Total Productive Maintenance

Industry Forum
Business Excellence Through Inspired People

Introduction

Industry Forum was initially formed in 1994 as a unique collaboration between leading vehicle manufacturers, the SMMT and the government to improve the performance and competitiveness of the UK's automotive supply chain. By 1996 Industry Forum had developed a model to achieve this by seconding highly skilled master engineers from the founding partners to transfer their skills to Industry Forum engineers through a 'learning by doing' approach.

Dr Chris Owen
Chief Executive Officer

Continued measurable success has led to sustained growth into many other sectors including aerospace, construction, domestic appliances, electronics, and food. Industry Forum now provides support to blue chip organisations in more than 30 countries across five continents.

The constant pressure on businesses to reduce cost has driven the need to provide extremely reliable, efficient and sustainable processes that deliver proven returns over the long term. The Japan Institute of Plant Maintenance (JIPM) TPM excellence awards are the global benchmark for businesses achieving this level of sustained success. Industry Forum is one of only six worldwide agencies qualified to assess businesses against these criteria.

Industry Forum has practical continuous improvement at its heart and its strategy is to align itself with world-leading partners to deliver complete solutions for customers.

Industry Forum delivers significant results in three ways:

1. Practical Solutions – providing knowledge, hands-on experience and guidance to improve business performance
2. Learning & Development – inspiring people through structured training and development programmes to deliver business excellence
3. Audit & Assessment – using globally recognised objective assessment criteria to understand, measure and monitor business performance

Industry Forum employs a team of engineers all of whom have substantial industrial experience in key sectors. Consistent with its founding principles the team undergoes continuous training and development to meet the needs of our customer base. To support our customers on a global basis, Industry Forum has established a network of trained and validated partners and associates in major economic regions. The goal of Industry Forum is to grow its business in key sectors whilst retaining this unique approach.

TPM ASSOCIATE AGENCY

Industry Forum is a Certified JIPM Associate Agency

Contents

Industry Forum & Total Productive Maintenance

Introduction

Since Industry Forum was founded in 1994, with the aim of driving continuous improvement methods in automotive manufacture, it has successfully expanded to support aviation, petrochemical, electronics, food and beverage divisions on a global scale.

As an integral approach to business solutions TPM (Total Productive Maintenance) is a core support programme affiliated with the Japanese Institute of Plan Maintenance (JIPM), considered to be the global leading body, TPM is not just a professional maintenance approach but also a cultural transformation programme.

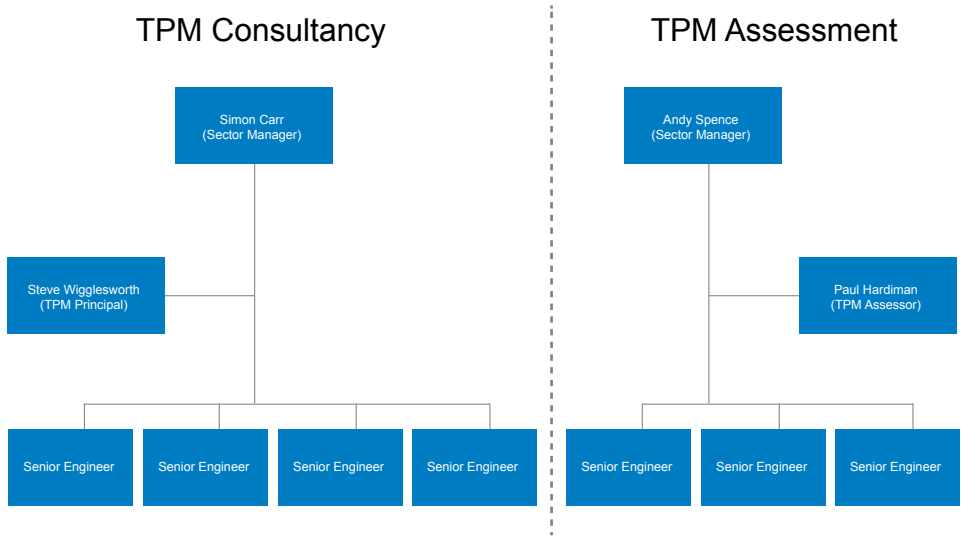
Industry Forum teams are experienced practitioners and have a deep understanding from multiple environments of application and hands on application. Our senior experienced teams have operated at corporate levels in large organisations and understand the holistic programme approach and have worked directly with JIPM for awards activities. Our teams have core disciplines, although they have a wide range of knowledge our approach is to hone our expertise in core disciplines so that depth of application is assured.

The Japan Institute of Plant Maintenance (JIPM) TPM Excellence Awards are the global benchmark for businesses achieving this level of sustained success. Industry Forum is one of only six worldwide agencies qualified to assess/consult businesses against these criteria.

Industry Forum's TPM approach delivers significant results in three ways:

1. Programme support material and knowledge, implementation approach and supporting materials to answer the 'why' and 'how' to implement.
2. Learning & Development – structured training and development programmes to support implementation. All our training materials are developed with training frameworks for effective delivery.
3. Audit & Assessment – experienced in applying the reflective process of audits and assessments exploring opportunities and creating competitive gaps in a constructive way.

IF Structure



Total Productive Maintenance Overview

The history of Total Productive Maintenance (TPM)

TPM has been developed from the original PM (preventive maintenance or productive maintenance) concept and methodology introduced from the USA. It has been further developed and implemented in many Japanese companies, and is now rapidly becoming a method applied worldwide.

In 1971, Nippon Denso Co., Ltd. first introduced and successfully implemented TPM in Japan. They won the Japan Institute of Plant Maintenance (JIPM) PM Excellent Plant Award for their activities. This was the beginning of TPM in Japan. Since then, TPM has spread progressively throughout the world and established itself as a renowned cultural improvement programme

The first example of TPM used in Europe to deliver world class performance was by Volvo in Ghent, Belgium, who won the PM prize for their work in the paint shop. This was quickly followed in the early 1990s by other European automotive companies trying to close the productivity and quality gap to their Japanese competitors.

