



TRANSACTIONS FROM
THE SYMPOSIUM ON
QUALITY FUNCTION DEPLOYMENT

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1993: 5th Symposium on QFD (ISBN1-889477-05-2)

Aerospace 1993

Concept Selection "A Process For Aerospace Design Decisions", *D. Hamilton, McDonnell Douglas Aerospace - East*. Many recent quality-related initiatives at McDonnell Douglas Aerospace-East have focused on Integrated Product Development and Systems Engineering approaches to the design of their products. Within the scope of these initiatives, there was a clear requirement to develop a traceable, unbiased, repeatable, and systematic approach to innovative design development, particularly design or concept selection. This paper presents a concept selection methodology which has been adapted from Stuart Pugh's concept selection process and applied for several design selection activities at the company.

Quality Function Deployment For Large Systems, E. B. Dean, NASA Langley Research Center. This paper reports efforts to extend QFD to large scale systems within NASA. It links QFD to the system engineering process, the concurrent engineering process, the robust design process, and the project measurement process. It includes issues, project functions, and resource utilization as a part of a tightly linked project structure of high dimensionality which provides a high quality, low cost, and hence a competitive product. A pre-QFD matrix linking customers to customer desires and the decomposition and mapping of customer value as a means of project activity prioritization are described.

Use of QFD to Design a Simulation System, *David L. Molnar, McDonnell Douglas Technologies Incorporated*. This paper describes the use of QFD to design a scenario generator for a system that electronically generates test targets for radars. The explicit primary goal was to use QFD as a tool to formally determine design requirements. Additionally, QFD was used to facilitate team building among two groups of people who had different technical expertise and had not worked together before this QFD project.

Automotive 1993

QFD Implementation at Chrysler - The First Seven Years, *Robert J. Dika, Chrysler Corporation*. QFD appears to be a simple and rational method to translate customer requirements into appropriate company technical requirements. It is also the nature of QFD to challenge some of the basic assumptions and traditions of the new product development systems in mature organizations. Since it demands a change in the ways that we think and act as a company, it will meet resistance. This paper presents the story of successes and struggles that Chrysler has experienced in the integration of QFD into its development process. It reports the steady growth in both the number and significance of QFD projects over a seven year period, and shows that QFD can be a strategy in the movement toward a TQM culture.

Utilization of QFD Principles In Chrysler's 1995 Small Car Program, *Monte G. Myers, Chrysler Corporation*. Is it possible for an American automobile manufacturer to design and build an affordable, fun to drive small car, in North America and at the same time make a profit? Chrysler's Small Car Platform Team not only believes that this is possible, but is on the verge of proving it to the world. This team has continually challenged itself to "Dare To Be Different" in all aspects of the automobile design and development process in an effort to challenge this paradigm. This paper presents a case study of a large scale, total vehicle program. It discusses the QFD process as used by Chrysler's Small Car Platform Team during the design and development phases of the new small car slated for an early 1995 model year introduction.

Application of QFD to Launch of G.M. D-Car Air Bag, *Leonard Pavia, Mexican Industries in Michigan, Inc.* As a tier two supplier for air bags, Mexican Industries does not interact with the end item customer to be involved in the first phase of QFD in determining the customers demands or wants and translating them into design requirements. However, the company does become actively involved in Phase Two "Part Deployment," Phase Three "Process Planning" and Phase Four "Production Planning." This paper explores the application of these three phases of QFD to a vary unique air bag designed to meet the customer demand of protecting not only the regular passenger but also the third person sitting in the front seat.

Volvo's E.C.C. (Environmental Concept Car) - QFD applied to a Future Concept Car, *S. Voegele, Volvo Monitoring and Concept Center*. While the majority of the world's automakers are involved in intense R&D of battery-powered electric cars that will meet the CAFE requirements, Volvo has taken a different view: Meet California's zero emission vehicle standard set for 1998 but also take the desires of Volvo customers into consideration. The voice of the Volvo customer guided the entire concept development process. Using QFD as a concept development tool provided product requirements that were surprisingly different from initial expectations.

Strategic Management of (Standard) QFD, *Keith B. Termaat, Ford Motor Company*. After five years of QFD, things right and things wrong with QFD were evaluated to specify a Ford standard process to achieve faster cycle time, reduced engineering workload and better direct marketing research and software institutional support. This paper describes a Ford proprietary QuickQFD™ process which relies on templates for wants, hows, and interactions to rapidly focus on no more than a couple of dozen each.

