A JURAN INSTITUTE REPORT

Quality Wars

The Triumphs and Defeats of American Business

JEREMY MAIN

THE FREE PRESS
A Division of Macmillan, Inc.
NEW YORK
Maxwell Macmillan Canada
TORONTO
Maxwell Macmillan International
NEW YORK OXFORD SINGAPORE SYDNEY

The Free Press
A Division of Macmillan, Inc.
866 Third Avenue, New York, N.Y. 10022

Maxwell Macmillan Canada, Inc.
1200 Eglinton Avenue East
Suite 200
Don Mills, Ontario M3C 3N1

Macmillan, Inc. is part of the Maxwell Communication Group of Companies.

Printed in the United States of America

printing number
1 2 3 4 5 6 7 8 9 10

Library of Congress Cataloging-in-Publication Data

Main, Jeremy
Quality wars: the triumphs and defeats of American business / Jeremy Main.
p. cm.
Includes bibliographical references and index.
ISBN 0–02–916684–5
1. Total quality management—United States—Case studies.
I. Title.
HD62.15.M3465 1994
658.5′62′0973—dc20 93–42422
CIP

Foreword

The incredible growth of world-wide competition in the past 30 years, led first by U.S., then German and then Japanese companies, has shaken modern business to the very core. People around the world, especially Americans, have access to the best possible products at continually decreasing relative costs.

Industry after industry struggled with the onslaught of high-quality, reasonably priced products from Japan, Europe, Southeast Asia, and now China. Industry after industry in America collapsed. Many high-tech products are no longer made in the United States, or made by American companies in the United States, or made by American companies at all.

But some leading American companies have shown clearly and dramatically that it is possible to make things virtually without error, with few failures over time, at increasingly competitive prices. In the past 15 years we have seen companies reduce defects by 10 times, by 100 times. We have seen a company that used to take six weeks to manufacture a high-tech device now take the order, custom-design hardware and software, produce, and ship it in 1 hour and 45 minutes.

Finally, someone with both the experience and the necessary skills has taken the time to document the tumultuous times of the past 15 years of America's quality revolution. Jeremy Main has an unusual skill of writing clearly and engagingly about complex topics—and total quality management is a most complex topic.

Although there is definitely no shortage of books on quality management, unfortunately most fall into two categories, neither of which is fully useful. The first category consists of easy-to-read, entertaining collections of quality anecdotes. Inspiring perhaps, these quality "lite-bites" may leave the reader eager to get started but unsure of what to do and even less sure of how to do it.

In the second category you find well-meaning but often turgid books explaining in great technical detail the tools and methods of total quality, and even the road maps for change. Written by quality professionals or senior

executives describing their own experiences, these books often overwhelm, frequently confuse, and sometimes mislead even the most dedicated reader.

Juran Institute recognized the need to create an objective documentation of America's quality revolution and, as it happened, that is just the kind of book Main wanted to write.

In *Quality Wars* Main has broken new ground. He covers major events that have transformed the management of business in fundamental ways. He describes them with a brisk, almost novelistic pace that sometimes leaves the reader breathless, but never bored or confused.

The breadth of topics Main covers is staggering. He starts with the beginning, sometimes emotional experiences that pushed many companies into action. He follows with a chapter on the leaders, what they did, and what they think now about their mistakes and successes. The author continues with a wonderful chapter, "The People: How Hard It Is." He then goes into intriguing detail to explain the rediscovery of the customer and the almost fanatical customer focus emerging across the country.

Main examines the tools of quality management, a subject most unusual for a book of this type. He pulls no punches here. After reading so many books by tools salespeople, I am delighted to see proponents and opponents given equal time and to see both the values and the misuses highlighted and discussed.

He then comes back for a second pass, this time in more depth. By devoting a chapter to each of several critical industries, Main allows himself time to explore the specific changes in the management of specific companies. He starts, naturally enough, with the automakers. These companies have been shaken to their very cores by incredibly strong competitors. In this chapter, Main's many years at *Fortune* shine through. The coverage is thorough but fresh. New insights jump off every page.

