

10 Easy Steps to Reduce Machine Repair Time



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Training

1-Training: A properly trained staff is, in my opinion, the most important element for reducing machine repair time and downtime in general. When I was twenty years old, I accepted an entry-level maintenance position at a paper company. While I was a decent maintenance mechanic for my age, I lacked diverse hardware experience. The new job had me servicing machinery substantially different than my previous job. One day my manager assigned me a “simple task.” This task was to replace a ballscrew in a custom Thomson linear actuator. This task, on the surface, appeared simple enough. I proceeded to unscrew the screw from the ball nut, and within seconds there were 62 .125” precision balls scattered on the floor. The truth is there were many failures in my scenario, but for the point of this article, had I been properly trained in how ballscrews worked, I would have known that I wasn’t supposed to remove the screw.

Make sure your maintenance team members are qualified to work on the equipment they are tasked to maintain. If a team member must work on a piece of equipment they are not trained to repair, make sure someone with the proper skills communicates the critical repair details.

Spare Parts

2-Spare Parts: The need for spare parts is obvious, yet this is an area that frequently turns a simple and quick repair into a drawn-out, costly disaster. First, make sure the parts needed to service a machine are on hand before a single tool touches the equipment. It's equally important to make sure the spare parts are, in fact, the correct parts. Verify the parts when they are received as opposed to when they are needed. Too often, I have seen maintenance team members take a machine apart then find out they do not have the parts required or correct parts. As a maintenance manager, this is a frustrating scenario.

Store spare parts in a clean, easy to locate, and organized manner. This sounds like a no-brainer, but maintenance shops, tool cribs, and storage areas are often disasters.

Bottom line: Stock the correct parts and verify compatibility before the parts are needed.

Tools

3-Tools: I cannot overstress the importance of using proper and professional quality tools. When team members don't have the correct tools to complete a task or their tools are inferior, the quality repair can suffer. Too many times, I have witnessed mechanics create a brand new problem while fixing the original problem.

Furthermore, if there are time-consuming, difficult, or annoying tasks, team members will find shortcuts that almost always result in a callback. A great example is wire strippers. Guys with low-grade strippers frequently turn to razor blades, pocket knives, or their teeth when stripping small wires. This practice is unacceptable and often results in nicked insulation jackets and missing individual wire strands. I wrote about my difficulty stripping the jacket and conductors of Festo cylinder position sensors in another post. I reduced my effort and machine down-time while improving my work quality by purchasing two specialty tools, a [Jokari 20310 Sensor Special "Mini" Automatic Wire Stripper](#) and [Knipex Automatic Wire Stripper 12 12 02](#).

Another example is the wrench flats on an air cylinder piston. Most cheap wrenches are thicker than the flats. When the mechanic can't get a wrench on the flats, his next choice will be his or her favorite vise grips or channel locks. Both of those tools damage the air cylinder piston and create a brand new problem.

I'm not saying the team needs the best tools money can buy; I'm saying they need the best tools for the job. If the team can't afford good tools, buy them for them. You are going to either buy tools or pay more money in lost productivity and downtime.

Preparation & Kits

4-Preparation & Kits: Be prepared by having replacement parts is, of course, an important part of the repair equation, but there's more to being prepared than stocking parts. A great way to expedite an efficient repair is to have the repair job parts assembled as a "Kit" ready to install. For example, there's a repair scheduled that requires the replacement of an air cylinder. These cylinder repairs can turn into a marathon running for additional items such as fittings, flow controls, and Teflon tape. A lot of wasted time. Another variation of this example is the mechanic is taking the time to recycle fitting from the old cylinder to the new unit. Too often, this spirals, creating an additional problem by breaking a fitting and then learning you don't have a spare. This is a complete and avoidable disaster.

The best approach is to "kit" the repair. In our example above, we would not only have the spare cylinder, but we would also have the fittings and flow controls not just on hand but also installed on the air cylinder and ready to go. This makes the repair as simple as disconnecting airlines, removing the bad cylinder, installing the new cylinder, and connecting the pneumatic lines.

