

RSA Reliability Newsletters on TPM



2007 – 2009 RSA Reliability Newsletters on TPM

- **RSA November 2007 Issue: Why TPM is hard to implement?**
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RSA November 2007 Issue : Why TPM is hard to implement?

Spending at least 7 years as a TPM Senior Engineer in one of the biggest semiconductor industries in our country provided me some insight and indebt understanding as to why TPM (Total Productive Maintenance) is not easy as you think to implement. Many books had been published on TPM with industries reaping its rewards and having a dramatic increase in their productivity, decrease in defects and breakdowns and not to mention the reduction in their operating and maintenance cost, but on the other side, many industries initiating a TPM journey in their plant had miserably failed and abandoned the process completely. I truly believe in the TPM process without a doubt, but TPM can only be successful if you know how to implement it correctly. Hence, before embarking on initiating a TPM Strategy, take note of the following because if these factors are not taken seriously, then all TPM efforts are doomed to fail in your industry. Therefore, for those plants initiating a TPM strategy in your plant, I believe this newsletter would be worth your reading.

1st : TPM is a Top-Down Approach

TPM is a Top-down approach and never a Down-up approach. TPM should be initiated by the highest member of the company which is a CEO, General Manager or President. As noted from TPM's Twelve Developmental Steps, a formal announcement from the Top should help get your TPM started.

2nd : TPM requires an Office and not a Facilitator

TPM requires a full time staff and not a part time facilitator. Assigning one person to handle TPM would surely lead you to its doomsday and downfall. As to how many people will be staffed in the TPM Office will depend upon the size of the plant. Just to give you an idea, the plant I've worked for have around 6,000 employees, and 8 of us belong to the TPM Office and each one of us directly reports to the TPM Manager, I was assigned to carry on the pillar of Planned Maintenance and Early Equipment Management. TPM Office will provide the details and legwork on how each of the pillar is being implemented, initial audits and certifications per step and phase training on their respective pillars, team recognition and most importantly consolidating the work of every single pillar. Remember TPM requires everybody's involvement and all employees of the plant will have a specific pillar to attend to.

3rd : TPM is a long term approach not short term

Operations and maintenance want everything fast therefore they result to quick fix solution in which eventually will resurface again in the near future. Management must understand that TPM is a long term and not a short term approach. Benefits will be realized first on a small scale which will eventually and gradually be felt on other areas of the plant. There is no short cut to this process. TPM is being implemented on a Step by Step approach.

4rth : TPM will require a Budget

The most difficult part in the TPM implementation would be the Preparatory Stage or Start-up as most management are sensitive to the issue on cost. TPM is costly in the initial stages of

implementation and believe me when I tell you. Some of the expenses in the initial TPM stages will include training and educating all employees on TPM and their respective pillars. Initial cleaning by Autonomous Maintenance in which the teams try to correct abnormalities in their equipment and restoration activities for Planned Maintenance since the aim of TPM will be to bring back the equipment as close as possible to its original basic condition.

5th : TPM and company goals must be aligned

This is one of the most important aspects of any TPM implementation that is mostly overlooked. Both TPM and Company goals must be aligned, it cannot be different. Otherwise TPM will be seen as a separate activity and not as a plant directive. This will include the indices and KPI's being tracked down to viewed the company's progress. OEE or Overall Equipment Effectiveness should be part of the company's primary measures.

6th : TPM is heavy on documentation

What is being done should be documented in the TPM process. Documents should be placed on Activity Boards and not on binders and folders so that everyone not yet involved in the TPM journey can see the benefits and results of TPM implementation. The activity boards should be updated regularly by the team involved in the TPM activity.

7th : Managers Model Machine for Managers

Managers must be involved and must have their share of responsibility in the TPM Process and most especially they should be part of a team. This will be an initial requirement for any industry aiming for TPM Certification and therefore essential to the success of any TPM implementation. Part of their role is to see to it that their pillar is moving and advancing to the next step. Remember that each TPM pillar is performed on a step by step approach and there are not shortcuts to it.

8th : AM must be done in parallel with PM

Although Autonomous Maintenance (AM) would be the largest pillar in terms of population on the number of people involved. Planned Maintenance (PM) should be and must be the strongest pillar in any TPM implementation. The equipment is always a shared responsibility for both operations and maintenance together. One of Planned Maintenance utmost responsibility will be to educate the operators on their equipment, as operators learn to accept some minor responsibilities in their equipments such as doing the basics which are maintaining the equipment clean, proper lubrication and tightening of bolts, these things can only be appreciated by operators with the aid of Planned Maintenance as their mentors. If Planned Maintenance Structure is weak so will be its Autonomous Maintenance. Planned Maintenance should serve as the Autonomous Maintenance coaches and mentors in their equipments. On the other side, maintenance can only advance to other maintenance activities and get out from the reactive mode of firefighting if Autonomous Maintenance will take part in their shared responsibility on their equipment.

9th : Management Commitment and not Support

Management can support and never commit to any TPM activities. In TPM what we need are Managers who can provide commitment and be part of the process. This is a very important lesson in TPM. These two words are entirely different “Support and Commitment”. Remember that TPM must be done not as a separate activity but rather management must realize that their day to day activities must be part of the TPM process. TPM is not a once a week meeting or activity but rather a continuous process.

10th : TPM is all about people and not machines

Most industries that implement TPM think that it is all about improving equipment yet little regard is being provided in educating its workforce. Many say that people are the company's greatest asset. I hate to disagree with this statement because I think that the right people are an industry's greatest asset. And how can we have the right people? Only if they are equip with the right knowledge to perform their jobs correctly. People will improve their equipments and it is not the other way around. Hence, people must continuously be educated and their knowledge upgraded.

11th : OEE is the impact of all TPM Pillars combined

Having a high OEE is not a product of only one pillar but rather is the consolidated effort of all pillars involved. Improving OEE means improving the six major equipment losses and all pillars will have their corresponding role in improving them. Below is the six major equipment losses and the pillar that will impact them most.

Breakdown Losses by Planned Maintenance, Set-up, Adjustment and Conversion by Focused Improvement and Planned Maintenance Pillar / Start-Up Losses by Planned Maintenance and Early Equipment Management (Initial Flow Control Activities) / Idling and Minor Stoppages (chokotei) by Autonomous Maintenance, Focused Improvement and Planned Maintenance / Design Speed Loss by Focused Improvement Pillar / Defects and Rework Loss by Focused Improvement and Quality Maintenance Pillar

12th : TPM is not culture bound

Although TPM originated from the east “Japanese”, it will work on any industry since it is not bounded by culture and beliefs. Japanese have a certain way of doing things, and what is important is not to imitate them but rather to be flexible and transparent in adopting TPM to our own culture.

I would like to dedicate this newsletter to my former TPM team in which some of them I am still in contact with and some I don't. Having been asked several times by industries to work with them and initiate a TPM journey which I decline would only be possible should I be working with the same team and to my former TPM team, wherever you are, it was an honor and privileged working with you.

RSA April 2008 Issue : My TPM Experience, A Successful Failure

As Tom Hanks said, in his role on the movie "Apollo 13", Our mission was a successful failure, successful that we return safely to the earth but failure since we never landed on the moon. I think and feel the same way, spending 7 years in TPM was quite frustrating, yet very rewarding. This is where I truly learn what TPM is all about and it is all about people and not machines. The real challenge is making it a way of life for all people and a part of their culture. In view of the sensitivity of this newsletter, I'll just call this company Company Bravo.

In 1995, I worked in Company Bravo as a production supervisor for 3 months, until I was transferred to one department, we call the TPM Office. It was a newly established department in the organization. There were 6 of us, which includes the TPM Manager, her secretary and 4 engineers, me included. The three engineers were assigned on the following pillars, one engineer handling Autonomous Maintenance, another handling Office and Administrative TPM, the other engineer handling Planned Maintenance. Since, I was new at this plant, I was assigned to be an assistant to all of them, Rolly, can you Xerox this 10 copies please, and can you call this entire people for a meeting and all sort of this and that.

Since, all of us were ignorant on what TPM is all about and how to go about each step, my TPM Boss decided to purchase several books on TPM which was divided among the engineers and we spend our days reading. In the afternoon, there was always a brainstorming session which lasted for hours on how to go about each of the TPM Pillars. I was always at the back listening to them and sometimes was called upon to ask my point of view, I think that is were I was allowed to speak up.

Six months had passed and a sad thing happened. The Planned Maintenance engineer died of cancer, and so a replacement was to be in place, until one morning, my TPM Boss called me to his office and told me, Rolly, I want you to handle Planned Maintenance; there is no other person I can think off and see fit to handle this than you. From now on you will handle Planned Maintenance and these are the people in the maintenance department you need to see. My expression was overwhelming, Wow, simply Wow, was my reaction that was the only motivation I have from my boss, yet until now, I can remember his words vividly in my mind. I guess, as we grow old there are things worth remembering even if we forget a lot of things.