Main follows with two intriguing chapters on the pacesetters—the true leaders of the quality revolution—and the fumblers—those hard-working, well-intentioned companies who somehow lost their way. For many readers, the lessons of failure may be painfully familiar. For others, the lessons may come just in time. If you have no time to read anything else, read these two chapters. If you do, I'm sure you'll quickly go back and read the rest.

The author concludes with chapters on the railroaders, service companies, the professions, and even government. He describes a wonderful variety of approaches, of philosophies, but an even more wonderful wealth of similarities, of commonalities, of willingness to learn from each other.

Much has happened to American industry in the past 15 years—and to Canadian, and Mexican, and European, and Australian industry—and on

around the world. Better than anyone else, Main has captured the essence of this quality revolution and packaged it so we can understand it. The book is about change:

- Change based on modern statistical methods and a revolutionary concept called total quality management.
- Change that yields incredible reductions in waste, that results in a new respect for the customer, that draws out the creativity and ability of every member of an organization.
- Change so profound that a new CEO announces he will not focus on short-term profits despite intense pressure to do so from institutional investors because he must also serve customers, suppliers, employees, and the community.
- Change so surprising that three second-graders serve on a quality improvement team with teachers, administrators, and custodians to improve recycling in their school.
- Change so unexpected that members of Mustang clubs throughout America participate with Ford in the design of a new model, working by fax and E-mail with a design team that includes suppliers, machinists, assemblers, market researchers, and engineers.
- Change that has spread through manufacturing companies and services around the world and now is beginning to impact our hospitals, our local, state, and even federal governments, and our educational systems.
- This book describes the key events, players, concepts, and methods that have created so much change and provides an extremely useful guide for others embarking on the same journey.

A. Blanton Godfrey
Chairman and CEO
Juran Institute, Inc.

Preface

This is not a how-to book or a book of theory. Nor is it an evangelical treatise or an act of worship. Too many books of those kinds have already been written by the advocates of what is known most generally as total quality management or TQM. They sometimes damage their case with an excess of zeal. They have seen how well TQM works, and they cannot wait to convince you, and they forget to talk about the failures and frustrations. What I have set out to do is to tell stories about companies and other organizations in the United States that have adopted some version of TQM. TQM is tough because it is not just a way of delivering better products and services; it is also a way of changing how we think, work, and relate to other people. It involves improving everything an organization does. Therefore it is stressful and demanding, full of surprises and problems, constantly challenging—especially for the CEO, who has to learn to lead in a new way. It has turned out to be one of the most difficult and rewarding realignments ever attempted by American business. Some companies have achieved levels of quality unimaginable a few years ago. Many have been disappointed. Adopting TQM amounts to much more than the formal steps that the textbooks outline. It seemed to me that to tell these stories, and to tell them as much as possible in the words of the crucial players, the CEOs, might be both useful and interesting.

The academic might be inclined to sniff at my approach as merely anecdotal. However, through these stories you might get closer to the reality of total quality management than you could through any number of surveys, theories, theses, symposia, and texts. Sometimes examples teach more than theory.

Quality boffins may be surprised to find that there is not a chart, diagram, graph, table, or other illustration to be found in this book. Most books on this subject are full of graphics. The practitioners of TQM seem to be unable to express themselves without propping themselves up with slides, blackboards, or illustrations. I cannot begin to count the number of diagrams purporting to explain some theory of quality or other that I have studied from every

angle and found meaningless or just dressing on a banality. Here, in this book, the reader will find unadorned thought, fact, and interpretation and, therefore, my shortcomings will stand in plain view.

I regret that I could not tell more stories. I should have said more about Corning, General Electric, and Procter & Gamble, and have written about American Express, Federal Express, Harley-Davidson, Johnson & Johnson, 3M, Texas Instruments, Wal-Mart, Whirlpool, and many other companies, particularly the smaller ones. But so much is happening in so many places in the quality field that it would have been impossible to fit all the interesting stories into one volume.

Today there are few leading corporations which will admit that they do not practice total quality management, or that it is not paying off. I have tried as much as possible to find out what went wrong as well as what went right, because failure can be at least as instructive as success. But no doubt there are instances where I did not see through the screen of happy talk. If, as a result, I mislead a reader, I apologize.