Another example of kits gets me strange looks, but I do it because it makes sense. When I receive sensors or sensor cables with leads, I make a small hole in the packaging to pull the sensor cable out a few inches. I then strip the cable with my [Jokari Sensor Special "Mini" Automatic Wire Stripper](#), strip the leads with my [Jonard WSA 1439 Self-Adjusting Wire Stripper](#) and crimp on wire ferrules with [Knipex Automatic Wire Stripper 12 12 02](#). It's a lot easier to prep the wires on the bench, and of course, it reduces machine repair time. Some time's I'm asked, "what if the application doesn't require ferrules?". The answer is simple, they are easier to remove than install, and generally speaking, most sensor installations are improved with ferrules.

A small benefit of kitting is you either consume inventory spares like fittings in advance of performing the repair, giving you time to replace them. However, a better method is to order everything you need to do the job and not deplete your inventory.

Some repairs require special tools, and it's often worth it to have those tools in the kit. Sticking with our air cylinder example, small air cylinders often feature wrench flats that are difficult to utilize. Store the appropriate wrench with the replacement air cylinder. If an air cylinder utilizes cylinder position sensors that require a hex key wrench or screwdriver, include the tool in the kit as well. Note: You can use a proximity sensor tester such as the [Banner DBQ5 DC Proximity Sensor Tester](#), which allows you to set the correct sensor position without operating the machine.

Kits are one of the best ways to **Reduce Machine Repair Time**.

Labeling

5-Labeling: -

Labeling machine parts, wires, sensors, valves, pneumatic lines, and other critical components make it easier to troubleshoot and facilitate repairs. I like to include as much useful information as possible, such as voltage, direction, orientation, function, plc tag, or address. Labeling also aids with communication to confirm everyone involved is discussing the same item.

Lastly, make sure your team replaces any labels removed during maintenance and repair. I use a [Brady BMP41 Handheld, Label Maker](#) on our equipment.

Documentation

6-Documentation:

Repairing machinery and equipment can be challenging. Not having product manuals, specification sheets, wiring diagrams, schematics, and repair history can turn a simple job into a project. I like to have master documents stored in the cloud, so they are readily available to the team for printing. Original documents stored locally, whether at the machine or in the maintenance shop, will eventually lead to missing or useless documents.

I prefer to keep all documentation in the Adobe Acrobat pdf format. This allows me to group documents together in what Adobe refers to as “Binders.” I also highlight document details and mark them up with useful information and changes in a clean, easy-to-use manner. Examples: I add calibration data to Omega Engineering DP41E process meter instruction manuals. I mark-up Ateq leak testers terminal assignments with the wiring information for the machines they are attached to.

Quality of Repair

7-Quality of Repair:

Stop, Look & Listen

8-Stop, Look & Listen:

Too often, I witness a maintenance mechanic or technician complete a repair while ignoring other potential issues outside the initial repair. For example, a machine operator calls maintenance to repair a broken proximity sensor. The mechanic completes the repair but fails to notice a pneumatic flow control leaking air, a loose timing belt, broken cable ties on a servo motor encoder cable, or a noisy bearing. These additional issues will most likely result in another callback and downtime soon. These are big missed opportunities to address problems while the machine is still under the maintenance team’s control.

In a best-case scenario, the maintenance person could spend a little more time on the machine and correct the newly found issues. If the additional repairs can’t be completed on the spot, they can at least be scheduled and prepared for.

Note: To Reduce Machine Repair Time, this should tie into your 5s “**Clean to Inspect, Inspect to Detect, Detect to Correct, Correct to Perfect.**”

Audit Repairs



Vise Grips Causing Damage to an Air Cylinder Piston

9-Audit Repairs:

As the maintenance manager, you have expectations for the equipment's maintenance and repair methods and quality. It's important to audit the work of your team. This audit serves a few purposes. The obvious purpose is to ensure a task is performed satisfactorily, with the proper tools and correct parts. Sometimes individuals will take shortcuts and/or use the wrong tools, which can cause a new problem that's worse than the original problem.

Beyond that, it also serves as a tool to learn team member's strengths and weaknesses. If weaknesses are observed, training can be administered at a later time. The other side of this equation is oftentimes, the maintenance technician or mechanic develops a technique or a tip that can be shared with other team members.

Communicate

10-Communicate:

Preparation is key, Properly equipped tool carts (tools & parts), Documentation, Labeling, Meetings, lessons learned, ask "why.", Take time to do it right, and reduce callbacks, Monitor& Audit repairs.

