Improving Productivity With Manufacturing Cycle Time Reduction

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A systematic application of the basic principles of CTM, JIT, TQC, CFM, OPT, VAE, and TEI in a unified, consistent framework. Managers learn step by step, methods to rapidly improve their operations. They also learn the secrets of operational excellence that are used as strategic weapons by top competitors. In the workshop, as part of a team, they operate a simulated manufacturing operation. Through "real time flow analysis", they identify and remove obstacles. They learn how to produce high rates of improvement with minimum cost, disruption and risk.

DESIGN OF WORLD CLASS OPERATIONS

Brief Summary of session.

This session details a step by step process which uses the best principles of System Cycle Time Management, JIT, TQC, OPT, CIM, CFM, TEI, VAM, and STS to redesign your Total Business System. These principles are the result of over 60 successful improvement projects in the last 10 years. Blow by blow descriptions of actual implementations in the manufacturing and the office area are presented. Topics include:

- Setting up for Operations Redesign
  - Strategic analysis of where to start
  - Planning the Redesign
  - Operations Unit Change Teams

- In the Hardware Manufacturing areas...
  - Using System Cycle Time reduction as the prime mover
  - The primary analysis tools: Activity vs Time map, Exception charts, & Functional Flow diagrams
  - Learning to identify and eliminate the major obstacles to competitiveness in the manufacturing area: Pacing Operations, Defects & Errors, WIP, Linear Dependence, Variance, Loops, Lot Size, Mix, Sequence, Scheduling, and Non-Value Added-Activities
  - Reducing Defects & Errors through reductions in Time to Detect, Correct, Error, and Learn.
  - Increasing Value Added/Cost ratios through identification of Non-Value Added activity

- In the Information Manufacturing areas...
  - Using the principles of Rerouting, Paralleling, Early Detection, Early Correction, IWIP Reduction, Consolidation, and Transaction Reduction. These principles are used in addition to the obstacle identification and elimination methods used in the manufacturing area.

- In the Strategic Marketing area
  - Marketing the resulting improved capabilities

Part A. From JIT, TQC, and CIM, to World Class Operations Design

1. In the late 70's, American business accelerated the application of many new techniques to improve productivity. Spurred by furious competition from the Japanese, many of these concepts were hurriedly applied and often with less than satisfactory results. In fact, as many as 50% of all "new" ideas resulted in setbacks. The roadmap to competitive advantage was anything but clear and, to many of us struggling at that time, looked like jungle.
2. In the early 80's, it was clear that JIT, CIM, and TQC would be the basic building blocks for any World Class Operations Design. Many Corporations tried to put all of these concepts under an umbrella theme like "Total Quality", or "Leadership Through Quality", or "OPTIM". Most business leaders realized the need to integrate these approaches into a consistent framework. Also, this was a period of considerable experimentation with Employee participation and Teams. Quality circles, Integrated Teams, Employee Involvement programs, and Joint Management-Union efforts were under development at many US corporations. These again, had mixed success. Often these efforts lacked clear goals and objectives which related to the strategic success of the business. This pre-guaranteed failure and disillusionment. Most of the successes were in isolated, controlled environments, usually well supported and protected. During this period, however, the foundations were placed for a Renaissance in the mid 80's. Numerous successful pilots were reported which inspired further development and support.

3. The mid 80's were breakthrough years. Westinghouse, Motorola, Delco Electronics, Harley-Davidson, Granville-Phillips, GE, Apple, Hewlett-Packard, & others were making significant strides in their manufacturing capabilities. Islands of excellence were common in manufacturing plants and many completely redesigned, World Class plants were operating in the US. Significant improvements in Quality, Inventory Turns, Costs, and Management-Employee teamwork were being reported.

4. In the past few years, a new, holistic approach has emerged which is dramatically speeding the rate of progress. This approach focuses on the Total Business System as that system serves the customer. The operational aspects of the system are systematically analyzed in a system context. Fundamental principles learned by applying JIT, TQC, CIM, & OPT are being applied at the total business system level. In addition, a new unifying concept is emerging which when used appropriately is a powerful driver for "World Class Business System Design". This "new" concept was System Cycle Time.

