In the best selling movie, *Back to the Future*, Michael J. Fox takes a time machine (actually, a modified DeLorean) back in time. There he must re-establish a certain sequence of events so that he can move forward to the future. Although he was not about to drive a DeLorean anywhere, when Sir Nick Scheele became COO of Ford Motor Company in August of 2001, he announced that the company would move forward by "going back to basics." In a September town hall meeting he was asked, "What do you mean by 'going back to basics?'" To appreciate his reply, let's use a time machine of our own to go back in time and consider the major system trends that have affected American industry over the past three pivotal decades.

Ford Motor Company is used to illustrate these trends. Although the timing and specific details of particular trends will differ from industry to industry, what Ford experienced in these decades is not only representative of the U.S. automotive industry, but U.S. industry in general, and provides lessons for us all.

**Mass Production (1970's)**

In the late 1970’s, taking advantage of a domestically captured market, the U.S. auto industry was selling virtually every vehicle it could produce. Competition was among the “Big 3” and the primary management focus was mass production with an emphasis on reducing short-term cost.

In manufacturing, quality was primarily assured by inspection. Armies of inspectors would randomly sample parts produced in each department and make sure these parts met the required specifications. If they found parts that did not meet print, the operation producing these parts would be shut down for repair, the parts rejected and sorted. It was the manufacturing foreman’s job to produce and ship as many parts as possible – the system would reward a foreman who would refuse to shut a machine down for repair, and could somehow slip defective parts past the inspectors. So inspectors and foremen would occasionally find themselves working at cross-purposes with each other! The burden on the inspectors was great as many processes were simply not capable of producing parts to print. In addition, many parts were manufactured using huge automated transfer lines, which were very costly to shut down and repair. If only one station in a long sequence of operations was not performing properly, management would either have to completely shut down production, or find a way to live with or deal with the problem off-line.

In engineering as well as manufacturing, the corporation relied heavily on engineers who had been in their jobs for a long time and had great knowledge and experience. It was not unusual to find engineers who had been designing a specific component for twenty or thirty years (a few had fifty years of experience!). These experienced engineers were a ready source of knowledge and on-the-job training for new hires. At that time, the same engineers were responsible for current as well as future product, and split their time between finding and fixing warranty problems and working on new product development.

The new product development process was aided by the use of Design Standards and Verification Manuals, which were notebooks that contained tabs for key product development disciplines such as FMEA and other basic reliability tools. Yellow in color, these notebooks provided a guide and a filing system for documents associated with various engineering activities, and they were periodically reviewed by management.

In the supply base, it was normal for a particular component to have multiple suppliers. These suppliers competed with each other for future business, which was, more often than not, awarded to the lowest bidder.

**Competitive Quality (1980's to early 1990's)**

As a result of an “oil crisis” brought about when the Shah of Iran was displaced by the Ayatollah Khomeini, the first few years of 1980 were brutal for the U.S. auto industry (from 1980 to 1983, Ford lost $3.3 billion or 43% of the corporation’s net worth). Wanting smaller, more fuel-efficient vehicles, Americans discovered that Japanese vehicles were very good vehicles, creating strong competition for automotive market share with an emphasis on quality.

Alan Gilmour, at that time Ford Vice President of Finance, said, “It became very clear to our management team that we were uncompetitive in every element of our business. We didn’t have the cars people wanted to buy. We didn’t have good quality and our costs were too high. Furthermore, we had poor relationships with practically everyone – our employees, dealers, suppliers, and the government.”
Louis Ross, who led Ford Product Development, said, “Imports in 1984 took 26% of the U.S. car market. So here in our home market domestic auto manufacturers – and their supply base – are playing in the World Series, and in order to score we have to be able to meet or beat the world’s best in quality, in cost, in productivity, and in product content.”

In the midst of this intense competitive and economic pressure, Ford literally experienced a renaissance! Guided by W. Edwards Deming, it began with the establishment of Mission, Values, and Guiding Principles. What made the Mission, Values, and Guiding Principles so compelling is that they came from the heart of the senior management team, who meant every word that was written. They then “walked the talk” and expected everyone in the company to “walk the talk.”

The Mission, Values, and Guiding Principles (MVGP) created an environment where people, not technology or profits, became the key to success. Don Petersen, then President and Chairman of Ford Motor Company, said, “It’s difficult to believe that we can have a truly excellent product unless literally every process and activity in the company emphasizes quality.” The MVGP provided a framework for decision making, without which, decisions would simply have been made by optimizing short-term cost.

