Importance of monitoring and containing High Humidity and Poor Indoor Air-Quality within Datacenters:

Unchecked concentrations of humidity, temperature, and various chemicals can lead to serious consequences like Data Center Corrosion. Data centers in urban locations have reported failures of servers and hard disk drives caused by sulfur corrosion.

Monitoring of Data center's Indoor Air Quality is important, in order to keep a check on corrosion effect on the data center

1. **Air Filtration Is a Must**: Any company that owns a data center must act preemptively to negate the effects of poor indoor air quality with an effective air filtration system.

2. **Active Air Quality monitoring through BMS/DCIM is Critical**: Systems that provide real-time monitoring are crucial to ensure that the air filtration devices are working at optimal efficiency. Filters can clean the air inside data centers. Chemical filters can effectively block external pollutants and toxic chemicals found in Atmospheric air, before entering the facility.

Step-1: Chemical Filtration

Chemical Filtration is necessary for built-in removal of pollutants, corrosive and toxic chemicals including SO_2 and H_2S.

Outdoor air used for ventilation, pressurization and cooling, remain the primary source of airborne contaminants. Air should be cleaned before being introduced into the data center in order to maintain an environment, conducive to the protection of sensitive electronic equipment.

HVAC units take in fresh air from the outside atmosphere. For Datacenters situated in polluted surroundings, additional chemical filters are introduced at the fresh air inlet ducts of HVAC units to keep out the gaseous contaminants. Although a variety of noxious gases can lead to corrosion, the most common contaminants that infiltrate a data center are Sulfur dioxide (SO_2), Hydrogen Sulfide(H_2S) and particulate matter, also known as PM

The salt and sulfur inside these data centers can corrode key electrical components and that can cause electrical shortages, discharges and physical deterioration of equipment.

Specific chemical filter options can be used for Data center applications, where the control of gaseous contaminants is a major concern. Most commonly**, chemical filtration** is used for the removal of SO_2 and H_2S.
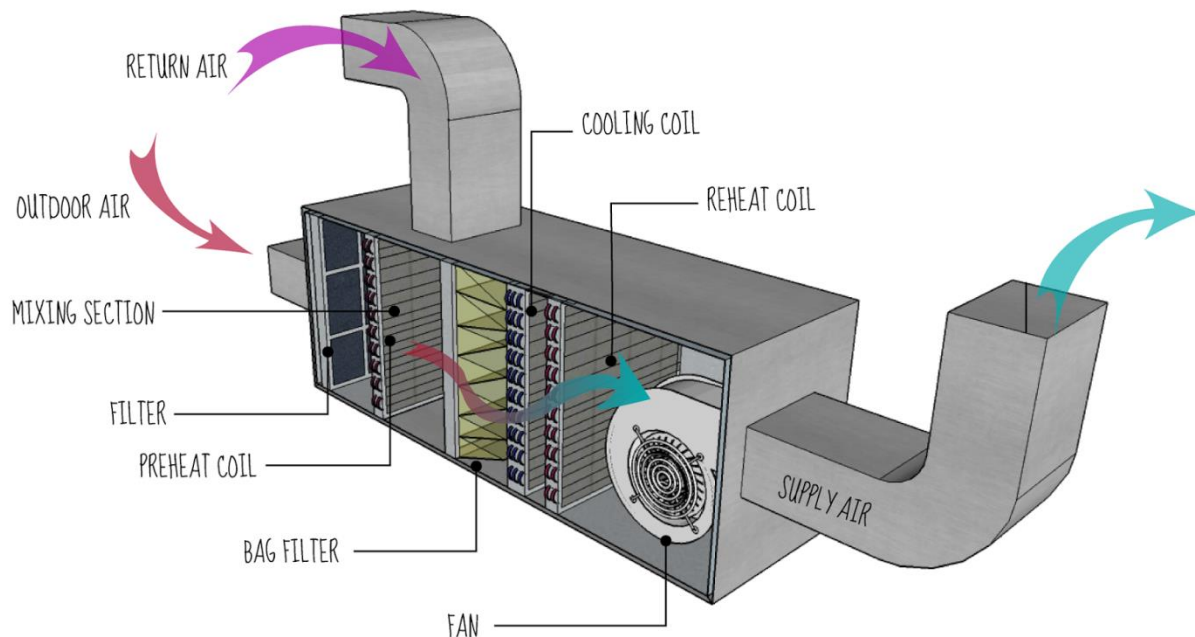
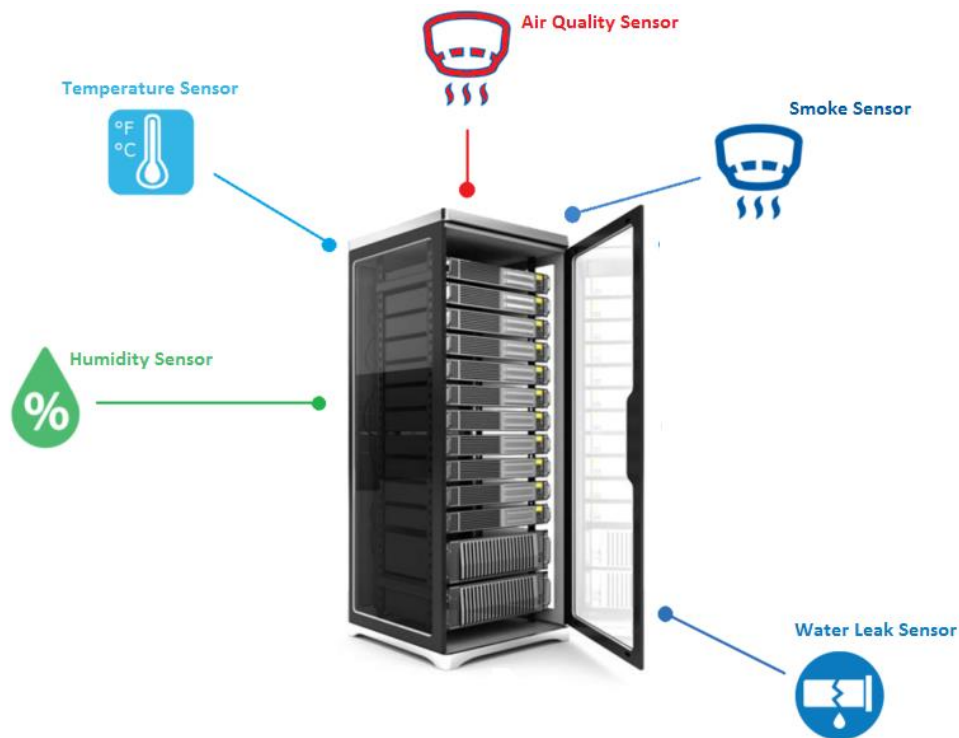# Step-2: Closely Monitoring Indoor Air Quality:

