



LEANING TOWARDS EFFICIENCY

Mass production may still be the best way to make cars but it is destined to fail without 'lean manufacturing'



Automobile production first started in machine tool companies in Europe in the 19th century when car-making was a craftsman's job. Cars were handcrafted according to the specifications of the customers

SANJEEV BAITMANGALKAR

Call it the fall of giants; when General Motors and Chrysler Corporation fell recently, it shook the manufacturing world. There are many lessons to be learnt from their stories. People expect such large corporations to be eternal and ever-providing...then why did the giants fall? Was it the lack of enthusiasm? Was it reluctance or the inability to change? Was it simply a cultural defect? Or, was it the result of an attitude? Let us explore.

Some lessons are learnt very slowly and some are never learnt at all. This is the sad story of many organisations. The fall of the big three of Detroit is a testimony to what went unlearned in automobile production.

Automobile production first started in machine tool companies in Europe in the 19th century when

car-making was a craftsman's job. There were no automobile dealerships then. One simply went to one of these craftsmen and discussed the type of carriage required, number of seats, luggage and cargo space and so on; they then made sketches to these specifications and handcrafted the automobile.

Every car, every part was thus unique. Interchangeability was absent from the manufacturing vocabulary. It was after World War I that both Henry Ford of Ford Motor Company and Alfred Sloan of GM moved automobile manufacturing from crafted customised production led by European companies to the age of mass production which they then came to dominate for a long time.

The beginning

In the early 1900s, financier William Durant bought a dozen car companies. Each of these made similar products; hence, they competed with each other in-



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stead of complementing. Durant inducted Alfred Sloan to sort out the mess around the time World War I was brewing. Ford and GM's concept of mass production did create problems of overproduction. As the world went into the Great Depression of 1929, the automobile industry took a beating. Durant was an investor and did not know much about production; he was pressured by his bankers to bring in professional management. It was then that Pierre du Pont became the chairman of General Motors who made Alfred Sloan its president.

Ford was the leader in automobile production from 1903 till the 1930s. Sloan devised a strategy to lead GM to become the world's biggest car maker. "We will make cars for every purse and purpose," he said. At this time, Ford produced only one product, while Sloan developed a five-product strategy — from Chevrolet to Cadillac. Sloan resolved various problems faced by GM and created decentralised divisions such as Delco, Saginaw, and Rochester, managing them from the corporate headquarters.

Flawed as a system

Ford, who led the world to believe in mass produc-

tion, was manufacturing only one variant of a car. His famous words were, "You can have any colour of car, as long as it is black." And to produce one variant, Ford had to back itself with enormous amounts of inventories. Huge truckloads of inventory moved regularly from warehouses to factories. The whole system was designed such that one had to push with all one's might to deliver the products. It was built like one great squeeze machine, where enormous amounts of efforts (push) had to be applied to squeeze the product out at the delivery end. Manufacturers who did not see huge resources put to non-productive use tried to copy the idea and fell prey to replicating the wastages as well.

Ford and GM had created huge facilities, used excellent machine tools, sported large warehouses filled with inventory and enjoyed a large market share. Although they succeeded with their concept of mass manufacturing, they could never devise the organisation and management system—philosophy, culture and strategy—needed to effectively manage the functions of marketing, customer service, product development, engineering, production, procurement, suppliers relations and quality that

THE NUMMI EXPERIMENT

Figure 1

Characteristics	GM US plants	NUMMI
Assembly hours per car	31	19
Assembly defects per 100 cars	135	45
Assembly space per car	8.1	7.0
Performance		
Productivity (hrs/vehicle)	25.1	21.2
Quality (assembly defects/100 vehicles)	82.3	65.0
Layout		
Space (sq ft / vehicle/ year)	9.1	7.8
Size of repair area (as percentage of assembly space)	12.9	4.9
Inventories in days (for 8 sample parts)	2.9	1.6
Work Force		
Percentage of workforce in teams	17.3	71.3
Job rotation (0 = none, 4 = frequent)	0.9	2.7
Suggestions / employee	0.4	1.4
Number of job classes	67.1	8.7
Training of new production workers (hours)	46.4	370.0
Absenteeism	11.7	4.8
Automation		
Welding (percentage of direct steps)	76.2	85
Painting (percentage of direct steps)	33.6	40.7
Assembly (percentage of direct steps)	1.2	1.1
(This table shows how productive Toyota Production System was at GM's NUMMI plant in its very infancy of implementation, as compared to GM's concept of mass production. These results were there to be emulated 22 years ago.)		E & OE

mass manufacturing called for. Manufacturers like GM, Chrysler and others tried to stereotype these mass production concepts and did not question either its productivity or ability to enhance value.