And so this is how I started in TPM. Since, changes in this organization were abrupt, I think, I recall, serving with at least 5 TPM boss, they were replaced all the time. My last boss was formerly the training department manager and was transferred to the TPM Office. Later on our TPM efforts were focused on 2 plants, the other plant was 3 to 4 times larger with respect to the number of people. Our office was now serving at least around 8,000 people from the 2 plants. Two people were added into the office to take care of it. Our TPM Office staff was now 8 including the secretary. This time, I was also asked to handle the EEM or Early Equipment Management pillar of TPM and partly Focused Improvement.

TPM days were tough; you need to push people and remind them "Always" of the journey to excellence. Work along with the other pillars as well such as Autonomous Maintenance and Focused Improvement and later on Early Equipment Management. Our mission was how to get our pillars moving and get the people on doing TPM. Our CEO was committed with TPM, and

appreciates the reports and progress the different pillars of TPM are experiencing.



Planned Maintenance Committee 1998,
myself seated third from left



Planned Maintenance Committee 2001,
myself extreme right

Through the years in our Planned Maintenance journey, we held yearly strategic planning, we have recognitions and rewards to teams that performed well, and we even have in-house symposiums exclusively for the maintenance people for sharing their improvement which was in the form of competition. It was really a lot of work for me but the rewards and fruits are beyond expectation, it was such a success.

Moral was very high with the Planned Maintenance team, in fact all members meet weekly to discuss each and everyone's progress, which they report to me and I summarize. We have the highest attendance record compared to the rest of the TPM Pillars at 92%. Each member knows what he will be missing if he was not present and each of them know that it's a mortal sin to be absent on the planned maintenance meeting. No one was late; simply because of one simple rule on tardiness, I impose where last person to enter the door will have to pay all the bills on the snack. Each of these people represents their department, most were senior engineers, others are managers and it opened doors and lines of communication on each other. There were quite a number of times during the meeting where they share their people resources since they are not fully loaded in their operations and even spares. Through these meetings we learn several spare parts which are the same in specs, used by the same equipment but different part number, since we have a lot of common equipments on every operations department. Bottom line we learn so much by keeping our lines of communication open, I guess this was one of the reasons why they attend the meetings plus the food of course.

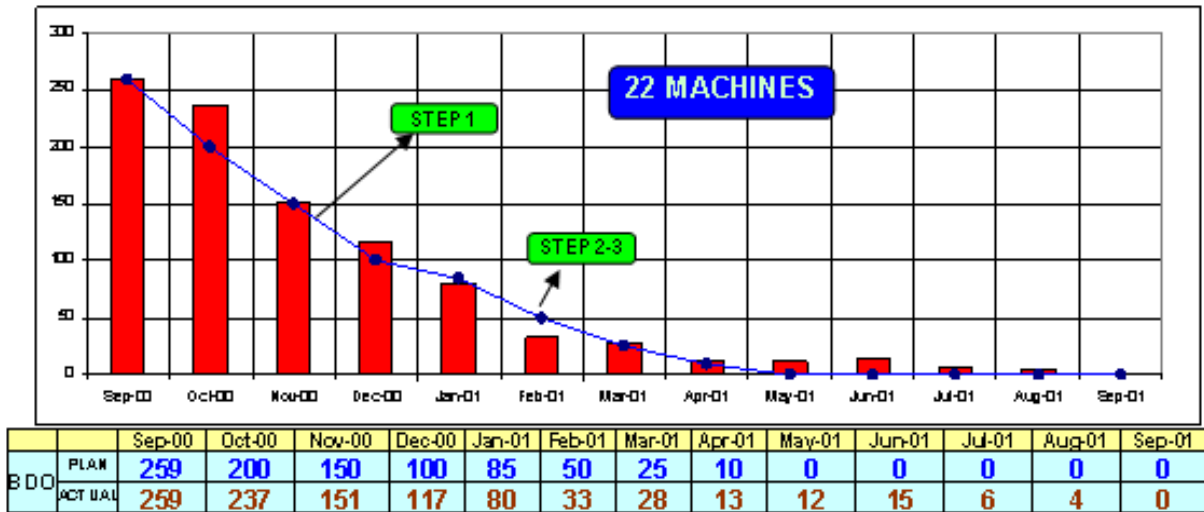
By the year 2000, we decided to challenge the JIPM Awards for TPM Excellence Awards, 2nd category and our dream to be the 2nd industry from our country to attain it. We hire a JIPM consultant and an interpreter since the consultant can hardly speak English. The JIPM Consultant comes in every quarter spending around 2 days on line tours and details on what we need to accomplish which he wanted to see on his next visit.

There was so much pressure on the TPM Office since everyone now is doing TPM, I thought previously that the pressure is when the people are stubborn in doing TPM. Each of us (8,000) people in the plant from the 3 shifts knows that we are aiming for the TPM Awards. We at TPM Office were so busy most especially on departments which are not up to speed in their roadmap. Our CEO was excited and even called us a couple of times at the TPM lobby where all the awards, trophies and recognition of this plant are placed and show us a spot where he wanted

TPM Award trophy to be placed, and ask us, when can I see this award ? I think being in my shoes you can feel the excitement and pressure. Everyone was doing their part on TPM. It was a dream comes true, we have change people. Scores of improvements were evident not only on my pillar but on each TPM Pillar, well of course, our Planned Maintenance pillar garnered the most number of improvements in a span of 4 years, with a total of 9,272 improvements and a cost savings of Php 5,787,369.72 not to mention the dramatic reduction in our repairs and maintenance costs and the excluding the savings our Predictive Maintenance group had initiated. MTBF improve and the number of breakdowns reduced dramatically. (This was our actual graph where BDO stands for Breakdown Occurrences or Number of breakdowns on their equipments)

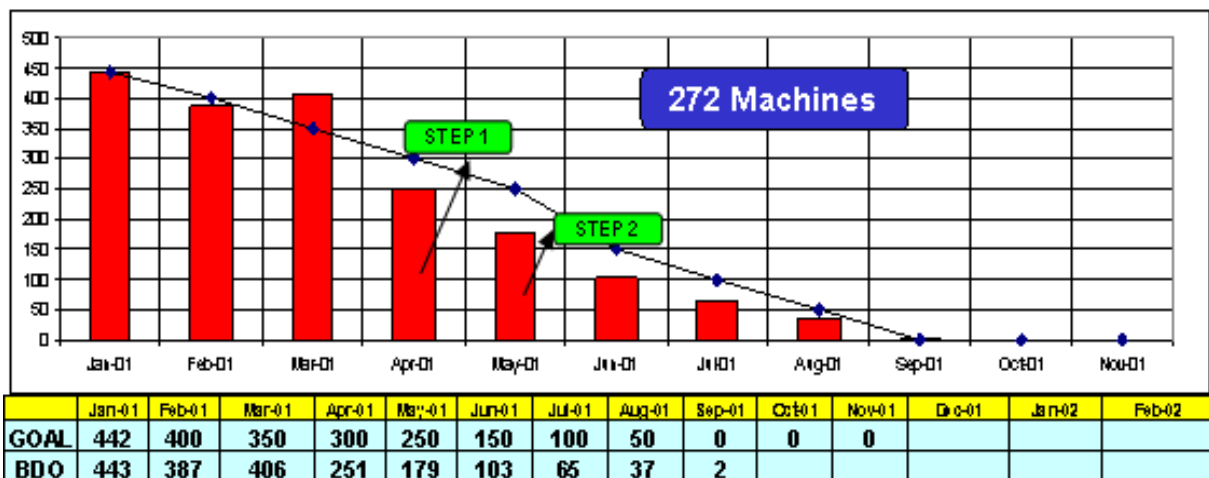
1st PILOT BDO TRENDING FOR PM PILOT MACHINES

Sa Planned Maintenance. Saang Mungon. Saang Disabogon pa rin



PM 1ST FAN-OUT MACHINE BDO TRACKING

Sa Planned Maintenance. Saang Mungon. Saang Disabogon pa rin



The last visit of our consultant was in 2001, as far as I can recall it was the 2nd quarter of 2001. At the end of every visit, he would have a meeting with all TPM Pillars and members in a big room to assess his results. He would talk about his findings on every pillar and when it was time to

discuss the Planned Maintenance pillar, he simply put his two hands and made a sign of 2 thumbs up. Planned Maintenance very good. I believe that was his message. His last words as translated by the interpreter Company Bravo now ready for JIPM Awards, I will report this to my office and it is time for you to make the JIPM Book. There was a round of applause from all of us. It was a relief for us all at the TPM Office, after all the preparations, meetings, trainings, and all the hustle, we are ready for the awards, our JIPM Consultant was confident that we will pass the initial assessment (since there are 2 assessments needed to achieve the most coveted TPM Excellence Awards). And that was the last time, I saw the consultant. I told him that someday, I want to be like you, he said, you are good Rolly.

