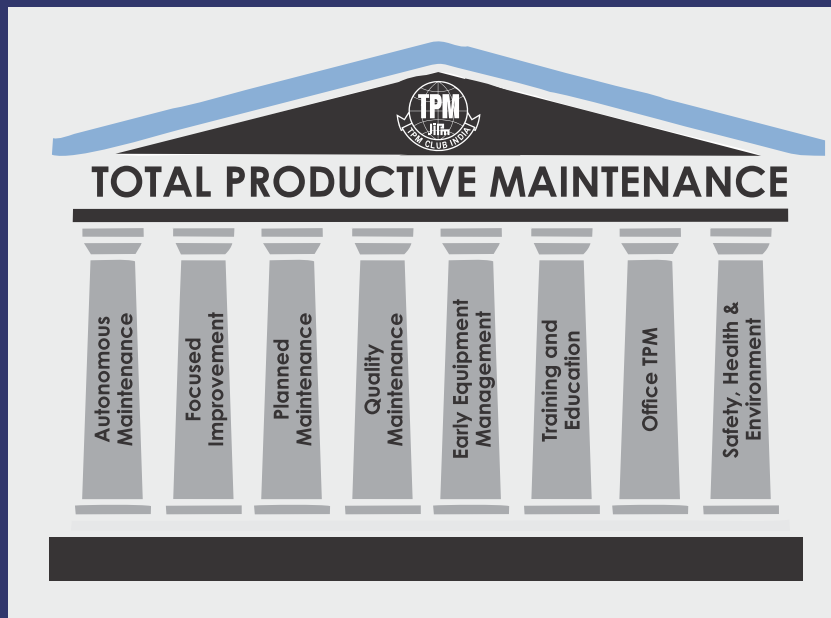


# INDIAN PROCESS INDUSTRY

Using TPM Methodology for Sustainable Profit Growth



Since the introduction of TPM in the year 1991, the Indian industry recognized the benefit of this technology and whole heartedly adopted to improve its competitiveness. Introduced in the year 1969 in Nippon Denso, Japan, the primary focus of TPM is to establish the concept of Zero Failure of Equipment extending to Production Efficiency Enhancement. It is seen as a breakthrough technique for the success of manufacturing industry in Japan.



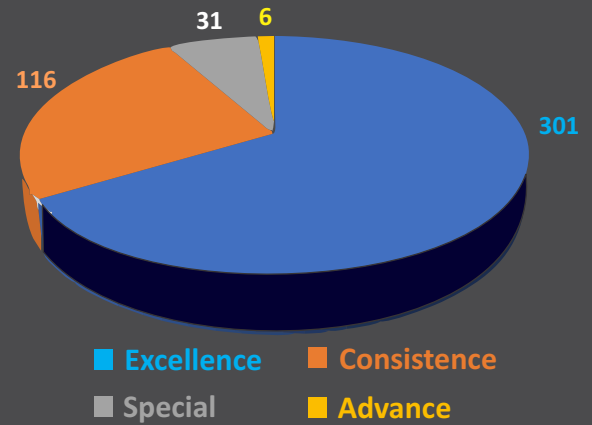
Adopted in 1991 by the Cement Industry in India, CII in collaboration with Japan Institute of Plant Maintenance (JIPM) created a focused CII TPM Club in the CII Institute of Quality to propagate and support the Indian Industry. TPM has been the foundation of many successful companies in India, with its applicability not only to the Automotive but to many other industries including Process, Chemicals, Electronics, Steel, Tyres, Textiles, Agri and Food etc. In recent times, we have also seen its applicability and benefit in enhancing productivity in the Healthcare Industry. Many Indian Industrial Giants, OEMS, and even MSME supply Chain partners have benefitted immensely from adopting TPM Practices.

