Masters work

Bizjak Matejka+

Kek Stanka: Influence of elastic properties and construction of fabrics and interlinings on final properties of fused panels (mentor: Bizjak Matejka)
The master's thesis thoroughly examines elastic properties of fabrics and interlining. It also explores the influence of such properties and the construction of fabrics and interlining on the final properties of fused panels. The methods of cyclic uniaxial loading of straps and cyclic spherical loading with a ball were used to this end. The characteristics of ten woollen fabrics with or without elastane were explored. The fabrics differ in weave, thickness, area density and warp and weft thread density. We selected and examined ten different types of polyester interlining that complement the selected fabrics in the production of woollen outer garments. We also presented the processes of fabric and interlining stabilisation for fused panels. The combination of selected fabrics and interlining sufficed for ten different fused panels. The thesis involves the results and analysis of bending stiffness, dry wrinkle recovery angle, tensile strength and elongation at break of stripe test pieces as well as dimensional stability following chemical dry cleaning. Moreover, the thesis mainly focuses on determining the elasticity of fabrics, interlining and fused panels in the warp and weft direction, maximum elongation variable, elastic recovery and un-recovered deformation. The measured values were statistically analysed to determine the extent of differences between the selected flat fabrics and the influence of factors on the measured values.
The results suggest that the construction parameters of fabrics are the main factor influencing elastic properties of fused panels. Woollen fabrics have a higher elastic recovery immediately after relieve, while a woollen fabric with added elastane required more time to recover to the initial stage. The measurements showed that fused panels with woven interlining have better performance properties than those with knit interlining. The ANOVA statistical analysis confirmed that the elastic properties of fabrics have the most significant influence on the elastic recovery and un-recovered deformation of fused panels.

Petra Eva Forte Tavčer+

Mateja Godec: Characteristics of phosphorescent pigments printed on fabric
(co-mentor: assist. prof. dr. Mateja Kert)
The characteristics of phosphorescent pigments printed on polyester and cotton fabric were investigated. The phosphorescent pigments are special pigments that glow in the dark after exposure to light. The main goal of the research was to determine the length of the luminescent activity of phosphorescent pigments in the dark after exposure to light and the effect of different chemical finishes and other pigments on the luminescent activity of these pigments. Another goal of the thesis was to also determine the effect of various washing procedures on luminescent activity of printed samples. The printing was performed with a laboratory printing machine using the flat print technique. Samples were exposed to illumination in a light chamber inside a dark room at different durations. After the removal of the light source, the photographs were taken, which were later spectrophotometrically evaluated to determine the colour values and light activity of printed samples in the dark.

Tatjana Rijavec+

Andreja Nagode: Fabric development factors from cellulose fibres
The research explores the fabrics from blends of cotton fibre yarn in warp and new regenerated cellulose fibre yarns from Lenpur, Bamboo and Rainbow viscose and cotton in weft. The best durability and aesthetic appearance was displayed by the fabrics containing the Lenpur yarns; the fabric containing the Bamboo yarn has lower quality, but the worst properties were displayed by fabrics containing Rainbow yarns. The fabrics containing the Rainbow yarns had the best handle; the fabric containing the Bamboo yarn had the worst handle. The fabrics made from blends of cotton/new regenerated cellulose fibre yarns showed better softness and lower geometric roughness than the pure cotton fabric after twenty cycles of domestic washing. Thirty minutes of bio-polishing with the enzyme Primafast 100 improved the surface properties of all the fabrics, but the most significant improvements were made on the fabrics containing Lenpur yarns.

Vanja Prevolnik: Fabric development factors from cellulose fibres
Textile technological properties of laminated silicon aerogel composite Spaceloft® 3251 (Aspen aerogels, Inc., USA) with a water vapour permeable membrane and polyester warp knitted fabric were studied in the research. The laminate of five layers has a mass per unit area of 615.6 g/m2, thickness of 3.0 mm and density of 0.21 g/cm3, has good mechanical properties, is resistant to rubbing, is water vapour permeable and is a hydrophobic and oleophylic material. Thermal conductivity of 47.4 mW/m.K (measured on a non-standardised apparatus) provides good thermal insulation. The material is a bit too heavy and rigid for use in clothing; the clothing would be non-flexible and uncomfortable. It is sensitive to sunlight and higher temperatures. The silica aerogel is inclined to crushing during use, which would make the clothes softer and more pleasant for wearing. For the usage of aerogel composite in laminate, a proper selection of membrane and thermoplastic adhesive is most important in order to limit the spread of the aerogel dust into the surroundings, which deteriorates the material handle and, in particular, its thermal insulation properties. Analysed laminate is suitable for sleeping bags, protective coverings and seat covers of wheelchairs for winter conditions, etc.

Brigita Tomšič+

Anja Maloprav: Creation of “lotus effect” on cotton fabrics with a combination of silica nanoparticles and functional sol-gel precursors
Co-mentor: prof. dr. Barbara Simončič
In the framework of the master’s thesis, a new process of chemical modification of textiles for creation of multifunctional superhydrophobic and antimicrobial properties by using environmentally friendly sol-gel precursors was developed. A combination of silica nanoparticles and precursors aminopropyl isooctyl polyhedral silsesquioxane (POSS) and octadecyldimethyl(3-trimethoxysilylpropyl) ammonium chloride (Si-QAC) was applied to 100 percent cotton using an impregnation process. Based on the results, it was found that the blocky structure of POSS is of great importance for achieving superhydrophobicity, since in combination with silica nanoparticles two layered micro to nanostructured roughness of the fiber surface is formed, with a contact angle of water higher than 150°. Despite the increased roughness and superhydrophobicity, studied samples did not show self-cleaning effect and sliding angle of water smaller than 10°. However, due to the presence of Si-QAC in the finish, excellent antimicrobial activity for both Gram-positive and Gram-negative bacteria was achieved.

Danaja Štular: Creation of cotton fabrics with stimuli responsive and antimicrobial properties
The aim of the master’s thesis was to study the possibility of applying temperature and pH responsive microgel

based on poly (N-izopropilakrilamid) / chitosan and antimicrobial active sol-gel precursor oktadecildimetil (3-trimethoxysilylpropyl) ammonium chloride (Si-QAC) to 100-percent cotton. Both agents were applied using two-step and one-step impregnation procedures. The results of morphological, chemical and functional properties of finished samples have shown that by the combination of the studied agents the formation of washing resistant coating on the surface of the fibres with excellent anti-microbial and thermoregulation activity can be formed. The importance of microgel in the gradual release of Si-QAC and thereby extension of the bio-barrier effectiveness was shown. This confirms the suitability of the combination of both agents for the creation of “smart textiles” with simultaneous responsive and antibacterial properties.