One day, my TPM colleagues said, have you heard the news? I said what news? Our CEO is being replaced by a new one. I thought it was not much a big deal to what we are doing but I guess I was dead wrong. One day, our boss told us that our senior VP (2nd in highest command) wanted to talk to us and asked us all in the TPM office to come to his office, and so we did. He was frank and straight to the point, and I honestly do not want to accept what I was hearing. He said that from now on TPM Office will be abolished, our new president does not believe in TPM, you are hereby given 2 options, resign or transfer to other department. I simply stand up and said, Sir, we are just a few miles from the finish line in getting the awards, lets go for it. He looked at me and said, I know, but I am just following orders. 6 of us transferred to other departments, 2 of us resign, there was tears in my eyes when I left that room, yet I said if company bravo do not want TPM then I will look for a plant that wanted TPM, simply stated, I can't let go since I've seen people change because of TPM.

News easily spread that the plant will no longer be pursuing TPM and that the TPM Office was to be abolished. My phone kept ringing verifying if the news was true and that my members are asking me if we were still going to do planned maintenance, I simply said, the big guys wanted us to drop it so let's just drop it. It was like the World Trade Center standing and in the blink of an eye, and then suddenly collapses. I feel like Nicolas Cage trapped beneath the rubbles of the World Trade Center. TPM was my life and it collapse right in my very eyes. I believe that the new president believes in more in Lean Organization and not TPM.

To cut the story short, I officially resign from this company in the 4th quarter of 2001 but we were given 3 months free where we don't have to report to work any more and still received our benefits and salary. In 2002, I ended up in a mining firm as a training manager where I develop and study further reliability best practices and certainly Lean Manufacturing is not one of them. I resigned from this company in 2005 and decided to carry on my own consulting business which up to now is still what I am currently doing.

Last February of 2005, I was acquired by company bravo and provided a contract to teach reliability courses and improvement initiatives and guess what one of the courses I teach is Planned Maintenance. I had learned that they finally realized their mistake and looking forward in accepting TPM once again. But they have to start from the beginning; this is their set-back. I also learn that only 1 person from the original TPM Office was still at this plant, while the rest had resign and are now working in other industries. I was asked a couple of times if I wanted to have my old job back at TPM and I said much willingly "YES" but only on one condition, I will only work with my old team, if you can bring them back then I will come back.

My experience with TPM is one that is worth sharing, we were successful as proven in our records that we have achieved dramatic improvements in our breakdown reduction, increase in MTBF and reduction in maintenance costs. I see people change because of the results they achieve, those who are pessimistic all the time with TPM are the once in the frontline and even preaching TPM with their people. TPM change attitudes, it changes lives. Our Planned Maintenance team moved mountains.

I failed because we did not achieve the JIPM Awards, for reasons way beyond the scope of my responsibility during those times. Yet, in my heart and mind, there will always be a place for TPM. My experience with TPM, is that it was simply a case of a successful failure.

[RSA June 2008 Issue : Comparing RCM and TPM which is the best lb for lb improvement strategy!](#)

In an attempt to compare these two World Class Improvement Strategies, I just can't help thinking how these two well know improvements fair in a boxing ring if they would fairly square it out evenly. Also, not to mention that I'm still a bit overwhelmed by the victory of our very own Manny "Pacman" Pacquiao over his latest opponent David Diaz

TPM have its origin from the east (Japan), while RCM originated from the west (UK) where its origin can be traced to the works of Stanley Nowlan and Howard Heap based on a study they had generated from the airline industry and later on adopted by the late John Moubray for use in the Nuclear Facility which later on spread to industries. I hope you don't mind me writing this newsletter in this fashion. So let me hand you over to Michael Buffer for the introduction.

Ladies and gentlemen in attendance and to the millions of fans watching, .Lets Get Ready To Rumble! Fighting for 12 rounds for the Undisputed Heavyweight Improvement Strategy of the World In the red corner from my left hailing from eastern part of the world, Seichii Nakajimaaaaaa, and his opponent from the blue corner hailing from western part in UK the great legend John Moubrayyyyyyyyyyyyyyy.



Seichi Nakajima
Father of TPM



VS



John Moubray
Developed RCM2

Round 1: How its being approach and which is easier to implement

One of main difference in approach regarding this two improvement initiatives is that TPM is always a Top down Approach and a plant wide improvement initiative while RCM can be done from the ranks or Bottom up Approach. Without management commitment and support it is very difficult for TPM to succeed. On the other hand, RCM is much easier to implement than TPM. I give this round to RCM. (RCM 10 points, TPM 9 points)

Round 2: Primary measure of performance

Although a lot of indices will be improved if any one of these two initiatives will be successfully implemented, the main indices used to measure TPM performance is OEE or Overall Equipment Effectiveness. OEE is computed by multiplying the equipment's Availability by its Performance Rate and Quality Rate. OEE address six major equipment losses encountered on the equipment mainly breakdowns, set-up and conversion, start-up losses, idling and minor stoppages, design speed loss, defect and rework losses. For RCM, the main measure of performance used is MTBF which is mostly related to equipment failures.

Although Moubray have some issues which he wrote on his book about OEE which states that: There is often a tendency to focus too heavily on primary functions when assessing maintenance effectiveness. This is a mistake because in practice trivial secondary functions embody bigger threats to the organization if they fail than secondary functions. As a result every function must be considered when setting up the maintenance effectiveness and measures. The OEE as defined above only relates to the primary functions of the asset.

What Moubray meant is that even if your OEE is high (85% for World Class Companies), and as long as availability, performance rate and quality rate is good, it does not guarantee you that the equipment is indeed reliable most specially if there are secondary functions that are in a failed state such as protective devices.

But comparing these 2 primary measurements, OEE is still wider in scale than MTBF, since failures and breakdowns are just a subset of OEE. I hope I am not confusing the readers as there are so many indices that can impact your plant when these 2 methodologies is successfully implemented, I am just referring to the main indices being used by the two. In view of this, I give this round to TPM. (RCM 9 points, TPM 10 points)

Round 3: What RCM and TPM believes

TPM believes that in order to advance to any improvement initiative, basic equipment condition must be carried out first. This basic equipment condition includes cleaning, proper lubrication and bolting. Why don't you complete all the screws and bolts of your equipment before performing any vibration analysis on it? On the other hand, RCM states that the first step is to change the way people think and apply this change thought to their asset.

I like what John Moubray is saying because even before basic equipment condition should be established both operators and maintenance should change the way they think about their assets if they want their equipment's to improve. I give RCM more credit to this round. (RCM 10 point,

TPM 9 points)

Round 4: Goal on maintenance

TPM's goal is to zero out unplanned breakdowns, while RCM's goal is not about eliminating breakdown but to understand that each failure have their own unique set of consequences and if the consequences of the failure is not acceptable then all effort must be exhausted in order to reduce its likelihood.

Maintenance is not about zeroing out or eliminating failures but simply trying to understand that it is more important to know the consequences of failure rather than eliminating them. In reality, it is impossible to eliminate failures, what maintenance can do is to anticipate, prevent, predict, control or prolong the duration of failure. RCM explanation here is much deeper than TPM; hence, I give this round to RCM. (RCM 10 points, TPM 9 points)

Round 5: Operators involvement in maintenance

One of the similarities between these two improvement initiatives is that both RCM and TPM value the importance of operators in maintenance. In any RCM analysis, operators must be part of the team doing the analysis since; it is the operators and not maintenance that have direct contact with the failure. TPM is much broader in scope as it compose of 8 pillars and one of these pillars is Autonomous Maintenance where operators learn to understand that the equipment is both a shared responsibility for operators and maintenance. Autonomous Maintenance is performed in 7 steps and is detailed in structure. Maintenance teaches operators about their equipment and operators learn not only to operate but to take good care of their equipment. TPM's role is to change the mindset that operators only operate while maintenance repairs and fix the equipment. Autonomous Maintenance let operators understand that they too have a role in maintaining their equipment by performing the basics such as cleaning the equipment, monitoring its lubrication and checking for loose and incomplete bolts on their equipments.

In short, the role of operators is much more detailed and structured in TPM. Hence, I give this round to TPM. (RCM 9 points, TPM 10 points)

Round 6: Its belief about continuous improvement

I believe that this is where both TPM and RCM have some form of contradiction. TPM is heavy on improvements. It believes that the equipment should be continuously improved, while on the other hand RCM focused more on understanding the consequences of failure with the aid of a decision diagram or algorithm. The team selects the most appropriate tasks for each failure mode as based from its consequences. In fact, John Moubray in his book RCM2 on page 188 considers that maintenance first before redesign or modification for the following reasons that most organizations are faced with many more apparently desirable design improvement opportunities than are physically or economically feasible. Most improvements take time to accomplish, some may even take several months, and hence, a person who is on duty today has to maintain the equipment as it exists today and not what it should be there in the future. Before considering improving and redesigning the equipment, have we asked ourselves, if the asset is here to stay there for a long time or will it be decommission? I have seen a lot of improvements being wasted

on their equipment's because the people who performed the improvement did not know that their equipment will soon be decommission out. Hence, before trying to improve or redesign the equipment we must have a concrete answer to these questions:

- Does the failure involve any major operational consequences?
- Is the cost of scheduled breakdown maintenance high?
- Are there specific costs which can be eliminated by the design change?
- Does the improvement have any harmful effects after the design change?
- Is the asset to stay for a long time or will it be decommission out?

