QUALITY/BUSINESS OPERATING SYSTEM - DESIGN AND CONTROL FOR PRODUCTION

Ing. Lenka Hejnková, Ing. Zdeňka Videcká, Ph.D.

Annotation:

Quality Operating System/Business Operating System is an advanced approach to Total Quality Management. The QOS/BOS methodology usually involves management in an analysis of processes and their impact on Key Performance Measurables. In many, if not most service organizations, processes are not well defined and are even less well understood in terms of output, their effect on performance, financial & other areas. QOS/BOS manages continuous improvement via strategic goals based on the organizational mission, customer expectations and competitive benchmarks.

Key words:

Total Quality Management, Simulation, Process Management

1. INTRODUCTION

On adopting the QOS/BOS implementation technique, the Management of a firm employs Key Performance Measurables to assess critical non-financial and financial results as well as their process-based causes. From then on, the organization moves to cross-functional management as a daily operating discipline. This is a process focused; data based continuous improvement strategy. In the final analysis, QOS/BOS creates a distinctive management approach to ensure that business plans 'adopted' will mean, business plans ' implemented '.

1.1 Advantages of QOS/BOS

First, QOS/BOS takes the framework of 'competitive strategy' meaning, the positioning of the organization to compete in providing specific services to a defined market. It assesses customer expectations and competitive benchmarking, to further establish the quantifiable levels of performance capability required to support the organization's strategic positioning. To some extent, the procedure is comparable to the "Balanced Scorecard" - but QOS/BOS goes further.

Each department implements its own QOS , from the operations departments of injection molding, painting, and bonding, to the supporting departments of finance, purchasing, and shipping/scheduling. All department personnel can contribute to the QOS and may submit a metric to be collected and monitored. If proven to be an effective indicator of performance, it is entered into the QOS .

QOS reports are structured for monthly, weekly, and daily review. Reports are combined to provide a plant-wide summary for monthly review by upper management and staff; daily departmental summaries are reviewed by middle management and staff; and departmental summaries are prepared for daily review by supervisors, operators, engineers, and technicians. Problem areas become a focus for resolution, either through

the application of additional internal attention, and/or searching externally for resolution.

2. PROBLEM SOLVING IN QOS/BOS

2.1 What is Problem Solving?

Problem solving is a technique to identify root causes of problem and strictly fact based.

Problem Solving techniques are used in:

- ISO-9000
- QS-9000
- QS-9000 TE Supplement
- QS-9000 Semiconductor Supplement
- Quality Operating System (QOS)
- Total Quality Management (TQM)
- ISO 14001:2004 Environment Management System
- ISO/IEC 17025:2005 Laboratory Quality System

2.2 QOS and Problem Solving for Continuous Improvement

We have to identify Customer Expectations and Competitive Bench Marks, Establish Strategic Imperatives, Identify Processes and Measurables, Disaggregate Data usage, Pareto Diagrams, Identify Improvement Projects, Conduct Problem Solving with, Cross-Functional Teams and Review Progress on a Regular Basis (Trend Charts, Pareto, 8-D Summary, Paynter Chart).

The organization shall have a documented system for preventive maintenance. This shall include a timely review of planned maintenance activities and a documented action plan to address any backlog. The Management Review process shall include a review of key metrics such as OEE, MTBF, on-time maintenance, and others as appropriate to determine the effectiveness of the program. Wherever possible, the organization shall use predictive maintenance techniques. When used, the techniques shall be based on statistical techniques and consider the cost of quality prior to implementation.

A data management system developed on this basis, measuring process variation as compared to the simple cost effects even in traditional accounting/budgeting models, identifies strategically critical process improvement opportunities for the management. The data management system also measures the impact (or lack of impact) of decisions made and actions taken validating decisions and targeting opportunities for further improvement.