Since the JIPM TPM awards were founded, over 3000 organizations have won awards, including Unilever, Wrigley, Tetra Pak, Heineken and Arcelor Mittal.

The Japan Institute of Plant Maintenance (JIPM) approach to TPM

The JIPM definition of TPM is:

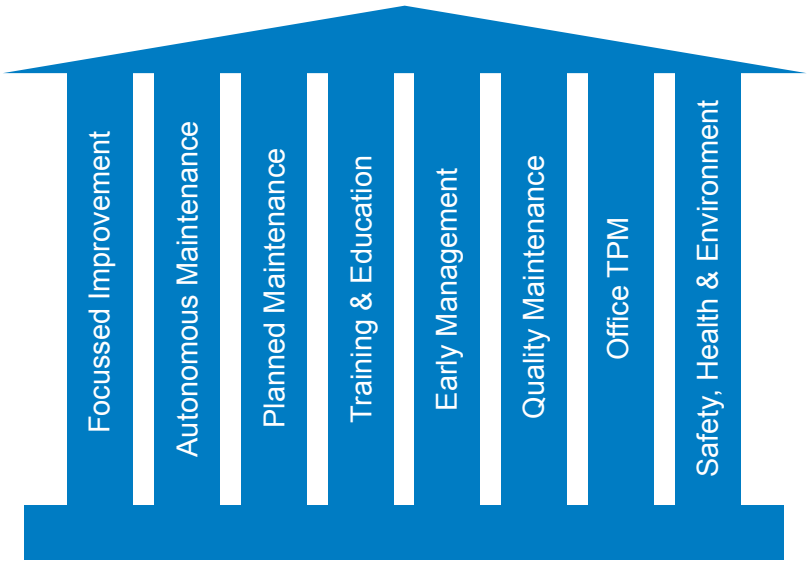
T = Total. Must involve all employees at all levels of the organisation.

P = Productive. Effective utilisation of all resources.

M = Maintenance. Keeping the Man-Machine-Material system in optimum condition.

JIPM developed an eight pillar approach to TPM focused on achieving:

- Zero Accidents
- Zero Break-downs
- Zero Defects



Total Productive Maintenance Overview

The mission of each pillar is to reduce loss with the ultimate aim of elimination of all losses.

To start implementation of TPM firstly top management need to understand that TPM needs to be part of a long term culture change programme, not just an initiative for the maintenance department.

A TPM structure to support the cultural change needs defined with clear responsibilities and ownership.

Next a pilot area needs to be identified. Typically this is selected based on reviewing data on breakdowns and quality issues. The operators involved in the area, along with other functions such as Maintenance and Quality are then trained in the principles of TPM and what role they will play in the implementation. In simple terms we build professional linked systems how we train, how we problem solve, how we maintain

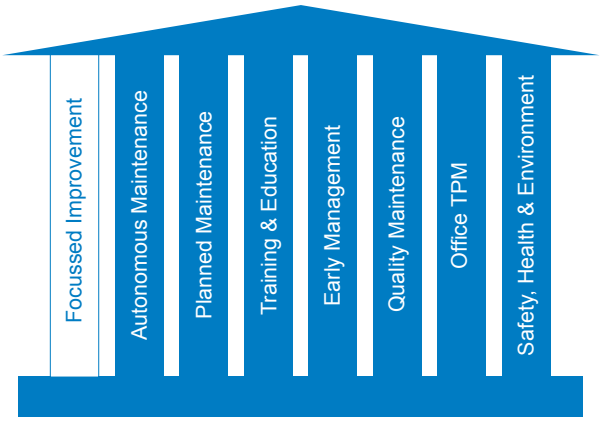
The power of TPM is greater than the key performance indicators measured at a single location. It is a mechanism or movement by which we transform our working environments and the way in which we work.

It can be said that pillars are themselves change streams; they develop systems, processes and standards with people. It allows and motivates a mechanism for leaders to work directly with the factory teams bridging gaps in hierarchies and forming a unified and cohesive structure that spans both levels and functions to achieve common aims. The pillar approach is a way of managing change and a rigorous methodology to ensure we sustain results for the future.

Focussed Improvement

What is Focussed Improvement?

Focussed Improvement is the first pillar of TPM. It provides a structured, team-based approach to drive elimination of specifically identified losses in any process.



How is the Pillar implemented?

The pillar follows a structured set of steps aligned to the Plan, Do, Check, Act (PDCA) cycle, which can be implemented for improvement activities of any size or complexity in any organisation.

The pillar builds an understanding and analysis of the different loss types affecting an organisation. The pillar operates at a strategic level, identifying the criteria for project selection and TPM deployment that will deliver the business objectives.

The pillar develops the capabilities of teams to be self-sufficient in applying appropriate problem solving approaches. By building competencies and embedding behaviours, the pillar ensures that the workforce has the skills and motivation to eliminate loss from their processes, not only for selected projects but also for normal every day issues.

What are the benefits of the Pillar?

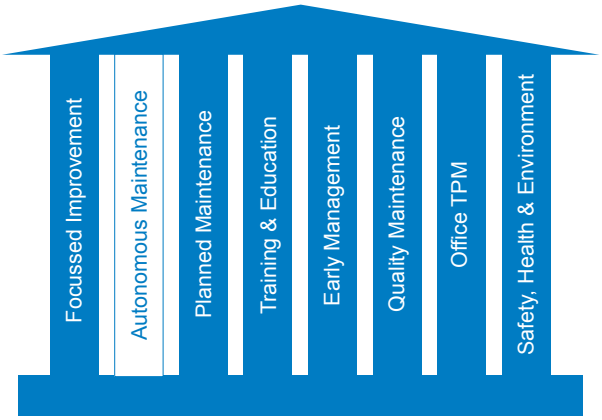
As well as improving efficiency, reducing defects and improving safety performance due to eliminating losses, the Focussed Improvement pillar ensures that the approach taken is consistent and repeatable to assure sustainability.

