Phil Tugwell, an Associate Director with MCP Consulting & Training, describes how Total Productive Maintenance is transforming the maintenance operations within an international pharmaceutical organization. Phil is the lead consultant on the organisation’s programme of increasing operational excellence.

From a quiet debut last year, the Total Productive Maintenance program (TPM) is now showing — clearly and loudly — its first contributions to the organisation’s operational excellence journey. TPM clearly exemplifies that in order to pursue the ‘company’s philosophy’, it was necessary first to challenge everything they do in their working environment. TPM does exactly that and much more.

Since its introduction in the early 1950s in Japan, TPM has gradually conquered the world as a tool to help companies maximize equipment productivity during its entire life cycle. But contrary to what most think, TPM is not only about equipment reliability, it is, more importantly, about people.

The pharmaceutical organisation’s TPM program not only focuses on increasing availability of equipment and reducing machine breakdown. It goes one step further by working towards the implementation of structured reliability techniques and the use of planning tools to ensure that at least 80% of maintenance work is planned in advance, thus ensuring that equipment and resources are available and that the correct spare parts are in place. It currently has fourteen work streams and each production site is in charge of developing its own asset care strategy document.

As an integral part of its continuous improvement pillar, phase 1 of the program launched the SS (sorting, straightening, systematic cleaning, standardising, and sustaining) methodology. The reason for this is that, although as hard as it seems, making problems visible is truly the first step towards improvement. If your work place is disorganised, cleaning and organising it helps the team to uncover problems.

A CATALYST TO INSPIRE A NEW MINDSET FOCUSED ON CONTINUOUS IMPROVEMENT

The Engineering Manager and TPM Co-ordinator makes the point; “As we implement SS, we do not emphasize mistakes – on the contrary, we emphasize improvements in a positive way. One of the basics is to look around, to observe and to think what we can do better. It is a chase against waste: waste of time, waste of resources. It is an opportunity to take charge and be proactive.”

What made a difference is that from the start the TPM initiative received support from the leadership team. The whole production team actively participated into the initiative and the pilot was successfully implemented on a packaging line.

TPM’S ANALYTICAL TOOLS SHED NEW LIGHT ON HOW EQUIPMENT SHOULD BE CARED FOR

The group has recently successfully concluded three major failure mode and effect criticality analysis (FMECA) studies at one of its manufacturing sites. The FMECA studies were applied to the equipment and plant in order to identify the possible ways in which failure can occur, the corresponding causes and effects of failure and the consequent impact on the site. When used in conjunction with root cause analysis, as well as other techniques, it provides the basis for designing out potential failure modes.

“At this site we have seven TPM work streams which are linked to the three major TPM pillars. When I joined the team early this year,” comments the TPM Co-ordinator, “My first real task was to understand TPM’s new concepts. Although I was a maintenance expert, TPM’s methodology has showed me several new concepts which I think make lots of sense. He continued, “Once we had a solid understanding of TPM’s basics, we started to apply them in three manufacturing areas, together with the head of manufacturing, the technicians and operators.”

From the start the task involved not only TPM co-ordinators but also technicians and operators who knew and understood the equipment well. MCP performed an asset criticality analysis with input from the
manufacturing area head and the site management team, in order to define which equipment was to be considered the most critical in the building.

The analysis also took into consideration new criteria such as output, hours of use, reliability, etc. The result of the analysis shed new light into how equipment should be cared for.

Once the critical equipment was selected then a FMECA analysis was performed with the goal of eliminating all risks involving the selected equipment. At this stage, new standard operating procedures (SOPs) were issued in addition to the site’s asset care strategy document.

The FMECA studies highlighted more than 40 units of equipment within three manufacturing areas. Among them, the centrifugation, bioreactor for cell culture and the water for injection systems (WFI) were considered the most important ones in terms of risk.

One of the advantages that TPM brings is that the results obtained for one site can be leveraged across all similar sites. For example, the FMECA results will benefit other plants in the near future, particularly when the US biopharmaceutical production site starts its own implementation. In this way, experiences and knowledge are shared and time can be saved.

“There is still a lot of work to be done in planned maintenance, but I think we did achieve a small victory by establishing the use of the SAP system to schedule work orders consistently in our manufacturing sites. Before, this was done only on paper. Having this data input into a system will allow us to use it to analyse trends, recognize patterns and therefore improve our planning activities,” reports the company’s TPM champion. “One initiative that TPM is largely contributing is to support the harmonization of the SAP plant maintenance (PM) system across all the sites. Currently, some sites do not have it or if they do, the system is used in different ways,” he added.

AMIS assessments (Asset Management Information Service) are conducted periodically by MCP at the sites currently being implemented. The global and local teams as well as the manufacturing area heads are involved in the exercise. The assessments focus on eight areas: general maintenance, organization, work planning, cost management, productivity and effectiveness, materials management, failure analysis and training and safety. As part of the feedback, each site receives a score.

The program has well defined milestones and is divided into two phases. Several sites have progress to report, such as the recent successful completion of the second AMIS audit at the group’s chemical production site in the UK. A major production building at this site achieved a score of 51, which clearly reflects real progress since the first assessment was conducted early in 2010, when the score recorded was 36.

Of special interest are the second AMIS assessment reports as they clearly highlight in detail how much a site has improved within the eight categories in comparison with the first assessment. Each report provides a clear indication of the areas a site has improved on. For example, during this year, at one of the group’s pharmaceutical production sites in Spain, 100% of the spares now have a criticality classification, a FMECA analysis was successfully concluded, skills gap analysis is now available for the operators and maintenance team, SAP-PM data is now more accurate and engineering downtime is used as a KPI, as well as a contribution to overall asset effectiveness (OAE). Moreover, autonomous maintenance was successfully implemented for pilot lines.

AS A FOUNDATION ELEMENT OF OPERATIONAL EXCELLENCE, TPM ENSURES THAT THE COMPANY’S ASSETS OPERATE AT THEIR BEST

Since the program started last year, the global TPM team has gradually been introducing and implementing it across several sites. They are now working hard to bring other sites on board, including two pharmaceutical production sites in the Far East.

More than a program, TPM is an ongoing process. “To change mind set and processes takes time”, reports the TPM programme manager. One of the biggest challenges we face is resources and the fact that in some sites TPM runs largely on volunteers, who commit their time, experience and know-how to the implementation. Probably one of TPM’s most noticeable achievements so far is the fact that the program is now firmly established as an important part of the company’s operational excellence program. As the implementation progresses with more sites completing their assessments, succeeding the audits and sustaining the TPM principles, I am confident that we will soon have more examples from other manufacturing sites to show how TPM contributes to our operational excellence journey, quality and safety”.

Total Productive Maintenance is a fundamental element of operational excellence as it ensures that assets operate at their best. OAE has always been a key measure since the implementation of lean, but the organisation has now addressed it systematically through their comprehensive TPM program. “The team is doing a tremendous job at implementing it across all sites and customizing it to local needs to gain the most benefits. I am very pleased with the momentum TPM has gained across the company as it is seen as adding real value to our operational performance,” concludes the Head of Engineering and Operational Excellence.