I first became interested in the subject of quality in the 1970s when William S. Rukeyser, then managing editor of *Money* magazine, asked me to examine the adage, "They don't make things the way they used to." I found out that they don't—thank heavens. This was before Detroit woke up to the quality gap between its cars and the Japanese cars. Even so, the Detroit cars were clearly better than they had been. So were other products. In 1981 I became aware of the evolution of formal quality-improvement methods when I contributed to a series of articles in *Fortune* entitled "Working Smarter," which subsequently became a book (Viking, 1982). Through the 1980s I had the opportunity, thanks to *Fortune*, to study TQM on many occasions, and to listen to, talk to, and travel with the late W. Edwards Deming, Joseph M. Juran, and some of the other leaders in the quality field. When the Juran Institute offered to support the book I wanted to write and The Free Press to publish it, I grabbed the opportunity. The modern approach to quality improvement seems so rational, so sane, so successful when it is done right, that I had to write about it.

Jeremy Main
Ridgefield, Connecticut
September 1993

Contents

Introduction

''A Slight Problem''

Southern Pacific's ''Extra 7551 East'' crested El Cajon pass at 25 miles per hour and started the long run down to San Bernardino, 2,000 feet below and 24 miles away. It was 7:03 A.M., May 12, 1989. At the head of the train, Engineer Frank Holland radioed Lawrence Hill, the engineer operating two helper locomotives at the rear, to ask if he had dynamic braking power. Hill replied, ''Yeah, I'm in full.'' It was the only time they had spoken since the beginning of the trip. The dynamic brakes on a locomotive work like the gears on a car when the driver uses the weight of the engine to slow down. Holland knew that one of his four head-end locomotives was dead—no power and no brakes—and another had only intermittent brakes. But with dynamic braking from the two other head-end locomotives and the two helpers, plus the pneumatic shoe brakes on the 69 cars he was hauling, Holland could hold the train. The cars carried trona, a grayish mineral found in evaporated lake beds and used for making fertilizer, to be shipped from the Port of Los Angeles to Colombia. Extra 7551 East's computerized profile listed the train's total weight as 6,151 tons. If the information given to Holland was correct, he had ample braking power to control the train's descent, starting from El Cajon at 25 m.p.h.

As Holland expected, on the downgrade the train's speed picked up 5 miles per hour and Holland put 10 pounds per square inch of pressure into the pneumatic brake cylinders. The train held briefly, then started accelerating. Holland added a bit more pressure, and again the train held its speed briefly and then began going faster. Each time he applied a bit more brake power, the train held, then accelerated. Still Holland thought he had the train under control. When the train entered a straightaway, he released more air pressure into the brakes and thought the train ''should start bogging down.'' It did not and he went to maximum braking power, 26 lbs. p.s.i. By 7:30 A.M. the train was rumbling downhill at 45 m.p.h. and Holland realized that ''this train wasn't going to stop.'' At the bottom of the hill, in San Bernardino, the

train would enter a curve flanked by a housing development where people were getting up and going to work.

At the controls of the helper engines, Hill, without talking to Holland, threw the pneumatic brakes on full emergency. But by now they were smoking and overheated, so they had little holding power. Hill's action automatically blocked out the dynamic brakes, but they could not make much difference at that speed anyhow. The train began to surge forward. Everett Crown, the conductor, got on the radio to the yard at West Colton at 7:33 and said mildly, "We have a slight problem. I don't know if we can get this train stopped." Overhearing Crown's understatement, Hill put out a Mayday call over his radio. Then he braced himself on the floor of the engine cab with his back and head against the control panel. At 7:37 Crown called in: "Mayday, Mayday . . . we're doing 90 miles per hour, nine zero, out of control, won't be able to stop . . ." Holland and Crown remained in their seats. There was nothing they could do at this point to stop the train. When it hit the curve in San Bernardino less than a minute later, it was probably doing 110 m.p.h., but the train recorders do not register above 90 m.p.h. The entire train—six locomotives and 69 cars—flew off the tracks and piled up on the right of way and into the houses beside it. The leading cars lay side by side, like neatly stacked logs. The others were scattered randomly. Over everything lay a thick blanket of trona. Crown and the head-end brakeman died, as did two small boys in the houses. Somehow Holland survived. So did Hill and his brakeman. Five of the six engines and all 69 cars were totally destroyed and so were seven houses. (Thirteen days later, a cleanup crew ruptured a gasoline pipeline under the site of the wreck, setting off an explosion and fire that killed two more people and destroyed eleven more houses, but that is another story.)