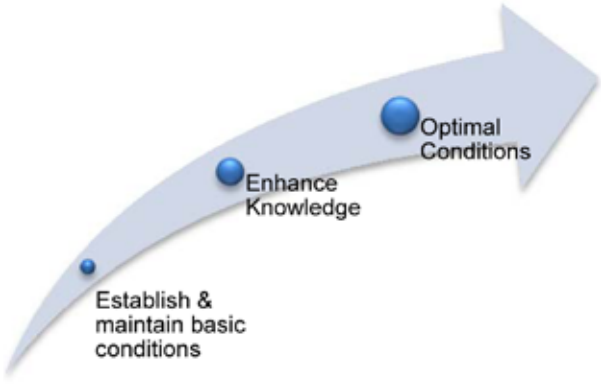
You can find out more about Focussed Improvement and its implementation by visiting the free Industry Forum TPM Forums at www.industryforum.co.uk/forum

Autonomous Maintenance

What is Autonomous Maintenance?

Autonomous Maintenance is the second of the eight pillars of TPM. It follows a structured approach to increase the skill levels of personnel so that they can understand, manage and improve their equipment and processes. The goal is to change operators from being reactive to working in a more proactive way, to achieve optimal conditions that eliminate minor equipment stops as well as reducing defects and breakdowns.





How is the Pillar implemented?

The Autonomous Maintenance pillar activity is broken down into three phases and is owned by the team who use the equipment on a daily basis.

The first phase establishes and maintains basic equipment conditions through restoration and eliminating causes of forced deterioration and sources of contamination. Standards are introduced for cleaning, inspection, tightening and lubrication to ensure the conditions are sustained.

The second phase increases the capabilities of the team by training them in the detailed operating principles of the equipment and then improving the standard basic condition.

During the third phase, the operators take total ownership of the equipment as self-directed teams, continuously improving equipment condition and performance to further reduce losses.

What are the benefits of the Pillar?

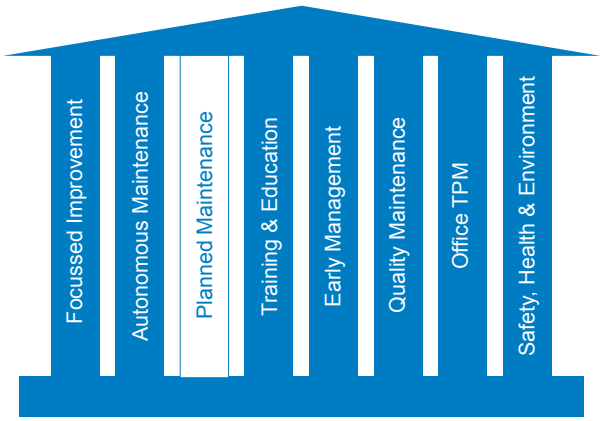
The deployment of Autonomous Maintenance will improve Overall Equipment Effectiveness (OEE) by reducing performance loss and increasing equipment availability. In addition there will be measurable improvement to employee engagement and capability levels.

You can find out more about Autonomous Maintenance and its implementation by visiting the free Industry Forum TPM Forums at www.industryforum.co.uk/forum

Planned Maintenance

What is Planned Maintenance?

Planned Maintenance is the third pillar of TPM and aims to achieve zero breakdowns. It follows a structured approach to establish a management system that extends the equipment reliability at optimum cost.



How is the Pillar implemented?

The Planned Maintenance pillar activities are normally led by the maintenance team. The initial phase prioritises equipment and involves evaluating current maintenance performance and costs to set the focus for the pillar activity. Support is provided to the Autonomous Maintenance pillar to establish a sustainable standard basic condition and the team focusses on eliminating the causes of breakdowns.

Information management systems are used to provide detailed data on the maintenance process and the use of spares. The team identify the optimum approach to maintaining the equipment, starting with a Periodic Maintenance (Time-Based Maintenance) system before introducing Predictive Maintenance (Condition-Based Maintenance) systems where they are appropriate and cost effective.

Finally the team drive continuous improvement of the process, eliminating reactive activities and assuring machine reliability.

What are the benefits of the Pillar?

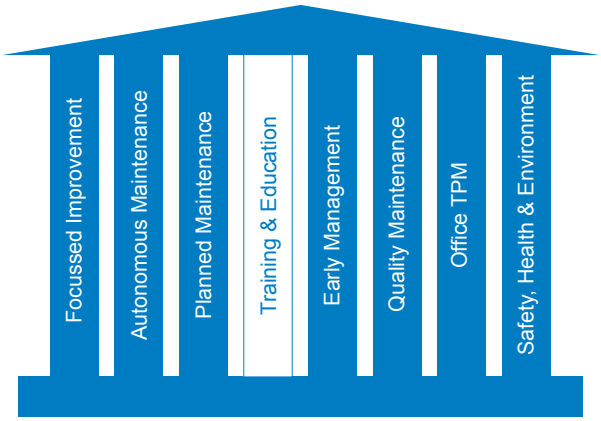
The primary benefit from implementing Planned Maintenance is the reduction in breakdowns, which leads to reduced cost and improved machine efficiency. The pillar will also contribute to improved quality and safety performance.

You can find out more about Planned Maintenance and its implementation by visiting the free Industry Forum TPM Forums at www.industryforum.co.uk/forum

Training & Education

What is the Training and Education Pillar?

Training and Education is the fourth pillar of TPM. It ensures that staff are trained in the skills identified as essential both for their personal development and for the successful deployment of TPM in line with the organisation's goals and objectives.



How is the Pillar implemented?

Initially the knowledge and skills required for carrying out each job are defined, in terms of both complexity of knowledge needed and the number of capable people required to support the business needs. A current state analysis assesses the current levels against the established requirements and a training plan is developed to close any gaps. This plan is implemented and evaluated to ensure that the activity generates the improved capabilities targeted.

The pillar team then design, implement and improve a 'Skill Development System' to enable on-going development of all employees. As the TPM programme develops, the pillar will expand to cover broader roles and increasingly complex training needs.