I believe this credit belongs to RCM. I give RCM this round. (RCM 10 points, TPM 9 points)

Round 7: RCM and TPM initial approach

RCM starts by determining the assets functions and failure modes, while TPM believes in addressing equipment's basic condition first. Many failures start from small things and it is from these small things which are often left neglected that cause big problem. TPM believes that big failures can be prevented if we address the basics. In fact some failure modes can be reduce if equipment's basic equipment condition is well established on the equipment. I give TPM credit for this round. (RCM 9 points, TPM 10 points)

Round 8: Plant involvement

TPM as its journey continues aims to involve everyone from the organization from the lowest ranks to even the CEO. They will each have a TPM pillar to be busy about. People from the offices such as HRD, Finance, Accounting and Administration will be part of Administrative or Office TPM which aims further to improve their systems and conduct administrative focused improvement. I recall during our TPM days when we audit our HRD department where I ask for a 201 document file they have and time them by a stop watch on how fast they can retrieve these files in less than 30 seconds. Have you gone lately to your admin department to ask some files and tell you to come back in a couple of days? This is what makes TPM fun. On the contrary, RCM involvement would be limited to operators, maintenance, engineers and from time to time vendors mostly who have direct impact on the equipment being analyze. I doubt if HRD can be involve in an RCM analysis. Again, as for plant involvement, I give this round to TPM (RCM 9 points, TPM 10 points). At this point of the round both RCM and TPM are dead even with a score of 76 points. Staggering left hook by RCM to TPM.

Round 9: Focus on maintenance

Although I like to limit this discussion on the equipment side, TPM focus on addressing the 6 big equipment losses. By reducing these equipment losses OEE will improve. On the other hand RCM focus on both primary and secondary functions of the equipment. RCM highlights the importance of secondary functions of the equipment and that it allows us to understand that there are cases where failure of secondary functions poses a bigger treat rather than the failure of a primary function. Imagine a multiple failure occurring because the protective device which is a secondary function is in a failed state. I think both RCM and TPM have good points on this and I consider this round to be a draw. (RCM 10 points, TPM 10 points)

Round 10: Applicability on industry

Speaking about its applicability to industries, I believe that RCM have an edge on this as its process can be applied and can suit mostly any type of industry from the Nuclear, Oil and Gas, Mining, Metals, Airline Industry where it originated, Shipping, Power plants, Automotive, as long as there are equipments and asset to maintain. TPM's application is mostly suited to manufacturing industries; I just won't recommend TPM to use for the Oil and Gas sector or the Airline Industries. Hence, for industry application, I think RCM is more diversified than TPM. I'll give this round to RCM (RCM 10 points, TPM 9 points)

Round 11: Flexibility of combining TPM and RCM

If we buy a pizza, TPM itself is the whole pizza, while RCM is just a mere slice. I see RCM fit perfectly into the higher phases of Planned Maintenance which is one of the 8 pillars of TPM. In fact several TPM case studies, includes doing RCM on their equipment. Although according to the author of RCM, John Moubray no mention of alignment to other improvement initiatives had been mentioned in his book. He also provides a standard SAE JA1011 to differentiate his classical RCM with those of streamlined RCM versions. In view of this, I think TPM is more flexible than RCM; therefore, I give this round to TPM (RCM 9 point, TPM 10 points)

Round 12: What RCM and TPM want to achieve in maintenance?

TPM aims for Maintenance Prevention
RCM aims for Proactive Maintenance

TPM aim is more idealistic, since in reality, we really cannot eliminate maintenance. Our equipment is not a plug and play asset where we expect it to be reliable all the time by doing nothing. TPM wants us to think about an ideal plant with zero breakdown, accidents and defect, and what would it take to bring our company closer and closer to it. An ideal plant had been chosen by TPM so that its people will continuously improve, TPM do not want us to remain in the status quo, but to improve gradually step by step, drip by drip. People believe that TPM is a continuous journey and if they have one word that is out of their vocabulary it is the word "BEST", because they believe that the best can still be improved. On the contrary, RCM aims for being Proactive, finding the most suitable maintenance tasks for each failure mode uncovered, doing RCM increases the assets integrity by considering both environmental and safety implications before considering effects on operations. RCM believes that maintenance is about understanding the consequences of failure rather than eliminating the failure itself. RCM is much more realistic in this fashion as is it allows us to understand what maintenance can and cannot do.

I think that both RCM and TPM clearly explain what they want to achieve in maintenance. Both initiatives understand that the key to all of this is their people. If people change, their assets will be improved. Hence, I consider this round to be a draw.

What a match. Honestly, I believe in these 2 strategies and do not really know which improvement initiative have an edge until we detail it through the rounds.

The results of this comparison are purely based upon my experience and knowledge with these

two powerhouse improvement strategies and might differ from other expert's opinion. I hope that you enjoy reading this reliability newsletter.

Round	1	2	3	4	5	6	7	8	9	10	11	12	
RCM	10	9	10	10	9	10	9	9	10	10	9	10	115
TPM	9	10	9	9	10	9	10	10	10	9	10	10	115

[RSA September 2008 Issue : How To Fit RCM Into The TPM Strategy](#)

First, of all I would like to dedicate this newsletter to all my maintenance brothers in India, as well as International Business Conference for choosing me to conduct this training on Reliability-Centred Maintenance. TPM or Total Productive Maintenance had already made its mark in India where a lot of industries are implementing its philosophy and principles. There are quite a lists of industries that are certified by JIPM (Japan Institute of Plant Maintenance), where a TPM Award (5 different types of awards to be exact) is achieved by quite a number of industries who have matured and reaped the rewards and benefits of their TPM implementation in their plant. I also noted that they have their own TPM Club India which I believe is a joint venture from JIPM which promotes TPM and provides references, consultation, seminars, conferences and research among TPM Industries as well as strengthen its ties with industries implementing TPM. In fact TPM have a very strong foundation in India and it have helped many industries achieved a level of achieving a World Class Environment on how they do business.

TPM is strongly recommended for manufacturing industries, yet even some oil and gas industries in India are implementing TPM. I am bit a little bit curious on how they compute their OEE or Overall Equipment Effectiveness if they are to consider the Quality Rate Component.

Reliability-Centred Maintenance is a new concept in India, while some may have heard of it yet others hardly knew what it's all about. Its concept and origin started from the airline industries and have a very strong foundation in the western part of the world. It is a strategy that highlights on achieving Reliability by focusing on Maintenance and its original standard SAE JA1011 will answer the 7 Basic questions as follows:

What are the functions and associated performance standards of the asset in its present operating context?

In what ways does it fail to fulfill its functions?

What causes each functional failure?

What happens when each failure occurs?

In what ways do each failure matters?

What can be done to predict or prevent each failure?

What should be done if suitable proactive tasks cannot be found?

There are a lot of comparison as well as a lot of distinction between these two powerful concepts, in fact, I have laid down some of their strengths in my June 2008 Issue of Reliability Newsletter : Comparing RCM and TPM, which is the better strategy.

<http://www.rsareliability.com/newsletterjune2008issue.htm>

I have spend around 8 years of my life implementing TPM as a senior TPM Engineer so I guess I have to say that TPM will always have a place in my heart and mind. So the question to raise is, can they fit together or will they blend together or not?

To answer this question is to understand how both are taken up into as a focal point of strategy. If a plant is already having a strong TPM foundation, then RCM can fit into the system which I will explain but if a plant without TPM would want to initiate RCM, then for it to provide good results, both operations and maintenance should address the basic equipment condition first, a good lubrication, a clean equipment and an equipment with complete bolts.

TPM is for everyone in the organization while RCM is not design for each and everyone, in fact only those people from operations and maintenance with extensive knowledge of the asset they are operating should be part of the RCM team. If we speak about the military, these are elite forces like Delta Force or Special Ops.

TPM will always be the bigger program and RCM will be part of the Planned Maintenance pillar of TPM, yet if RCM is implemented with TPM, other TPM pillars would benefit from it such as Environmental, Health and Safety, Autonomous Maintenance, Focused Improvement for RCM decisions that will default to “REDESIGN or MODIFICATIONS”, Initial Flow Control Activities or Early Equipment Management, but the biggest impact of RCM in the TPM Pillar will be in the Planned Maintenance.

How TPM's Planned Maintenance Pillar is implemented:

There is a wide range on how to effectively apply the Planned Maintenance system, just to give you a glimpse on how TPM's Planned Maintenance pillar is applied in industries worldwide.