Measuring composition of Air within the Data Center

1. **Humidity/ Temperature:** As the temperature fluctuates, humidity also changes accordingly. More so for tropical coastal climates, where atmospheric humidity tends to be high. High levels of humidity can cause deterioration of silver and copper components of IT devices within the data center. Relative humidity above 60% accelerates corrosion, by forming conductive solutions on electronic components. Above 80%, RH causes extensive electronic corrosive damage, regardless of the levels of contamination. Additionally, corrosive gases and water vapor encountering a base metal, results in the buildup of various chemical reaction byproducts. As the chemical reactions continue, these byproducts of corrosion can form insulating layers on circuits, which further lead to thermal failure, conductive failure or short-circuits. Hence it is essentially vital to strictly maintain Humidity values below 60% RH within the Datacenter.

2. **Air Quality Sensors**: Acidic gases are typically the most harmful and require better monitoring. Small concentrations of Acidic Gases such as hydrogen sulfide (H_2S), Sulfur Oxides, Chlorine and Nitrogen Oxides in the air can result in huge losses for IT and Data Centers. Due to the presence of SO_2, acidification and eutrophication (causing the growth of algae) can take place inside the data center, which can inevitably harm IT equipment. In data centers, presence of SO_2 at higher levels

will attack certain types of metals of electronic circuit boards eventually resulting in corrosion. In worst cases scenarios, component or circuit failures result in unexpected downtime for IT devices leading to losses and high maintenance costs.

Environment Monitoring for the Data Center:

For any Data center, the standard practice is to install Temperature and Humidity sensors across the White space area, to closely monitor temperature and humidity in and around the IT Racks. To detect fire in incipient stages, smoke detectors are installed. To detect the presence of water (Due to condensation or leaks), water leak sensors are installed. Additionally, to detect the concentration of harmful gases like SO_2, H_2S, CO, etc., air quality sensors are deployed within the Datacenter space.

All these devices are closely monitored 24 x 7 by DCIM to ensure the clean indoor air quality within the Datacenter facility. DCIM will raise alerts when internal air quality deteriorates beyond set thresholds. DCIM notifies that it is time for maintenance/ replacement of the DC HVAC system's chemical filters.

For more details and technical discussions, please call or write to us.