Manufacturing Irony: Fans Are The ‘Achilles Heel’ Of Your PC

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Those of you working with a desktop, take a moment and look at the fans on the back of your PC. Go ahead, I’ll wait…

Not a pretty sight, I imagine. If you are like most people -- even those working in an air conditioned office -- you are seeing a nice patina of dust covering your blades. And if you are in manufacturing, you are likely seeing something much uglier: the genesis of a huge suck of time, money and resources.

But what does it do, why does it matter and maybe more importantly, why should you care about the humble fan in the first place? Lets start by talking about this component which, after all, is designed to save (not hurt) your workstations.

Suck and Blow
We all know what fans do, they move air around inside the PC circulating air to cool the components inside. Some suck air in, others blow it out; in the process they move the air, and whatever is in it, through your PC. (This is referred by the engineers as “active cooling.”) You might have one or two on the back of your pc, one on your processor, and even one on components like graphics cards. The bottom line is they all do exactly what you expect: they move air around to cool your PC down.

Case In Point: The maker of a BBQ Chip has a problem on the manufacturing floor. The spicy powder that gives their chips flavor is thick in the air, saturating everything with BBQ particulates. That air ends up being drawn in by the fans of the average PC and flavoring their fans & motherboards with spice.
But what is in your air?

Take a moment and think about what is in the air of most shop floors and factories. Dust? Pulp? Powder? Oil? Grease? In some environments, people are wearing heavy masks, but PCs are not so lucky. Whatever particulates are in your air, they are in your PC thanks to your fan. In other words, the dust bunny on the back of your computer is symptomatic of a bigger problem.

Particulates Build Up
In a particulate-rich environment, the stuff (dust, dirt, sand, soot, etc.) builds up on your fan. The fan, in turn, slows down and needs to run longer -- and push harder -- to get the same effect. Meanwhile, your components are covered in a kind of dust blanket (which can be another whole set of conductivity problem in its own right), keeping them insulated and causing your fan need to work even harder. This is where things get hairy.

Case In Point: On the floor of a tire manufacturer, the air is thick with rubber, plastic

and sulfur. Mission critical PCs were losing the fans at an accelerated rate when the rubber dust would build up and create a thick black mess that visibly slowed their fans and was nearly impossible to remove.

Fans as Point of Failure
PCs have an optimal operating temperature that is maintained by whatever cools them. When cooling is done by a fan, there is a tipping point that occurs where a fan -- even one running 24-7 -- will not be efficient enough to cool the system and the temperature will rise. Best case scenario, your PC’s efficiency is diminished and you are dealing with a loud hum as your fan chugs away. Worst case, you fan fails, your system overheats, and your PC slags.

So What Then?
Apologies if you are now staring at your PC like a ticking time bomb. However, you can “defuse” the situation.

- *Can it:* The first step most people take is blasting the fan with a can of pressurized air. But this is the equivalent to washing your car and not vacuuming the inside. Will it look better? Sure. Will it solve the problem? No. At the end of the day you will likely be blowing more of the particulates into your computer or just moving them around.

Case In Point: A major wood manufacturer had so much pulp in the air, the branded towers were seizing. It became so problematic the company hired a member of staff whose only job was to vacuum PCs on the factory floor. This solution caused their total cost of ownership to skyrocket, while the PC functionality and usability remained impaired.

- *Vac it:* Another option is to literally open up your PC and clean it. This usually entails vacuuming the unit out very carefully. While effective, this solution is plagued with it’s own problems. Off the bat, it’s grossly inefficient especially if you are have more than a couple PCs to manage. In a manufacturing, machine shop, or food production environments, how many man hours do you want to devote to cleaning your pcs? How often? How much money are you losing while that machine is out of action? How many times can you clean a PC before a human error cracks a motherboard, knocks a RAM stick or otherwise damages the delicate innards of your computer? Suddenly you have an whole new set of problems.

Case In Point: At a steel foundry, particles of steel literally tore the fans apart as they were sucked in. Enclosures were brought in to protect the PC, complete with filters and built in AC, but they were cost prohibitive, bulkier and -- worst of all -- the next generation of PCs did not fit in them.

- *Throw money at it:* If money is no object to you and tossing a PC every 3 months when its too dusty, crusty and covered with grime to use, more power to you. For the rest of us, there are some other patches that help, but don’t solve the problem. High powered fans, fan filters, and temperature monitoring software can help alleviate some problems. But an unchanged filter can devastate a fan, a stronger fan moves more particulates around and temperature management software is only going to warn you of problems that are in progress.

- *Enclose it:* Enclosures are worth mentioning, because the instinct is to protect the PC. At their core, they are a big box that the PC sits in, usually with filters or even their own fans. But they are expensive, bulky and awkward.

Case In Point: Trash processing is dirty work and a processing plant ran into problems with the sheer variety of materials which made its way into the air. Debris was causing havoc in their systems, gumming up fans and even occasionally melting them. However, utilizing fanless systems cut down time on these mission critical PCs, while increasing their life by 200 percent.

Forget the Fan
A more strategic option is a fanless PC. A fanless computer is cooled by some other “passive” means: heat sinks, convection, heat pipes, or what have you. It keeps the insides cool and the particulates out, while removing fans entirely as a point of failure. While not a quick fix for existing (ticking time bomb!!!) PC, “loosing the fan” is the most viable long term solution, especially in a dusty or particulate-rich work environments like industrial manufacturing. Going fanless means longer lifespans and increased reliability.

So there you go, a brief look at fans as a point of failure and the inevitable problems that arise from their use in certain situations. Got questions or stories of nasty fans? Please share them below.

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