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Wellbeing in textiles assessed by electromyography|Wohlbefinden in Textilien bewertet mit Hilfe der Elektromyographie

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Clothing is an inseparable attribute of whole human life. Human skin is in direct touch with textiles both during the day and during the night. The interaction of skin and apparels depends on many factors. As well raw materials, fabric structure and climatic conditions: temperature, humidity, air movement and physical activity and individual characteristic of wearer are responsible for all the features of skin - clothing microclimate. Sensory receptors, the nerve endings in the skin collect signals from the skin surface, regulate the physiological processes in the human body. An analysis of clothing influence on activity of muscle is presented. Clothes have been investigated, made out 100 % of the man-made cellulosic fibre TENCEL, 100 % polyester, and their blends. Every sort of raw material has been examined and the parameter of EMG of forearm muscle tension was registered each time with the volunteers wearing the clothes being examined. The special attention has been put during examination on monitoring of parameters of skin-clothing microclimate, during 5 hours of wearing the clothes by volunteers. The parameters being registered were: temperature of skin of the back and humidity of skin covered by the examined clothes, and also the potential difference of an electrostatic field of electrostatics charges collected on the surface of the clothes. The experiments were performed during the state of rest. Results of the study showed that everyday clothing may cause changes in the electromyographic records of muscle tension. These phenomena were observed in case of wearing polyester clothes and not observed in case of TENCEL manmade cellulosic fibres garment.

Holofiber: An optically active fiber with bioactive properties|Holofiber: Optisch aktive Faser mit bioaktiven Eigenschaften

TURNER-TERRY

Holofibre is a PET based fibre that contains a proprietary blend of microscopic particles distributed throughout the polymer matrix. These natural minerals selectively transmit, reflect and refract light energy - both ambient and from the body. Influenced by NASA-sponsored studies of physiological reactions to specific wavelengths of light, the additive has been designed to recycle this energy back to the body for positive effects. Clinical studies using Holofibre have demonstrated increases in transcutaneous oxygen perfusion (TcPO₂) indicating improved oxygen delivery to tissues as compared to non-Holofibre control garments. The fibre has been used in a variety of products including socks, thermal underwear, performance shirts and pants, equine blankets and wraps, pillows, mattress pads and comforters. Anecdotal reports from users include reduced swelling, reduced pain, increased warmth, faster recovery from physical exertion, rapid healing from injury and improved sleep.

A serious approach to wellbeing with textiles|Wohlfühltextilien, ernst gemeint

MATHIS-RAYMOND|MEHLING-ANNETTE

Textiles, the first interface between human beings and the surrounding world, can contribute a lot to feeling protected and comfortable. They do this in a classic passive way with a good fit, proper thermal and moisture management and a pleasant handle. Today, however, they can be transformed into 'active' players for even more well-being by building into them e.g. skin care or aromatherapy properties that can really make a difference to the consumer. The development of cosmetotextiles which will have a strong appeal for consumers is not an easy task. Many cosmetic ingredients are rather heat sensitive and prone to oxidation while perfumes for example are quite volatile. This is the reason why micro-packaging via micro-encapsulation is such a key technology for cosmetotextiles. Although covalent grafting of micro-capsules especially onto natural fibres is feasible, the most common fixation and actual quite effective technology involves the usage of a well selected 'glue', a binder with good skin compatibility. The general philosophy of Skintex at Cognis is quite simple: Whatever is promised must be easily noticed by a large majority of consumers. Skintex Supercool is based on encapsulated menthol along with emollients and synthetic long lasting coolants. Skintex Slimming is a sophisticated formula based on an optimized combination of natural emollients, shea butter, apricot kernel oil and rose hip oil enriched with vitamin E and a series of anti-cellulit ingredients used in cosmetics. Skintex MM combines the powerful skin care effect of shea butter, jojoba oil, Monoi de Tahiti and squalane with free radicals scavenger vitamin E. Skintex MM was applied by exhaustion onto cotto/polyamid/elastane knee-high socks.

