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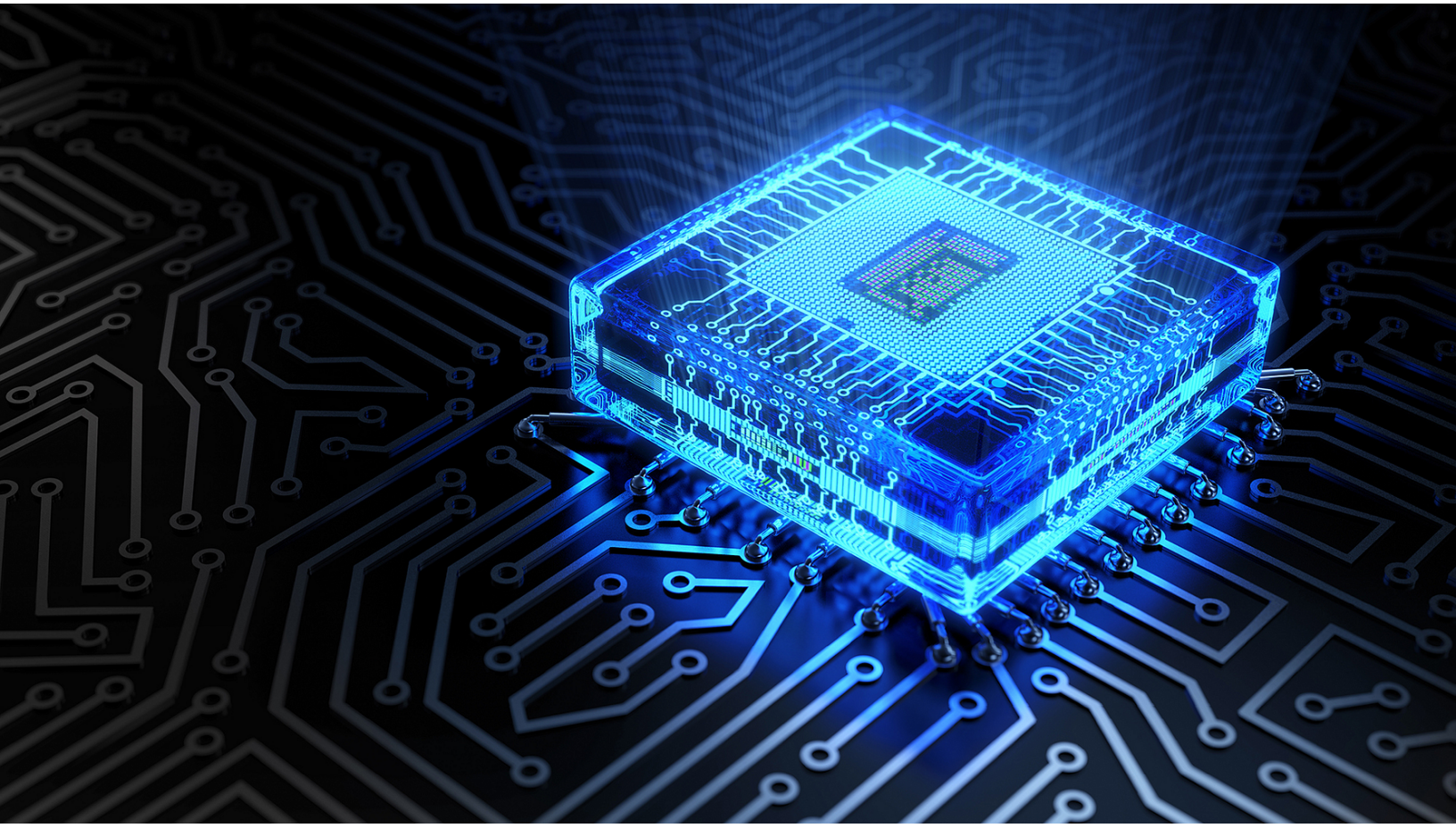

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What are the effects of corrosion?

Some of the effects of corrosion include a significant deterioration of natural and historic monuments as well as increase the risk of catastrophic equipment failures. Air pollution causes corrosion, and it's becoming worse worldwide.

One of the consequences of air pollution that is seldom talked about is the effect of corrosion on man-made materials throughout the world. As air pollution levels have risen in industrialized countries, so too has there been a corresponding increase in corrosion levels. But this doesn't just affect man-made monuments; it also affects things closer to homes such as vehicles, household electronics, outdoor furniture and household tools.

Moreover, corrosion can cause damages to communication/data transfer facilities, industrial process control installations, sensitive production and cultural heritage premises. In all of the applications above one needs to measure the corrosivity.**Download our White Paper on Measurement of Corrosivity here.**

Corrosion also degrades important infrastructure such as steel-reinforced-highways, electrical towers, parking structures and bridges. In short, corrosion is a subject that bears further investigation, so that you can understand how this hidden degradation impacts your life.

What Is Corrosion?

