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INDUSTRIAL MANAGEMENT & TECHNOLOGY

EXCERPT America remains the world's top industrial power with the help of innovators like these. Their contributions include exquisitely machined parts, nimble new software, and refinements in the art of selecting the optimum production tempo.

By Gene Bylinsky

HEROES OF U.S. MANUFACTURING

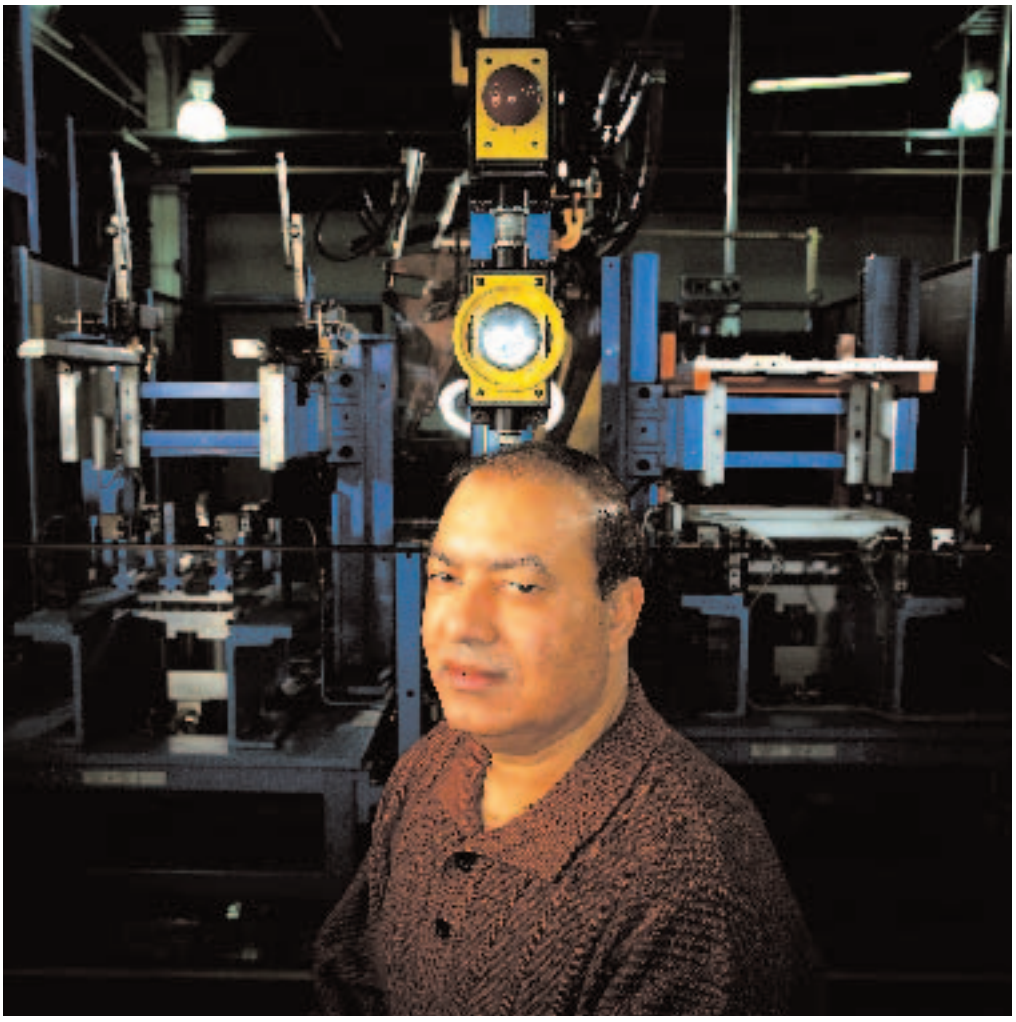
A MAESTRO OF THE PLANT FLOOR

Anand Sharma of TBM Consulting Group

Anand Sharma, 55, a personable manufacturing consultant who runs TBM Consulting Group in Durham, N.C., has a reputation for finding out what a factory is doing wrong by simply walking through it with the plant manager. Sharma usually asks the manager about the factory's "rhythm." More often than not, the manager expresses puzzlement. But Sharma, like a seasoned orchestra conductor, may already have noted off-tempo components on the plant floor—a machine with a hardly perceptible squeak here, workers laboring at an uneven pace there, too much inventory piled up.

Sharma trusts his senses to point to evidence of bad processes. In addition to looking for obvious signs—is the plant well lit and clean?—he checks to see if operators at one part of the line are working at a very fast pace while others elsewhere are working slowly or stopping. He observes whether the progress of a part being made can be tracked from beginning to end by line of sight. Says Sharma: "Where other people see complexity, I look at how simple things can be."

