Microfiber knitted carrier for wastewater treatment - surface layer design

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Abstract: The investigation aims to facilitate/extend biomass carrier development to support microbial adhesion [1] and enhance biofilm attachment which is crucial in wastewater treatment. To replace a solid (usually plastic) biomass carrier with a carrier made of warp-knitted fabric, it is essential to know its description and predict the behaviour of the knitted fabric based on a suitable geometric model mentioned [2–4] and also of 3D warp knitted structure model [5].

Keywords: *warp knits, spacer fabric, design parameters, wastevater treatment.*

INTRODUCTION

In [2] the comparison between theoretical and experimental values of total run-in and weight per unit area of some basic warp-knitted structures (tricot, locknit, satin and sharkskin) are presented. For support carrier efficiency adhesion [1] is necessary to increase the specific surface area which corresponds with loose and open structures (using single or double overlaps) to enable the attachment of microbes during nitrogen removal. The high fabric porosity provides ample space for biofilm growth and it is premeditated together with the fabric roughness and unevenness. All these mentioned phenomena together with the potential of biofilm capture on textured multifilament can be beneficial for solid carrier replacement.

RESULTS

Several variations (Fig. 1) of two guide-bar warp-knitted fabrics were designed and investigated the structure behaviour and geometrical parameters after the relaxation process.

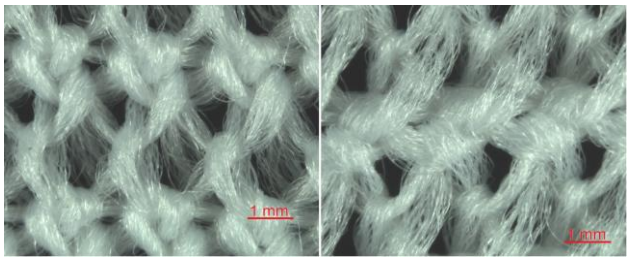

Figure 1 Design 3, technical face (left), and back (right)

The different shrinkage of structural units is analysed according to the lapping and loop inclination to help the carrier surface development (Fig. 2). Firstly, the multifilament consumption, weight per unit area and thickness of designed fabrics are carried out to evaluate the suitable microfiber carrier surface. The next step will be laboratory denitrification testing of the fabricated 3D knitted carrier and determining the parameters that may influence its increasing efficiency.

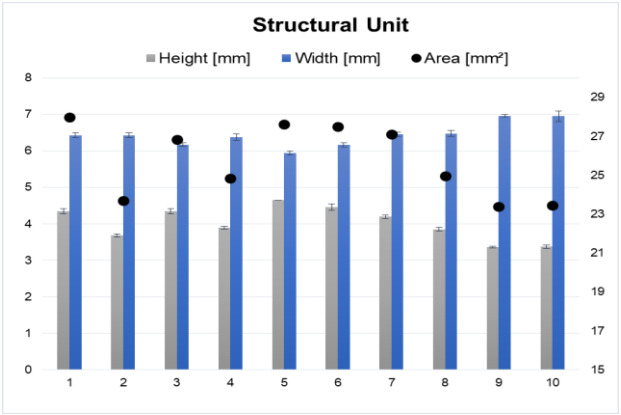

Figure 2 Structural parameters of knitted designs

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