What are the benefits of the Pillar?

Increased skills and performance of all personnel throughout the organisation is essential for the successful implementation of TPM. Without a strong Training and Education pillar, the impact of the first three pillars will not be sustainable.

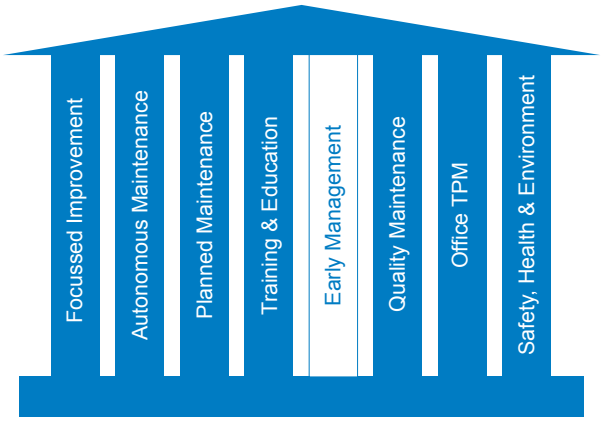
Untapped human potential creates substantial waste within an organisation. Training and Education creates a corporate environment which is able to maximise the potential of all employees and respond positively to the changing business climate, technological advances and management innovation.

You can find out more about Training and Education and its implementation by visiting the free Industry Forum TPM Forums at www.industryforum.co.uk/forum

Early Management

What is Early Management?

Early Management is the fifth pillar of TPM and aims to implement new products and processes with vertical ramp up and minimised development lead time. It is usually deployed after the first four pillars as it builds on the learning captured from other pillar teams, incorporating improvements into the next generation of product and equipment design.



How is the Pillar implemented?

There are two parts to the Early Management pillar: Early Equipment Management and Early Product Management. Both approaches focus on using the lessons from previous experiences to eliminate the potential for losses through the planning, development and design stages.

For Early Equipment Management, the goal is to introduce a loss and defect free process so that equipment downtime is minimal (zero breakdowns), and maintenance costs are all considered and optimised, from commissioning onwards.

Early Product Management aims to shorten development lead times, with teams working on simultaneous activities so that vertical start up can be achieved with zero quality loss (zero defects).

What are the benefits of the Pillar?

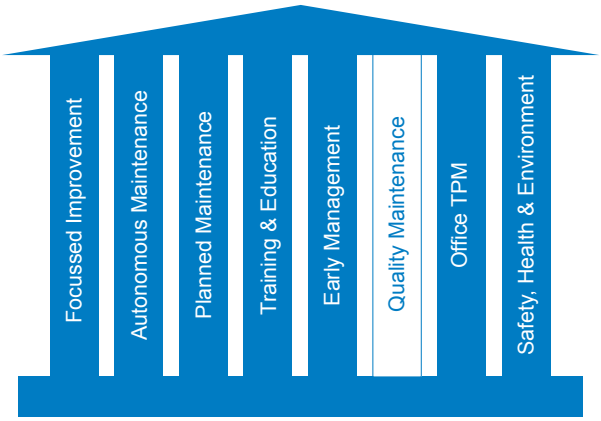
Effective Early Management implementation will deliver reduced product and process introduction lead times, improved Overall Equipment Effectiveness and the ability to deliver in volume at the right quality from production start-up. Cost savings will be delivered both during the introduction phase and throughout the equipment or product life cycle.

You can find out more about Early Management and its implementation by visiting the free Industry Forum TPM Forums at www.industryforum.co.uk/forum

Quality Maintenance

What is Quality Maintenance?

Quality Maintenance is the sixth pillar of TPM and aims to assure zero defect conditions. It does this by understanding and controlling the process interactions between manpower, material, machines and methods that could enable defects to occur. The key is to prevent defects from being produced in the first place, rather than installing rigorous inspection systems to detect the defect after it has been produced.



How is the Pillar implemented?

Quality Maintenance is launched later in the overall TPM deployment process because certain conditions must be in place for it to be successful. These conditions are delivered by full implementation of the first four pillars. Forced deterioration must be abolished, process problems must be eliminated and any variation in materials must be under control. Operators and maintenance must have the required capability to sustain equipment conditions.

Quality Maintenance is implemented in two phases. The first phase aims to eliminate quality issues by analysing the defects, so that optimum conditions can be defined that prevent defects occurring. Then, the current state is investigated and improvements are implemented. The second phase ensures that quality is sustained, by standardising the parameters and methods to achieve a zero defect system.

What are the benefits of the Pillar?

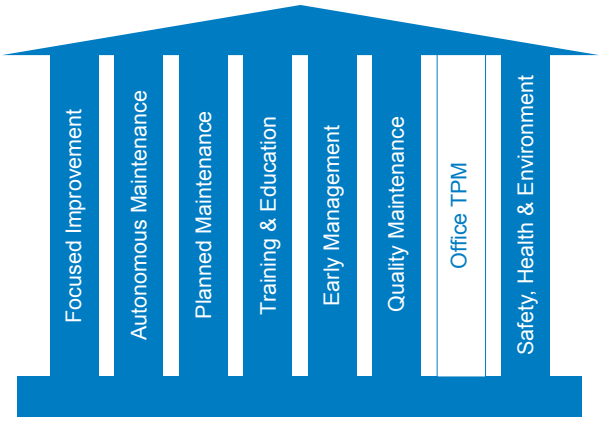
Quality Maintenance reduces the cost of quality, as waste resulting from poor quality, rework, consumer complaints and the need for inspection are reduced. Defects become a failure of the organisation's systems, not the fault of the operator, and poor quality is no longer accepted as a normal occurrence. Everyone is responsible for maintaining optimal conditions and striving for zero defects.

You can find out more about Quality Maintenance and its implementation by visiting the free Industry Forum TPM Forums at www.industryforum.co.uk/forum

Office TPM

What is Office TPM?

Office TPM is the seventh pillar and concentrates on all areas that provide administrative and support functions in the organisation. The pillar applies the key TPM principles in eliminating waste and losses from these departments. The pillar ensures that all processes support the optimisation of manufacturing processes and that they are completed at optimal cost.