Textiles for the improvement of physical performance of multiple sclerosis patients|Textilien zur Verbesserung der körperlichen Leistungsfähigkeit von Multiple Sklerose-Patienten

ROTHMAIER-MARKUS

Persons suffering from Multiple Sclerosis (MS) often show a reduced speed of communication between nerve cells. Moderate body cooling of these patients results in an increased velocity and has a positive effect on for example spasticity, muscular strength and fatigue. The correlation of body cooling and improved body control has been known for a long time (Uhthoff phenomenon) and is used in modern therapies routinely (ice water baths). To employ body cooling to patients in their everyday environment many solutions have been conceived (e.g. suits with an integrated tubing System for circulating cooling liquids). However the personal mobility was restricted profoundly. The section 'Medical Textiles and Membranes' of the EMPA has developed novel laminates, made of two polymer membranes and a textile substrate, which can be tailored to lightweight personal cooling garments. Evaporation of water from the intermediate textile layer of the laminates requires cooling energy which lowers the temperature of the skin and subcutaneous muscular tissue by a couple of degrees Celsius. Water is added shortly prior to a chosen activity by the patient and can be refilled at any time desired (even while wearing the garment). In a preliminary patient survey, it could be shown that patients wearing a tight-cuff cooling garment had better motion sequences and were able to per-form physical activities for longer time periods than usual.

Functionalisation of cellulosic fibers by addition of nanodispersed inorganic charges|Funktionalisierung von Cellulosefasern durch Beimengung von Nanolösungen anorganischer Ladungen

MANTERO-E|SEGHIZZI-A|CAMINO-G|FRACHE-A

Overhead presentation. This project is the result of the collaboration between the Polytechnic of Turin and the Italian textile group BembergCell S.p.A. It is born as the result of the merger of the three fibre manufacturing companies Bemberg, Novaceta and Nuova Rayon. Innovation is focused on the exclusive association of the three cellulosic fibres cupro, acetate and viscose and is assured by the strong orientation towards R&D activities to individuate new development. This is why BembergCell applies to academic world to develop a research project about innovative materials (such as nanomaterials) applied to cellulosic fibres. The aim of the present project is to create a new cellulosic fibre with innovative and peculiar properties: an improvement in fibre performance (spinnability, mechanical properties such as elastic modulus, elongation at break, breaking stress and yield stress, tenacity etc.) through a functionalization obtained by addition of inorganic clays in which at least one dimension of the dispersed particles is in the nanometer range. The uniform dispersion of nanoparticles against their agglomeration due to van der Waals bonding is the first step in the processing of nanocomposites. Besides the problems of agglomeration, exfoliation of clays and graphitic layers are essential. Micrometric agglomeration into the dope can obstruct the hole of the spinneret.

Tencel - Natural intelligence by adaptive nanofibrillar structure|Tencel - natürliche Intelligenz durch adaptive nanofibrilläre Struktur

SCHUSTER-K-CHRISTIAN|SUCHOMEL-FRIEDRICH|MÄNNER-JOHANN|ABU-ROUS-MOHAMMED|FIRGO-HEINRICH

The outstanding comfort in wear of textiles made from (hydrophilic) Tencel staple fibres, compared to textiles from (hydrophobic) synthetic fibres is known in the experience of textile consumers for many applications. Recent research has confirmed these effects objectively and shed light on the question why wear comfort for hydrophilic Tencel textiles is even better than for textiles from other hydrophilic cellulosic fibres. The main asset of cellulose, the ability to absorb water into the fibre structure, is the key to the functional and comfort properties. Tencel contains water in an adaptive nano-fibrillar structure, which changes its properties according to the application by changing water content. For example, the 'cool feeling' in Tencel textiles increases with air humidity, so, the effect is higher in hot and humid weather, when cooling is needed. The outstanding features are found in water transport, humidity buffering, heat insulation of duvets and wadding fleece, the reduction of microbial growth purely by physical means, and avoiding electrostatic charge. The resulting overall enhanced comfort in wear was also proven in medical studies with patients suffering from skin problems. For special applications, e.g. sportswear or professional wear, fibre blends of synthetic fibres and Tencel prove to be particularly functional.