Awakening in Europe

The year of Sloan's retirement from GM—1955—was the first year when more than seven million automobiles were sold in the United States. While Ford, GM and Chrysler had become the Big Three and accounted for more than 95 per cent of this sale, six of their models accounted for over 80 per cent of this share and GM had become the biggest auto maker in the world. By then, the likes of Andre' Citroen, Louis Renault, Giovanni Agnelli, Herbert Austin and William Morris had caught on to the American idea. In Europe, Fiat, Renault and Volkswagen were soon producing vehicles at rates comparable to those in Detroit. Even Daimler Benz saw a transition from craft production to volume manufacturing.

Sunrise in the East

The dominance of Ford, GM, and Chrysler in the

US and those emerging in Europe would have continued had it not been for Toyota in Japan. Toyota had borrowed its learning from America—it wanted to produce automobiles in Japan because the rail links were insufficient and it would save people walking from one village to another. Toyota wanted to produce automobiles as well as Ford and have all those excellent facilities (plant and machinery) that it had. But it had neither the kind of money to invest nor the volumes.

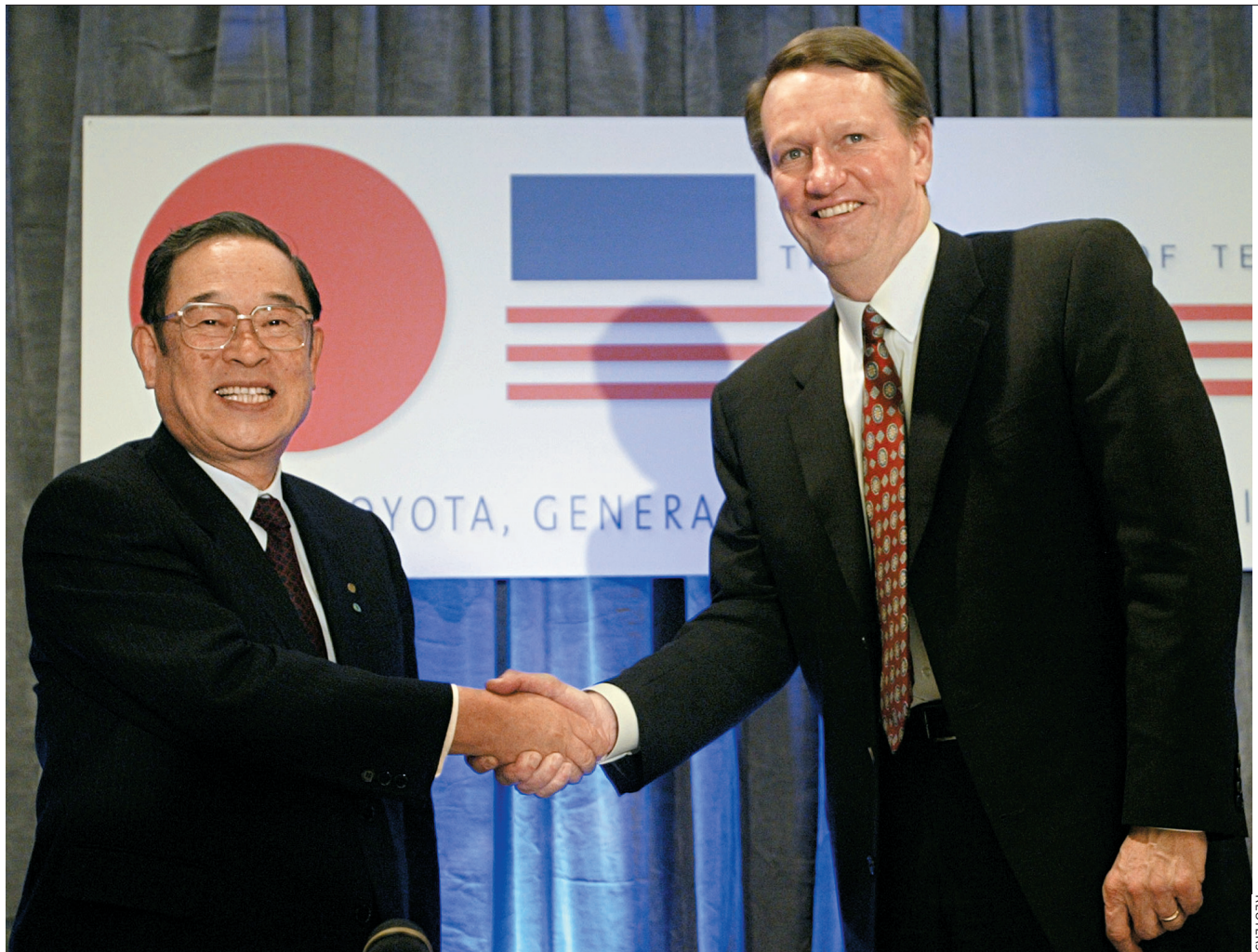
In fact, it had a huge problem; and that was one of too many varieties and very little volumes. While a Ford assembly line could produce 900 cars in a day, Toyota could build only 90. So, instead of stereotyping Ford's concept, it developed a revolutionary approach to drive out the costs that it could not afford such as large warehouses. This made the concept of mass production redundant and delivered the new concept of mass customisation built on the principle of the flow of value along a chain that would respond to the customer's pull and improve to achieve perfection. This was an evolutionary way to produce automobiles which was later called the Toyota Production System. It is now known as lean manufacturing.