The assessment and the walkabout help Sharma and the 72 manufacturing experts who work with him select the best site for their first improvement project in a plant. The TBM experts then come in to eliminate the root causes of problems on the production lines. In the process they may restructure the whole plant operation. But they don't just tear up things and leave. Unlike consulting firms whose employees depart after a quick fix, TBM often has its experts stay at a plant for years, because it believes that improvement of operations never stops.



A big Maytag plant in Tennessee that makes gas and electric ranges has been working with Sharma since 1998.

In the decade since it was founded, TBM (short for time-based management) has worked with more than 500 manufacturers around the world, generally helping them lift productivity 15% to 20% a year. Sharma's clients include big companies such as Freightliner, Kaiser Aluminum, Mercedes-Benz, and Polaroid, as well as such lesser-known names as Batesville Casket Co. in Indiana, Cold Spring Granite in Minnesota, and Huffy Sports in Sussex, Wis.

Sharma's rare skills took time to hone. While growing up in a part of India that was ceded to Pakistan after the country's partition, he felt driven by what he calls "a compulsion to make things work right." The son of a professor of Sanskrit who died while he was still a boy, Sharma and his two older brothers were brought up by their mother, who had started a sewing school for women. Sharma loved to build radios and bicycles, and knew he wanted to become a mechanical engineer. He picked Roorkree University in the foothills of the Himalayas because at the time it was India's only institution of higher education that offered hands-on training with production machines. The university ran a shop that made and sold electric motors.

An imaginative, straight-A student, Sharma did a comprehensive study of how to set up and run a manufacturing company that caught the attention of the general manager of the Hindustan Machine Tool Co. Offered a job there upon graduation, Sharma showed up for work in a three-piece suit. The general manager sent him back to his hotel to put on work clothes. When he returned, he was taken to the tool room, handed a piece of steel, and told to file it. After Sharma finished, the general manager informed the aspiring executive that he had made seven mistakes—not holding the file right, straining his body, and so on. The boss asked Sharma how he expected to teach people to do their jobs.

Thus began an odyssey that turned Sharma into an expert machinist and tool operator. The general manager dispatched him for six months to a training center run by experts from Switzerland, where Sharma toiled on the morning shift from 4 A.M. to 2 P.M. He recalls working on an especially complex part for two weeks, only to be told by a Swiss taskmaster to redo it because its dimensions were off by two-millionths of an inch.

Back at Hindustan Machine, Sharma underwent two more years of training in various departments and then was assigned to head a tool room. He was soon challenged by a machine operator twice his age, who questioned whether Sharma could make a better part than he. Sharma did, and the questions stopped. Soon Sharma became bored with all the grooming to become a plant manager. But today he says, "I was unbelievably fortunate to have gone through that kind of training."

More training came in the U.S. when the young engineer was dispatched to Franklin, Pa., to gain experience at a Chicago

PHOTOGRAPH BY JONATHAN SAUNDERS

Pneumatics plant. The blunt-talking Sharma questioned the plant's old-fashioned product design and sloppy manufacturing methods, and was given a chance to make improvements. Eventually he left and took a succession of manufacturing jobs at U.S. Steel, Zurn Industries, and a division of American Standard, where he rose to director of manufacturing and later to vice president of strategic planning, R&D, and operations.

Along the way, Sharma got an MBA at Boston University. He kept up with manufacturing trends and attended quality-control seminars offered by the founders of the quality movement, W. Edwards Deming and Joseph Juran. By the early 1970s Sharma was designing better and faster production lines at American Standard's various divisions. "I was always trying to reach for the next level," he says.

He still had a lot to learn. The revelation of how much better manufacturing can be came in 1979 when Sharma met Toyota manufacturing guru Shigeo Shingo and was invited to see some plants in Japan. What stunned Sharma was the ability of Toyota's workers and others to replace dies on presses in minutes instead of the hours, or even days, that it took in American plants. The Japanese did this, moreover, with a very simple technology that employed compressed air to lift the thousand-pound dies as if they were feathers.

When his division of American Standard was put up for sale, Sharma moved to a manufacturing-consulting firm in Connecticut as an executive vice president. In 18 months he turned the money-losing firm into a profitable one. Unable to get along with the owner, Sharma and three colleagues started TBM Consulting in 1991, operating out of Sharma's home.