The National Safety Transportation Board investigators amassed the details of what happened in the hours, minutes, and seconds before the wreck. They found that when the Southern Pacific clerk accepted the bill of lading from the shipper, the Lake Minerals Corporation in Owens Lake, California, he didn't notice at first that the weight had not been entered on the forms. Later, he tried calling Lake Minerals, but couldn't get their number, so he estimated the weight of the trona at 60 tons in each of the 69 cars. He testified later, "I figured these cars were lighter than cement cars and I knew cement cars weighed 75 tons." He wrote the total down on the bill of lading, but without noting that it was an estimate. Had he so noted, the billing office in Los Angeles would have double checked. But it didn't and thus drew up a train profile on the basis of 60 tons per car. In fact, as Lake Minerals assumed the Southern Pacific people knew, the 69 cars each carried 100 tons

of trona. Adding to these 6,900 tons the weight of the train itself, Extra 7551 East started down from El Cajon weighing 9,000 tons, not 6,150 tons as Holland thought.

When Holland was making up his train he discovered that one of the locomotives would not start. It was dead. But he left it in the string of four engines because nobody told him what to do with it. Assigned to help Holland, Hill picked up the two additional locomotives and heard from the engineer he relieved that one of these locomotives had no dynamic brakes. He assumed that the engineer had already reported this failure, so he did not report it. Nor did he tell Holland. They did not discuss the weight of the train, either. Hill and Holland came from different yards, different chapters of the Brotherhood of Locomotive Engineers, did not know one another, and had very little communication over their radios at each end of the train. When Hill told Holland as they crested El Cajon, ''I'm in full,'' he was referring to the one additional locomotive that did have dynamic brakes. Holland thought he meant both of them.

Extra 7551 East weighed 50% more than Holland thought and had a lot less braking power. Of the six locomotives, two had no dynamic brakes, and a third had only intermittent power. All these facts were known piecemeal to someone, but no one knew them all, certainly not Holland, who was driving the train. The investigation later revealed that the fourth engine might also have had only intermittent braking power.

The National Transportation Safety Board listed the probable causes as the failure to determine and communicate the accurate weight of the train, the failure to communicate the status of the train's dynamic brakes, and Southern Pacific rules that provided inadequate directions to engineers about downhill braking and speed. It did not address the question of whether Holland applied the brakes too slowly and in increments too small to bring the train under control.[1]

The NTSB findings addressed only the immediate causes or symptoms. The investigators did not ask the questions that might have gone to the roots of the accident. ''The accident was caused by multiple failures,'' says Lloyd Simpson, Southern Pacific's vice president for quality. ''The root cause was the total lack of a quality system. It all came together in one train.'' At the time, Simpson was SP's general manager for the Western Region.[2] Had the NTSB probed more deeply, it might have asked how SP could have put together a six-engine train with one locomotive dead and two if not three others malfunctioning. What was SP's locomotive maintenance program? How could such a critical item as the weight of the train be underestimated so grossly? And why wasn't the mistake discovered? Why didn't the five-

man crew on the train act as a team and talk to each other? Why weren't the crew and the clerks and the dispatchers trained in the importance of knowing and communicating weights and other vital information? The questions go on and on. Above all, what were the management failures that led to this accident? Why didn't management attack the root causes? Why did it not create the tools, the practices, and the atmosphere that would have avoided the accident?