Although Toyota opened its first dealership in California during the late-1950s, it really got serious about the American market after the 1973 oil crisis; slowly but steadily the share of Japanese vehicles began to increase, and those of the Big Three began to shrink. GM's slide started in the late-1970s.

In the early-1980s, Toyota offered GM to jointly set up a plant in America. Toyota wanted to test its production method in the American setting; and for GM, it provided a way to learn how to build cars more efficiently using Toyota's lean production. Since GM also wanted to manufacture a small, high-quality car, Toyota seemed the perfect partner. Thus, in 1984, after overcoming legal battles with Ford and Chrysler on the formation of the joint venture, the experiment called NUMMI (National United Motor Manufacturing Incorporated) started delivering the Chevrolet Nova.

GM's Fremont facility in California that had closed in 1982 became GM's equity in the joint venture. GM's employees were picked and trained in Toyota's Takaoka plant in Japan on the Toyota Production System. NUMMI's efficiencies has been summed up in Figure 1.

The data for Figure 1, taken from IMVP world assembly plant survey and JD Power's quality survey, is of 1987 when NUMMI was only three years old. It shows that even in those initial days when



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Toyota Motor Corporation President Fujio Cho and General Motors Chairman and CEO Rick Wagoner marked the 20th anniversary of NUMMI in 2004

GM was exposed to the concepts of lean manufacturing and produced cars more efficiently than mass producing. NUMMI has had an impressive record from then on; having won various awards for quality and human relations.

Changing the mindset

This June, when GM and Chrysler came crashing down, it brought to light a harsh reality of how things will not work. Did GM take the lessons from its joint venture with Toyota and apply it across its plants in an effort to reduce costs, improve productivity and become lean? Even if it says it tried, did the results reveal that efforts had fallen short? Why is it that GM could produce the Corolla, Tacoma, and Pontiac Vibe efficiently in the common auto assembly plant (NUMMI) but could not replicate the efficiency in its other plants? Why

Did GM take the lessons from its joint venture with Toyota and apply it across its plants to reduce costs, improve productivity?

haven't Ford and Chrysler taken seriously to implementing lean manufacturing? It is 25 years since GM had direct access to learning about lean manufacturing; most people achieve all their learning degrees in this time!

I don't believe that it did not try, for there must have been pressure because of its poor results. Was it willing to adapt it correctly and completely? Or, did it tinker with the idea and try its own modifications? There are two distinct things that need to be applied together — building the lean culture (philosophy) and applying the strategy (tools). It is the leadership that applies the heart and builds the culture. It needs to be demonstrated through the leadership's body language. To focus on culture is to focus on permanency, look for long-term gains. This is where most fall short

and end up making a U-turn.

This change is about everyone changing one's daily habits, doing things differently, learning everyday and improvising. Everyone who stays the course and goes the distance comes out a winner in this transformation to lean. When the leadership cannot change its thinking, cannot alter its behaviour and demonstrate it through body language, the change will not stick. While all companies and managements want the lean results and want to belong to that elite club of lean manufacturers, few are willing to change themselves. So what do they do then?

Pitfalls of template thinking

Manufacturers try to format the just-in-time (JIT) tools by applying them at random. Some even try to evolve their own production system and name it after their own group or company — as GM evolved the Global Manufacturing System. The management of such companies institutes a periodic review on measurement but loses enthusiasm and ownership over time.

This approach takes away the focus from daily and continuous improvement — *Kaizen* — the essence of which is understanding human motivation. This approach of managing by numbers rides on the American school of thinking which teaches 'what to think' rather than 'how to think'. And on the journey of lean, knowing 'how to think' is what will get you forward.