Aligning The Product Development Process Using Momentum^(R) QFD: A Case Study In Letting The Voice Of The Customer Drive The Conceptualization Of a New Leak Detector, *R. Norman, Leemak Training Systems, Inc.* Using a case study, this paper examines the phases a company went through to implement a process for concurrent product development. The first phase included Voice of the Customer alignment and tools, the second phase embodied the tools and techniques of QFD, and the third phase involved implementing the plan.

Computer & Electronics 1993

Optimizing QFD, *G. Brubaker and P. Dunham, NCR Corporation*. This paper traces the introduction, optimization process, and training of QFD that took place and has been going on at NCR since the methodology's introduction to the company in 1989. Barriers to success, high performance QFD teams, and improvements made in market research brought by QFD are also discussed.

Successful Quality Function Deployment (QFD) Application at Digital Equipment Corporation - Unique Approaches and Applications of QFD to Address Business Needs, *Michelle Ackerman, Bob Buckland, Digital Equipment Corporation*. DEC is applying QFD concepts to successfully improve internal business performance. Application of general QFD concepts to everyday business issues such as strategic planning, problem solving, and process development, in addition to more traditional software and hardware design and development, is shared.

Building Beyond the House of Quality: Concept Development, *Donald E. Demallie, Unisys Corporation*. Designing a product that satisfies customer requirements has often been considered an art rather than a science. Using concept development changes that perception. By eliminating guess work, concept development applies a disciplined approach to developing products that best satisfy customer requirements. This paper describes the concept development process and defines the relationships between the process, the house of quality, the parts deployment matrices, and the use of Pugh's concept selection process.

Eliminating Customer Dissatisfaction Using Negative Relationship Matrix, *David H Green, Michael Cooke, Ian C. Wild, Electronic Data Systems Consulting Division*. This paper describes how to use customer feedback to make trade-off decisions so that product features are not offered at the expense of the important customer requirements. The methodology involves the use of a "Negative Relationship Matrix," which was derived from the QFD technique. The example used illustrates how an automotive company might provide the best possible fuel economy to its customers.

Beyond the House of Quality - Dynamic QFD, *Cindy Adiano, IBM Austin, Aleda V. Roth, Duke University*. The kaleidoscopic nature of today's environment has transformed the basis of industrial competitiveness. Prerequisite to superior manufacturing is the ability to create defect-free products that are right for the customers over time. Thus, the point of departure for market-driven manufacturing is the voice of the customer. Incorporating the voice of the customer into manufacturing is a multi-step process that poses the conundrum on how to link the voice of the customer with the manufacturing processes efficiently and effectively. The problem is technically solved through "Dynamic QFD," which is designed to optimize manufacturing's capability to enhance product quality and solution timeliness. The paper describes the method.

Construction 1993

QFD: A Step-Change Planning Tool for Engineering and Construction Projects, *Thomas H. Oswald, P.E., Quality Management Consultant*. This paper describes recent research into the use of QFD in the project management processes of the engineering and construction industry (E&C). It addresses the unique nature of large E&C projects as complex, customized packages in which joint planning, teamwork, and communication between customer and supplier are often as important as decisions regarding materials, systems, and other aspects of physical configuration. The paper discusses industry differences which create challenges in adopting QFD in the E&C process, and concludes by setting forth implementation issues currently being investigated by the author.

Defense 1993

The Application of QFD to a National Security Issue, *Greg A. Mann, Sandia National Laboratories*. On Aug. 4, 1990, the U.S. Senate passed a resolution requesting that Department of Defense investigate the feasibility of installing a post-launch destruct mechanism in all intercontinental and submarine-launched ballistic missiles deployed by the U.S. The feasibility investigation required the complex analysis of high level political, technical, environmental, operational, and security issues by a cross-functional team from DOE and DOD. Clarity and conciseness of the investigation results were of critical importance. This case study reports how modern quality tool, QFD, was modified and used successfully to organize the study, prioritize customer requirements, document decisions, evaluate technical options, and to identify critical system's characteristics necessary to respond to this national security issue.

QFD's role in Advanced Tactical Aircraft Development, *Suzanne Bergman, McDonnell Douglas Aerospace - East*. Advanced aircraft design requires solutions to postulated future problems. MacDonnell Douglas Aerospace - East has developed a process which uses QFD to aid in the understanding of potential world futures and their implications. Beginning with national goals, successive matrices capture the flow down of requirements through the prioritization of technologies to be applied to advanced tactical aircraft. This paper describes how National Goals can be linked with successive levels of military policy in order to illustrate the impact of these policies on future aircraft force structure requirements. A method for examining the sensitivity of these requirements to external variables, such as the defense budget, potential U.S. and world futures, is also discussed.