It is not as if the San Bernardino crash was an isolated incident. Southern Pacific was notorious for derailments, as well as for late trains, misplaced loads, decrepit engines, inaccurate accounting, and a management totally insensitive to the customers' needs. SP was spending $100 million a year to pay for the costs of derailments, which happened to be just about what it was losing every year. Since the San Bernardino crash, SP has, like other railroads, mounted an enormously difficult, risky, complex effort to improve its quality in every sense—to get at the root causes of those accidents and the railroad's other problems. However, like the rest of us, SP has a long, rough road to travel.

THEY DIDN'T LISTEN

We are surrounded by quality failures that are appallingly costly in money lost, opportunity wasted, work scrapped, grief incurred. Our lives are full of mundane personal failures. When I spend an hour looking for a file or a tool I have mislaid, when I go shopping and forget an item because I did not consult my list and therefore have to make a second trip, when I am late for an appointment or forget to pay a bill on time, then my personal quality control has failed because of my lack of a systematic way of doing things right the first time.* The suppliers I deal with often disappoint me with their quality failures: the cable television company that cannot send a bill to the right address or that sends an installer who drills through a power cable; the metal tongue on the can of corned beef that always breaks off before I have finished opening it; the new bathroom cabinet that arrives with a cracked mirror. Anyone who has to wait three hours to see a doctor or to be admitted to a hospital is the victim of a quality failure. So is the airline passenger who waits in line to check in, then stands in a

* The reader who thinks his personal quality needs improvement might want to read *Quality Is Personal* by Harry V. Roberts, a professor at the Graduate School of Business at the University of Chicago, and Bernard F. Sergesketter, an AT&T vice president (New York: The Free Press, 1993).

crowded waiting room, then stands in more lines at the gate and at the plane's door, then squeezes into a tiny seat, and then has the choice of going hungry or eating an execrable meal.

I recently made intimate contact with the construction industry by building a house. Although the house as a whole came out very well with minimum stress (I have to acknowledge here that the builder was my son-in-law), some of the subcontractors made me wonder how much they had to overcharge to make enough money to cover their mistakes and stay in business. A supplier of built-in fittings delivered library shelves and cabinets of light maple when the order plainly said dark oak; he brought kitchen cabinets with doors out of square; and he forgot the kitchen-counter tops altogether. Both the bathtubs installed by the plumber immediately leaked, one of them in three places: at the faucet, at the drain, and around the edge of the tub where caulking was missing. (Since I wrote the last sentence a fourth leak has developed.) The shower in that bathroom did not work because there was no device to divert the water from the bath faucet up to the shower head—which was just as well, because the shower would have leaked into the kitchen. The other shower worked, but the hot and cold pipes were reversed. We all have our quality horror stories, which we are eager to tell.

The impact of poor quality can be momentous. Ask the makers and recipients of the 86,000 Bjork-Shiley heart valves manufactured by Shiley Inc., a subsidiary of Pfizer Inc., and installed between 1979 and 1986. Because of fractures in the struts that hold a disk that closes the valve, 295 of these devices failed, resulting in 178 deaths. A second model, sold overseas but not approved for sale in the United States by the Food and Drug Administration, failed 94 times, resulting in 70 deaths.[3] Throughout the 1980s and into the 1990s the cost of these fractures and potential fractures hung over Pfizer. The company took a charge of $300 million in 1991 to pay legal claims and agreed in 1992 to pay $75 million into a research fund to identify valves at high risk.[4] Patients wearing the valve had to make a life-or-death choice: whether to leave the valve in place and run the risk of a failure with a two-thirds likelihood of death, or to have it replaced in a costly, risky operation. Just why the struts fractured may never be known because Pfizer has settled these suits out of court, heading off detailed public testimony. However, a report on the valve by Congressman John Dingell's Subcommittee on Oversight and Investigations said that Pfizer had marketed the valve "aggressively" even though it knew serious manufacturing problems existed.[5]

The spectacular explosion of the space shuttle *Challenger* with the loss of

all of its crew on January 28, 1986, might have seemed like a freak, random accident. In fact, it had the classic pattern of a specific failure arising out of a flawed system that could have produced failure in many ways. The presidential commission that investigated the *Challenger* tragedy focused, as most such bodies do, on the immediate cause: the O-rings on one of the booster engines that allowed gases to escape through a joint in the booster. The launch occurred after a night of frost, on a day colder than that for any other shuttle launch, and the rubber O-rings lost their resilience and failed to set a tight seal at the joint.