Today Sharma applies what he learned from the famous Toyota Production System (TPS) and adds a large dollop of Americanization. TPS is based on a Japanese update of Henry Ford's vision of integrated production. Ford was practicing just-in-time supply of raw materials and parts at the legendary River Rouge plant long before the Japanese popularized the term. TPS evolved during the transition from mass production to mass customization. Unlike the old "push" systems designed to build to inventory, TPS aims to build to customer demand in the shortest possible time and with minimum resources. Its Westernized version is now widely known as lean manufacturing. Sharma goes beyond TPS by combining both lean production and quality elements from Six Sigma into what he calls LeanSigma.

The advent of e-manufacturing nevertheless raises a question. Now that some companies' salespeople are beginning to send orders electronically from the field directly to production machines, is Sharma's old-fashioned emphasis on manufacturing excellence an anachronism?

Not at all. Most manufacturing companies, experts say, still haven't fully mastered modern "pull" production technology, or making products to customer demand, as contrasted with the conventional "push" production, in which stocks of unsold goods can accumulate. "We still have a lot of bloated and screwed-up processes out there, left over from the neglect of the '60s and the misapplication of the operations-research approach," says noted manufacturing consultant Patricia E. Moody, co-author with Sharma of a forthcoming book, *The Perfect Engine*. Sharma argues that manufacturing is the key to success of e-business, as some failing dot-com companies have discovered to their chagrin. He adds that "there are also a lot of bad plants in Japan," where, contrary to received wisdom, the Toyota system is not widely used.

At one level TPS is built on the concept of *kaizen*, Japanese for "continuous improvement." TBM experts adjust rigid Japanese methods to freer American ways when they establish *kaizen* methodology in a plant. In Sharma's approach, for instance, production-line workers have a lot more say than Japanese workers about changes on the manufacturing floor. To assure himself of their input, Sharma refuses to work with companies that propose to lay off workers after his system is introduced; that destroys morale, he believes. Any superfluous line workers are assigned other jobs, with some becoming trainers. "We unleash the power of the people," he says.

TPS's initial *kaizen* study teams are constituted equally of production-line workers, managers and supervisors, and office workers. The teams set up model lines and practice the changes before they are introduced on the floor. Sometimes TBM totally reorganizes production, as it did starting in 1998 at the Maytag plant in Cleveland, Tenn., that makes gas and electric ranges. With no added workers, production of one product line zoomed by 100%. Workers' suggestions are readily accepted and incorporated into Cleveland's new system, which is deemed always open to improvement. That one plant has cut its annual production costs by $7 million and reduced its inventory by $10 million. Says Tom Briatico, vice president and general manager of the Cleveland operation: "Anand Sharma and TBM have skillfully trained us in assembly-line layouts, quick die changes, and, most important, how to manage our operations for daily improvement."

Naturally, Sharma doesn't always succeed. He puts his failure rate at 5% to 10%. But he attributes this to lack of participation by higher executives in his efforts to introduce LeanSigma. That was the case, he says, at Chrysler in the mid-1990s and at two

General Motors plants in 1998. Such negative experiences have taught Sharma to pick clients cautiously. He and his associates now carefully study a manufacturing company and its plants and reserve the right to withdraw within a week of the start of a project if they don't like top managers' attitudes. Out of every two companies that approach it, TBM chooses one.

The companies most receptive to change, Sharma finds, are in the $50-million-a-year to $5-billion-a-year revenue range. Results such as production increases may quickly become visible. But it takes a long-range commitment, Sharma believes, to maintain constant improvement in financial performance. In his view, the task of improvement never ends. To keep client companies on their toes as well as to expose new managers to the Lean-Sigma system, TBM employs a unique method in which, in addition to the ongoing *kaizen* campaigns, it conducts "*kaizen* breakthroughs" at client companies.

It's not unusual for TBM to assemble 50 manufacturing managers from client companies around the world for two days of classroom instruction, usually at a hotel near a big manufacturer. They are then bused to a plant. One such group, with participants from 30 companies, was transported last year from Chattanooga to Maytag's Cleveland operation, which still works with TBM. The trainees were split into four teams wearing different-color hats—red, blue, brown, and yellow. Armed with big yellow stopwatches and clipboards with timing charts, the teams spread out through the sprawling plant, spending 22 days to come up with further improvements in the production rhythm. Maytag was happy to get the visitors' suggestions.

A typical accolade for what TBM achieves comes from Pat Lancaster, CEO of Lantech Technology, a Louisville maker of shrink-wrap machines. When TBM began working with Lantech in 1992, the company was losing money. Four years later, sales per employee had increased 80%, and the company enjoyed a healthy 10.5% return on sales. Though the CEO won't disclose the privately held company's financial assets since then, he allows that "the results in terms of profit and sales growth have been awesome." He adds, "We wouldn't be the company we are today without TBM. There isn't a place here that you could go to and not see the impact of multiple *kaizen*. The biggest role that Anand played was to tell us the next step."