Autonomous Maintenance

Autonomous Maintenance occurs when maintenance responsibilities are shared between operators and maintenance.

For example, when you’re driving your own car around, you’re the operator. Do you notice when it starts to sound a little different? Maybe it smells different, handles a little different. Well we like to look at our operators to know enough about their equipment because they operate them every day, they can detect first and foremost something’s not quite right with this equipment.

So let’s take advantage of that experience and have them tell us something’s not right. Something’s going wrong, let’s try to fix it before the warning light goes on, we have some issues. So some of the things we can help have our operators do, we can have them involved in a daily cleaning of the machine.

Again, that’s not just to clean it for 5S, that’s clean to inspect. They need to look for things. We need to set up a system so they know what to look for. Take a look at basic lubrication, that’s something operators can do. They can look at basic tightening. Is everything tight, are bolts tight? We’re not asking them to completely understand the schematics of a machine; just basic operational things that we can have operators do, and use their senses that they can tell us if something’s not quite right.

We can attack something before it becomes a major downtime issue. That’s what we want to set up. So we’re getting away from I operate it, you fix it, to we’re all responsible. We’re all responsible for cleanliness. So we want to get involved with everybody to make sure.

One of the things that I like to teach maintenance professionals is when maintenance goes in and works on a certain area, maintenance helps clean the equipment. Some maintenance folks do a really good job of making sure a machine is in really good condition when they leave it, then when they got there. With others you see handprints all over the place, grease, and it’s just in worse condition. So you want to make sure that everybody is responsible for the machine.

Research shows operators can detect around 75% of all maintenance problems at the earliest stages, and by doing the involvement of operators, then you can say operators can take care of the lower skilled tasks and that frees up the maintenance crew, the skilled trades, to really do the advanced things.
So you’re not wasting the talents of your skill trades on doing some of the lesser talented items. Like changing loot, ok changing filters, absolutely. And then you can come up with what level your operators can be engaged in and then concentrate your skilled trades on more advanced things, and now have them concentrate on more proactive things.

Again, what you’ve done is taken things out of their bucket, and now you want to fill it up with things that are more proactive, and that’s what we want to get to. So they’re actually working on things they should be.

The 7 steps of Autonomous Maintenance

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| 1. Initial Cleaning (Initial Inspection & “Restoration”) | -Detect problems of lines and restore its original state.  
-Start managing the line autonomously. (5S, Minor Stops, Quality)  
-Create & perform temporary “Cleaning/Lubrication procedures.” |
| 2. Source of Contamination & Hard-to-Reach areas | -Solve “Sources of Contamination” and “Hard to Reach” areas. (Cleaning, Inspection, Lubrication) |
| 4. General Inspection | -Provide training on their equipments, products and materials, inspection skills and other AM skills. |
| 5. Autonomous Inspection | Develop a routine maintenance standard by operators |
| 6. Standardize Autonomous Maintenance operations | Standardize routine operations related to workplace management such as quality inspection of products, life cycle of jigs, tools, set up operation and safety. |
| 7. Autonomous Management | Autonomous team working |

Now, the 7 steps to Autonomous Maintenance (refer to image above) starts with the initial cleaning. We look for the source of the contamination, look for those harder to reach places, where the sun doesn’t shine, that’s where you want to go into. You want to go into those places of the machine you don’t normally see. That’s normally not the outside. Everything gets wiped down on the outside, but nobody ever goes inside the machine. Look what your standards of cleaning and lubrication are and develop them. Have general inspection. It may take you 3 years just to develop that. You think it’s pretty simple, but depending on the size and the scope of your facilities, expect it to take years to get that developed on a regular daily basis. And then you are going to get into more operations where there are other inspections that you can do and everybody’s working as a team to get things done, and looking at the life cycles of your pieces of equipment.

Now some tools that can help you, visual boards, again, we like to make things visual, we like brief meetings. We mentioned that earlier, and then one point lessons. You can have an actual TPM board...
or Autonomous Maintenance board set up in your areas. You can have it by zone, by machine. Basically you’re just focusing strictly on the activities used to improve or maintain your piece of equipment. You can have pictures of people involved with the layout of the area. This is what we found out by initial cleaning. This is what our definition of cleaning is, so have before and after pictures involved. Put tag lists up, so when you tag the piece of equipment, make a list of all of those. Track your OEE, look at tags that you actually saw, share some of your learning from your one point lesson, look at where some of the sources of contamination are.

Basically it’s a communication board to know what’s going on. So we as management can also go to that piece of equipment and also see what is being done and help coach.

One point lessons help take something that you learned in your lesson or TPM and then put it on a one piece, one side of a piece of paper and share the information that you learned. And then in this case you’re looking at the compressed air and in that particular case, you have a picture of it and you’re showing what causes the mess, don’t make a bigger mess, it’s just a simple lesson.

Here’s a TPM where you have cards in action and you have a TPM board, where people can see what’s going on, what’s part of the cleaning, what’s the schedule, some of the tag issues and a log of that.

Now be careful with these boards, because it’s really easy to set up the boards and set up the system. But when I talked to the operator on this board, because I thought it was pretty cool, I said what do you think of the board? Well, I don’t like it. Well why not? Well, I’m doing my cleaning and stuff, just like they were taught, but no one is doing anything with the cards. Maintenance is not following up on anything.