Reference: TPM Industries by Tokutaro Suzuki

- Step 1: Evaluate equipment and understand current conditions
- Step 2: Restore deterioration and correct design weaknesses
- Step 3: Build an information management system
- Step 4: Build a periodic maintenance system
- Step 5: Build a predictive maintenance system
- Step 6: Evaluate the planned maintenance system

Reference: Nissan Motor Co., Ltd, Yokohama Plant by: Yuichi Suzuki taken from TPM World Congress C4-2-8

- Phase 0: Establishment of aims of planned maintenance
- Phase 1: Understanding of actual conditions of equipment and work
- Phase 2: Restoration of deterioration
- Phase 3: Recurrence prevention and countermeasure for weak points in design
- Phase 4: Establishment of periodic maintenance
- Phase 5: Improvement of maintenance efficiency
- Phase 6: Horizontal application
- Phase 7: Condition management of facilities

Reference: Idemitsu Kosan Co, Ltd. Hokkaido Refinery by: Akira Kitayamna

- Phase 1: Deterioration, repair / elimination of forced deterioration
- Phase 2: Extension of characteristic life span
- Phase 3: Identify and repairing internal deterioration
- Phase 4: Pursue predictive maintenance and forecasting techniques

Reference: JIPM TPM Instructor's Course Second Revision March 1996

- Phase 1: The dispersion of reduced or extended MTBF (Mean Time between Failures)
 - Restoration of unattended deterioration
 - Removal of forced deterioration and establishing key operating conditions
- Phase 2: Life span should be extended
 - Extend life expectancy and removal of sporadic failures
- Phase 3: Time-Based restoration of deteriorated portion to its original state
 - Assume lifespan and time-based restoration extend life expectancy
 - Understand irregularity for internal deterioration through the five senses
- Phase 4: Prediction of failure by the equipment diagnostic techniques
 - Failure mode for diagnosis and extension of lifespan by technical analysis of catastrophic Failures and breakdowns

Reference: as per my previous employment and JIPM Consultant

- Step 0: Preparatory stage and understanding the need of Planned Maintenance System
- Step 1: Perform initial cleaning
- Step 2: Restore deteriorations uncovered
- Step 3: Preparation of standard documents
- Step 4: Countermeasure for weak points in design
- Step 5: Periodic – Preventive Maintenance
- Step 6: Overall audit and diagnosis
- Step 7: Machine ultimate utilization

There are many versions on how TPM's Planned Maintenance Pillar is implemented and may vary from one industry to another, yet whatever Phases or Steps is being adopted to comply with the consultants or TPM reference, they will end up in doing the 4 basic activities which are as follows: ***RCM will fit perfectly in the higher Phases of Planned Maintenance***

Phase 1: Establishing basic equipment condition through restoration

Phase 2: Address design weaknesses through improvement

Phase 3: Periodically restore deterioration w/ a Maintenance Algorithm or Decision Diagram

Phase 4: Achieve a Predictive Maintenance stage

Phase 1: Establishing Basic Equipment Condition through Restoration

Both Autonomous Maintenance and Planned Maintenance begin to accept the concept that their equipment is always a shared responsibility for both of them. These TPM pillars address abnormalities and perform restoration on their equipment. As Autonomous Maintenance addresses mostly the exterior part of the equipment, the Planned Maintenance pillar addresses the interior parts of their equipment. The goal of establishing Basic Equipment Condition in their equipment is to transition from a stage where Accelerated Deterioration is rampant to a stage of Natural Deterioration for parts which are Age-Related in nature. The objective of this Phase on

Planned Maintenance is to reduce the amount of unplanned downtime caused by machine related problems mostly equipment breakdowns. ***Hence, when we perform Phase 1, we are dramatically improving our equipment in terms of reduction in unplanned breakdowns.***

Phase 2: Address design weaknesses through improvement

Once accelerated deterioration had been reduced, equipments will suffer from natural deterioration. There are spares and parts of equipment that will deteriorate naturally. Team exposed themselves to study several parts of equipment with inherent short natural lifespan and correct design weaknesses by improving the parts dimension, strength of materials, construction, dimensions and so on. An MP (Maintenance Prevention) is usually used for this activity and later on feedback to the IFCA (Initial Flow Control Activity Group) or Early Equipment Management so that when the company decides to purchase future equipments these improvements are discussed with the designers to be included in the new equipment purchase. A cycle must be established where MP Design improvements must be feedback to IFCA. Correcting design weaknesses can prevent major breakdowns from recurring unexpectedly. Teams are trained on special tools such as P-M Analysis for a more detailed approach in dealing with Chronic Breakdowns. Likewise most breakdowns are caused by human errors, hence, both operators and maintenance must upgrade their skills to eliminate human errors, application of Poka-Yoke solution may solve human errors but not necessarily improve the level of understanding of the mistake caused by the person involved. ***Again for Phase 2, we are improving our equipment by addressing parts with design weaknesses.***

Phase 3: Periodically restore deterioration with a decision diagram

Once the parts with design weakness had been addressed, its lifespan will change, hence, we need to have a thorough review on how we are going to maintain it. This is accomplished with the aid of a maintenance algorithm; RCM refers this as the decision diagram. A thorough study of the maintenance tasks must be done to establish the correct maintenance. Since the basics had already been established, we can perform this phase through Reliability-Centred Maintenance. Not all parts need to belong to the Time-Based system. This can be done by having a thorough understanding on how to maintain our equipment and activities to be performed. Each part has their own failure characteristic pattern. The key in this activity is to understand the 6 failure pattern so we can derive the correct maintenance tasks for each function through an Algorithm or Decision Diagram. In this activity we are not dealing with the equipment but rather on the system on how it is being maintained... What parts must undergo time-based, what parts can be predicted, what parts needs inspection and what parts does not have any consequences at all and can be left to a No Scheduled Maintenance. ***In this Phase we are no long improving the equipment but rather the system on how the equipment is being maintained.***

Phase 4: Predict Equipment Life

In Phase 4 we introduce the concept of Predictive Maintenance or Condition Based Monitoring Techniques, although this is similar in using the human senses in a much higher perspective with the aid of instruments. Several parts of equipment can be predicted through the use of these specialized equipment techniques. This is done by checking the condition of the equipment. The key on using this technique is to determine the P-F Interval; if a part shows symptoms then these parts are a good candidate for using Predictive Maintenance. For example, a bearing may produce noise, increase in temperature, increase in vibration or heat; these are symptoms or potential failure indicating that a failure is likely to occur or is in the verge of occurring. Therefore,

maintenance can schedule the equipment. Advantage of using Predictive Maintenance is we can maximize the utilization of this part.

To conclude, these two powerful strategies are not meant to contradict one another but rather, they complement each other regardless of the origin. No strategy is a silver bullet solution for every single problem we face in our plant. Perhaps an independent consultant on RCM with little background or knowledge on TPM will be biased as to which strategy to implement and vice versa, both strategies have their limitations as well as their strengths. I think I am one of the lucky ones who know these two strategies by heart and mind. So my advice is before establishing any RCM efforts in your plant, try to address the basics first since by addressing the basics, some of these failure modes can be addressed.



[World Class Maintenance Management Class
Chennai, July 16 to 17, 2008](#)



[World Class Maintenance Management Class
Bharat Petroleum, Mumbai, Sept. 11 to 13, 2008](#)



[Reliability-Centred Maintenance Class
Mumbai, Sept. 25 to 27, 2008](#)



[Reliability-Centred Maintenance Class
Chennai, Sept. 22 to 24, 2008](#)

I would like to thank all my reliability and maintenance brothers in India who have participated in my training as well as for my few lists of subscribers and hope that the concept of Reliability-Centred Maintenance may find its way in your industry which you can benefit from. I am very thankful and flattered by your feedback and responses as well as the hospitality and kindness of your people. Your feedback touched my heart.

[**RSA February 2009 Issue : TPM's Planned Maintenance Pillar**](#)

Spending many years in TPM, I have learned that while Autonomous Maintenance is the pillar of TPM with the most number of members, Planned Maintenance should always be the strongest pillar in any TPM implementation, why, it is simply because, Planned Maintenance will be the one responsible in developing and supporting the pillar of Autonomous Maintenance. Planned Maintenance will also be responsible in guiding and coaching operators regarding their

equipment in performing the seven basic steps of Autonomous Maintenance. The role of Planned Maintenance plays will be crucial in any Autonomous Maintenance since it will play a very important role in changing the mindset of operators from just operating the equipment to being involved in establishing basic equipment condition. This means that if Planned Maintenance structure is weak, then so will be the Autonomous Maintenance pillar.

I recall during our TPM days when I asked some of my Planned Maintenance members what support they have provided to their operators and that what should we do to be mutual partners with our operators in having a shared responsibility of maintenance on their equipments? One of the members said that when he repairs the equipment, he make sure that the operator is beside him while he is repairing, this way he can communicate freely and tell the operator what this part had failed and what is its function in the equipment. I said that is good. He said that he was not finished and told me that during lunch breaks, he make sure that both of them eat together and as they eat, he told her all about what she needs to know about her equipment. Again, I said, that is good. He told me that he still have something to say and that during her shift, he told the operator how to perform light repairs in the equipment that he believe she can handle. But that is not all, at the end of our shift, since they are both on the same shift; they go home together with the bus shuttle service (since the company offered a free bus shuttle as part of its employee's benefits). It's an hour long travel most especially during rush hour due to traffic, so instead of being bored and just sit down on the bus, he told her stories about his actual experiences in the line and from time to time he still discuss with her about what he can think of regarding the equipment. He said that he just never ran out of words. Today, they are now married and have three kids. This person had taken my word literally, when I said that operators and maintenance should be partners with their equipment, since performing maintenance is always a shared responsibility for the two. Perhaps if Autonomous Maintenance is done in 10 steps, the last step will be for Maintenance to marry the operators. Anyway, I think that's about it.