How is the Pillar implemented?

The initial preparation stage for the pillar ensures that the goals and objectives for each department are aligned to the organisation's vision and mission. There are then five key activities that the Office TPM pillar undertakes within an appropriate timeframe.

The Office TPM team implement office versions of Focussed Improvement, Autonomous Maintenance and the Training and Education pillars to establish sustainable, performing processes. They deploy a flexible staffing policy to allow departments to manage peak workloads, without overstaffing, and a prioritised improvement program, by loss analysis, against the goals and objectives set in the preparatory activity phase.

What are the benefits of the Pillar?

Office TPM benefits organisations by eliminating losses in the administrative systems across the whole organisation and into the extended supply chain. This delivers cost reductions in the organisation's overheads as well as supporting improvement and sustainability of the manufacturing process efficiency.

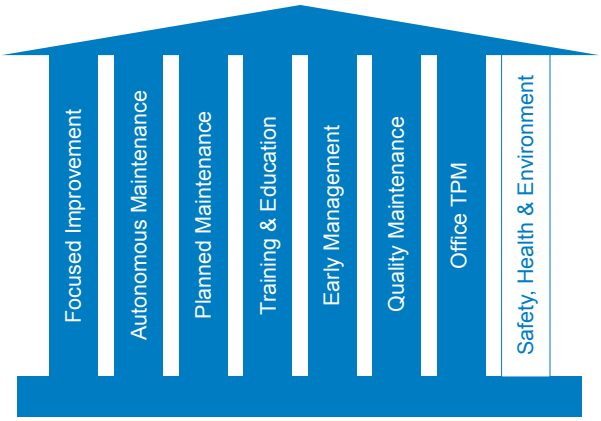
The application of Office TPM also benefits the organisation by developing support functions that react flexibility to changes in customer requirement and that ensure a strong brand image is maintained.

You can find out more about Office TPM and its implementation by visiting the free Industry Forum TPM Forums at www.industryforum.co.uk/forum

Safety, Health & Environment

What is the Safety, Health and Environment Pillar?

Safety, Health and Environment (SHE) is the final TPM pillar and implements a methodology to drive towards the achievement of zero accidents. It is important to note that this is not just safety related but covers zero accidents, zero overburden (physical and mental stress and strain on employees) and zero pollution.



How is the Pillar implemented?

Although the SHE pillar is the eighth pillar of TPM, it should not be thought of as the last to be deployed. The implementation of SHE strategies occurs throughout the TPM deployment process and SHE activities are never complete.

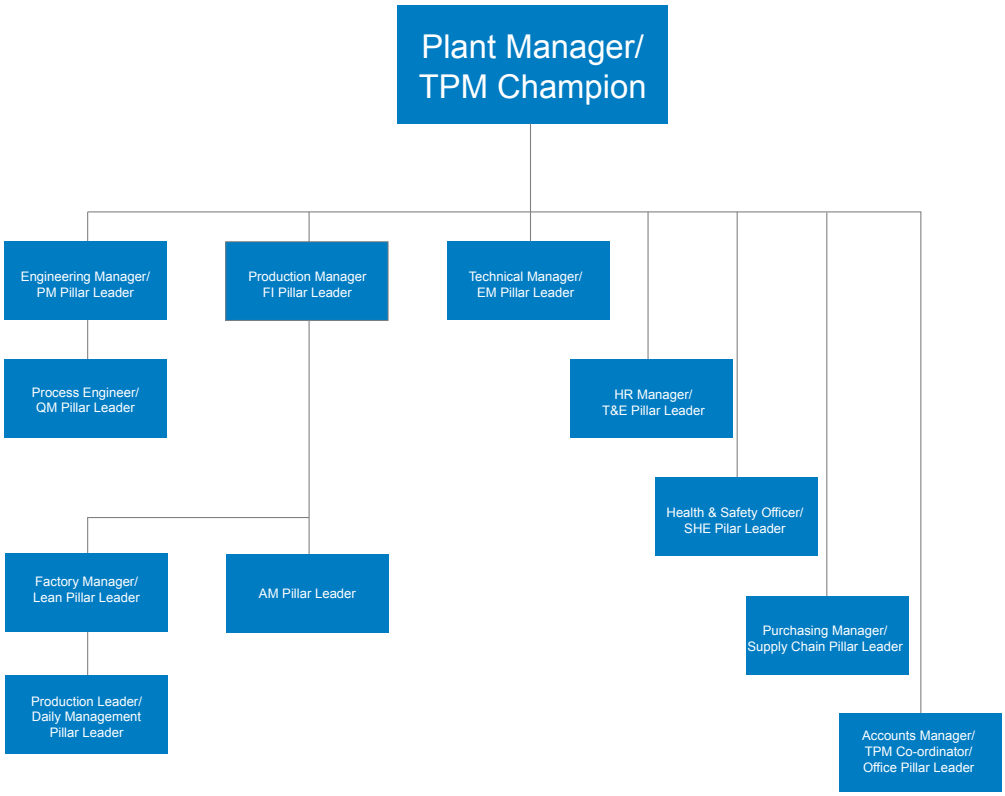
SHE pillar activities aim to reactively eliminate the root causes of incidents that have occurred, to prevent reoccurrence, and proactively reduce the risk of future potential incidents by targeting near misses and potential hazards. The pillar team target three key areas: people's behaviours, machine conditions and the management system. All SHE pillar activities should be aligned to relevant external quality standards and certifications.

What are the benefits of the Pillar?

The immediate benefits of implementing the SHE pillar are to prevent reoccurrence of lost time accidents and reduce the number of minor accidents as well as preventing environmental system failure. This has a direct financial saving in the cost of containment, investigation and compensation as well as reputational impact.