Benefits for low compression garments for healthy people|Vorteile von Beinbekleidung mit leichter Kompression

BAKKER-W

Overhead presentation. It is well established that high compression, with or without graduation, in garments for the leg can give many benefits for those who have medical problems. Compression, with or without graduation, in garments for the leg can also give many physiological benefits for the healthy wearer, ranging from less fatigue, less swollen legs and enhancement of athletic performance. Graduated compression is achieved by using Lycra in legwear garments in such a way that compression decreases from the ankle to the upper part of the leg. The LegCare concept was developed for woman's hosiery. In clinical studies it was shown that by lower compression from ankle to thigh with a certain gradient reduces swelling of the lower leg during the day, and as a consequence the feeling of fatigue. When this concept was evaluated in socks, similar effects were observed, even when the graduated compression was applied from ankle to calf. This concept, marketed as Energizing Socks, will allow men as well as women to benefit from the favourable effects. In sports garments, compression, graduated or non-graduated, can also improve the performance of an athlete. The Lycra Power concept demonstrated the postponement of the moment of exhaust of the muscle and the accuracy of the accuracy of repetitive movements. More recently, it was demonstrated that the use of socks with graduated compression by runners has the potential to significantly reduce post exercise muscle soreness and heart rate, and an increase in jump height which suggest that other benefits may exist. The participants completed two main trials (2 x 5 km), each separated by at least 3 days. Prior to the main trials subjects were required to complete the 10 km route at least once and the times(s) obtained were used to determine the running pace for the main trials. The pace was maintained for the subjects by one of the investigators riding beside them on a bicycle throughout the trial. Runner with compression stockings showed a slightly reduce heart rate and a slightly faster speed.

Functional textile for decubitus prophylaxis|Funktionelles Textil zur Dekubitus-Prophylaxe

GERHARDT-LUTZ-CHRISTIAN|SCHRADE-ULRICH|WAEBER-PETER|DERLER-SIEGFRIED

Overhead presentation. Current commercial anti-decubitus systems were generally conceived with regard to pressure reduction and pressure relief. The basic concept of the novel, functional textile is to optimize contact-mechanical (surface structure, frictional properties) as well as thermo-physiological parameters (buffering of humidity, water vapour permeability) of a woven fabric in order to reduce injuries and deformations of the skin and to maintain its integrity. Based on the investigation of currently used hospital textiles as reference materials, a prototype of a novel skin protective textile will be realized. Until now, the tribology of skin in contact with textiles as well as the role that textiles play in the formation and prevention of decubitus is largely unexplored. Biomechanical and tribological test methods have been developed to realistically simulate the patient situation in laboratory experiments. Interface pressures were measured between lying persons and hospital mattresses. Frictional properties of different fabrics against a mechanical skin mode] were determined. The novel functional textile is expected to prevent the onset of decubitus.

Use of monofilaments in health care|Einsatz von Monofilamenten im Healthcare-Bereich

SCHLEICHER-DIETER

Overhead presentation. Textile products in health care area increasingly fulfil important functions to the care and preservation of health. In these textile applications monofilaments are used in constantly increasing volumes. Beside the classical application for example surgical sewing thread in the past years, new and interesting areas were discovered. At this point especially the 3D-fabrics (knitted or interlaced) are used for pressure discharge and temperature regulation of the human body. In this aspect, the advantageous qualities of Teijin monofilaments like stiffness, smooth surface, high dimension stability and good adaptation to the environmental properties play an important role. Monofilaments between 33 dtex and 100 dtex are used in 3D textiles with a maximal thickness of 10 mm. At high distance structures with a thickness up to 60 mm monofilaments between 0.15 mm and 0.3 mm diameter are used. Beside PES, Polyamide 6.6 with diameters between 0.11 and 0.3 mm and PPS in diameters between 0.15 and 0.3 mm can be applied. The high adaptation possibility of the textile qualities is basis of variability. The melt spinning process allows by addition of additives a durable effect for the whole life span of the monofilaments in functional textiles. The finishing of the monofilaments with antibacterial effect is possible, as well. The bicomponent technology provides variability of the qualities of monofilaments in different applications. Teijin owns the necessary experience for adaptation and development of monofilaments for the individual application in health care area. Teijin Monofilament Germany has know-how concerning the combination with other fibre materials to compile innovative solutions which results in new applications.