Corrosion is the process of decay on a material caused by a chemical reaction with its environment. Corrosion of metal occurs when an exposed surface comes in contact with a gas or liquid, and the process is accelerated by exposure to warm temperature, acids, and salts.

Although the word 'corrosion' is used to describe the decay of metals, all natural and man-made materials are subject to decay, and the level of pollutants in the air can speed up this process.

The reason is that airborne contaminant such as corrosive particulate matter (PM) are created because of the chemical reactions between liquids and solids. These same liquids and solids, including salt and black carbon, can interact with the molecules within metals and accelerate decay. Additionally, gaseous acidic contaminants have a major role in corrosion of materials, either directly or indirectly as precursors of corrosive particulate matter (PM).

In fact, sulfur dioxide that is generated by power plant and vehicle emissions is one of the biggest contributors to corrosion. Sulfur dioxide is particularly aggressive towards copper contacts used in electronic equipment.

High levels of sulfur dioxide can also damage trees and plants by destroying foliage and inhibiting future growth. A recent analysis from Greenpeace also states that high levels of sulfur dioxide result in disastrous air pollution and premature deaths as well. (1)

In other words, sulfur dioxide doesn't just help degrade metal and other

materials; it also results in disastrous air pollution has some harmful health effects. The U.S. Environmental Protection Agency (EPA) has found that short-term exposure to sulfur dioxide can worsen asthma symptoms and make breathing difficult. (2)

Atmospheric Corrosion Study Sheds More Light

A recent atmospheric corrosion study has helped to shed more light about how airborne pollutants directly affect metals in an industrial city environment.

Researchers began with the thesis that atmospheric corrosion of metals and their alloys is very common in the industrial city environment due to the high concentration of corrosive pollutants in the air. (3)

In other words, researchers theorized that air pollution in a major city would accelerate the corrosion process and help degrade metals faster than if the pollution was at a lower level.

To test this theory, researchers exposed various metal samples to an industrial city environment for 12 months to determine the effect of airborne particulates on the rate of corrosion. They chose an area within the test city that had a high level of pollutants.

The study found that metals corroded at a much faster rate during the winter when pollution levels were at their highest. This increase in pollution was caused by higher emissions generated by nearby power plants and heating plants, as well as from vehicle emissions and heating furnaces that were in wide use due to the cold weather.

The most common pollutants that accelerated corrosion were sulfur dioxide, carbon dioxide, dust and humidity.

Additional contaminant resulting in high levels of corrosions include hydrogen sulfide generated by waste facilities, geothermal activity or anaerobic digestion of organic waste; nitrogen dioxide from traffic and combustion processes, hydrochloric acid, chlorine, acetic acid (the vinegar molecule) and process chemicals released to the environment.

Corrosion Hazards for Electronic EquipmentCorrosion induced equipment failure has been a fact since the mechanical telephone switch centres in the beginning of the 19th century.

The extensive use of computers and electronic equipment in today's society together with increasing pollution, especially in large cities and in industrial locations put even higher demands on finding solutions to lower the risk of failure.

Currently, communication and data transfer facilities are of great importance. One way to reduce the cost for cooling is to use "free cooling" or "air-side economizers" which refers to systems that allow outdoor air to by filters pass into the room to provide direct cooling when outdoor temperature and humidity permits. **Download our White paper on Corrosion Hazards for Electronic Equipment here.**

The Effects of Corrosion

So what are the effects of corrosion that could actually affect your daily life or working environment?

Direct effects of corrosion may include:

- Damage to commercial airplanes or vehicle electronics
- Damage to hard disks and computers used to control complicated processes (e.g. power plants, petrochemical facilities or pulp and paper mills).
- Damage to server rooms and data centres.
- Damage to museum artefacts
- Costs of repairing or replacing household equipment that fails

"We know that many commercial industries such as oil and gas, paper mills, construction and electronics used in a multitude of processes are vulnerable to the effects of corrosion," stated Camfil Molecular Filtration Segment Manager. "Without control methods, there is likely to be equipment and structural failure that can have catastrophic consequences. That's why molecular filtration is so vital to removing corrosive agents from the air and ensuring structural integrity." **Read more about corrosion control in our brochure.**

Preventing Corrosion

There are several ways you can prevent corrosion from pollutants that cannot be removed at the source. First, you can use surface treatments on all metals to protect them from airborne pollutants. Second, you can galvanize all metal products, which makes them more resistant to corrosion. And third, you can invest in high-efficiency air filters (compact filters, scrubbers and media) to improve your indoor air quality and eliminate harmful pollutants that contribute to corrosion processes.

The Camfil Group is headquartered in Stockholm, Sweden, and has **30** manufacturing sites, six R&D centres, local sales offices in **35+** countries, and **5,600** employees and growing. We proudly serve and support customers in a wide variety of industries and in communities across the world. To discover how Camfil can help you to protect people, processes, and the environment, visit us at www.camfil.com.

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