But unlike the National Transportation Safety Board, which looked only at the immediate causes of the Southern Pacific wreck, the presidential commission looked into the root causes of the failure—perhaps not deeply enough, but more than most investigations. The commission found that the original design of the seal was flawed, that engineers at Morton Thiokol, which built the booster, and at the Marshall Space Flight Center, which was responsible for the booster and main engines, had for years warned of flaws in the performance of the seals. On previous launches, especially in cold weather, the O-rings were eroded by burns and marked with soot. But top management never listened to the warnings. NASA acted like a manufacturer such as an auto plant, with management demanding that it "push metal" out the door—and fix whatever problems might show up later. NASA was under pressure from Washington and the media to send more shuttle missions into space, but NASA had no way of fixing the shuttle's problems "later." The engineers well knew that *Challenger* should not fly right after a freeze, but NASA management did not get the message. So little frank communication existed among the NASA units and their contractors that potential problems did not get aired. Four months before the accident, Robert Ebeling, the head of a task force at Morton Thiokol appointed to study the O-ring problem, sent what he called a "red flag" message to his boss. He reported that the work of the task force was being delayed by "every possible means" available to seasoned bureaucrats and that the people in manufacturing, quality, and procurement whose help the task force needed "are generating plenty of resistance."[6]

Thus, a lot more than faulty O-rings caused the *Challenger* accident. The total failure of management, in business and government, to create both a system and an atmosphere that would allow the expert opinion of engineers on the spot to reach whatever level they needed to reach quickly was the root cause. In spite of the emphasis on safety, redundancy, and reliability, NASA was primed to fail. The loss of an Atlas Centaur rocket with an $83-million

military satellite aboard the following year, the flaws in the Hubble space telescope launched in 1990, not to mention cost over-runs and general confusion, all emphasized the underlying weakness of NASA.

The reaction of Congress and federal functionaries to something like the *Challenger* disaster can almost be guaranteed to produce a result opposite to what they intend. Instead of giving NASA or whatever body happens to be the target of the official blame-seekers the incentives and ability to do better, the government encumbers it with more regulations and oversight, which are usually part of the problem in the first place.

Congress itself, of course, is a national model of poor quality, of a collapsing system. While its proliferating staffs and committees fall over each other to pester the administration and to find things to do that are good for us, Congress grinds out junk legislation. Recall Superfund, which has poured billions of dollars more into the hands of litigators than into actually cleaning up toxic waste dumps; or the futile efforts to balance the budget; or the tax reforms. In every year but two from 1981 to 1990 Congress passed a so-called tax reform bill. The net result was that the average American paid about the same in taxes at the end of the 1980s as at the beginning (although the very rich paid a lot less and the poor somewhat less). The total tax burden, including social security taxes, basically did not change. But the "reforms" did keep changing the structure of the taxes, the deductions, the incentives. Savings deposits were not taxable one year; the next year they were.[7] Stability would have helped more than reform. Our laws, like our factories, often run better when left to themselves than when humans constantly meddle with them.

THE COSTS OF FAILURE

Congress and NASA, plumbers and cabinetmakers, hospitals and airliness, railroads and cable TV—they all afflict us with poor quality, and we add to it by our own frequent failures to do things right the first time in our personal lives. The burden that poor quality imposes on society is probably incalculable. When corporations are asked what poor quality costs them, they guess around 5% or 7% of sales. But when they actually calculate their costs they find that it is more like 20% to 30%.

Hewlett-Packard decided at the end of the 1970s that it had to make better products. So it studied the cost of poor quality in two hardware divisions. Hewlett-Packard asked, if all their products were perfectly designed and perfectly manufactured, how much could the company save? The answer

was 25% of sales, and most of that was coming right off profits. That number packed a kick that helped launch Hewlett-Packard on a campaign which is held up throughout U.S. industry as an example of how to do it right. Yet in 1992 when I asked Craig Walter, then Hewlett-Packard's corporate quality director, what the cost of quality would be today, he said it would probably still be 25% or 30% (although it has not been recalculated formally). He did not mean that Hewlett-Packard's efforts for the past 13 years have failed; rather, the company's expectations have risen: "We've peeled another layer off the onion and we can see a lot of things now are obvious that were hidden before, a lot more opportunity."