You can find out more about Safety, Health and Environment and its implementation by visiting the free Industry Forum TPM Forums at www.industryforum.co.uk/forum

Reducing costs through the application of Total Productive Maintenance



Background

This electrical component provider produces and delivers key electrical components to a wide number of customers. The products go into two main categories and the manufacturing and supply chain process is developed to ensure this. These products are widely used in street lighting, in greenhouses and the lighting of buildings such as shops, showrooms, hotels and public spaces.

Both categories of product have a high output but are also energy efficient. The first category product uses half of the energy of other similar designed components typically used and the second category product is an energy efficient replacement for modern automotive electrical components.

The provider currently uses injection moulding, a technique which is already widely used in plastics, to create the intricate shaped ceramic components.

Energy efficiency has become an important issue and global demand has risen for these products. This in turn has led to rising demand for the electrical components.

The Challenge

The factory has been using Lean improvement techniques to improve the productivity, delivery and quality of the factory for several years but they recognised the need to reduce costs even further to ensure that they remained competitive against emerging market competition.

The Objectives

The introduction of TPM was seen as a long term solution for the company which would allow the losses within the business to be identified and eliminated. This would allow them to achieve a production cost for a typical electrical component, a reduction of over 60% within a 4 year period.

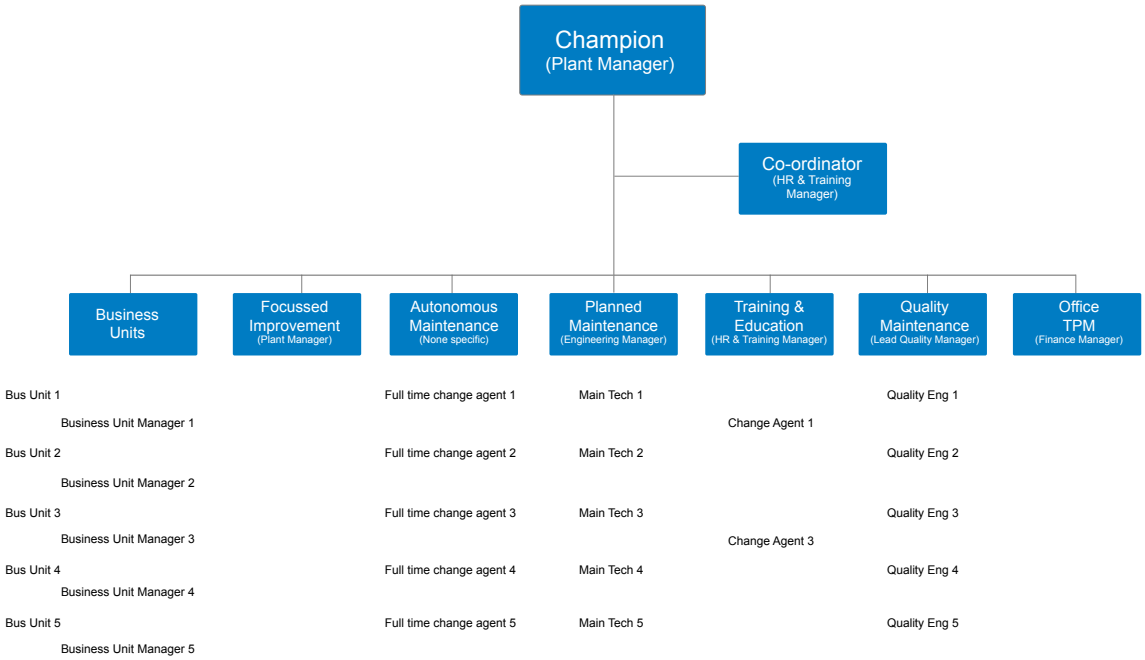
The Industry Forum Solution

In 2010 Industry Forum and the factory conducted initial management training and a pilot TPM project, focussed primarily around Autonomous and Planned Maintenance on the front and mid end process. Following on from this a decision was taken by the Senior Leadership Team to use the Japan Institute of Plant Maintenance (JIPM) Total Productive Maintenance Award as a structure to drive sustainable business improvement within the organisation.

During early 2011, further TPM Pillar training was conducted with members of the leadership team, followed by a road map activity to help establish a TPM Pillar structure and align it to the vision and Ssrategy of the factory. This improvement structure includes the standard 8 TPM pillars that are assessed by JIPM together with 2 additional specific pillars: Lean and Supply Chain.

Activities to support the introduction and sustainability of TPM within the factory were conducted throughout the following 3 years. Periodic assessments against the JIPM Award criteria have shown that the team is on track to be to apply for the first level TPM Award in 2014.

The team already have examples of zero breakdown equipment and zero accidents, operators have ownership for their areas and OEE, delivery and quality has improved across all areas of the factory.



Background

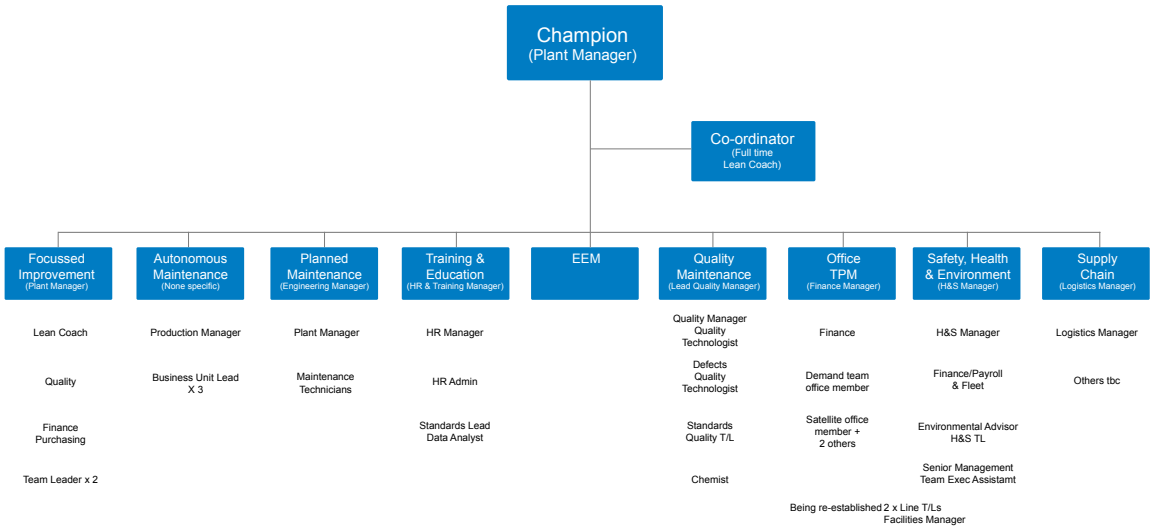
This well recognised foods producer started their TPM journey in 2010. They had done some good work but their factory was spread over a large area in individual business units. Change Agent roles were in place but reporting to a central steering group meant that business unit leaders were not seeing it as core to their role. There was a noticeable lack of the activities linking back to the site's strategy.