Quality became the focus of everyone and every process. In manufacturing, senior management came to each manufacturing facility every month, spending one full day focused only on quality. In business meetings, safety and quality items were put first on the agenda – cost items came last. Basic standards were established for manufacturing quality systems. These standards were audited and formed the basis for a “Q1” Quality award that could be earned by internal manufacturing operations and the supply base.

Manufacturing operations became focused on reducing manufacturing variability around significant product or process characteristics that impacted customers. The goal was to achieve manufacturing capability of 2 Cpk, or six sigma, using tools such as Statistical Process Control, Designed Experiments, Process Failure Mode and Effects Analysis, and Control Plans.

Both manufacturing and business processes were studied and improved using a seven-stage Process Improvement methodology, which improved quality and productivity while saving many millions of dollars. Departments focused on establishing Quality Operating Systems, which consisted of standardized processes with appropriate measures with the intent of continuously improving the satisfaction of internal and external customers.

In engineering, the focus shifted from “finding and fixing problems” to “preventing problems” in design. A Statistical Methods Office and Statistical Methods Council were formed and met with Dr. Deming once a month. Because of an observation from Dr. Deming that not enough engineers understood quality and statistics, opportunities were created for engineers to obtain master’s degrees in these topics from local universities. The Quality Education and Training Center and Ford Design Institute were established to create and deliver basic quality courses. Additional training was available from world-renowned experts.

Engineers were empowered to use these methods and solve problems. In response, many engineers went out of their way to improve carry-over designs in situations where there were no formal funds budgeted for design work. As a result, quality and cost improved dramatically and Ford became a leader in the use of methods such as Quality Function Deployment and Designed Experiments.

Engineers were also encouraged to personally visit suppliers. Many improvements in both quality and cost came about as a direct result of improved communication between product engineering and the supply base. At that time, Ford Purchasing made a real effort to reduce or eliminate multiple suppliers and establish collaborative partnerships.

The results from this activity were amazing. Breakthrough improvements were made in both quality and cost. Employee morale was high and Ford quality was the best of the “Big 3.”

Global Economy (mid 1990’s)

The mid 1990’s brought a change in management and a change in management focus. Deming had passed away, and many high-level managers that had worked with Deming had retired.
Alex Trotman, the new Chairman and CEO, had a passion for new product and a global vision for how Ford could operate. He once remarked that he would “sell the bloody furniture before I cut out new product programs.” Management emphasis was on product cycle plan, with a special emphasis on European recovery, using world-wide engineering centers (North America, Europe, Asia) to develop common world vehicles from common processes. The strategy included the addition of more vehicle features as a means of increasing customer satisfaction.

In manufacturing, it was decided that problems could be identified and solved faster if product engineers were permanently stationed at the plants in the form of Plant Vehicle Teams. These engineers focused on the “vital few” problems associated with each vehicle line and made dramatic improvements in quality.

The use of Process FMEA’s and Control Plans were emphasized as part of an Advanced Product Quality Planning process. ISO and lean manufacturing were also emphasized. Quality meetings still took place once a month, but the responsibility for attending these meetings was delegated to lower levels of management. The strategy of variability reduction on significant characteristics and the use of SPC began to rapidly decline.

Product Engineers were reorganized into a matrix system of management that emphasized vehicle platform teams. Once a vehicle was launched, the engineers would be assigned to a new area in a new platform team. Before this reorganization, an engineer would tend to remain in a particular discipline, gaining greater experience and expertise over time. After this change, engineers would change positions and disciplines every several years. For example, when this reorganization took place it was not unusual to find an engineer with seventeen years experience in steering being assigned to work on headlights. In addition, there were no training programs to provide these engineers with background knowledge of their new discipline.

Quality training was rewritten and centralized into one activity where professional teachers, not subject matter experts, provided instruction. For the most part, these teachers stuck to a pre-written script. They had no previous experience in the various quality disciplines and could not answer detailed questions. Quality Function Deployment (QFD) had become Quick QFD and was eventually eliminated from the training curriculum.

Supplier Technical Assistance (STA) was reorganized from Quality to Purchasing. More and more suppliers came under the status of “full-service suppliers” who operated independently of Ford engineering and certified their own quality. Purchasing found that they could reduce cost by decreasing STA headcount, allowing more and more suppliers to self-certify prior to production. Purchasing also strongly “encouraged” suppliers to aggressively cut costs.

Niche Markets and Acquisitions (late 1990’s and early 2000’s)

At a mid-level manager meeting, Human Resources announced that Ford would adopt an A/B/C system to rank management at each level, where 10% have to be rated “A” and 10% have to be rated “C.” The “A’s” received greater merit raises and bonuses. The “C’s” would receive no raise or bonus whatsoever. They would be provided with “remedial” coaching and be given an opportunity to leave the company. If a person received two “C” ratings in a row, the opportunity to leave the company would not be voluntary. It was announced that this is the way Ford would operate and it would not do any good to voice opposition or complain about it. While some were no doubt thinking of Dr. Deming’s “red bead experiment,” where an operator would be replaced if they randomly drew too many red beads on their paddle, one manager stood up to speak. He said, “This goes against everything that Dr. Deming taught. But I can see now that this system is better. Dr. Deming was wrong.”

