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THE EFFECT OF POROSITY AND PORE STRUCTURE ON THE ACCUMULATION OF PARTICLES INTO CELLULOSIC FIBROUS FILTERS

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Air filters are usually composed of fibres that are laid randomly and planarly by using some nonwoven technology. Presently these filters are made mainly from plastic or glass fibres, but it would be environmentally important if one could replace them at least partly with cellulosic fibres. To overcome some problems of the traditional nonwoven technologies VTT has developed foam laying technologies that enable good fiber uniformity and the use of clearly higher fiber consistencies with wood fibers and mixes of staple and wood fibers than the traditional nonwoven techniques.

In this work we study the filtration properties of two industrial air filters and several generic test filters of different porosity that are made from a mixture of viscose fibres and softwood pulp by foam forming. The filtration efficiency of these filters is measured and the filters are loaded with fine test dust. The clean and dirty filters are imaged with X-ray microtomography. The 3D structure of the clean filters and the spatial distribution of the dust particles in the dirty filters are analyzed. Moreover, accumulation of particles is analyzed with flow simulations and the obtained spatial distributions of the particles are compared with the measured distributions.

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References

Time Block Preference

Time Block B (14:00-17:00 CET)

Participation

Unsure

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