Over the years, GM and Chrysler have hired some of the most brilliant people around, whose intellect has tried to fix inefficient and broken-down processes, resulting in the creation of enormous wastes rather than developing excellent processes that are fool-proof and can be run by ordinary people.

These individuals with brilliance may have demonstrated their ability to manage results by numbers, had a deep understanding of the financials, but it keeps bringing back the question — if they had everything, yet why did they fail?

Attitude is everything

Lean is a culmination of the right attitudes. The success of NUMMI demonstrated the capability of the American ability to adapt to the lean culture. So, the top management at the Big Three could have adapted it from the late-1980s, shedding their resistance and indifference. The right attitude would have been to

embrace a better result-producing system capable of finding end-to-end solutions. American manufacturing has displayed an unwillingness to acknowledge something superior to its own thinking. Instead of learning and getting adept at it, it has wasted time and effort in pursuit of ambits that don't work as replacements to lean. The hype behind Six Sigma and Lean Six Sigma as an alternate to lean is one such example.

The biggest challenge for the GM and Chrysler managements will be to think through and re-engineer the companies. Reducing bureaucracy, considering decentralisation and greater autonomy and making individual plants accountable for their performance and results will help. They may have to find a new Sloan in a leader who can chart a new course. The product philosophy must be driven by customer demand.

Over these past decades mass production has steadily declined as lean production has steadily taken over. The management of discrete organisations (as opposed to lean companies connected to a value chain) the world over must heed this as a wake-up call. GM and all large manufacturers have now accepted lean as a management philosophy that can be applied to any business, although

many still struggle to practise it because top managements are not involved.

Some say that Toyota shifted its primary focus from solving customer problems to becoming the world's largest vehicle manufacturer during the middle of the last decade. Toyota, with its global footprint, is present in 170 countries and manufactures in 30 of them. When there is a global meltdown, it affects the big players more than the smaller ones. One has got to just wait and watch the results that Toyota will produce in the years 2010 and 2011, because that will tell the success of a resurgent lean thinking. At this stage, it will be premature to read it as a setback to lean.

Every once in a while, large companies trip over themselves and fall. Wiremold, the US-based wire and cable solutions company, was a discrete company that was not doing well. The management inducted a lean coach, Art Byrne, as the CEO, who turned it around with *Kaizen*. However, once the stock prices went through the ceiling, the owners decided to sell it and collect hefty profits. The new management changed the leaders and brought in its own men.

There are two things that are needed for lean manufacturing — building the lean culture (philosophy) and applying the strategy (tools)



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When adopting lean manufacturing, did GM adopt it completely or did it tinker with the idea and try its own modifications?

The new management went back to what it knew best — discrete manufacturing — and took Wire-mold on a nose dive in no time.

Closer home, Mysore Kirloskar, the machine tools company, had two factories — one lean and the other discrete. While the lean plant at Hubli (which was among India's firsts to achieve significant lean results in the early 1990s) continuously worked on cost reduction, productivity improvement and value addition to generate large profits, the processes at the discrete factory in Harihar had high costs, low productivity and without profits. The company wrongly decided to merge the two factories. It closed the profit-making lean factory at Hubli, sold the real estate and shifted it to integrate it with the discrete factory at Harihar.

Lean is a culture that exudes optimism. People from such culture find the discrete environment completely debilitating. So, more than 90 per cent of the people transferred from Hubli to Harihar chose to quit. The management let them go; perhaps thinking that it will reduce costs.

Mysore Kirloskar was left with a clutch of excellent products, built on lean processes that focused on flowing material and to deliver products at high

velocities. The processes were capable of responding to daily variations in demand. The discrete practitioners at Harihar had no clue how to handle the efficient lean processes and eventually turned it into a big mess.

The Hubli factory was the company's cash cow and it was killed with the emphasis on a discrete approach. The practitioners at Harihar had never made money, eventually leading the company into closure.

The lessons from GM and Chrysler must serve as a reason for the leaders and top managements of discrete manufacturing companies to reflect on their own business philosophies and processes, learn to internalise Kaizen, because the result of an attitude that is unwilling to change or whose response to change is either cosmetic or without the heart will end up at destinations their companies and its stakeholders neither deserve nor desire.

ABOUT THE AUTHOR

Sanjeev Baitmangalkar, the CEO of Stratmann Consulting, has nearly two decades of experience in implementing lean manufacturing across industry segments. He can be reached at stratmannconsulting@gmail.com or (080) 41209075