The Quality Professionals and industries working in this domain have silently worked on the ground to create path breaking progress in their companies and areas of influence. It is not only said but is experienced that once a TPM Man always remains a TPM Man. An interesting example is of a retired Middle level professional from a leading Indian company following TPM practices, who continued with his passion even after retirement. He went back to his native village after retirement and started applying his learnings of TPM Principles to better all the religious places in that region. He made a presentation with photographs on the results achieved during the CII TPM National Conference in 2018 in Chennai, relating the applicability of various TPM Pillars successfully to this social cause. There are many more such examples of professionals who have imbibed the TPM principles within their blood stream and continue to make a difference in the society even after their active professional careers. Imagine the impact it will make if thousands of such Quality Ambassadors plant the seeds of Quality practices in our society in all nooks and corners of the country. When this happens then the dream of 5 trillion economy and India becoming a developed economy is not far. And it is indeed possible. CII IQ through its Organization and Professional Club Membership is charting a road map for creating a suitably trained, collaborative human resource chain for building competitiveness in Educational institutions, Industry and the Society at large. Support of Munjal Showa in creating a Centre for supporting the Educational Institutions and Supply Chain Partners of large OEMs is another key step in this direction.

# JIPM -TPM Awards

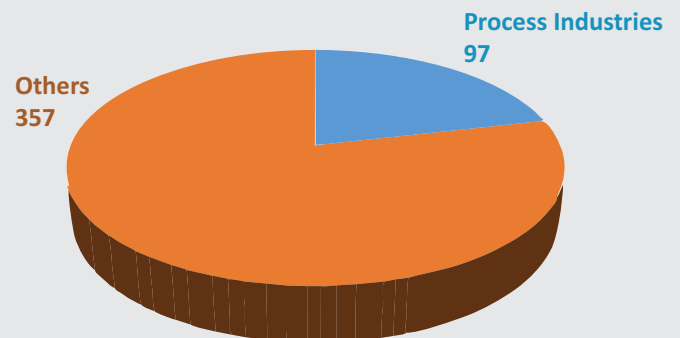
If we observe the last decade's data of the international TPM Awards, between 2009-2019, more than 40% of the awards have been won by Indian Companies, which is a great achievement by the Industrial partners with the support of TPM Club India.

Total JIPM Awards (2009 - 2019): 454




## The Process Industry has won 27% of the JIPM Awards

The Process Industry is clearly competing with the Engineering and Auto Industry in its share of TPM Awards. This paper is trying to highlight the important factors contributing to the losses in the Process Industries and broadly highlighting the benefits that can accrue through use of TPM Technologies.



## The Industries are classified in to 4 types

 Continuous Process Industry –  
Cement, Paper, Chemical and Petroleum products

 Engineering Industry –  
All auto sector

 Batch Process Industry –  
Sugar, Abrasive, Food and Agri

 Job Shop Industry –  
Tool manufacturing

Of these types, both the Batch process and the Continuous process industries are unique, in the sense that, the business challenges of raw material availability, Raw material price, raw material yield, the operating style, Losses inside the plant, people knowledge, power consumption, In process industry, types of defects are totally different from the other type of industries. Also, in the scope for improvement in profitability i.e the possibility of achieving exponential growth is very high.

The Process Industry by nature has following features wherein,

- Production is continuous.
- Process is more important than the individual equipment.
- Property of the material being handled is complex.
- Large amount of energy is used.
- The operators need to control a wide range of parameters and equipment.

# Challenges

For example, the entire plant has so many varieties of process like evaporation, crystallization, distillation, refining and furnaces which has both the static and rotary equipment. The Breakdown Maintenance of such equipment is almost 7 to 10 % of the overall down time, Preventive maintenance which again contributes to another 10 to 12 % of the down time and Shut down maintenance is another very big challenge.

In the food processing industries, the shutdown maintenance is mandatory to meet the FCCI norms. But the people working in the process are very less in number and they need to take care of the entire process operation. Frequent stoppages are very costly in terms of power consumption, yield loss and defect creation.

During the process also the attention by either the automated controls or manual is very essential as any lapse leads to heavy losses. The potential for accidents in the plant is also very high. The transfer of materials from one stage of the process to the next stage is again a critical issue.

Above all, maintaining the standby equipment is a major area of challenge, due to unexpected failures, the process industries are forced to have the ratio of almost 1:1 in the standby equipment, because of which the maintenance cost also is very high. The spare part inventory may also not be under control. Maintenance budgeting usually is very challenging for the maintenance team.

