CHARACTERIZATION & INTEGRITY TESTING OF FILTRATION MEMBRANES UTILIZING A UNIQUE CORONA BEAM TECHNOLOGY

Author: Gregory J. Gormley, President
ConverTec Corporation
P.O. Box 690
Newtown, PA USA
Phone: 215-860-8998
Email: cbeam-gjg@msn.com

The patented and proprietary technology entitled "Electron Resonance Analysis Technology" (ERAT), is nicknamed "C-Beam Technology" or “Corona Beam Technology” (a corona beam is an electron beam in an open atmosphere that provides a continuous electron discharge), which has a frequency imposed on the beam and is utilized to monitored the constructive and dis-destructive harmonic distortions from the standard signal (calibration signal) or 5he materials “signature”. The changes in the signature signal indicate material differences. These changes may be acceptable or they may fall outside of a pre-imposed range of acceptability. This technology has the capability to test the integrity and characterize many different types of filtration materials.

The technology will measure the porosity, permeability, hole and permeability distribution, thickness of he material, moisture content, un-catalyzed resin areas, adhesion interfaces failures, cracks, fissures, molecular structure and many more types of anomalies.

All measurements can be calibrated to a narrow range of acceptability. Testing can be performed for 100% certification, non-destructively, on-line and in real-time without contacting the material. The beam is drawn and not projected. The unique aspect is that the beam will follow a tortuous path through material and curve to follow its’ electronic potential.

The “Point-To-Point Effect” is composed of an Anodic Electrode or the positive electrode on one side (which is the Corona Beam Gun) and a Cathodic Electrode, or the negative or ground electrode on the other side (which is usually a roller). The material being tested is traveling between the two electrodes. When an anomaly passes under the corona beam, which is continuously being drawn through the material, the beam becomes focused base on the material's signature calibration parameters and the disruption of the frequencies signal harmonics. This frequency signal is then digitized to a digital signal. The digital signal is then sent to the computer controller or the PLC to make a decision and take appropriate action based on the controllers program's range of acceptability.

The incremental measurements are are based on what is called the “FOCAL AREA”. Similar to the Laser Beam, the Corona Beam has an area of focus that is much larger than the of the area of a Focal Point for the Laser Beam. The area of the Corona Beam can vary from a large sized area of a half of an inch to as small as a one-one-thousand of an inch. The size of the potential can vary based on the signature of the material. The signature of material is based on the molecular structure, the dielectric quality and thickness of the material.

ERAT will provide a series of discrete measurements vs. a gray average measurement. This technology can test to the smallest level of 0.5 nanometers and to the largest size of the focal area. Sizes beyond the focal area will not be detected since the beam will loose it's attenuation with the mandrel or the source of electrons or the cathodic electrode side of the “Point-To-Point Effect”.

This technology can be interfaced to create a closed-loop control system. The system can also mark the margin of the material leaving a rating code for latter splicing operations that can rate different levels of permeability, acceptance or rejection.

The technology was thoroughly investigated by an elite group of notable scientists and engineers. ERAT was awarded the 1997 R&D 100 Awards by Research & Development Magazine and was awarded the NASA 2005 NANO50 Award by NASA Nanotech Briefs as one of the fifty top, “technologies that will have a significant impacted on the development of Nano technology”.