QFD for Military Technology Development Planning, *Robert A. Fiske and William J. Adams, North American Aircraft Division, Rockwell International*. The U.S. Air Force and U.S. Navy crew escape communities are merging forces to develop requirements and technology programs intended to produce an advanced ejection seat for fighter pilots. With the participation of this joint-service team Rockwell International and LME, Inc. executed QFD for bridging the large set of conflicting escape system requirements to a technology development plan. The first House of Quality embodied 6 Customer Voices, 12 requirements as Whats, and 33 technology goals as Hows. Subsequent matrices revealed key technology projects and technology development programs and culminated in a Technology Development Roadmap planning document.

Using QFD to Establish and Improve Internal Customer Satisfaction, *Linda K. Hoffman, FMC Corporation*. Effective use of information resource technologies is critical to the success of a product development program. In June 1992, a TQM team was assembled to establish the desired interface between Information Resources and development program at a FMC Corp. in MN. Using QFD, the team analyzed customer data obtained from experienced development program managers. This paper describes the steps taken and products of using QFD.

An Application of QFD in Product Support Services, *Jeff Litwin, Rockwell International*. QFD for Military Technology Development Planning, Robert A. Fiske, Ph.D. and William J. Adams, Rockwell International, Walter R. Peck, LME, Inc. This study looks at the application of QFD at Rockwell International's Collins Avionics & Communications Division (CACD) in the product support area. Management had developed a goal of an average turnaround time for the repair of customer equipment. To address

this target and identify opportunities for breakthroughs necessary to achieve such a goal, a QFD project was initiated. This paper reports the initial application of QFD of this project that is still in progress.

Education 1993

QFD in Academia: Addressing the Customer Requirements in the Design of Engineering Curricula, *Mahesh Krishnan, Cincinatti Bell Information Systems, Dr. Ali A. Housmand, University of Cincinnati*. Can the powerful methodology of QFD be used in academia? This paper describes a QFD model that can be used in the design of engineering curricula and how it can be implemented at a university setting. Specific success stories from the University of Cincinnati are used to illustrate the effectiveness of the model.

General Industry 1993

Using Fuzzy Set Theory To Derive An Overall Customer Satisfaction Index, *G. Wasserman, Wayne State University, Agus Sugjianto, C. Wisry Sanrow, Quality Engineering Consultants and Contractors, Inc*. This paper details on how one may construct an overall customer satisfaction index based on the use of the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) found in multi-attribute utility theory. The index is derived using competitive customer assessment information contained in the (A1) QFD planning matrix.

Measuring Improvements in Customer Satisfaction Through QFD, *Jose A. Santos, Universidade de Sao Paulo, Brazil*. This research paper presents a unified methodology to measure product improvement, based on the concept of QFD.

Quality Function Deployment for Product and Service Improvement, *Daniel Hanson, Weyerhaeuser Company*. Applying QFD to existing product lines, cross-functional team developed innovative design requirements which are now used to measure product and service performance. This paper outlines the steps the company took and processes used to build the initial house of quality. It describes the barriers the team faced and how they handled them, the breakthrough leanings that took place as a result of using QFD, and how this created an important link between external customers and the company's manufacturing facilities. Also discussed are the diverse resources used, how QFD allowed the company to consolidate vast amounts of information into a few clear, concise pages of the most critical information, and the realization that QFD, used well, can create a significant competitive advantage.

QFD And Selecting Best Design, *I. Ferguson, Ian Ferguson Associates*. The balance between quality of design that ensures market share, cash generation for investment payback requirements, and the assurance and confidence of reliability is a fine one. This paper shows how QFD, particularly beyond the House of Quality, can reconcile these demands by generating eight sets of benchmarks that make a selection of Best Design one that will meet pre-set targets.

Quality Function Deployment - A Systems View, *Dr. S. Nelle, Decision Management Australia, Byron Frew, Global Strategies*. This paper explores QFD from the perspective of General Systems Theory. Examining QFD from this perspective helps explain the major reasons for the failure of the process and QFD projects. General Systems Theory provides a structure from which to teach and present QFD to ensure the process is understood and used successfully. The paper draws on experience from consulting assignments in Australia.