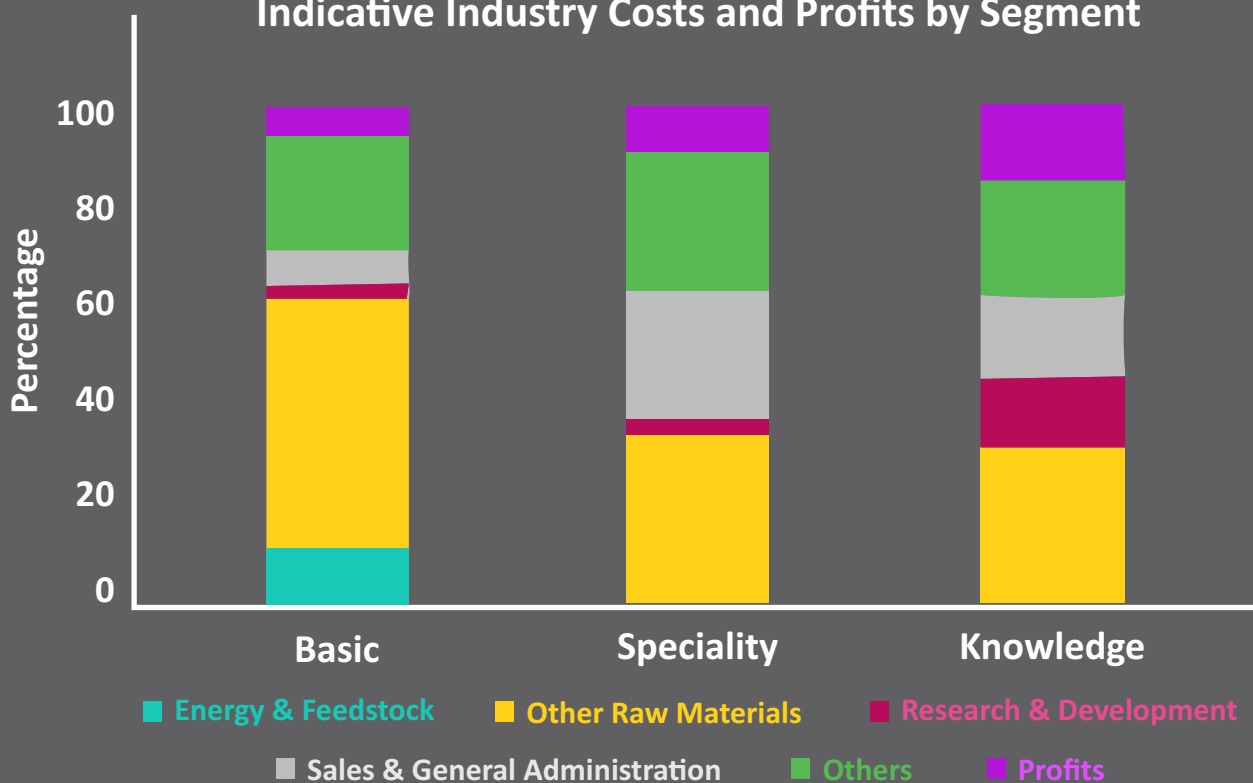
The loss due to not operating the process to the recommended speed due to various reasons starting from the variation in the skill level of people, raw material availability is again a major challenge. In sugar industries, the variation in supply of cane which is almost 10–12 % will lead to the differential juice flow in the process. This speed loss will create the unwanted losses like process failure, more in process defects & re processing and high-power consumption.

There are industries, where the reprocessing of defective products is possible. This is taken for granted also. But the loss to the company incurred because of any reprocess is 7 times higher than the normal production cost.

But at the same time, there are industries, where the reprocessing is not possible, the products are sold as second grade quality products. Especially in the sugar segment, if the sugar produced for the Pharma grade is not meeting the specification, it will be sold to either the Institutional customer or in the retail market.