When Jac Nasser became CEO of Ford Motor Company, he emphasized the development of new products for niche markets where competition did not currently exist. He also focused on acquisitions where Ford could find profit opportunities in other areas of the product life cycle besides manufacturing. Examples of these acquisitions included the purchase of dealerships; Kwik-Fit, a chain of British service and repair shops; Greenleaf, a U.S. junkyard business; as well as various dot coms.

Mr. Nasser pushed for youth and diversity in management, bringing senior-level managers from Europe into the U.S. and hiring a multitude of people (think thousands, not hundreds) from outside Ford and putting them into significant management positions. Although bright and energetic, for the most part, these managers were not familiar with Dr. Deming. They did not know the U.S. Ford culture, or what Ford had gone through in the early 1980’s. And there was no way for them to learn. The MVGP and Dr. Deming’s philosophy were no longer taught.
By now, Ford had become a very different company from the time when Dr. Deming was alive. Where Dr. Deming advocated people and knowledge, 10% of the people were now thought to be “deadwood.” Knowledge and experience were not appreciated as they were before – it was felt that anyone could do anyone’s job anytime.

Dr. Deming advocated teamwork. In the past, when someone had an idea, peers would jump in to help. With the A/B/C system this level of teamwork diminished. Peers would take opportunities to make sure that they were not viewed as one of the “C’s” by not providing the previous level of support for peers who needed help, and the culture became very adverse to risk.

Dr. Deming advocated work on processes. One of the criteria for ranking people was a “bias for action.” This was interpreted as not working on processes because it was thought that process-related work took too long to see results. Process improvement activities rapidly declined, as did “prevent” work in engineering.

Bright spots for quality in this period of time included the introduction of Six Sigma, the emphasis on lean manufacturing tools such as error-proofing, and increased STA headcount. Six Sigma made a huge difference in problem solving because it gave engineers training in basic statistics and provided them with powerful software. The difference in presentations at quality meetings before and after Six Sigma was as dramatic as the difference between night and day. Six Sigma was rapidly accepted at Ford because senior management believed that Six Sigma had produced good results at GE and significant progress could be made in a few months. Lower levels of management, especially in the plants, had grown up during the Deming era. They desired a return to statistical thinking and saw in Six Sigma a way to make this happen. They went out of their way to provide exceptional support and contributed to the success of the Six Sigma effort.

STA headcount was dramatically increased because Ford was experiencing quality problems with suppliers that had self-certified. About 200 engineers were hired to work with the supply base, and were given a specially developed, fairly extensive training program to develop their skills.

The story of what happened in the Jac Nasser years and the role that William Clay Ford Jr. played in making changes, has recently been documented in a book published in 2005 by David Magee.

**Back to Basics**

When Sir Nick Scheele was asked, “What do you mean by going back to basics?” He replied, “Going back to basics means building quality products on time and at the right price – with a value proposition that is absolutely compelling.” “Back to basics” involves a driving vision with mission, values, and guiding principles that lead to quality by valuing people, teams, and processes.

In manufacturing, the “back to basics” vision begins with the implementation of a fundamental quality system (Q1 criteria) that is audited for effectiveness over time. It includes the notions of variability reduction and process improvement, while utilizing lean/flexible manufacturing systems with Six Sigma problem solving and periodic attention from senior management.

In product engineering, an ideal vision involves the up-front implementation of a disciplined system that seamlessly integrates all of the prevent quality disciplines (Design for Six Sigma). It includes the notion of measuring how well this engineering is being done (a Q1 system for engineering) with appropriate rewards and recognition for progress. Training for engineers must include cutting-edge methods such as TRIZ [a Russian acronym for “Theory of Inventive Problem Solving’”] and Axiomatic Design with appropriate software.

The vision for the supply base involves implementation of the “basics” in manufacturing and engineering with the goal of establishing longer-term collaborative partnerships that operate in a lean value stream.

In the words of Dr. W. Edwards Deming, “Management will in time be judged not by the quarterly dividend, but by plans and innovation with the aim to stay in business, to protect investment, to ensure future dividends, and to provide jobs and more jobs through improvement of product and service for the future. One requirement for innovation is faith that there will be a future. Innovation, the foundation of the future, cannot thrive unless the top management has declared unshakable commitment to quality and productivity.”