

O₂ Monitoring in Radiation Curing

Radiation curing is a process where material is exposed to either UV energy or Electron Beam (EB) energy. There are two primary uses for radiation curing. One is for cross linking. This process uses primarily EB technology. A good example of the user of this technology is for a polymerisation process. Monomers and oligomers when exposed to radiation combine to form a solid. If UV radiation is used a photo initiator must be present to start the polymerisation process. A good example of this would be for the curing of ink on labels for soap bottles.

Oxygen inhibits the reaction of radiation cured chemistries. In some cases the oxygen inhibition is not important and thus the process can happen in air. Most chemical suppliers try to supply chemistries that will react in air.

However, whenever EB technology is used the curing chambers must be inerted with N₂ because there are no photo initiators present to start the reaction. Because of this, oxygen analysers are typically an integral part of each EB system when it is sold. When inerting most EB applications would like to see levels of O₂ below 100ppm. EB has been used in a number of applications. Some of these are: shrink wrap, silicone release linings, magnetic tape media, abrasive materials and many wood and ceiling tile applications.

UV chemistries usually require nitrogen inerting when specific characteristics are required. As an example: plastic overlays require certain gloss to be easy to read and look nice. The gloss can be changed by the level of N₂ in the curing chamber. Another application is for printing companies that print signs for outdoor use. Many of the chemistries used in this process require Nitrogen inerting to give the inks long term stability and fade resistance. During the manufacture of tapes-one side of the material has to have a silicone release agent applied or the tape would just stick together. Many of these coating facilities use UV cured silicone release materials. GE manufactures a material that can be used on plastic.

This material does not need to be cured in an inerted environment. Goldschmidt manufactures a material that has different release characteristics and can be used on both paper and plastic materials. The chemistry requires a nitrogen inerted environment. Most UV applications that require nitrogen inerting are confidential. Most companies try to design the chemistry to be an air cure chemistry.

All EB systems are able to be nitrogen inerted. Only UV systems that are designed to be nitrogen inerted can be nitrogen inerted. Customers see value in a system that can be nitrogen inerted. Many UV companies will offer oxygen analysers as an option to purchase, but leave the final decision up to the end user.

Systech Instruments Ltd
17 Thame Park Business Centre,
Thame
OXON
UK
OX9 3XA

www.systech.co.uk
email advice@systech.co.uk
Fax +44 1844 217 220
Tel +44 1844 216 838