

# FIFTEENTH NATIONAL CONVENTION

of  
**PRODUCTION ENGINEERS**  
&  
**NATIONAL SEMINAR**  
on

## ***EMERGING CONVERGENCE IN MANUFACTURING SYSTEMS***

( March 3 - 4, 2001 )

**Mr. F. W. Taylor**  
**Memorial Lecture**

by

**Prof. P.B. Sharma, FIE, Vice Chancellor**

Rajiv Gandhi Technological University of M. P. BHOPAL

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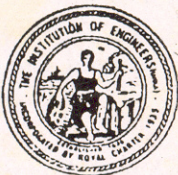
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# F W TAYLOR MEMORIAL LECTURE

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Inventor and engineer, Frederick Winslow Taylor was born on March 20, 1856 at Philadelphia.

Educated at preparatory schools in Pennsylvania and New Hampshire, Taylor entered apprenticeship in the trades of pattern maker and machinist in Philadelphia in 1875. In 1878, he was employed by the Midvale Steel Company in their machine shop. In 1881, he introduced his method of increasing the efficiency of production by close observation of individual workers, identifying and eliminating wasted time and redundant motion. He earned a degree in 1883 from the Stevens Institute of Technology, and in 1884, he was elevated to the position of chief engineer at Midvale. In 1890, he became General Manager of the Manufacturing Investment Company. He subsequently became consultant in management in a number of organizations. Having dedicated about forty years in the improvement of production techniques and productivity Taylor earned the distinction of being the father of modern scientific management. He expired on March 21, 1915.

**In memory of his dedicated service, the Institution of Engineers (India) instituted the Annual Memorial Lecture in his name during the National Convention of Production Engineers.**

## **INNOVATION & KNOWLEDGE MANAGEMENT - Creating Globally Competitive Manufacturing in India**

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Let me at the outset express my personal gratitude to the President and Honorary Secretary of M.P. Chapter of Institution of Engineers (India), for inviting me to deliver the coveted *FW Taylor Memorial Lecture* at this National Convention of Production Engineers. Ladies and gentlemen, I am conscious of the honour bestowed on me and also the prestige attached to the name of FW Taylor, the founding father of modern Management. Taylor, as you all know, was an engineer working in a manufacturing industry who has very keenly observed the work activity being carried out by his fellow engineers and fellow workers around him in the production systems. Those were the days of specialized manpower carrying out the work activity and a large number of co-workers were supportive of the main activity of production. The interrelationship between the various elements of the manufacturing chain, their direct and indirect influences on worker's productivity were least understood. The main task of the management was to meet the targets of production. Taylor realized that a lot can be achieved in terms of efficiency in production, in respect of high productivity and smooth functioning of the organization, if the whole system could be tuned to work on a set of principles. Taylor evolved the first ever set of principles of management which were later designated as Taylor's 14 Principles of Management. These included division of labour, line of authority, unity of commands and flow of authority etc. The foundation of modern scientific management was thus laid by Taylor who even to date is regarded as the father of modern management. I therefore feel highly elevated to have been invited to deliver the memorial lecture in the name of the brightest engineering genius, FW Taylor, the founding father of modern management. In fact the development of modern management during the last 100 years is structured around the Taylor's principles of management.

Like any other system and a code for smooth and efficient functioning of human endeavor the management also has undergone continuous evolution. In fact, it

has graduated from being an art which it was upto about 1960's to being a science in the decades of 70's to 80's. However with the rapid growth of communication technologies, later integrated into computer applications, the management today is more of engineering and technology than merely being a scientific application of the basic principles of management. The rapid growth of knowledge and product innovation in today's IT driven industrial and economic environment is exerting a compelling influence on the codes and practices of management. Managerial procedures, organizational structures, system dynamics and the practices of production and quality management are therefore undergoing as rapid a change as the pace of change of knowledge and technologies. Managing knowledge, managing innovations and managing frequent technology changes are the major challenges to be addressed to by the management of modern enterprises and industry houses. I have therefore chosen to devote today's FW Taylor memorial lecture to the managerial imperatives of Innovation and Knowledge Management.

### ***INDIAN MANUFACTURING INDUSTRY IN THE GLOBALISED ECONOMY:***

Manufacturing in India's surged and has undergone a phase of rapid growth during the first few decades after independence in 1947. The protection and patronage it enjoyed from the socialistic outlook of the Government and the vast Indian market provided a fertile ground for the growth of Indian manufacturing industry. We find that the key and heavy engineering industries in India such as **BHEL, Bhilai Steel Plant, Heavy Engineering Corporation, HMT and Bharat Earthmovers** were all setup by the Government as public undertakings. These industries flourished in the protected economy era. The growth of small-scale industries, SSIs, in the country in manufacturing as well as in consumer electronics has been highly impressive. An average annual growth of 15 – 20 % was achieved during 80's and up to mid 90's. Today of course the scene is quite different. Indian manufacturing is rapidly declining. The SSIs are under heavy pressure from the MNCs and industries abroad. They are infact facing a severe threat of extinction. I am hearing of closure of industries, laying off of employees, voluntary retirement schemes and golden handshakes in Indian industries these days. In fact I have witnessed such key words in newspapers in U.K. during late seventies and eighties while I was there. There must be similarities, I presume, in scenario prevailing in Indian manufacturing industries today and that of U.K. industries in the late 70's and 80's. I find the following similarities:

- Low productivity in production.
- Lack of investment in new technologies.
- Loss of focus on product innovation.
- Poor quality production and large avoidable expenditure.

