S1.1: Filter Media Development Using Filtration Theory

Thad Ptak
Consultant

ABSTRACT

The selection of a filter media structure that is optimal for specific conditions is not a simple process and, generally, is affected by several factors. Traditionally, the design and selection process are based on experience and professional instinct. This approach to filter media design and decision-making process lacks an objective basis for making comparisons between alternative media structures. In order to optimize the performance of filter media, the decision-making process should be placed on a rational and objective basis.

The formulation of the optimization problem involves transforming filter media performance into an equivalent mathematical model. A set of equations based on the classical filtration theory can be used to describe the initial filtration efficiency and pressure drop of filter media. A single criterion deduced from performance characteristics (pressure drop and efficiency) as well as economic indices (cost) can be formulated and expressed in a form of mathematical model.

In this study, the use of filtration theory in developing filter media, its benefits and limitations are presented. One of the biggest challenges is the prediction of the initial and real-life performance of electrostatically enhanced filter media.