

Chemical textile recycling - What does it take to scale it?

It is widely recognized that a radical transformation is needed for the fashion and textile industry. The consumption of textiles is growing, and they end up in waste much faster than before. At the same time, the quality of textiles is decreasing driven by our consumption habits and ultra-fast fashion. Fiber sourcing is in most cases not sustainable; the growth is managed by increase in synthetic fibers and the proportion of recycled fibers is not growing. Legislators in Europe are trying their best to solve the issue and minimize the harmful effects of textile waste: collection of textiles from households is already mandatory, landfilling will be out-phased, incineration decreased and export mostly banned. The question then arises what to do with the textile material that is collected and not fit for re-use anymore?

Recycling textile waste is presented as the solution. Mechanical recycling is already an established industry but used mostly for downscaling, i.e. the treated material is used in other purposes than textiles, such as insulation. Fiber-to-fiber recycling by mechanical means is challenged by the reduced fiber length after processing and the quality of the material required for processing, ruling out mixed textile materials. In addition, the margins in mechanical textile recycling are fairly small, making it difficult to conduct profitable business.

Chemical recycling of mixed textile waste holds promises for fiber-to-fiber recycling of mixed textile waste, and potential technologies have been actively developed for this purpose. However, most of the technologies have been demonstrated only in the laboratory or pilot scale and there is only a few operating at scale close to industrial. The question is what would it take to scale chemical textile recycling? First, you need a technology that works with challenging and variable raw material such as textile waste containing both natural and synthetic fibers of various kinds treated with several different dyes and finishing chemicals. In addition, this technology needs to show technical feasibility beyond the laboratory, i.e. processes need to be up-scalable and resource-efficient. Commercial viability is equally important and there needs to be a profitable business case, at least when longer time period is considered. Sustainability claims alone are not enough to justify the process, but safety and sustainability aspects need to be taken account, so that safety is ensured, both for humans and the environment.

In this presentation I will highlight the progress of textile recycling concept development at Valmet; the challenges we as a process and equipment supplier have faced and what we think is needed to commercialize chemical textile recycling