Likewise, in my experience, Planned Maintenance will be the most difficult pillar in TPM and leadership of both the Planned Maintenance Facilitator and the Planned Maintenance core team must be strong. Planned Maintenance itself have its own eight pillars. Two of the most important pillars of Planned Maintenance will be Planned Maintenance support for Jishu-Hozen or Autonomous Maintenance and the Implementation of the Planned Maintenance Steps or Phases. Also, some of the pillars of Planned Maintenance will be improved directly as a result of implementing the Planned Maintenance Steps or Phases. The following are the Eight pillars of Planned Maintenance in no particular order:

1) Support for Autonomous Maintenance

Planned Maintenance must fully understand their role in its responsibility in providing support and guidance to Autonomous Maintenance. Maintenance will be indirectly involved with Autonomous Maintenance by providing them with the trainings operators need about their equipments, safety, lubricating points and other facets of their equipments. Planned Maintenance will likewise provide technical assistance in eliminating sources of contamination on their equipments. When Autonomous Maintenance reached step 4 of their activities, Planned Maintenance will be the once responsible in providing theoretical knowledge to operators with respect to lubrication, bolting and conducting general inspection. Operators must not only know that bolts should be tightened but must also understand that bolts should be completely tightened based on the correct level of torque required.

2) Planned Maintenance Steps / Phases

Just like Autonomous Maintenance, Planned Maintenance is carried on by performing its different steps or phases. This will depend on the type of industry and the JIPM consultant itself. However, whatever steps is being performed it will all boil down to the Planned Maintenance Four Phases to Zero Unplanned Breakdown. The first two Phases of Planned Maintenance is aimed in reducing the amount of unplanned breakdowns in the equipment but the last two phases of Planned Maintenance is aimed in improving the system or the way maintenance is being performed in the equipment and this is where RCM will perfectly fit into the TPM implementation. For a detailed and variations of Steps and Phases in the Planned Maintenance implementation, you may want to refer to my previous newsletter or click this link: [September 2008 Issue of RSA Reliability Newsletter](#).

3) Spare Parts Management

A good Spare Parts Management system is having the right part at the right time when maintenance needed it most. Movements of parts in the storeroom must be monitored and controlled at all times. Having a good Spare Parts Management System is not only about housekeeping but maintaining an accurate inventory of parts from the system and its actual physical location. When the quantity of parts in the system does not match with the physical inventory, maintenance loses its confidence in the storeroom. Maintenance should decide on what to do with non-moving parts in the storeroom and for those equipments that had been decommissioned, the parts must also be disposed. Some of the Fast Moving parts in the storeroom will be subject to Planned Maintenance Phase 2 where the parts will be analyzed in prolonging its lifespan by addressing the part's design weaknesses.

4) Lubrication Management

As Autonomous Maintenance helps in checking the lubricating points in their equipments, maintenance seeks to understand how oil is being contaminated and have the oil analyzed for contaminations present. Many failures are attributed as a direct result of poor lubrication. Maintenance must also understand if the different lubricants used in their equipment is sufficient enough to reduce the amount of friction. What is important is to understand how oil is being contaminated and what contamination can do to their equipment. Having a thorough understanding about this can aid maintenance in developing strategies such as Oil Contamination Control in order to reduce the amount of harmful contaminants in their oil. Maintenance must likewise understand the different properties of oil and what Oil Analysis test is best suited with their equipments.

5) Maintenance Skills and Knowledge Upgrade

TPM believes that not only must the equipment be improved but much more important is improving the skills and knowledge of the people doing TPM itself. It will be the people that will improve the equipment and the people can only improve if they are equipped with the right skills and knowledge. Specialized trainings in different reliability and maintenance strategies as well as Predictive Maintenance technologies must be provided to the maintenance people. Both theoretical and practical application of these skills and knowledge must be provided with

maintenance. A maintenance training curriculum must be drafted at the start as maintenance journey themselves into the Planned Maintenance implementation.

6) Predictive Maintenance

As knowledge of the maintenance people is upgraded, maintenance realize the necessity of using non-destructive and diagnostic instruments in order to monitor and check the condition of their equipments from time to time. The most common Predictive Maintenance instruments are vibration analysis, infra-red, oil analysis and ultrasonic monitoring. Predictive Maintenance work hand in hand with the Preventive Maintenance group in addressing failure modes in their equipment that provides signs that they are on the verge of failing.

7) Maintenance Management Budget Control

It is expected that through the initial stages of Planned Maintenance activities maintenance budget and cost will grow as a result of restoration activities and simply the costs of training its people. However, as maintenance pursue its activities on Planned Maintenance, cost will definitely be reduced as a direct result of improving equipment's reliability and likewise the cost of doing maintenance. Maintenance budget will likewise be reduced as maintenance performs the other pillars of Planned Maintenance such as Spare Parts Management, Lubrication Management and Predictive Maintenance itself. As Planned Maintenance implementation begins to mature cost will definitely go down as reliability starts to improve.

8) Building an Information Maintenance Management System

An information management system or CMMS must be in place that must include all relevant and important information maintenance needs from spare parts, lubrication, parts life monitoring, maintenance 201 file, maintenance indices and KPI's, breakdown history records, machine 201 file, predictive maintenance monitoring and so on. The goal of building an information management system is to automate and streamline the maintenance process. Remember that CMMS can only be useful if we put in useful information that can aid maintenance in performing their jobs fore efficient.

Planned Maintenance must be the strongest pillar in any TPM implementation as they are the once to guide and support the Autonomous Maintenance pillar of TPM. When Planned Maintenance structure is weak so will be its Autonomous Maintenance.

[RSA March 2009 Issue : TPM and RCM do they contradict or complement each other ?](#)

In a sequel to our June 2008 RSA Reliability Newsletter: TPM vs RCM which is the best lb for lb improvement strategy, I would like to discuss this subject once more and provide details based from my account and experience whether these two methodologies contradict or complement one other. If you want to read our June 2008 RSA Reliability Newsletter: I would like to point out the facts between these two methodologies for us to serve as a basis and as a guide.

The origin of these two methodologies are somewhat from the different parts of the world, TPM started from the east while RCM from the west. Origins of RCM can be traced back to the works done by Stanley Nowlan and Howard Heap from the United Airline industries which later on was adopted to land industries by the late John Moubrey. Just like the upcoming fight between the Philippines Manny “Pacman” Pacquiao and Ricky “The Hitman” Hatton from England be sure to watch it on May 2, 2009.

ABOUT OVERALL EQUIPMENT EFFECTIVENESS (OEE)

First, let us speak about the primary measure of TPM which is OEE or Overall Equipment Effectiveness. In John Moubrey’s book, on page 302, he quote: *There is often a tendency to focus too heavily on primary functions when assessing maintenance effectiveness. This is a mistake because in practice trivial secondary functions embody bigger threats to the organization if they fail than secondary functions. As a result every function must be considered when setting up the maintenance effectiveness and measures. The OEE as defined above only relates to the primary functions of the asset.*

And again on page 304, quote, *the OEE defined above only relates to the primary function of any asset. This is misleading, because as in the case of the gasoline storage system, every asset, machine tools included have many more functions than the primary function and each of these will have their own unique performance expectations. Consequently, the OEE is not a measure of the “Overall” effectiveness at all, but only a measure of the effectiveness with which the primary function of the asset is being fulfilled.*

My point about John Moubrey’s statement is that this is true. OEE is just a measure of the primary function and will never be able to measure the effectiveness of secondary functions, but the activities of TPM most especially the pillars of Autonomous Maintenance and Planned Maintenance will take care of the secondary functions of the equipment. While Autonomous Maintenance will address the abnormalities of the equipments, Planned Maintenance will address mostly the deteriorations found on the equipment. These two pillars when joined together will address the failed secondary functions of the equipment. The purpose of these two activities is to bring the equipment back to its original condition when the equipment was previously commissioned in the plant where all secondary functions of the equipment were working in the first place. In hindsight, if we address the secondary functions of the equipment which are not working, then we can expect fewer failure modes to maintain.

WHICH COMES FIRST, TO MAINTAIN OR TO MODIFY ?