Hence in such cases, until there is economies of scale, the manufacturing cost is high, and the selling prices is constantly under pressure because of which the companies are forced to compromise on their profit. Almost in every process industry, there is a loss in profit of almost .25 - .3 % loss in the profit is faced

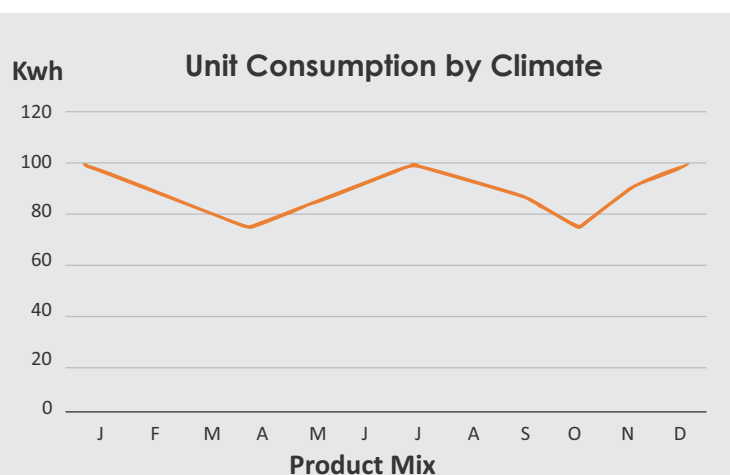
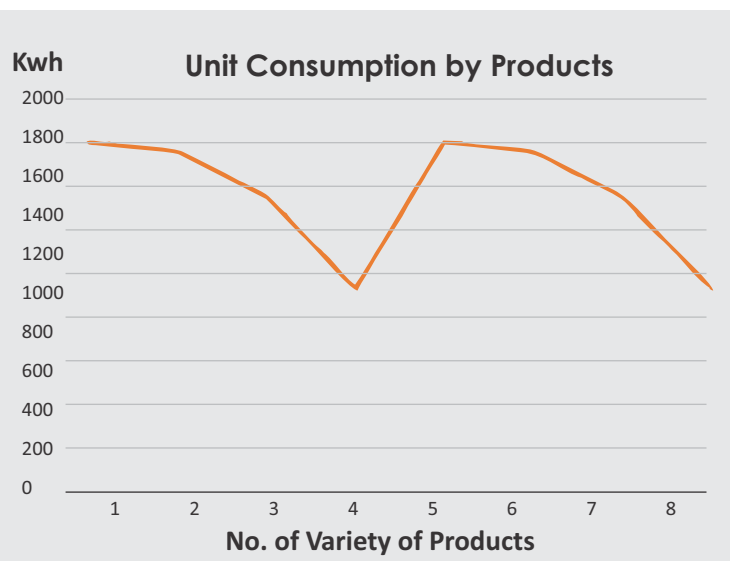
## Indicative Industry Costs and Profits by Segment



The common abnormalities like Leakage, spillage, flying, blockage, clogging, rapture, cracking, corrosion, wear, distortion, burning, short circuiting, faulty insulation, mis-operation and overheating are to be given top most priority, because the amount of time, energy and the cost required to resume the operation is very huge.

In Cement sheet industry, the loss of overflow is a major issue due to the line blockage. One-time overflow from the silo will lead to the down time of nearly 8 to 9 hours and the energy and the manpower spent for cleaning is very high. This being a normal routine impact in increase of expenses.

The Petroleum industries must deal with the quality of crude oil quality, which decides the entire plant performance and the profitability. Also, there are certain, climatic losses, Process losses like loss on evaporation, loss on ignition etc. are beyond the control.





For industries like Paper, Cement, Thermal insulation and chemical industries, the loss due to Production adjustment is a major challenge. This is because of the variation in the Supply and Demand ratio. In the overall losses, it is accounting to 5–7% of the overall loss.

## Focus - As Way Forward

With all these difficulties, the process industries need to focus and achieve the objectives of: **1 More Number of Operating Days** **2 Least Cost Manufacturing**

For achieving this, the focus should be on the people working in the plant, Plant machinery, Material being used, and the Method of operation to name a few focus areas.

Both the Raw material related issues and the machine maintenance put together, has the huge potential of almost 25–27% of improvement.