Uses various problem solving tools:

- Creative thinking
- Rational thinking
- Decision thinking
- Risk analysis
- Check-sheets and Work Instructions
- Pareto Diagrams and Trend Charts
- Process Flow Diagrams, FMEA, and Control Plans
- Cause and Effect Diagrams
- Dot Plots and Histograms

- Scatter Plots and Analysis of Variation
- Control Charts
- Advanced Statistical and Data Analysis Tools (Simulation, Regression Analysis, Designed Experiments)

3. QOS and Problem Solving for Continuous Improvement

3.1 Establish a small group of people with the process/product

Knowledge, allocated time, authority and skill in the required technical disciplines solve the problem and implement corrective actions.

- Describe the Problem
- Specify the internal/external customer problem by identifying in quantifiable terms the who, what, when, where, why, how, how many (5W2H) for the problem.
- Implement and Verify Interim (Containment) Actions
- Define and implement containment actions to isolate the effect of a problem from any internal/external customer until corrective action is implemented. Verify the effectiveness of the containment action.
- Find and Verify Root Causes
- Identify all potential causes which would explain why the problem occurred. Isolate and verify the root cause by testing each potential cause against the problem description and test data. Identify alternative corrective actions to eliminate root cause.
- Select Permanent Corrective Actions

3.2 Though test programs quantitatively confirm

That the selected corrective actions will resolve the problem for the customer, and will not cause undesirable side effects. Define contingency actions, if necessary, based on risk assessment.

- Implement Permanent Corrective Actions
- Define and implement the best permanent corrective actions. Choose on-going controls to ensure that the root cause is eliminated. Once in effect, monitor the long term impact and implement contingency actions, if necessary.
- Prevent System Problems

Modify the management systems, operating systems, practices, and procedures to prevent recurrence of these and any other similar problems.

4. Simulation Tools

Historically, simulations are developed off-line using custom software packages/languages with limited direct connections to the actual data generated by the production system (Drake and Smith 1996). This traditional simulation generally examines long-term system performance, mostly for planning and design purposes. These models are usually “one-shot models” because they are seldom used after the project is finalized (if - then mostly only for checking the system ability under new project conditions). Primary reasons for this inflexibility are that the input data of the

simulation are collected and analyzed outside the simulation model and simulation environment and that the simulation system cannot communicate automatically with the information system - Entreprise Resource System (ERP) that is responsible for collecting, administration and distribution of status information. On-line simulation integrates the information system with the simulation model. On-line simulation for process scheduling, real-time "intelligent" control, performance forecasting, process capability estimation, real-time control systems emulation, real-time displays of system status, and short term decision making is nowadays active area of software development. By using the most current information system, accurate predictions about the system and future control alternatives cannot be developed.

The reason for using simulation is that simulation can better capture and describe the complex interactions where analytical methods fail. Current simulation software tools are already able to communicate with databases – but the full integration is more or less still future to see probably only in automotive industry by using the concept of digital factory. In this way stays the combination of simulation, information system and real-time control very promising framework for optimization of dynamic characteristic in flexible production systems.

5. Conclusion

Process management is commonly used in most firms. Effective management of business processes leads to increasing in productivity and efficiency by the right costs. The result is distinct competitive advantage in the production area. Other result of solution gives to process management required flexibility and transparency of process innovation keeping process stability, feedback and possibility of a process monitoring in their reality. Connection of software for process management and discrete event simulation gives strong competitive advantage and benefit for value added processes in companies.

6. Literature

[1] WATSON, G.H., CONTI, T., KONDÖ, Y.: Quality into the 21st Century: Perspectives on quality and competitiveness for sustained performance. Milwaukee, Wis. : ASQ Quality Press, 2003. ISBN 0-87389-602-5

[2] Manual Witness. Lanner Group

[3] **www.asq.org**

[4] **www.omnex.com/misc/register.asp**

[5] **www.qualsat.com/qualWeb2Lrg.swf**

Kontakty:

Ing. Lenka Hejnková, ., Faculty of Mechanical Engineering, Brno University of Technology, Kolejní 4, 612 00 Brno, Czech Republic, E-mail: yhejnk00**Chyba! Neznámý argument přepínače.**stud.fme.vutbr.cz

Ing. Zdenka Videcká, Ph.D., Faculty of Business and Management, Brno University of Technology, Kolejní 4, 612 00 Brno, Czech Republic, E-mail: videcka@fbm.vutbr.cz