The Strategic and Tactile Use of QFD in the product Planning and Development Process. *Kenneth L. Pia, Creative Research Services, Inc*. The benefits of QFD can be greatly enhanced if the strategic direction for product development is defined by the organization prior to the actual technical development of products by R&D or engineering. This paper details the process developed by this consulting firm to define and integrate strategic focus with tactical development of new products, using QFD as the platform.

Healthcare 1993

Applying QFD to Health Care Services: A case Study at the University of Michigan Medical Center, *Deborah M. Elrich, PH.D. and Dennis J. Hertz, University of Michigan Medical Center*. The University of Michigan Medical Center piloted QFD in a new unit which consolidated several separated diagnostic procedures into one unit. Based upon early TQM success, the organization employed QFD to realign resources to meet the valid customer requirements of the combined groups in order to stimulate service volume by better satisfying customer desires. The team is now completing the A-1 matrix. This paper discusses the Medical Center's approach, reports experiences learned, identify changes which have been implemented, quantify the financial benefits which have resulted from these changes, and offer ideas on how best utilize QFD at a referral hospital.

Market Expansion Analysis Through QFD, *J. A. Miller, Quality Processing Consulting, H. N. Tucker, Clintec Nutrition*. This paper presents the approach and findings from a House of Quality based analysis of how the market leading company could cause expansion of the entire clinical nutrition business worldwide.

Human Resources 1993

QFD for Improving Employee Morale, *Gary Ekstrom, IBM Skill Dynamics*. This paper illustrates the use of QFD for improving the overall morale of employees within a company. The process used by the QFD Team is illustrated along with the top employee wants and needs and a prioritized list of characteristics. A complete QFD diagram provides the team results and the subsequent actions taken based on those results.

Research & Development 1993

QFD Applied To R & D Activities, *M. Soril and Z. Goifi, LaBein Centro de Investigacion Tecnologica Quality*. This paper reports the LaBein's efforts in application of the QFD methodology to its R&D lines and services by a qualified Quality Improvement Team in order to a) identify the customer's current and future needs, b) improve the accuracy of its own projects, research guidelines

and other activities, and c) help its management to adjust the organizational long-term vision, customer driven master plan and yearly strategies, d) improve employee satisfaction and motivation while matching their profiles and academic careers to the market requirements, and e) launch a TQM program with the short term goal of accomplishing ISO-9000 accreditation.

Safety 1993

Application of QFD to a "Soft" Issue, *Jonh Crossley, The Clorox Company*. The Clorox Technical Center Health and Safety Team had a concern. But an unusual application of the QFD process quickly solved the problem. The paper describes how QFD was able to surface the cause of the H&S committee's problems and allow them to develop a recommendation, that in combination with other data from the analysis, resulted in a much improved system.

The Application of Quality Function Deployment In the Los Angeles River Rescue Task Force, *Kathleen Butler, Robert Litwin, John Marzec, Rocketdyne, Rockwell International Tony Ennis, Los Angeles City Fire Department*. Each year, on the average, six people drown in the L.A. area flood control system. After a highly publicized tragedy in 1992, the City Council formed the River Rescue Task Force. One of the objectives was to develop new technology as may be necessary to assure rescue of people from the flood channels. QFD was used as a means to sort through the various concepts. Rocketdyne provided training and team facilitation to the Task Force as they worked through the QFD process. They have completed the House of Quality and the Pugh concept selection. Prototypes will be tested and recommendations made to the City council.

Service 1993

QFD for Service industries: From Voice Of Customer To Task Deployment, *Glenn Mazur, Japan Business Consultants*. Traditional quality approaches to assuring service quality often focus on work standards, automation to eliminate people, or Quality Improvement Teams to empower employees to solve problems. As manufacturers are finding out, however, consistency and absence of problems is not a competitive advantage when only good players are left. Exciting, positive quality must be created that adds value to the customer. This paper discusses why the service industry should be embracing QFD to stay ahead of the game. It includes an excellent explanation of what the Kano model really means, what is QFD, how to identify key customers, how to implement QFD steps, what are the deployments of Service QFD and how QFD can be successfully implemented in small businesses. A 1985 case study of a translation business is used to illustrate the points, in which the use of QFD increased the revenue by 28.5% in the first year, 150% the second year, and 215% the third year.