Innovative monofilaments for medical use|Innovative Monofilamente für medizinische Anwendungen

DEBREUCK-H

The monofilament production is a relatively low speed process (100 - 200 m/min), especially compared to the multifilament extrusion (1500 - 5000 m/min). Each yarn leaving the extrusion head is collected separately on a spool or bobbin, whilst in a multifilament a bundle of yarns is grouped together and wound on a single spool or bobbin. Scourlux is a separation yarn (for knitting industry). Fluorocarbons are high-tech yarns for aviation industry, filters, conveyor belts, automotive, etc. Fluolux are fluorescent yarns for protective and security textile applications. Rods and strips are produced using thick monofilaments and tapes for the off-shore, telecom and furniture industry. Luxamide and Luxester are PA and PET monofilaments for e.g. sewing thread. Thermolux is a thermal bonding yarns made of co-polymers with a lowered melting point. The melting points vary from 70degrees C till 190 degrees C. Elastolux O is an elastomer with very interesting characteristics for use in medical applications. The material behaves likewise natural rubber but causes less allergic reactions. The material is approved by the FDA and/or USP for medical applications. The yarn has also other interesting characteristics: excellent hysteresis, washable, UV stability for over 10 years (outdoor use) and suited for sterilization. Luxilon is one of the leading companies in the production of non-resorbable surgical sutures. In this category we also include the yarns used for other medical applications as there are: (surgical) mesh, braided structures, (parts of) implants, etc. The Sterilux yarns find more and more applications in specific textile applications for medical use. The main reasons why people come to us for these type of products are very high quality and stability of the yarns and the guarantee that everything is well controlled, - the right polymers, meeting all requirements (FDA, USP, EP, etc.), very quick service and short reaction time and very close collaboration with the customer. Luxilon is testing a serial ultra pure grades of biopolymers in association with a polymer supplier, Centexbel and a UK University. Expected characteristics are anti-bacterial, tissue engineering and the possibility to make sutures of them.

Textile medical devices - safety requirements|Textile Medizinprodukte - Anforderungen an die Sicherheit

HÖFER-DIRK

Overhead presentation. Amongst technical textiles the product group of medical textiles has an enormous worldwide growth potential. Many of these products are medical products by definition. Therefore these textiles for medical use are submitted to the general requirements for product safety that are defined in the European norm EN ISO 10993 'Biological judgements of medical products'. This norm specifies which kind of risk analyses have to be conducted depending upon the kind of contact with the body and its duration. Risk class I comprises bandages, drapes, bed linen, risk class IIa surgical towels, risk class IIb textile wound dressings, and risk class III implants. A lot of requirements for the safety of medical and hygiene products can be met reliably. In order to judge the biological safety of medical textiles in the final product scientifically objectively, the Hohensteiner Institute have compared current in-vitro testing methods with the testing methods of EN ISO 10993. Textile manufacturers should have a clear understanding of the meaning of tests like cytotoxicity, the potential of sensibilization and irritation to comply with the requirements of norm EN ISO 10993 and to develop a successful textile for medical use.

Wellbeing and health with textiles|Komforttextilien unter Verwendung von antistatischen Fasern und Mikrokapseln

LUTIN-DELZERS-C

Overhead presentation. Textiles can contribute to comfort, well-being and even security. Average users do not know about it but there are some ways to cope with uncomfortable electrostatic discharges occurring mainly through textile materials (when changing clothes and hair stand on end, when getting out of the car, when holding a door knob or a rolling chair after walking on a carpet etc). Making textile materials sufficiently conductive with the adding of conductive fibres is the solution to neutralize static electricity or to shield against waves (mobile phones, electro smog). Bed linen textiles can be made more comfortable and healthier thanks to microencapsulation or thanks to antibacterial and/or anti-dust mite treatments. Fibrefill coated with microencapsulated essential oils let you enjoy the well known benefits of essential oils. Antibacterial fibres added to textiles prevent more or less serious pathologies, limit odours development but also prevent textile deterioration (discoloration, deterioration of fibre characteristics and performance). A caricidal fibrefill in bed linen prevents allergies and the troubles they cause. Fabrics can be made more comfortable and healthier if they have thermal-properties: warmth in winter-jackets, in sportswear, thermoregulation in garments, shoes. R.STAT will raise a panorama of different ways to make textiles more comfortable and healthier, talk about the advantages and drawbacks without forgetting to speak about the existing means to measure these performances.

