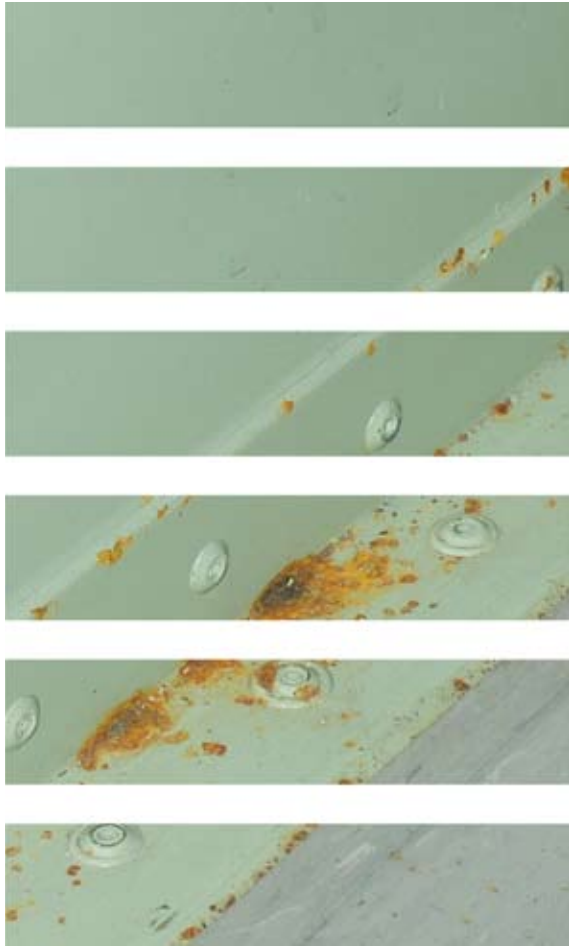


# Controlled Humidity Environment Protecting the Protectors



# In peacetime, humidity is the biggest enemy of defense equipment



The time that defense equipment is actually used is very limited; when compared with non-use time. This is logical for equipment in storage, but even “active status” equipment is not used most of the time and stands parked somewhere. Deployed equipment that is parked or on “Stand By” might have to be made available immediately, without the hassle of solving malfunctions first.

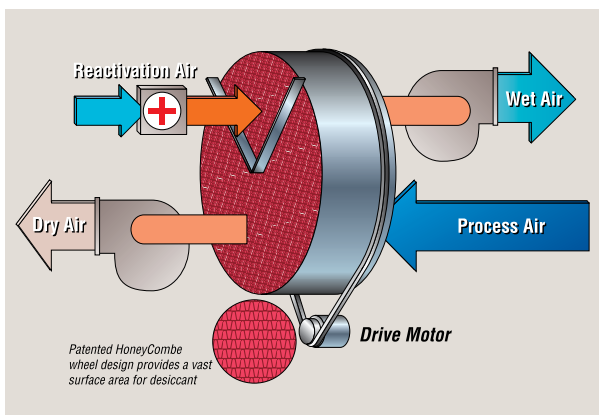
During times that the equipment is not being used, it suffers from the high ambient relative humidity (RH). The average RH in many places around the world is approximately 80%. Corrosion, electronic malfunctions, fungus, chemical decomposition, etc. are all a result of humidity that is present in ambient air by nature.

## Munters, the Humidity Expert

Munters has solutions which take the excess humidity out of the air. The result: less corrosion, fewer malfunctions, better availability, longer inspection and maintenance intervals, more time for training and over the total lifetime of the equipment significantly lower “Life Cycle Costs”.

With more than 20,000 dehumidifiers in use on defense applications worldwide, Munters has a proven track record in effective partnering to solve humidity related problems.

Dehumidification is not a strictly military affair..... Many well known civilian companies use our technologies to protect their production processes, stocks and logistics. We count companies like Nestlé, Intel, Daimler-Chrysler, Siemens, Pfizer and Walmart among our customers.



