S2.1.3 - *High-Performance Metal Filter Cloth - New Developments in Woven Wire Filtration Media*

Frederich Edelmeier[1]
[1]Haver & Boecker

Previous filter cloths with small pore sizes lead to reduced flow rates and significant pressure loss in the production process. The cloth structure of a newly developed three-dimensional weave increases the number of pores and thus the open surface over the same area. For a given pore size, the flow rate is more than doubled compared to conventional Dutch Weaves. The pore size within a batch can be calibrated as desired from 5 µm to 40 µm.Conventional woven wire filter cloths can cause turbulences that affect the filtration process at high flow rates. Turbulences with the 3D-filter cloth is effectively avoided.Its pore size can be calculated precisely in advance and adapted to the respective requirements. The mathematical formulae for determining permeability were developed in cooperation with the University of Stuttgart within the scope of AVIF projects A224 and A251, and experimentally validated by glass bead tests and air flow-through measurements. These predictable pore sizes can achieve extremely high cut-points and dimensional stability. The depth structure of the new woven wire filter cloth facilitates high separation efficiency without rapid blinding. This leads to longer filtration processes between cleaning intervals and longer service life for greater production reliability. The 3D metal filter cloth is

woven from standard diameter wires. Moreover, it is possible to weave special materials such as Alloy 310 S, Hastelloy C 22, Inconel 600 or titanium even in the small pore range. Thus, for the first time, filter cloth with pore sizes below 40 µm can be manufactured in corrosion- and temperature-resistant alloys. The effect of different gradient structures on the load-dependent fractional separation efficiency and its dirt hold capacity have been subject of design considerations in single and multi-layered woven wire mesh combinations in solid-liquid and solid-gaseous separation. In cooperation with the Institute of Mechanical Process Engineering in Stuttgart (IMVT) different gradient structures of wire mesh filtration media were investigated as to their influence on the load-dependent fractional separation efficiency (FAG) as well as their dirt holding capacity. In addition, different offline measurement techniques and particle systems and their influence on the result of the FAG and the dirt hold capacity were investigated and evaluated.Square mesh fabric as well as filter fabric in twilled and plain weave and their combinations in sintered and unsintered condition have been described.It was confirmed that by means of a specifically selected gradient structure and layer orientation, the load-dependent fractional separation efficiency as well as the dirt holding capacity are favorably influenced. This in turn has positive effects on the service life and efficiency of multi-layered metal wire mesh combinations. Blocking tendency is significantly reduced. The throughput characteristics are optimized.

Frederich Edelmeier

Friedrich Edelmeier, Vice President of Haver & Boecker, has been working for the company for more than 45 years. He maintains a strong focus on customer requirements and applications and is instrumental in research and development programs. In addition, Friedrich Edelmeier assumes responsibility for some of Haver & Boecker’s manufacturing subsidiaries.

Keywords:
Flow rate
Cut-point
Separation efficiency

Fractional separation
Dirt hold capactity
Solid-liquid separation
Solid-gaseous separation