The Challenge

There was a belief in the TPM programme to carry out the activity and an acknowledgement that the benefits would be reflected in the company culture. However, there was no link with the strategy and delivery of the business plan which meant that deployment was, at best, random and unconnected. In 2012 there were major new workload and new equipment initiatives which led to the Management Team's focus being taken away with the Change Agents struggling to keep realistic momentum.

The Industry Forum Solution

The factory has been restructured and a driven business unit TPM Team has been established so that each business unit manager needs to decide what activities need to be delivered to meet their business unit objectives. It is not insisted that TPM is the way by which it is done, however now the links have become clear they must consider how else will they meet their targets. This now gives a matrix structure – site steering group, business unit steering group and then pillar teams with site steering group pillar lead and then the pillar representative in each unit. Activities are now linked to the strategy in a top down structure, giving a much clearer focus and enabling an environment for Change Agents to make change happen.



Background

This client started their TPM journey in 2009 with the implementation of some initial pillars but they were independent and were not working collectively or collaboratively. Completion between the pillars meant that standards were often imposed and not collectively agreed or developed. All pillars were launched together and critically they were not related or linked to the business or its strategy so they did not have a clear purpose. Measures were so numerous that it became impossible to understand and rationalise as they were all activity based. This resulted in quantity driven results and not quality driven results.

The Challenge

A corporate structure was in place but it existed primarily as a result of auditing processes and it was not directly linked with the factories. This meant that shaping of the programme was variable and each factory was reinventing what had been learnt elsewhere in the business. Internal reviews recognised that the approach was not sustainable and now the maxim of “if it doesn’t support the strategy then don’t do it”.

The Industry Forum Solution

The 2013 key management indicators objectives have been divided amongst the pillars and can then use loss analysis to identify activities and show a clear link back to the business objectives. The bottom up approach is now also being driven following some line management restructuring which enables the approach of daily management upwards, pillar strategy downwards and a meeting in the middle to complete tactical activities. There has been however, some significant improvement following the initial uncertainties mainly due to a change in the management team and an effort to direct the programme with more focus towards deliberate activities. A key decision by the management team to enable the pillar teams to focus on the priorities that will drive the business delivery has brought about a new dynamism and energy in the TPM deployment.

Global TPM Transformation Deployment

Background

This global manufacturer processes minerals to produce great volumes of product used all over the world supplying high specification material to the automotive, marine, energy and renewables sectors. A vital factor to stay ahead of the competition is to maximise the return on capital associated with over twenty factories spread across all regions of the globe. Key to their success is the reliability and maintainability of the equipment as well as the commitment and motivation of its workforce.

The Challenge

The processing equipment operates in a high temperature and highly abrasive environment, so reliability and resilience is a key differentiator. There were additional challenges due to a range of technologies across the globe and also huge cultural differences, rates of acceptance and uptake by the workforce.

The Objective

The clear need was to develop a programme that maximised the performance and life of the equipment. It was recognised that this would need an approach that involved not only the equipment designers and maintainers but the whole organisation within plants and also to have consistent application across the regions.

To meet this end a Total Productive Maintenance approach was deployed in line with the JIPM model for a proven effective implementation.

The Industry Forum Solution

Phase 1

In 2010 an approach was designed to develop pilot improvement areas in a well-considered and selection of pilot factories in just one of the regions. The model followed the JIPM approach with an initial assessment and awareness of TPM for the leadership teams, followed by the development of a master plan. This focussed on the first four pillars of Focussed Improvement, Autonomous Maintenance, Planned Maintenance and Training and Education. Pilot areas of equipment were selected on a chosen criteria based on chronic need, the opportunity to engage and learn, and also whether or not they could be completed in an appropriate time frame.

Phase 2

Following the evaluation of the Phase 1 findings and the initial success of this phase the approach was expanded to engage all regions in similar programmes following the same approach. As the network grew there were additional work streams to develop Pillar specific expertise and knowledge sharing. At the same time the original pilot plants continued their deployment to include more areas, engage more people and learned how to implement the advance pillars.