## The sorption rotor, invented by Munters

Carl Munters is the inventor of the sorption rotor or Honeycombe® desiccant wheel. The working principle is very simple:

- Process air passes through the drying wheel and leaves the dehumidifier as dry air.
- Heated reactivation air collects the moisture absorbed by the drying wheel and leaves the dehumidifier as wet air.

Because a sorption rotor is not temperature dependent, the moisture removal capacity is superior under various climatic conditions that should occur the whole year round, or even through one 24 hour cycle.

Many defense forces around the world have put their trust in this effective technology..... Simple Magic.

# Saving money by lowering the relative humidity



In a military environment many costs can be avoided by lowering the relative humidity (RH). A lower RH than what nature offers us will dramatically influence the amount of moisture damage that normally occurs.

## Corrosion

Research done by Vernon back in the 1920's has shown that there is a direct and exponential relation between corrosion on steel and the relative humidity in the space. Further investigations have shown that this also applies to other metals and combinations of metals. A recent USAF study shows that 20% of all electronic malfunctions are caused by corrosion.



## Electronic malfunctions

Along with corrosion, the RH also has a clear influence on resistance values of insulation materials. This leads to frequent malfunctions during the start-up of electronics that disappear later, when the component is tested in a workshop. These "No Fault Found" (NFF) or "Could Not Duplicate" (CND) phenomena reduce the "Mean Time Between Failure" (MTBF) unnecessarily and are a burden to the logistic system.

In extreme cases a high RH can lead to arcing. In those cases electronic components are often damaged beyond repair, potentially becoming a fire hazard.



## Fungus

The development of fungus depends on humidity and temperature. At ambient RH conditions fungus development is considerable. By lowering the RH, current fungus growth can be destroyed and future fungus growth is prevented completely.

## Chemical decomposition

Humidity in the air can also be a component in a chemical reaction, often with undesirable consequences. For example, due to humidity, ammunition can turn unstable and therefore become very dangerous. By lowering the RH in the storage environment the safe shelf life of the ammunition can be prolonged.



## Experiences

Findings by the "General Accounting Office" (GAO) show that up to 25% can be saved on maintenance costs when the "Dry Air Method" is used. These findings are corroborated by experiences of the Swedish Defence Materiel Administration. The Australian Defence Science and Technology Organisation (DSTO) also supports the use of the "Dry Air Method".

With assistance from Munters, many nations have similar experiences on a wide variety of equipment: aircraft (fixed and rotary wing), armored vehicles, truck mounted shelters, radar systems, ships, ammunition, logistic supplies, etc..



## Application examples

Vehicles and equipment stored in Controlled Humidity Environment (CHE). The storage building does not require heating and the equipment is kept at high quality while inspection intervals are prolonged. Many allied forces use this storage technique as it is proven to be most effective.



Ammunition is typically stored in magazines which are partly earth covered. Usually, ammunition magazines have a high humidity inside, resulting in corrosion damage and the quick decomposition of chemical compounds. Munters sorption dehumidifiers create an environment where corrosion is slowed down and the safe life of the ammunition is extended.



By using portable Munters equipment, ammunition stocks as well as heavy equipment can be protected during Out of Area Operations. Our equipment has seen operation in most peace keeping missions and Out of Area Operations in recent years. The picture on the left shows ammunition containers in Liberia.



Several Munters dehumidifiers are suited for demanding applications where the dehumidifier is built into a system. These dehumidifiers are shock and vibration proof and meet the high standards that are normally set for these applications. Munters can also advise on how to use this equipment in combination with RFI/EMP or NBC protective requirements.



Especially in a corrosive naval environment, dehumidification can be very rewarding. Munters is a world leader in the protection of platform systems, such as gearboxes and shafts, as well as weapon and sensor systems. Latest "state of the art" technology, such as the Thales APAR radar is protected with Munters equipment.



Aircraft and helicopters benefit very much from dehumidification. In many cases, electronic malfunctions are reduced by 50% or more. The structure and engine also benefit from the dry air because the low humidity stops corrosion. With transport aircraft, condensation is a common phenomenon during high altitude flight. Munters dehumidifiers dry the insulation blankets whenever the aircraft are connected.



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