British industries in those days being old were facing technology obsolescence as against their counterparts in Japan, in Europe and in U.S.A. In India the neglect of constant upgradation of technology levels in the industry has created a situation of technology obsolescence in the industries. The British industry being conservative in its product outlook was unable to match the rapid pace of product innovation and process modernization as much as its competitors abroad. Compared to this in India there has been a total dependence on foreign collaborations for import of technology, knowledge and product designs. The lack of environment for product innovation and urge for indigenous development of technology and expertise have pushed the Indian industries to wall when the field was wide open to multinationals from abroad and the flood gates were wide opened for import of goods manufactured outside India. The outcome is quite obvious. You have seen the high and mighty **BHEL, SAIL, HEC** and of course all sectors of Indian industries facing the toughest time ever. Let us look at the reasons from close quarters.

### **1. LOW PRODUCTIVITY IN PRODUCTION:**

Workers productivity in India is all too well known to be no more than around 20 times less than that of that of Japan and other highly productive systems in the developed countries. It is not technology that affects worker's productivity. I must emphasize there are a whole lot of factors including the work culture, education, training and retraining of the workforce, interest and enthusiasm of one and all in success of the organization, the role of management in inspiring every one right from the lowest in the manufacturing chain to the top most in the hierarchy to tune to productivity consciousness, rewards and incentives for coining good and useful ideas, workers participation in management and of course inductment of new technologies and system up gradation, all go in a long way to create productive organizations. The urge to produce anything of whatever quality and dump it in the home market in fact created conditions conducive to the growth of highly inefficient system of production in India and have constrained Indian industries to achieve high workers productivity. You may however ask as to why during 10 years of a globalised economy in India we could not improve workers productivity and create a globally competitive Indian manufacturing sector?

### **LACK OF FOCUS ON PRODUCT INNOVATION:**

In the modern science and technology driven economy era, the industries roar with success at home as well as in the international market on the strength of the innovations in product design. Product innovation has become one of the most powerful instrument of creating global competitive edge in today's highly competitive market driven economy. When we look at our industries in India, we find the lukewarm response to product innovation and continuous improvement of quality and productivity has in fact provided a highly uneven play field for our industries when

the globalized economy era began some 10 years ago in July 1991. The globalization and liberalization opened immense opportunities for Indian industries to respond to the challenges of quality and product innovation. With a strong base of S & T manpower and basic infrastructure for technological competence, it was indeed a golden opportunity for the Indian industries to emerge out as leading players in the manufacturing sector. But the inertia of the protected economy has not been shaken as fast as was stipulated. **Indian industry did not take its HR competence seriously, and continued to look outside India to outsource its product design and technology requirements.** The net result is quite obvious the Indian engineers continue to be more and more in demand in the advanced countries who took the opportunities of globalization seriously and made strong inroads in the developing countries. Infact the Indian industry lost very heavily in the manufacturing sector to the multinationals from abroad. You may ask as to how a industry ridden with financial crisis can focus on product innovation when it has not enough strength to even continue? Product innovation is a process by which good ideas from both academic, industry and society quarters are channelised to yield new and improved designs, are translated into products, which create a market wave. However, **in India because of a very low or little interaction between the industries and the institutions, the pooling of the minds and synthesis of ideas has not become a reality.** 10 years of globalization have failed to create a real impact on the industries at home to realize the value and worth of industry-institute linkages. What is required is to understand that the industries should go beyond recruitment of the graduates and postgraduates and establish **synergetic partnership with the institutions** so that the rich intellectual wealth of our nation is translated into the strength of our industries. **It is rather disappointing that industries in India during the last 10 years of the globalised economy have only understood the value of alliances and collaboration with the high and mighty abroad and neglected the core – strength which could have been created by such alliances with leading Indian institutions and R & D houses.**

In today's IT environment the speed and pace of product innovation and management of technology change make it imperative that the dynamics of Innovation and Knowledge Management be better understood. Quick and favourable response to good ideas, rewarding the valuable ideas, pursuing good ideas with speed through innovation management teams and through rapid prototyping taking the most valuable ideas to the market in the form of improved and innovated products is what is required. **Vast global international market is reachable to India as much as to China and others purring the Indian Industry could understand the value of productivity, innovation and knowledge management.**