## Current Status

To face the challenges and make profit in business, some of the industries are changing the business module of refining the Top down approach, where, they are focusing on various strategies like



**Raw Material Strategy**



**HR Strategy**



**Marketing Strategy**



**New Product Development Strategy**



**Manufacturing Strategy**

Many of the Large industries have also started focusing parallelly on the entire supply chain for exponential benefits. Quality Technologies especially TPM has contributed significantly for improvements not only on the shopfloor but across the company functions and areas impacting even the dealing of the companies with Customers and encouraging their involvement in growth oriented strategic decisions of the company. There are many success stories in every process industry who are practicing and enjoying the benefits of the TPM

To have a basic understanding of what TPM can do in the organisations

- TPM changes the thinking style of people in various levels and various functions
- The strategy of implementing TPM changes the shop floor culture.
- The culture of TPM leads the Organisation towards Zero orientation in loss elimination
- TPM tools emphasis and proves zero losses
- It involves all level of people and various functions in the organisation towards the common Business objective

For example, in MMTCL, the leading manufacturers of thermal insulation material, the supply chain improvements have been initiated which have impacted the overall effectiveness and strengthening the supply chain linkages. There are some specific shop floor approaches like Daily performance review (DPR), Centralised Production Planning System (CPPS), the concept of OTIF which among other concepts have been wholly adopted by the supply chain partners.

In some of the sugar industries, the farmers are getting involved in the business development journey. The requirement like Profitability improvement and productivity improvement are taken collaboratively for improvement. Because of this approach the average plant running days has improved by almost 15 %. The productivity per acre has increased from 35 Metric ton to almost 70 metric ton in such cases.

The employees of such companies after getting the exposure to TPM concepts have working on alternate raw material, Business model change etc., which is a progressive sign of improvement.

By implementing the various concepts and the methodologies of TPM, like PM analysis, Fault tree analysis, FMEA, Industrial Engineering, Value analysis and JIT the business growth is nearly 30% year on year.

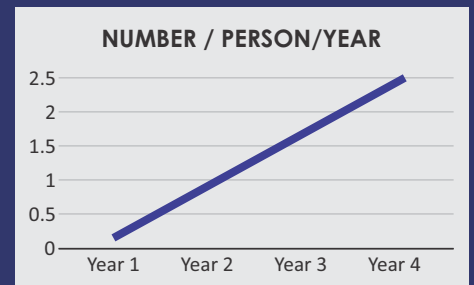
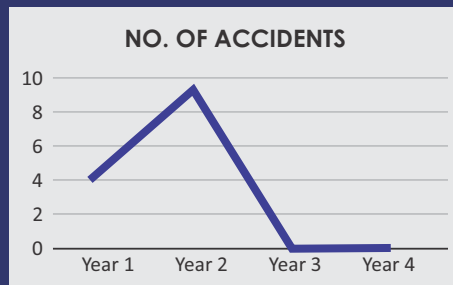
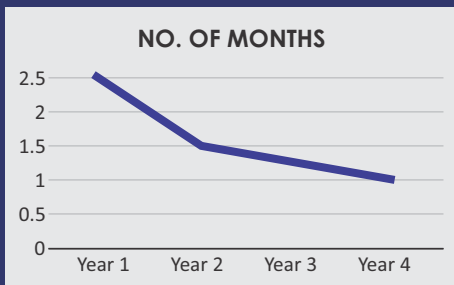
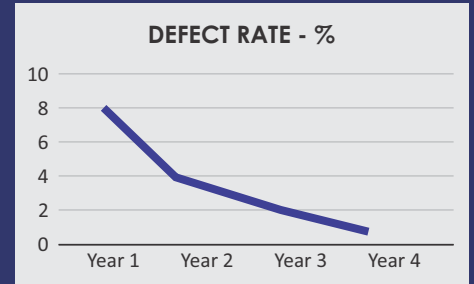
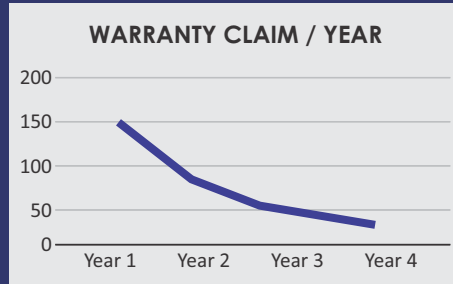
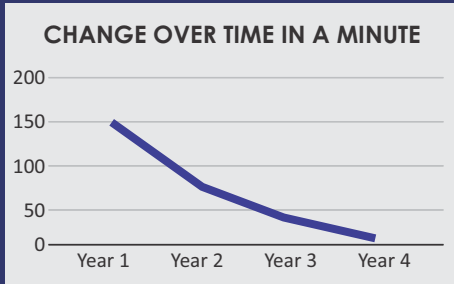
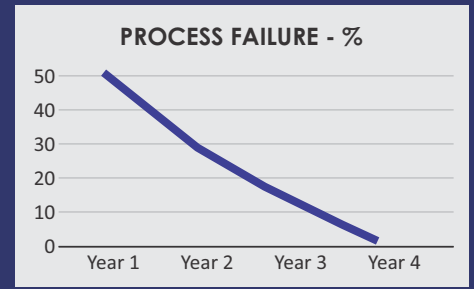
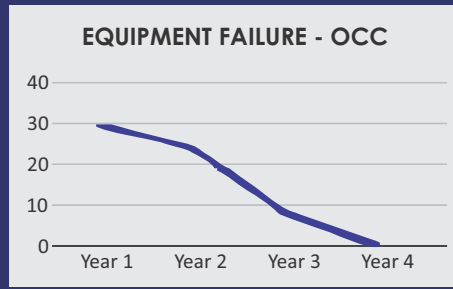
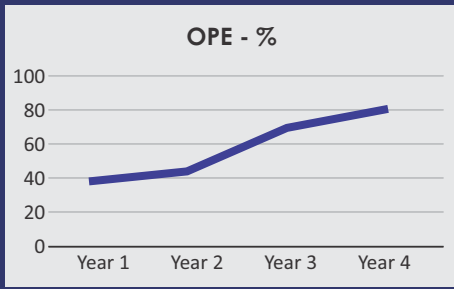
Apart from the consultancy services and the tools usage, the input given by the assessors from CII IQ TPM Club of India and JIPM has also been adding good amount of improvement in the business results.