There is no easy answer to this question, but allow me explain this the best I can. TPM is an improvement methodology, and its concept is about incremental step by step or drip by drip improvement. Again from the book of John Moubrey on page 188, he quote, *Which comes first, redesign or maintenance? Reliability, design and maintenance are inextricably linked. This can lead to a temptation to start reviewing the design of existing equipment before considering its maintenance requirements. In fact, the RCM process considers redesign first for two reasons, first, most modifications take from 6 months to three years from conception to commissioning depending on the complexity of the new design . . . Secondly, most organizations are faced with many more apparently desirable design improvement opportunities than are physically or*

economically feasible. By focusing on failure consequences, RCM does much to help us to develop a rational set of priorities for these projects. In other words, RCM simply tells us to first look on the consequences of failure so as we can set our priorities.

While I definitely agree with the concept of RCM in this point, we must also look at this two strategies in different perspective. RCM is more flexible since it can be adopted to almost all types of industries including manufacturing, while TPM is design mostly for manufacturing industries. I recall having lost an opportunity here in my country just for being honest. A Power Plant industry wants me to conduct a series of training on TPM, I told them that TPM is not design for their plant, and I never heard from them again. Imagine having an OEE of 90% for a Power Plant, for sure the city will suffer a lot of blackouts, but for manufacturing an OEE of 90% will be considered as world class if secondary functions are likewise working at this stage. Again OEE is not design for Oil and Gas sector unless you have a way of measuring every contaminant or bad molecules the oil has. TPM have its own territories and boundaries. Duties and responsibilities of operators in a Power Plant or Oil and Gas industry differs pretty much from a manufacturing plant. A manufacturing plant operations can have hundreds or thousands of equipments inside their operations and performing modifications or redesign on one equipment to improve its design flaws and weaknesses will definitely take a much shorter time compared to other plants if you understand my point. There are pillars of TPM that will definitely not be applicable for an Oil or Gas Sector and one of them will be Autonomous Maintenance, since the duties and responsibility of operators differs from these types of industries as well as the type of equipment they handle.

Modifications and redesign for manufacturing equipment will not take 6 months to 3 years but much shorter time. Let us say a design flaw had been spotted on a punch in which it does not reach its designed lifespan can be subject for a Planned Maintenance modification and improvement by studying the cause of its failure and identifying changes in its strength or shape in order to lengthen the lifespan of the part. But one thing I learned from RCM that I include in the selection of TPM's pilot machine is to reconsider the time the equipment will remain in operations since if the equipment will no longer stay or will be decommission in a few months from now, then it will be pointless to perform any modification or improvement in this equipment.

HOW BOTH TPM AND RCM IS PERFORMED ?

RCM is performed by first writing the operating context of the asset which will undergo a thorough RCM process. This is followed by answering the 7 basic questions of RCM. The first part will be to conduct a simple FMEA on the asset and understand the consequences of each failure by subjecting it to an algorithm or decision diagram in order to derive the most feasible maintenance task to address each failure modes. On the other hand, TPM consists of 8 pillars and the pillar that is closely related to RCM will be Planned Maintenance. There are a wide variety of approach on Planned Maintenance depending on the consultant the plant hires. However, in my experience with TPM, whatever steps or phases Planned Maintenance will undertake will all boil down to the generic 4 Phases of Planned Maintenance.

Phase 1: Stabilized MTBF - This initial phase of Planned Maintenance deals with restoring the equipment back to its original condition, which is done in parallel with Autonomous Maintenance which in turn will address the abnormalities of their equipment.

Phase 2: Lengthen Equipment Lifetime - The second Phase of Planned Maintenance is to identify parts with inherent design weaknesses by analyzing it and modify it to improve its lifespan.

Phase 3: Periodically Restore Deterioration - Once the parts with design weakness had been addressed, its lifespan will change, hence, we need to have a thorough review on how we are going to maintain the part. This is accomplished with the aid of a maintenance algorithm, a thorough study of the maintenance tasks must be done to establish the correct maintenance tasks as well as to establish the correct frequency for doing maintenance.

Phase 4: Predict Equipment Lifetime - In Phase 4 we introduce the concept of Predictive Maintenance or Condition Based Monitoring Techniques, although this is similar in using the human senses in a much higher perspective with the aid of specialized instruments. Several parts of the equipment can be predicted through the use of these specialized equipment techniques which is done by checking the condition of the equipment.

Whilst, TPM will aim for zero breakdown, RCM will deal with the consequences of failure. This statement is true, but there is also another point we need to understand. In TPM, the first 2 Phases deals in improving the overall performance of the equipment in terms of breakdown and MTBF. TPM classifies breakdowns into two parts Planned and Unplanned Breakdowns, what TPM is aiming for is zeroing out all unplanned breakdowns, TPM will not or can never eliminate Planned Breakdowns. An example of Planned Breakdowns is Scheduled Maintenance over the equipment. While the last 2 Phases of Planned Maintenance is no longer design to improve the performance of the equipment, but rather the last 2 Phases are done in order to improve how maintenance is performed on the equipment. In short, we are dealing with improving the system and not the performance of the equipment.

Phase 4 is about Predictive Maintenance, it is my initial thoughts that the aim of Planned Maintenance is to transition from a Preventive to a Predictive Maintenance structure, how very wrong I am. Phase 3 is done so that we can identify which parts are more suitable to undergo a Predictive Maintenance stage. In reality, there is no transitioning from Preventive to Predictive since it is unlikely that all failure modes is suitable for a Predictive Maintenance strategy. Second point is that, TPM believes that it is more feasible and effective to use Predictive Maintenance if the basic equipment conditions of the asset is addressed in the first place.

Now, if you understand the concept of Reliability-Centred Maintenance, isn't it that the goals of Planned Maintenance Phase 3 and 4 are similar to what RCM wants to do in the first place? In fact, I truly believe that RCM will fit perfectly into Phase 3 and 4 of Planned Maintenance. When I was still with the TPM Office, I asked our JIPM Consultant if we can add RCM into the Planned Maintenance structure, and the consultant just smiled and said, do not be in a hurry, you can do that in the later steps of Planned Maintenance. At first I do not understand what he meant, but as we progress into the Planned Maintenance implementation, I understand his point fully.

No disrespect to other TPM and RCM consultants, but if an independent RCM consultant with little knowledge on TPM will be a bit of biased and that is what I had experience before with an RCM consultant. He wants us to drop TPM and implement RCM. That is why instead of following his advise and dropping TPM off, we drop him off. When I was in India last year and conducted a

series of offsite training on RCM, I received a lot of negative reaction from some (not all the delegates), when I explaining the principles of RCM process. Some say, is that it? Others said, where does cleaning and doing the basics be done on RCM? You see, India's industries are heavy on TPM and for most industries the RCM concept is quite new to them. Most of them are familiar with TPM and some of the companies there have already been awarded on TPM Excellence Awards. However, what I was teaching was RCM and not TPM. Some of the people complained to the sponsors and wanted to quit the training, I remain patient and on the last day, I explained to them where does RCM fit in the TPM process, and I told them that it fits perfectly into the last Phases on Planned Maintenance and the delegates began to smile. A couple of them even apologized for their behavior, Whilst others said why didn't you explain that on the beginning? And so they went home with a smile on their faces.

My message in this newsletter is straightforward and simple, these two methodologies do not contradict each other if you understand both its principles. In fact they even complement each other. RCM fits perfectly into the last phases or steps of Planned Maintenance. I think only the consultants of both RCM and TPM do the contradiction but not the methodologies itself and I think that's all I have to say about that. I hope that you enjoy reading this newsletter in as much as I do enjoy writing it.

TPM and RCM are not design to contradict each other. In fact if you understand both its principles, they complement one another and they can work together, only independent RCM and TPM consultants do the contradiction.

[RSA May 2009 Issue : 13 Grave Mistakes in TPM Implementation](#)

Mistakes in TPM implementation are costly hence it is important to know its basic fundamentals and roots before initiating it. These things are non-negotiable if we speak about implementing TPM. Many have tried to short-cut the TPM process which eventually cause their failure and blamed it on TPM itself. TPM is a very good process and I have seen it worked. Both people and equipment are improved, but this can only be achieved if we follow the process accordingly. I have listed some of these common mistakes in no particular order of importance. Most of these are not written in TPM books and is based from my own account and experience in doing TPM. If your plant is initiating any TPM initiative or have been implementing TPM for a long time with little or no success at all, then perhaps you need to take time out, read this edition of our newsletter, share it with your management team and gave it some thoughts.

1) Never Use Contractual Employees in Your TPM Implementation

Never attempt to perform Autonomous Maintenance on contractual employees in your plant, it will simply not work as they will leave the plant in a short period of time and we need to retrain your operators again. TPM's goal is to empower operators and I do not see any form of empowerment or enthusiasm when the operator's contract to work is nearing to an end. What is inside the mind of operator during his final days of work is not about getting to Step 2 or Step 3 but where am I going to be tomorrow, what happens to my family, where will I find money to enroll my kids to school and that sort of stuff? If you tell me that, this is our practice in our plant, then I only have one logical advice with you. Stop doing TPM, whatever you do and how extensive your efforts are

in driving TPM it simply will not work. It's that simple. How can we motivate people that are about to leave the plant for good? You simply can't. The goal of TPM is not just to improve the equipment but for both the operators and equipment to improve together in parallel with each other.

