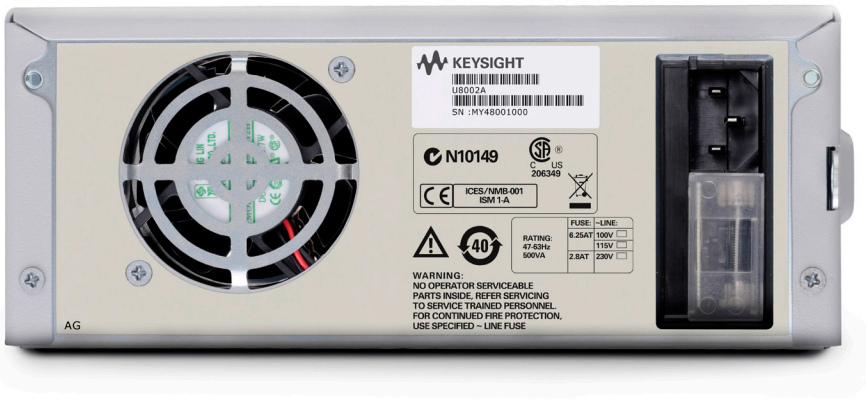
Keysight Technologies

The Metrological and Financial Implications of a Clogged Fan Filter

Application Note



KEYSIGHT TECHNOLOGIES

Unlocking Measurement Insights

Introduction

When you've peeked around the back of an ATE system, have you ever discovered one or more dirty or clogged fan filters? If not, then congratulations!

Maybe your work environment approaches 'clean room' quality – or maybe your preventive maintenance program is effective enough to keep the filters clean. However, it's reasonable to consider that the majority of systems are operating in environments and processes that:

- Degrade metrological integrity
- Increase equipment maintenance cost and downtime

How serious are these effects? It may help to consider the following scenario, drawn from a number of real situations.

The Scenario

Over a period of months, the air filter for an instrument in your ATE system gradually becomes clogged. The internal operating temperature gradually rises; and some metrological parameters gradually drift. At some point, due to circuit temperature coefficients, the instrument goes out of specification. Unaware of this problem, you continue to use the instrument!

Of course, the air filter continues to collect debris. Eventually - maybe weeks later - you smell something burning. Almost simultaneously the instrument goes into hard failure. Now for the first time, you become suspicious, to say the least. You search, inspect and ponder and it doesn't take long for you to spot the clogged air filter.

Although the cause of this dilemma is now obvious, perhaps you don't even want to think about the metrological and financial effects. The truth is that, for some unknown period of time, you have been using an out-of-tolerance instrument in your production process. This is the metrological impact!

Furthermore, your system is now inoperative due to the failure. This downtime translates to lost income and almost certainly to customer dissatisfaction. You have the instrument repaired and recalibrated. This is probably at great expense because there are multiple failures. Due to the nature of heat damage and the associated repair process, the instrument is likely to be out of service for weeks; but eventually you begin using the instrument again.

Unfortunately, due to the original heat-damage incident, many parts (that were not replaced) are functional - but wounded. During the following months and years, you notice the instrument has poorer reliability than before; and it is not as stable between calibrations. You might need to reduce the instrument's calibration interval according to your company's periodicity management process - a pity since the instrument previously had an extended interval based on its excellent historical performance. So, to meet metrological reliability targets, the instrument is calibrated more often.

But this has an undesired impact; the cost of ownership and the inconvenience of downtime are disappointing, compared to what could have been. And, without doubt, variations of this scenario do occur in normal working environments.

The Solution

Anticipation of the problem is the best strategy and is very simple to implement
- To help preserve metrological traceability of your processes
- To improve your customer satisfaction
- To reduce operating costs

All you need to do is follow a simple preventive maintenance program to inspect and clean the air filters at regular intervals.

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