a new tool or technology is no good unless you show them how to use it properly and effectively. Hence, this methodology is called 'holistic' because it encompasses all the resources of the entire manufacturing process.



## How Does Holistic Manufacturing™ Work?

The essence of **Holistic Manufacturing™** is to find those key variations in the manufacturing process that if reduced would yield the greatest potential for an increase in output or efficiency. These opportunities for improvement are identified and realized through a well-defined process. This process allows considerable flexibility in that it first characterizes the variability and then identifies the opportunity for improvement. This helps focus limited resources on those areas likely to produce the largest return.

In order to determine the causes and scope of the variability, we first conduct a diagnostic to surface key factors influencing performance, the degree of variability in operations and to quantify the improvement potential. We establish the links between product variety, process variables and productivity outcome. We look in detail at the links between process variables and process outcomes for each element of the production line. The outcomes of our diagnostic assessment are largely based on direct observations of lines, interviews and a review of 3-6 months of historic cost, yield, waste, and/or production data. Finally, we look at the range of performance after removing exceptions and then identify how much opportunity there is to improve and confirm how much of the variability could be controlled.

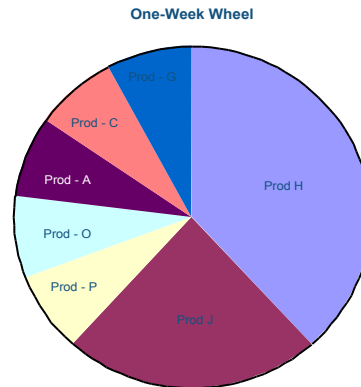
Once the diagnostic is complete we have a good handle on which areas of the process need correcting and which of these areas, if corrected, will generate the largest return. Typically, the areas where most of the variability is introduced into the process falls into 5 categories:

- Operating Procedures
- Changeovers
- Maintenance
- Teamwork
- Communication

**Operating Procedures.** We undertake detailed control studies before introducing new Standard Operating Procedures (which later become DYNAMIC Standard Operating Procedures). Having completed the interviews for the control study, we are able to identify if operators and technicians have different ways of performing the adjustments during runs and for setups. Once we have a full understanding of the issues at each plant, we select the most appropriate techniques to improve the performance of the specific plant.

**Changeovers.** Another key aspect of **Holistic Manufacturing™** is the use of a Product Wheel to manage changeovers. Traditionally, manufacturers use a matrix to establish acceptable times for changeover between SKUs. This optimizes any one specific week but does not encourage ‘mastery’, since each week may be different, and people tend to work to the standard. By implementing a product wheel, the number of changeovers can be reduced dramatically.

**Product wheel scheduling is prompted at a fixed interval.**



For week one, 40,000 cases of Prod H may be produced based on the previous week's sales. However, for week two, 20,000 cases may be produced.

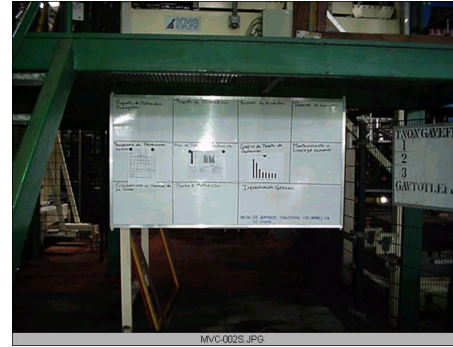
To help develop the product wheel the different characteristics of changeovers need to be identified and documented for each product type. Once the most difficult changeover elements have been identified, primary, secondary, tertiary, etc., sorts for each characteristic are conducted in order to optimize the sequence. Various types of product wheel configurations can be developed based on the type of product, volume produced, and inventory levels. Complete wheel revolutions can be at various time intervals (e.g., 3-day wheel, 5-day wheel, 1-week wheel, 2-week wheel, etc.). Finally, we develop a program that provides the scheduler with a printout for each possible change and the elements required. Completed sheets are returned with additional comments, suggestions for improvements, any deviations that were necessary, and sign-off.

**Maintenance.** We often observe underlying trends that show a ramp up effect due to maintenance activities. From hour by hour data we can look at the effects of such things as cleaning, hand-over, and relief operator performance. We then compare data by shift and in most cases we can improve the maintenance procedures to lessen the overall slowdown caused by the stoppage.

**Teamwork.** It is important to identify and focus on core issues. A key aspect of sustainability is that the management and workforce develop a mentality of prioritizing issues and then solving them together. Consequently, we involve many people in the early team structures. As time progresses, the teams change as issues are resolved. Part of the foundation is to develop the Learning Organizational skills and to generate the shared understanding of where the company wants to go.

We also consider the structure of teams, their ‘goals’ and their orientation. For example, in many cases Maintenance and Operator crew rotation affects teamwork since crew allocations to a shift

**Communication.** We also introduce Communication Boards and "communication" logbooks that help facilitate better communications between shifts and functions. These provide feedback and engender a line focus rather than shift focus. The hourly information systems allow line personnel to monitor line performance on a real time basis, making it possible for them to learn and improve and to immediately see the impact of their actions. Output from these systems is the basis for the daily production meetings.