2) Too Many Improvement Initiatives in the Plant

Many people are somewhat numb or too naïve to understand the implication of too much improvement initiatives and strategies in their plant. All improvement initiatives are good if the plant focuses on it, but if there are too many initiatives and these initiatives like six-sigma, TPM, Lean Manufacturing, Just in Time, TQM, RCM and the rest is not being consolidated your plant will end up with each of these initiatives having their own what you call "Champions" or "Facilitators" and you will end up with too many meetings and action items to be done. Perhaps your day at work is consumed by endless meetings. How much of your time is spend on meetings and action items where you have a 9:00 am to 11:00 am TPM meeting review followed by 1:00 to 2:00 pm meeting with six-sigma then a 2:00 to 4:00 meeting with Safety and finally a 5:00 to 6:00 Operations Review Meeting with your boss. The next day will be no different and so are the rest of the days. All plant improvements and strategies must be consolidated, integrated and aligned. The problem is when champions of these initiatives do not communicate with other champions of other initiatives. Besides a redundancy of activities, people are confused on which strategy to prioritize.

3) Assigning Part Time People to do TPM

TPM is done on a cookbook step by step format and one of the important aspects of its preparation is assigning full-time people that will be assigned to the TPM Office. Each of these people will play a very important role not only in driving TPM initiative in the plant but also on their respective pillars they are handling. These people act as your plant's TPM internal consultant and will be responsible for providing directions and roadmaps in their TPM journey. The number of full-time staff on TPM will depend on the population of the plant. Many industries who want TPM implemented in their plant merely assign a part time staff or engineer and again I will be frank with you, it simply will not work.

4) TPM Office Reporting to Operations

TPM Office should be directly reporting to the President or CEO of the organization and must not be reporting to any part of the department such as Operations or Quality Control. TPM office should never be dictated and should be an independent body. Let me put it this way, during the initial process of implementing TPM, expect a lot of resistance in the beginning. When TPM is under operations, then operations can delay TPM activities to push through with production unless the Operations Manager sees value in the TPM process otherwise it would be the other way around and TPM activities will just be deferred and delayed until it is completely forgotten. I recall during my time when our TPM Office was reporting to one of the high echelon of operations, he completely change the TPM direction and dictated us to act as a police, provide photos of any untidy, messy or anything unusual either from offices, equipments, environment that we can spot and highlight them to their management. One of the engineers handling Office TPM reported one time a photo of a messy office which angered the boss, the engineer said that, Sir this is your office!!! The rest was history.

5) No Budget for TPM

TPM is an investment; you can only reap the fruits when you understand what is at stake here. Although many of the readers most especially Top Management would think twice about this item yet I would rather be frank and honest about this issue. TPM will require heavy investment during the early stages of implementation on training their people, correcting of abnormalities and restoration activities done by Planned Maintenance group. The problem if their requisition had been disapproved and the machine is scheduled for an Autonomous or Planned Maintenance Certification or Audit, the teams will have no resort but to cannibalize parts on other equipments and by doing this then we are just fooling ourselves with this practice. Like any other department TPM must have a budget whether the budget to be allocated will be charge to TPM office or charge to the department initiating TPM.

6) Trying to Shortcut the TPM Process

There are two kinds of trains; we have the fast train and the slow train. Most managers simply want the fast train. They want everything done fast. When equipment fails, operations and management wants the equipment to be repaired in the quickest possible time. If I say wait, let's perform a Root Cause Failure Analysis, they will say that they have no time for it. The problem with the fast train is that when your equipment fails and you repair it, the evidence is being washed out. Most of the time, the part that fail is thrown away where much information can be obtained from that failed part. I believe that in order to be fast, we need to take things slowly. Just like the TPM process, this is a very slow process, everything is done step by step, phase by phase and one step at a time. Plants initiating TPM must fully understand that we are changing a culture and we are not simply improving the equipment but rather we are making a paradigm shift in the minds of the people. Many will be tempted to perform TPM, set-up an Autonomous Maintenance Team and perform Initial Cleaning at once on the machine. WHOA! Stop, you are way so wrong. That is not how it's being done. Remember when one of your operators gets injured during the Initial Cleaning process then I believe that will be the last time you will hear about TPM. Initial Cleaning can only take place when the team understands the safety of their equipment which is being initiated by the Planned Maintenance team. All machines should be ranked so that the team can finally select their model machine to undergo the TPM process, Only Rank A or Worst Machines must be targeted first in selecting their model machine. For TPM to work effectively, do not try to short cut the process.

7) TPM and Company Goals are not Aligned

Each company have their own indices, measurement, yardstick and kpi's that they measure from time to time so that they can determine where they are and how well they are doing and that is a good thing. Likewise, TPM have their own indices and measurements as well, the problem begins when the goals of the company and TPM are different, the effect will be that TPM will be considered a separate program and not part of the plant's corporate strategy because in industries we only focus on things that we measure. When a plant is measuring Availability and TPM is measuring OEE, either both must be measured or the plant can change their measurement to OEE instead since Availability is one of the components of OEE.

8) TPM Office Insufficient Knowledge on their Respective Pillars

Again it is not enough that a plant have a full time staff on TPM but the TPM staff must be equipped with sufficient knowledge on TPM or more importantly on the TPM Pillars that they are driving. References, books and training must be accessible to the staff of the TPM Office. Let

me give you an example, when a TPM Facilitator driving Autonomous Maintenance is only knowledgeable on Step 1 of the 7 Steps of Autonomous Maintenance the teams that have completed Step 1 of Autonomous Maintenance will have to wait until the details of Step 2 is finally ready. The team's momentum and enthusiasm simply fades away and machine gets worst once again and the team needs to undergo and repeat the process of Step 1 once again. Before initiating TPM, roadmaps should be completed; training for each steps and phases in TPM pillar should be available so that TPM activities will run smoothly.

9) TPM is thought of as a Short Term Approach

Many people mostly managers are disappointed when they cannot gain results from TPM in a short span of time completely abandoning the process and blaming it once again on TPM as another fad or flavor of the month. Industries must realize that TPM is a slow process. It takes time to realize the benefits of TPM both from the equipment and from the people. TPM is done on a Step by Step process. Doing TPM's Preparatory Stage can take 6 months to 1 year or more depending on the size of the plant. These things are crucial in any TPM implementation and must be understood by the plant or industry at the start before initiating any TPM activities. The benefits that can be reaped from TPM can be felt first on a small scale and increase gradually. Remember that the most difficult part in any improvement initiative is about changing culture and to adopt a culture of TPM cannot be done overnight if you know what I mean by that.

10) Frequent Reorganization in the Plant

It is quite difficult to implement TPM if there is frequent reorganization in the plant. One thing for sure that will happen is that team members will be affected. Just to tell you a bit of a story, there was one team that have completed the 7 Steps of Autonomous Maintenance, the team was highly motivated and empowered and from time to time the team had been invited by other plants to present their success stories. Three of its members were transferred to other departments and been replaced by new operators after some time another two were again transferred leaving one original operator in that equipment. What happens, their model machine deteriorated rapidly and the basic equipment condition had been forgotten. How can you simply push through with a Focused Improvement Project if your members keep on changing all the time? Perhaps we need to change the name of this pillar from Focused Improvement to a Not So Focused Improvement Team.

11) Wrong Selection of Pilot or Model Machine

Almost all books on TPM will recommend that the worst machine must be selected as the model machine in order to start their TPM activities. Whilst this is true, we must not take the word literally. If you go to your plant identify the worst equipment, you might be selecting an equipment that had been abandoned for a long time or equipment that had not been used because of too much problems in the past or you might be tempted to select an equipment that will take more than the cost of the equipment to restore and rebuild. Likewise is selecting a machine that will be decommission and phased out in a short period of time. To me this is complete nonsense. When selecting your model equipment make sure that the equipment is being used regularly in your operations.

12) No Management Review on the TPM Process

One of the important parts of TPM is having a regular review with Management people in order to determine how the plant is performing with respect to their TPM Activities. The TPM Master Plan

serves as a guide if the team is behind or ahead of schedule. What Steps are we in the Autonomous Maintenance or Planned Maintenance process, which department are fast and slow in their TPM roadmap? When will we complete this step and that sort of stuff? Management also asked what changes that takes place when doing TPM on both the people and the machines. When a regular review takes place, the people involved in TPM knows that something is expected from them. The review process also creates a feedback forum between management and the TPM teams involved. The review process also creates a venue for management in only showing their support but likewise their commitment in the TPM process.

13) Ignoring the Real Message of TPM

Industries who value their people have a great chance of implementing TPM with success. Remember that TPM is about changing people because it believes that if people change then they will also change the way day do things in the plant for the better. When equipment improves, it did not improve by itself. Someone did. It was the TPM team. TPM is about people. When people are become empowered, there are exactly no limitation as to what benefits it can bring to the plant. Therefore, remember that in any TPM initiative focus must be on the people since they will be the once to improve their equipment and it is not the other way around. And I think that is all I have to say about that, until the next reliability newsletter, keep on reading