The industries in India especially in the manufacturing sector are poised for resurgence if they take the challenge of managing innovations and managing knowledge seriously. We have all the ingredients of success in this country including internationally acknowledged human resource competence, basic infrastructure for in-house technology development and a strong base for S&T education and research. What we lack, of course, is the strategy to harness rich talent, which we possess. We also do not have efficient mechanisms for converting knowledge into prosperity by taking the ideas to the product innovation levels. I am sure the industry understands the imperative of productivity in production, quality at all levels and the dynamics of global competition, which compels us to think of total quality and cost management as the hallmark of our initiatives and professional practices. The industries undoubtedly need the support of the government as far as the industrial policy initiatives are concerned. The industrial policy of the nation is to be targeted to create 'Advantage India', which means supporting our industries to acquire capabilities of producing world class products and services, facilitating channels for international trades for marketing of Indian products abroad. The question is when China can do it why not India. India's vast population can be converted into a real human power by ensuring that opportunities for employment and self-employment are created in abundance. This requires a careful planning of our industrial development in the changed globalised economy environment. Let the industry also understand that the days of protection are gone but certainly the industry cannot be allowed to reel under the global pressures of uncontrolled flow of imported goods and services currently being witnessed in the Indian market. Every nation has its first and foremost duty to protect the interest of its people and no policy on the earth can deprive India and its people an opportunity to use their capabilities for strengthening the basic fabric of economy of this country.

I have already made my views quite clear about the dire need for synergetic partnership between the industries and the institutions, between the industries and R & D organizations and between the industries and the technological universities. Let a new era of **partnership for progress** begin in this country where by the core competence of the faculty and students in the institutions is utilized by the industry for creating global competitive edge in respect of knowledge, know-how, technology and product innovation. Let the core competence and the expertise and vision available in the industries help the educational institutions and R & D houses in targeting their efforts for creating a strong and globally competitive industrial base in this country. Let there be a much greater cooperation between the industries and the institutions and let you from the industries and we from the institutions work together for a common cause that is to create world-class institutions and undoubtedly globally competitive industries in India.

Ladies and gentlemen, it is important for each one of us to realize the importance of our partnership and ensure that in this new information age we are not left behind in management of innovation and knowledge, specially that we have

registered our claim and have successfully demonstrated our capabilities in the Information Technology sector in this country. What is required is to make the best use of our IT capabilities and our human resource competence in our industries and bounce back with roaring success in the market at home and abroad. Let me pray that this day comes much sooner than expected and let the Indian industry march on the path of resurgence from now onwards.

I felt highly elevated in sharing my views with you specially that you have invited me to deliver the coveted FW Taylor Memorial Lecture at the National Convention of Production Engineers organized by the Institution of Engineers (M.P. Chapter). I can assure you that we at the Rajiv Gandhi Proudyogiki Vishwavidyalaya, the State Technological University of Madhya Pradesh are firmly committed to work with our industry partners, to create **Advantage India** by our efforts. Let you support us to become a world class technological university and let us provide you all that is desired from the academia and the science and technology community to create world-class industries in our country. I have great pleasure in extending my very best wishes for the success of the National Convention and I take this opportunity to thank the organizers for giving me this opportunity to be with you today and share my views.

Ladies and gentlemen, may I thank each one of you for your patient hearing.

Thank you.



### A Brief Biographical Sketch



Born in April 1948 at Vidisha in Madhya Pradesh, Professor Pritam B. Sharma graduated in Mechanical Engineering from Samrat Ashok Technological Institute with a GOLD MEDAL in 1969. He obtained his Post Graduate Degree in Thermal Engineering from University of Birmingham (UK) in 1974 and received the Post Graduate Prize for being the topper of the Engineering Faculty. He later received his Doctorate Degree in Mechanical Engineering from the University of Birmingham (UK) in 1978.

Professor Sharma has over 28 years of experience of teaching and research, which included 12 years at IIT, Delhi, where he was a Professor of Mechanical Engineering before taking over as Principal of Delhi College of Engineering in 1990. Besides teaching at UG and PG levels, Professor Sharma has made a significant contribution to R&D in the area of Power Generation and Aero-engine-technology. He has guided Ph.D. scholars and has undertaken a number of major R&D Projects sponsored by the Government and Private Agencies. His work on contra-rotation for future generation aircraft engines is highly valued internationally.

Professor Sharma has widely travelled abroad and has interacted with Universities and industries, in the developed as well as in the developing countries. He is a Fellow of Institution of Engineers and also a Fellow of the Aeronautical Society of India.

Professor Sharma is heading the prestigious Delhi College of Engineering, the mother Institution of a number of National Institutes including I.I.T., Delhi School of Planning and Architecture.

In the year of 1992, Professor Sharma **has been awarded the NAFEN National Excellence Award for Best Technical Educator of the year.** Professor Sharma has also been awarded **“Order of Merit in Management”** by the Indian Council of Management **1997** for his outstanding contributions to Engineering Education and Research. Recently has been awarded Fellowship of **World Academy of Productivity Sciences**, a fellowship conferred to around 250 around the world.

During his tenure as Principal DCE, Professor Sharma has made a distinct contribution to the Management of Technical Education. He has authored a number of research papers on Quality and Productivity in Technical Education and made a profound contribution to the policy issues in technical education administration. Prof. Sharma is the first Vice-Chancellor of Rajiv Gandhi Pradyogiki Vishwavidyalaya (University of Technology of Madhya Pradesh.)

Professor Sharma brings with him a combine of a first rate academician and an active technologist having a strong interface with the industry.