" System Cycle Time (SCT) is a concept of major importance for many reasons:
- Lead time for delivery after receipt of order is becoming an important marketing factor.
- On-time delivery in a rapidly accelerated business environment is becoming a requirement. With JIT it's a must.
- Reducing SCT (System Cycle Time) also reduces the time to detect and correct defects and errors, thus improving quality and eliminating waste.
- Reducing SCT causes a focus on, and an elimination of, non-value-added activities.
- Reducing SCT reduces the time for creation of errors.
- SCT reduction improves ROA through reduction of unnecessary inventory in process.
- SCT is a Total Business System concept which spans all operations from the first awareness of a business opportunity to the receipt of payment for delivery.
- Reducing SCT forces simplification and therefore should precede any application of CIM.
- Finally, but possibly most importantly, reducing SCT reduces the time to learn, because the learning rate depends on the time to detect and the time to correct, which are both decreased in a lower SCT system.

Companies who use this approach are improving competitively at very high rates. They are leveraging their improvement efforts by applying them in high benefit, low risk areas of the business system.

Part B. Implementation methods of the late 80's

Implementation methods have come a long way. We can now expect to progress in 6 months to a level that required two years in the early 80's.

1. As noted above, successes of the late 70's and early 80's were primarily in isolated hardware manufacturing areas. The managers of these pilot areas were often carefully selected and the efforts were well supported and protected. Pilot operations selected for improvement were usually set aside and were often allowed the latitude to start with a "clean sheet of paper". Printed circuit card fabrication, printed circuit card assembly, solenoid subassembly, & small final assembly lines were converted to JIT/TQC/CIM.

2. The implementation process in manufacturing is much more sophisticated today. Let's use an example to illustrate.

Case Study: Flexible circuit manufacturer

3. In addition, redesign of office (or information manufacturing area) processes is advancing to a science. Again, an example will help here.

Case Study: Purchase Order to Start of Production.

4. Support operations are also being redesigned.


5. And finally, entire Business Systems are being redesigned.
Workshop agenda
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Operations vs Strategy
- Defining Operations
- Operations Units
- The Business System
- Examples of Operations Units

Simulation
- Run #1
  - Real time analysis
    - Identification of obstacles
      * Pacing operation
      * WIP
      * Quality problems
      * Variance
      * Mix
      * Scheduling
      * Linear dependence
      * Lot size
      * Shortages
    - Developing OPT/JIT/CFM solutions
    - Implementing the best solutions
      * Surgical intervention principle
      * Max benefit/Min risk
      * Fitting boundary conditions
- Run #2
  - Analysis
    - Controlling interstage time
      * Max.-Min. rules, Pull, Synchronizing
      * Max. only rules
      * Sequence
      * Local decoupling of MRP
    - Variance in linear dependent chains
      * Linear dependence
      * Reducing variance due to yield, periodics, downtime, lot size, statistical fluctuation, and scheduling.
    - Dealing with model mix
    - Reduction in Defects, Errors, and Variance through system redesign
      * Introduction to the concept of "Defect and Error Density"
      * Reducing time to detect, correct, err, and prevent.
  - Reduction in product waste due to redo, rework, scrap
- Run #3

Time to Learn
Non-Value-Added-Cost reduction
- Identify NVAA's and hidden costs
- Distinguishing between necessary and unnecessary NVAA
- Using the eliminate, combine, and substitute "Enablers"
- VA,VAM, VAE

The importance of structuring the approach

Generalizing from the case study
- Product development
- Providing a service
- Office work
- Information systems
- Accrued cash expenses in competitive systems
- Assessing suppliers

The Implementation Process
- Strategic Analysis of Business System
- Choosing Operations Units in the Business System where improvement would yield high leverage for the total business.
- Instituting "Redesign Teams"
- Analysis of Operations Unit
- Developing 6 month and 1 month action plans

Wrap-up