Hewlett-Packard's early calculations focused on hardware, and did not take into account the costs of failures in business processes like accounting and order fulfillment, or the costs of mistakes in software design. But in 1990 Hewlett-Packard sampled the costs of errors in software research and development during the year. The answer, $400 million, shocked Hewlett-Packard into a whole new effort to eliminate mistakes in writing software. The $400 million waste, half of it spent in the labs on rework and half in the field to fix the mistakes that escaped from the labs, amounted to one third of the company's total R&D costs. Or put another way, mistakes in software design were lopping $2 per share off the company's earnings. Since the earnings amounted to $3 per share that year, perfect software development could have increased earnings by almost 67%.[8]

The burden of poor quality that we carry, imposed and self-inflicted, should not blind us to the fine quality that we do enjoy. To err may be human, but it is not inevitable. Many things made and done in America are excellent and have been all along. Our jet aircraft are world leaders. Our airlines may provide dreadful service, but their safety records are astoundingly good. Our integrated circuits and our software are world class. Foreign visitors love to buy our sheets and towels, our sports and casual clothing. American fishing rods and other types of sports equipment are excellent and moderately priced. Our washing machines and dishwashers are unbeatable at the price. American-built construction and agricultural machines are as honest as the soil they work. In spite of the dismemberment of the Bell system, the United States enjoys superb telephone service. The list of good things made in America is long. Moreover, the United States of America remains the most productive country in the world and therefore, if productivity is the other side of the quality coin, our products and services cannot all be bad. But if you are making a lot of production mistakes, with high scrap rates, warranty costs, design corrections, returns, and repairs, then productivity is bound to suffer.

WHAT IS QUALITY, ANYWAY?

Sometimes we exaggerate the things gone wrong because our view of quality is muddled by nostalgia. We like to say, ''They don't make things the way they used to. Remember the 1940 Lincoln Continental? A beautiful car. Beginning at the sculptured grille, the lines flowed back, clear, simple, and elegant. A classic. Show me a car built like that today!'' Well, to be unsentimental about it, the Lincoln Continental was an oil burner. Like most cars built before the 1960s, it needed greasing every 1,000 miles and an oil change every 2,000. Any car today can run 5,000 miles or more between oil changes. The old Lincoln would need a valve job and perhaps a whole new engine by 40,000 miles or so. Today's engines are unlikely to need a valve job before 70,000 miles—if they ever do. The Lincoln had a primitive transverse spring-leaf suspension similar to what you would have found on a Model-T. Today's car might have independent four-wheel suspension with coil springs and an anti-roll bar. The Lincoln's tires and tubes would wear out at about 20,000 miles, and probably would go flat several times before getting there. Today's tubeless steel radials last 40,000 miles or so and grip the road a lot better. The comparisons go on and on. With its safety belts, air bags, collapsible steering column, crash bars in the doors and other safety features, today's car is much safer than the Lincoln. It emits a fraction of the old car's pollutants.[9] No, they don't make things the way they used to, thank God!

When we become nostalgic about quality, we are probably thinking about the kinds of exceptional things the privileged have always had: a Rolls-Royce, dinner at a three-star restaurant in Paris, the Oriental Hotel in Bangkok, the beautiful tapestries or fine steel produced by the secretive guilds of the Middle Ages, or the bank manager who knew your name. Quality of this kind has always been expensive, exclusive, within reach only of the few. Or else we are thinking about the work of skilled and caring hands, the armchair made by a grandfather, the way a farmer could scythe a field, the goodness of fruit fresh from an orchard. This kind of quality still exists, though perhaps mainly in the home (cooking) and in hobbies (fly-tying), but let's call it ''old quality.''

Fit for Use

The kind of quality at issue today, the kind that pits the Japanese economy against America's, produces good things at reasonable prices for everyman. The consumer determines what is good. Quality is ''fitness for use,'' in the