So she called it her “mocking board”. It mocks me, it teases me that all these things are going to get done with my machine and nothing’s getting done. It was her mocking board. So you don’t want to turn these great visuals into something in her face that says we don’t care about you or your piece of equipment. We have higher things that we need to do, and we’ll get to them later. You’re not a high priority. So her level of enthusiasm dropped dramatically as a result. No one was helping her when she is doing her thing of tagging these issues and doing the daily checks. So be careful to not create a mocking board!

Create a checklist. Work with your operators, work with your maintenance to figure out some of the things they can work on. Focus on the cleaning to inspect. Look at oil replacements, look at filters and lubrications, some of the simple things. Let your operators be the eyes and ears of your piece of equipment. And you can make that easy.
Have an operator checklist. This is an example of a machine with numbers going this is what needs to be checked, how often, and how you do it. So it’s their checklist, so the operator knows what to do. You can check their checklist so you know they are doing it.

Make it simple, create your own, have a picture, which I like visual. Put simple tasks and how often they need to be done and you can even have initials off to the side to make sure the operator checks off. So not only can the operator use the checklist, you can use the checklist to audit it, part of our standard work. And then work with the operators to implement it.

Here’s an example that’s a little bit longer, they have a couple of pages that they do, instead of one page. But what they did is the task number, task 1, you could actually go to the machine and it was labeled task 1. So that made it easier for the operator to see where on the piece of equipment they could do their check. So again, make it very visual. Have the instructions already set up, so the operator knows how simply to make the checks.

Also look at different things like the 5S. Here’s an example of a motor, on the left hand side, it’s dirty. We took the cover off, it was dirty. And what happens when you have that dirt inside that motor? It heats. What’s the purpose of the fan? What’s the function of the fan? To cool with air. If it’s clogged up with dirt, what’s it going to do? And what’s going to eventually happen to the motor? Burn up, and then what do you do? Replace the motor, what are you going to do in a year, two years. Replace the motor again. How often do you replace motors? Now a simple thing that you could do is open it up, clean it up and then stick a simple filter system. A simple filter pad on the outside and now you can have the operator inspecting it and changing the filter. Simple lesson to help reduce the heat on the motor and improve the life of the motor and keep it clean.

You might have a situation where an operator explains, “I never knew you could open that up and clean the fan. I never knew there was a fan in there?” Well make it a one point lesson. Make a picture of it and share it with your operators. Maybe you don’t know that there are 5 motors on this piece of equipment. And then you can set up a system where you can improve it.

Alright, look at the gauge on the left. Are we at good pressure or bad pressure? Why not? Not labeled? Have no idea, that’s for air pressure. So we had to go to maintenance, we had to go to engineering. Find it in a book somewhere and found out it was 40psi, so simple kaizen is one label.
your gauges, so you know what you need and then we put a little piece of green tape, plus or minus a couple, so you can show at a glance if it’s good or not.

Now if you looked at the right hand side, do we have good air pressure? Yes. You made it visual, simple thing. You can go thru and you can set up a system of just making it very visual on your labeling. Ok, visual management here, are those good or bad? Don’t know.

So what are some of the things you could do to kaizen this? One, put labels on it, right? And you usually have a range, plus or minus. Next kaizen you can do is put green ranges so it’s visual, so you can see. Another kaizen you can do is rotate the gauges so all the needles are up. Gauges don’t all have to be in one direction. But how quick is it to see ok that’s right, that’s right, that’s right too. Yeah they are all up. Did I save a second or two finding out if I’m all up? So you can switch the gauges having them all pointing up is good. Then another kaizen you can do is you can have an alarm system tied to it where it will sound a little alarm if it’s outside so if you weren’t looking, something audible can go off. Different small kaizens you can do to make it all visual.

![Image of gauges with green tape and labels]

**Good or bad?**

Ok again, another picture (see above). An actual picture of a piece of equipment. Can you read that gauge at all? Then after we clean it up and had it set up you can now read the gauge and you know the indication of if it’s good or bad. Now you don’t have to use green, you can also use red. In this case you know inside the red is good, outside is bad. So use your own imagination to put it and make your own labels pretty easy to see. We talked about tightening bolts to make sure they were not loose. One of the quick simple things you can do is tighten them and then put a piece of white tape or marking and you can mark it to say I know that that is tight. So what happens when they loosen up? They don’t line up, so without even touching them you can see if something’s loosened up. That’s one way you could make it visual.

Also, it’s a good thing to know if things are moving on a rotating, have arrows to indicate where the rotation is. You can use a simple label system. You know the rotation of equipment. You know the
direction of air, or direction of other utilities. So use directional arrows. Again, you’re trying to make it visual. Clearly mark all your labels on the knobs and controls, so you know what everything does. You’d be surprised if you just go out to your old piece of equipment, how many of your buttons and controls are not labeled. People will just know it. Put visual warnings up, another great example. Use your TPM boards, set them up so that you can see the tracking.

We set this up at the maintenance department so that they could track all the future events that they were doing. They decided that this is a good system to go and do the cleaning, that maintenance was going to be involved in every initial cleaning, so that they could learn about the equipment. That’s a good thing. Then they set up a program so that every month or every two months they did a different major piece of equipment and they set up a system to do that. And then I could track it, or anyone in management could come see how they are doing against their plan. How their actual is against their expected.