Dewpoint Dependent Switching

In an ideal case, dewpoint measurement instruments and adsorption dryers form a complex unit based on mutually complementary systems. The aim is to not only monitor the dewpoint, but the primary discussion objective is how to achieve effective control of the dewpoint, given all the required possibilities. If humidity is accurately controlled, reduced desorption surpluses in the region of two digit percentages can be achieved, thus reaching more economical operating situations and clear savings in energy when adsorption drying. Compressed air, which is too dry, however can also lead to unnecessary equipment wear and therefore.shorter service life.

Adsorption dryers in combination with a humidity measuring system make possible an improvement in the quality of compressed air right up to the boundaries of present-day technical possibilities. Conceived as load dependent control system instead of time cycle control, dewpoint control systems are practically immune from maintenance problems and can be integrated into process control consoles at any time. By means of modern electronics and microprocessor technology, values obtained can be directly exploited via computer.

When drying by adsorption, not only the compressed air but also the saturation limit of the adsorbents have to be monitored. Regenerating adsorbers too early means unnecessary waste of energy, whereas on the other hand, regenerating adsorbers too late can cause 'troughs' in the quality level when drying compressed air.

Contrary to a time dependent control system of traditional design, continuously working humidity measurement systems are capable of permanently reacting to changing operating conditions, such as

- moisture saturation of the gaseous medium
- differences in volume flow
- fluctuations in temperature or
- pressure fluctuations

With a time dependent control system, regeneration always commences after firmly programmed time intervals, whatever the state of loading of the drying material. In conjunction with a dewpoint measuring system, is it possible to achieve continuous and stepless adjustment of the regeneration of adsorption dryers, finely tuned to the desired dewpoint.

A load dependent control system always brings about a variable cycle if there are fluctuations in the flow of compressed air, or if the inlet temperature with its associated moisture load varies strongly from summer to winter operation, or if there is the possibility of pressure fluctuations over a wide range arising from fluctuations in consumption.

Differences in moisture load at the inlet of the adsorption dryer through changes in volume, pressure or temperature cause changes of dewpoint at the outlet of the dryer. Depending on the requirement for residual humidity, the pressure dewpoint of the compressed air.is specified as a limiting value and used as control parameter in relation to a varying load situation.

Electronic programmable systems, coupled to a humidity measuring instrument, are capable of detecting the changing operating conditions, to evaluate them and to transmit them as secured signals. Every partial loading of the adsorption dryer is therefore directly converted into an extension of the adsorption period, while the desorption time remains

constant. The saving in desorption energy results from the difference between variable adsorption time and constant desorption time.

A special characteristic has to be observed when using load dependent control systems with adsorption dryers regenerated by a percentage of the dried purge air. If one assumes the utilised load on the dryer with time dependent control to be 70% of capacity, given a constant compressor output flow, the quantity of air for desorption is set for just this 70% of the compressor performance.

When using load dependent control systems, on the other hand, this setting is always for 100%, because the load dependent control utilises the dryer to 100% through an appropriately lengthened cycle. Within the range of partial loading, the adsorption period is extended in proportion to the moisture load and calculated to correspond to a full load situation.

In doing so, the desorption period is not variably adapted with a correspondingly reduced desorption air quantity, as a partial load can, at any time, be followed by a full load and the necessary desorption period must have been fully concluded at such a point in time. Desorption time remains set at a constant level, corresponding to the shortest cycle time.

Overloading the adsorption dryer can, in principle, not be compensated for by a load dependent control system. Dewpoint control arrangements are suitable for all adsorption dryers, whatever mode of regeneration is used.