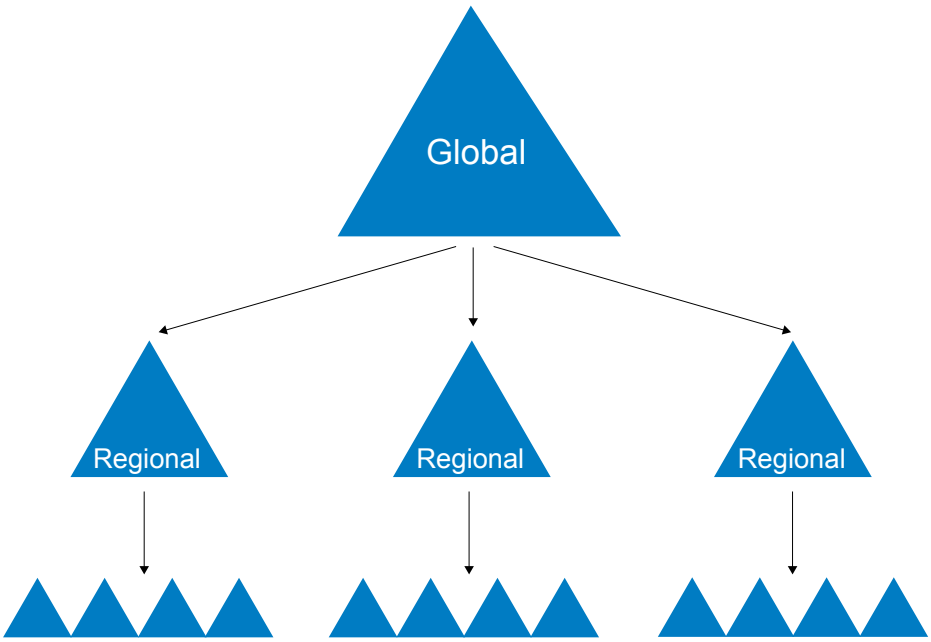
Phase 3

As the factories and regions developed traction the programme moved into a third phase where certain global strategic imperatives were pursued to move faster and deeper on areas of global concern. This included a series of technical and process areas that were of concern. Here a selected plant would develop the solution using Focussed Improvement, then deploy across other plants and regions.

Also in this phase other global pillars were launched on additional global projects, these included Finance, Supply Chain and the building of new and refurbished factories around the world.

The programme continues to develop and gain increased momentum, engaging more people and depth of application. Leadership now identify with TPM as “the way we run our business”.

After three years of deployment the return on investment is over 4:1, and the initial first leading factories are getting ready for the first TPM award from JIPM.



Total Productive Maintenance
Practical Examples

Function Analysis

Force Resistance

TPM Practical Workshop

Process Variation

Understanding Defects

Smart ‘Set Ups’

Total Productive Maintenance Seminars & Workshops

Industry Forum offers a series of TPM seminars where the concept is to both share our knowledge of TPM and to develop networks of people and organisations that will share and further develop collectively their approaches. The agendas and discussion topics are:

- What is TPM?
- How does TPM fit with other improvement initiatives?
- The pillars of TPM
- Case study
- The TPM deployment approach
- The TPM Excellence Awards

The seminars are designed to allow attendees to contribute, ask questions, pose ideas and share as much as possible their experiences and challenges.

Industry Forum also offers a series of TPM workshops which have been developed to deliver not only the theory but the practical application of the methodology also. Materials have been developed and designed to meet the needs of a wide variety of learning styles and are delivered by our experienced trainers who understand how to both break down information and ensure that people in the room are following the learning curve needed. Courses offered are:

- Focussed Improvement
- Autonomous Maintenance
- Planned Maintenance
- Training & Education
- Early Management
- Quality Maintenance
- Office TPM
- Safety, Health & Environment

Total Productive Maintenance Courses

Industry Forum offers a range of courses to cover the full scope of the JIPM approach to TPM.

Introduction to TPM

This 1 day course gives an introduction to the concepts and methods that lie behind TPM. Using the tried and tested JIPM approach, delegates will learn that TPM is much more than a maintenance technique and how it can become an organisation-wide improvement programme.

TPM Foundation – Practical Application of TPM Pillars

This 4 day practical activity takes a progressive approach to applying TPM in a manufacturing environment. Building on the basic concepts at the heart of TPM the course gives a clear understanding of how TPM can develop into a company-wide Improvement programme.

2 Day 'Pillar' Courses

- Focussed Improvement
- Autonomous Maintenance
- Planned Maintenance
- Training & Education
- Early Management
- Quality Maintenance
- Office TPM
- Safety, Health & Environment

These 2 day courses are designed for people looking to increase their understanding of Focussed Improvement, to share best practice and learn how to develop a standardised approach to support the roll out of the pillar(s) within their business.

The course content includes "hands on" practical group activities and is interactive in nature with time allowed for in-depth situation-specific questions and answers.

The courses are delivered by SMMT Industry Forum expert practitioners with direct experience of Total Productive Maintenance.

To enquire about any of our courses please email courses@industryforum.co.uk or visit the Industry Forum website www.industryforum.co.uk/learning-development/courses/

Glossary Of Terms

TPM:
Total Productive Maintenance.

4 M Condition:
Ensuring product is manufactured under optimum conditions for the machine, material, method and man.

Makigami Analysis:
Makigami Analysis is a method of concentrating on business processes and seeks to improve process efficiency by eliminating waste in the process.

Mean Time Between Failures (MTBF):
MTBF is a measure of equipment reliability and a glide path to zero breakdowns.

Mean Time To Repair (MTTR):
MTTR is a measure of the ease of repair of equipment and the efficiency of our maintenance labour.

OEE (Overall Equipment Effectiveness):
OEE is a performance metric compiled from three data sources of the machine (or process) being measured. The three data sources are Availability, Performance and Quality.

- **Availability** - Compares the actual time a piece of equipment is actually available to produce parts in comparison to the planned available time.
- **Performance** - Compares the actual amount of product processed relative to the maximum amount that could be processed within the available production time.
- **Quality** - The proportion of the product from a process that is right first time with no scrap, rework or concession to accept outside process tolerances.

PM Analysis:
PM Analysis is an advanced problem solving tool that focuses on understanding the Phenomenon (P) and the Mechanism (M) of a defect or failure.

Condition Based Maintenance:
A Condition Based Maintenance approach looks to understand the current condition of components and how close to failure those components are to determine when physical maintenance should take place. Non-invasive techniques such as thermography, vibration analysis or lubricant analysis are used to measure parameters that directly indicate the level of wear.

Maintenance Prevention (MP):
This term means designing and building equipment that is excellent in reliability, maintainability and economy from the outset.

Time Based Maintenance:
A Time Based Maintenance approach triggers the maintenance of components at a set frequency defined by component history and is managed using a maintenance calendar. The calendar is updated as improvements are made and maintenance data increases.

Notes

.

SMMT Industry Forum Ltd,
2680 Kings Court, The Crescent,
Birmingham Business Park
Birmingham, UK B37 7YE

T +44(0)121 717 6600
E enquiries@industryforum.co.uk
W ww.industryforum.co.uk