Desiccants can be mouldable

Recently, a newly developed range of products combines adsorbent **desiccants** with **polymers**. Behind this idea there is the possibility to have a **"mouldable"** desiccant, able to be shaped in complex geometries and fit perfectly into tiny and narrow spaces.

Various products have been developed combining different quantities of desiccant and polymers. Among these products **VMAP** is the most versatile.

This composition of **molecular sieve** (60%) and polymers PBT and PET-G (40%) possess the advantage of being **injection-moulded**; therefore it can be pressed into the desired shape providing maximum space utilisation.

VMAP represents a practical alternative to conventional desiccant bags if space available is limited. VMAP gives the adequate **moisture protection** and it is able to adsorb also odours and volatile organic compounds. In addition, the operating temperature ranges from $-40°C$ to $+90°C$.

This product is perfectly suitable for electronic and optic applications, where it is required a high level of cleanliness. Conventionally desiccants are provided in bags and this involves the risk of fibre loss and desiccant dust contamination. VMAP differs from the conventional desiccant because it does not require a barrier between the desiccant and the component that needs to be protected. Instead, it can be placed on the component, while maintaining a clean external environment.

The controlled adsorption properties of the VMAP prolong life of the desiccant. The actual VMAP present in the market is optimised for long time frame operations, where the component needs to be protected for a really long time; hence reducing maintenance costs.

Brownell conducts continuous research and testing on this product, in order to meet different requirements and in the meantime enhancing its performance.

The last challenge involves accelerating the **adsorption** capabilities of VMAP maintaining the same space-exploiting characteristics. This can be achieved in two ways: decreasing the density of the material or increasing the exposed surface area.

The size of the VMAP sample tested is $50\ x\ 30\ x\ 8\ mm$. This standard-size piece is compared with the same sample size part, in which the surface area was increased by drilling holes in the sample.

As a result, faster moisture adsorption was achieved increasing the surface of the sample exposed.

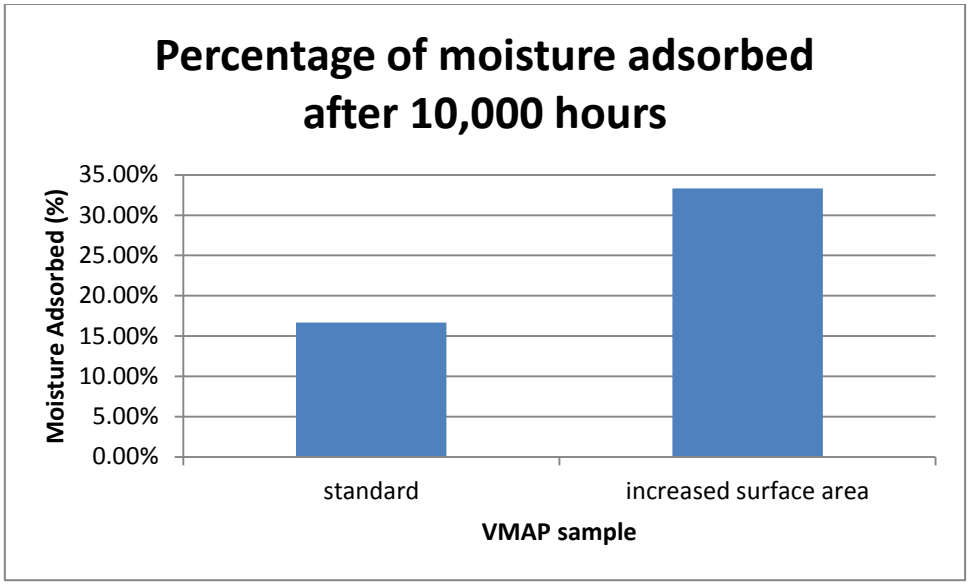

Figure 1 - Comparison between the two samples (time of adsorption at 50%Rh and 22°C).

The graph above shows the percentage of moisture adsorbed by the two samples after 10,000 hours at 50%Rh and 22°C (100% means saturated sample).

After a certain amount of time, the percentage of moisture adsorbed by the standard sample is about half the same quantity for the sample with higher surface area.

Obviously, in order to keep the main dimensions unvaried, the volume of the modified sample had to decrease. The immediate consequence of this operation involves a slightly lower amount of moisture adsorbed per square centimetre in the case of the drilled sample. This is shown in the graph below at 50%Rh and 22°C.

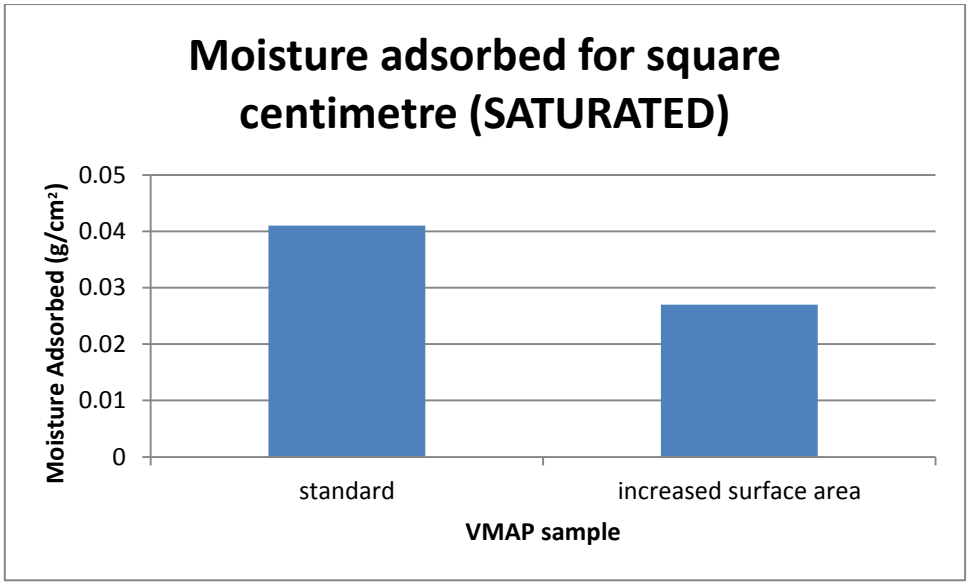

Figure 2 - Comparison between the two samples (moisture adsorption at 50%Rh and 22°C).

This is due to the fact that moisture adsorbed for square centimetre is a quantity that depends on the weight of the sample and on the surface area.

Both samples contain the same amount of desiccant; therefore they will adsorb the same relative weight percentage of moisture. However, a smaller volume entails a smaller weight. Therefore, if the weight decreases and the surface area increase the adsorbed for square centimetre will decrease as it occurs in the second sample.

This proves again that Brownell aims to meet the specific needs of different application and that the extensive research is necessary for this scope.

The study conducted on VMAP demonstrated that increase the surface area of the sample is a valid method to accelerate the adsorbing process. However, a slightly bigger sample will be required to adsorb the same quantity of moisture adsorbed by the standard sample.

On the other hand, if the main constraint is not the speed of adsorption. The standard sample offers the possibility to have a long-term desiccant, allowing reducing maintenance costs.