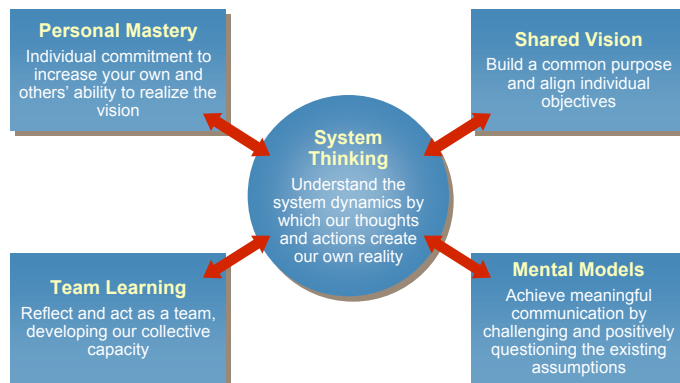


Supervisors and mechanics also have a simple visual system for monitoring performance. They can identify trends & patterns. The output is analyzed biweekly to establish major problem areas. With the right information they are able to prioritize and value specific problems. Then we give them problem-solving methodologies to identify and fix complex problems.

Through this approach, the goal is to not only reduce production variability but also to ensure that the resulting improvement is sustainable. This can only be achieved by taking a holistic view of the manufacturing process and taking into account all factors that influence performance, including both technical and human systems.

### Achieving Superior Performance

In order to effect sustainable improvements it is often necessary to implement fundamental changes to a corporate culture. All of the hard work identifying critical manufacturing components, implementing new procedures, improving teamwork and communication, will go for naught if the company reverts to its old system of doing things, its own paradigm, if you will. Holistic Manufacturing' uses System Thinking\* techniques to demonstrate the system dynamics of a company.

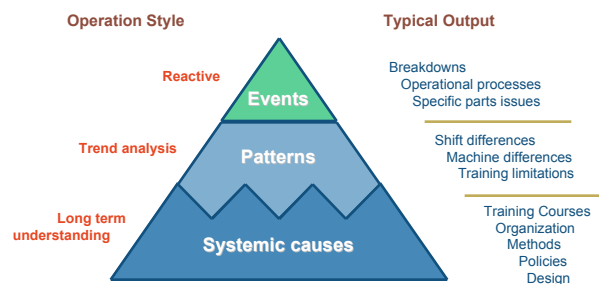


\*Peter Senge The Fifth Discipline: The Art of the Learning Organization

This is an excellent tool for identifying persistent long-term problems. Some of these techniques include creative tension driven improvement process, high performance teams, extensive involvement of all plant employees, and implementation of a learning review process. These tools help a company develop a systematic methodology for evaluating and solving manufacturing and other business problems.

For example, we have developed a methodology for bringing about fundamental change at the plant or corporate management level necessary for sustaining these new improvements. Mega changes come from management teams operating differently. Instead of desperation, teams have an aspiration to common goals and go from a reacting to a creating mode. Instead of looking to blame someone, teams look to develop a common understanding and go from looking at only a part of a problem to looking at the whole problem. Finally, teams stop competing with one another and being to use collaboration and thus take a 'we' versus 'I' attitude. As the old comic strip character Pogo once said, "we have met the enemy, and he is us!" Unfortunately, in many of today's businesses more time is spent fighting internally than against the competitor. **Holistic Manufacturing™** endeavors to produce a new culture that encourages teamwork, collaboration, common understanding, and shared vision to achieve and sustain improved manufacturing performance levels.

Similarly, to achieve sustainable levels of production improvement it is not enough to just "solve the problems." It is vital that we understand why the problem ever existed or was allowed to develop. The chart below shows how most problems are events that mask the underlying patterns and systemic causes. Fixing events only saves a small amount of time TODAY. Fixing patterns, however, solves future events and thus provides greater leverage on reducing production variability. We help supervisors and management find the patterns of problems, which then frees them from having to deal with events that consume a large portion of their time. Once they find and solve more patterns they have fewer events. They can then leave the events to operators to handle, giving them more time to understand the underlying dynamics to get to the root causes. With Holistic Manufacturing, the ultimate goal is to provide long-term, sustainable improvements, and that is only possible if the root causes of production variability are identified and corrected.



## Examples of Results

The success of this approach lies solely in the achievement of results. Here's a sampling of some of the results that have been achieved using the **Holistic Manufacturing™** approach:

- A 56% increase in output from PET line of a bottling plant in South America.
- A 30% increase in output for a bottling line in Europe with an increase in the number of line changeovers, later increased to 50% by the company themselves through continuous improvement.
- A doubling of output for a food equipment manufacturer in 6 months with lower lead times (8 weeks down to 1), 41% less overtime, and reduced set-up time.
- A 6 fold reduction in raw material losses for a tobacco manufacturer in Argentina
- A 44% increase in average monthly cigarette output for a US Consumer Goods manufacturer in just 2 months!

**Stephen F. Hardy** is President of **HMC**, based in Atlanta, GA.

HMC was formed in 1995 with the goal of revolutionizing the way companies implement manufacturing process improvements. HMC is dedicated to increasing manufacturing productivity on a sustainable level.

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