Strategic Planning 1993

Does QFD Support Corporation's 35-Year Vision? *J. Terninko, Responsible Management*. Why and when should QFD be used? The Check-Act-Plan-Do cycle is the critical process connecting an organization's vision to the design process. The design process defines the tasks and functional assignments which may require QFD activities. This presentation formally connects vision, TQM, design process and QFD, providing a road map for the practitioner. A service application for healthcare consultation is used to present the idea.

Team Building 1993

QFD and Personality Type - The Key to Team Energy and Effectiveness, *Dilworth Lyman, International TechneGroup, Inc., Ken Richter, Chevron Chemical Company*. This paper discusses the company's use of MBTI as an aid to improve the effectiveness of QFD teams. The paper shows how the MBTI was used as a tool to educate teams and improve the effectiveness of their QFD efforts.

Concurrent Engineering and the Entire QFD Process: One Year After Start-Up of a New Mill, *D. M. Scheurell, Ph.D., Kimberly-Clark Corporation*. In the previous year's symposium, the company reported a paper that emphasized how their company went about forming the QFD team, the strategies to get around the barriers, results, and the transformation. This year's paper follow up on the program and postulates what they believe are the keys in obtaining all possible benefits from QFD. The importance of the team charter, a shared vision, and the team empowerment is stressed.

Just Do it!, *John Stitt and Cheryl York, Kimberly - Clark Corporation*. This paper describes the obstacles to implementing QFD in an older Kimberly-Clark mill, the team dynamics used to overcome the obstacles, and the changes that took place within the QFD team and spread to other departments within the mill.

Supporting Technique to Improve Cycle Time When Using QFD, *William J. Riordan, Howard Hohnson, Catherine Olin, Tom Salyers, GDE Systems Inc.* The QFD enhancement discussed in this paper is based on Delphi theory and aims at balancing individual efforts and team needs while minimizing the time needed to achieve mutual understanding and group solidarity. The paper describes the theoretical basis of the method, the integration of computer tools, and the mechanics of the total process and how the enhancement was used in two QFD efforts (service and management related projects)

Telecommunication 1993

QFD Adaptation Under Changing Business Directions - An Application for Product Fulfillment Systems, *Sherry M. Bosserman, Motorola, Inc.* After four years since the introduction of QFD and 12 completed QFD projects in various applications, the QFD facilitators at Motorola began to see the patterns of successful QFD teams vs. unsuccessful ones. Why did some QFD projects succeed and others fail? And what can be done to enhance success rate in the future? This paper reports detailed analysis of the various factors that were present in the past QFD efforts, and identifies a several key points that are critical to successfully bringing QFD into a technology-driven culture.

DMOQs: Measuring Yourself Against the Voice of the Customer, *Patrick G. Brown, Dianne M. Thompson, AT&T Bell Laboratories*. The QFD toolset is a superb mechanism for driving all aspects of an enterprise by the voice of the customer. At AT&T, QFD techniques have been used to define service offerings, strategic plans, quality improvement programs, and business

metrics that are closely aligned with customer needs and expectations. This paper describes how the QFD approach has been used at AT&T to generate customer-focused metrics called "direct measures of quality," to help ensure that the aspects of the products and services that are most relevant to satisfying their customers' needs are measured.

Enhancing Customer Service Through QFD, *Lori A Frantzve, Mahesh Krishnan, Cincinnati Bell Information Systems*. This paper describes the use of QFD to improve customer service at Cincinnati Bell Information Systems. It looks at the process of handling external customer calls related to product/service information, on-line systems support and other customer and product needs. The paper also speaks to how QFD fits into the TQM cycle.

Tools and Methods 1993

Priorities: the Analytical Hierarchy Process in QFD, *Richard Zutner & Company*. An approach is presented for applying an Analytical Hierarchy Process (AHP) in Quality Function Deployment to improve the accuracy of priorities and make QFD better fit particular projects. A more accurate development of priorities can be accomplished by the consistent use of ratio scales, such as produced by the AHP, throughout QFD. The Figures presented illustrate the application of these concepts to the A-1/House of Quality matrix.

Utilities 1993

QFD at PG&E - Applying QFD To The residential services of Pacific Gas & Electric, *A. Tessler, N. Wada, PG&E, R. Klein, Applied Marketing Science*. In 1992, PGE began using QFD to identify programs and services that would improve customer satisfaction and overall favorability. The first application focused on residential customers system-wide with the San Jose division as a test site. The pilot program went so well that the company expanded the program to other geographic divisions and customers. This paper reports the use of the Voice of Customer to link market research, SPC, continuous improvement teams, systems modeling, and information systems design and development, as well as the resulting benefits of using QFD.