For example

- Reducing the by product in the process, so that the power, labour and Raw material can be saved to a greater extent
- Reverse production
- Changing the Business module, to have very good impact in the profit margin
- Customer oriented GMP implementation in our manufacturing, especially for the Pharma grade of manufacturing Yielded very good results in the business, like food industries

With respect to the measurables in TPM, the indicative results achieved by the Process Industries adopting TPM is as follows. The following graphs have been prepared collating data of the CII IQ TPM Club Client companies over the 4-5 years of their TPM journey. Most of these companies have also won the prestigious JIPM Awards and are constantly expanding their markets not only domestically but also overseas

# Current Status - Growth



## Opportunities -Potential for Indian Companies:

As an example, Indian chemical industry which contributes around 6.7 per cent of the Indian GDP. The Indian chemicals industry stood at US\$ 178 billion in 2019 and is expected to reach US\$ 304 billion by 2025 registering a CAGR of 9.3%. The demand for chemicals is expected to expand by 9% per annum by 2025. The Indian chemical industry – the 6th largest in the world and 3rd largest in Asia – is one of the oldest industries in our country. Throughout the years, the chemical industry has served as the backbone of the industrial and agricultural development of India.

Out of the total number of Process Industries including Chemical Industry in India, approximately 1% of the industry is actively adopting and benefitting from TPM. The scope for business improvement for India is huge if even 10% of the industries start this practice year on year. This can only happen if the Top Management drives this initiative wholeheartedly with a definite strategic plan for 3-4 years for driving it internally and externally with supply chain partners.



The benefits are immense, it is now for us to work in this direction, consciously, collaboratively and consistently.

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Since 1998, through a rough estimate, the benefits accrued to the Indian industry in the last 20 years include

PROFIT IMPROVEMENT OF **20,000** CRORE

MACHINE OEE IMPROVED BY **36%**

PRODUCT DEFECT REDUCTION BY **77%**

MAN PRODUCTIVITY IMPROVEMENT OF **130%**

TURN OVER IMPROVEMENT OF **1,50,000** CRORE

CUSTOMER COMPLAINT REDUCTION BY **85%**



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