Use of textile materials for the elimination of odours and harmful substances in the air by adsorption and catalytic degradation|Verwendung textiler Materialien für die Beseitigung von Gerüchen und schädlichen Substanzen in der Luft mittels Adsorption und katalytischen Abbau

WITTE-INGE-DE|WITTE-KOEN-DE

To give a surplus value to existing textile products, more and more specific functionalities are incorporated into the materials. One of the possibilities is the addition of products that actively eliminate odour and harmful components by adsorption and catalytic degradation. Some primary products - developed in Japan and Germany and bound to exclusivity contracts - are currently being commercialized. The efficiency, the selectivity or the permanent behaviour are factors that are not sufficiently demonstrated and a further scientific and fundamental optimization of these products is needed. The goal of this project is to examine and optimize the possibilities of adsorption and catalytic degradation to the specific requirements of textile materials. An important part of the research project is the optimization of the necessary techniques to measure the efficiency and permanent behaviour of the catalytic degradation, for both basic products (catalysts) and textile materials. The complete cycle of utilization - including maintenance - is then simulated. The products to be optimized are most suitable for the interior textile market (carpet, furnishing fabrics, and upholstery fabrics). The technology, however, also offers opportunities for clothing textiles and technical textiles.

New laminates for trousers: weather protection meets indoor comfort|Neue Hosenlamine: Wetterschutz vereint mit Bürokomfort

SPINDLER-U

Trousers are normally worn throughout the whole day directly on the skin, whereas jackets are worn as they are needed on top of another layer. This means that trousers almost always get worn inside and outside. With foul weather this means a compromise which leads to insufficient weather protection for the legs. Increasing the weather protection level without reducing the indoor comfort is the clear goal. Furthermore it can be easily derived from the much higher wear hours compared to jackets that the demand for durability and wear comfort is much higher for trousers, and wear comfort now additionally includes skin contact. Consequently the combination of durability and skin comfort, highest level of breathability and the look/appearance of regular trousers were the main criteria for the development of the new 3-layer Windstopper laminates. The trousers made of these new laminates convincingly showed in lab tests, climatic chamber studies, as well as field trials that they meet the goal of increased weather protection without compromising the wear comfort in office conditions.

Megatrend Wellness - Designstrategien|Megatrend wellness - design policies

STARK-KARIN|WIEDEMANN-JUTTA

Durch den bewussten Einsatz von Marketingstrategien zur Vermarktung von Wellness-Programmen und -Produkten wird das Wellness-Konzept zum Megatrend der Zivilisationskultur. Dieses Konzept basiert auf vier Säulen: bewusste Ernährung, regelmäßige und angepasste Bewegungsprogramme, Entspannungsmethoden wie Meditation und Yoga (auch passiver Art wie Massagen oder Sauna) und sorgfältiger Umgang mit der Natur und ihren Produkten. Basierend auf diesen Erkenntnissen werden Prognosen zu Designstrategien entwickelt, die das Wellness-Konzept in das 21. Jahrhundert tragen. Dabei stehen visionäre Konzepte und Anforderungsprofile für textile Produkte im Sinne eines Designs, das Wellness integriert im Vordergrund. Diese Designkonzepte werden auf Lifestyle-Szenarien abgestimmt, die auf soziologischen Studien basieren und einen Wandel der Wertevorstellung in der Gesellschaft hin zu einer Ära der Eigenverantwortung prognostizieren. Dienstleistungen werden unter dem Schlagwort Wellness neu vermarktet. Mit dem Versprechen Wellness kaufen wir Produkte, welche unser Wohlbefinden steigern sollen. Intelligente Textilien und Smart cloth sind die Schlagwörter der Zukunft, das heißt, nicht mehr schwitzen, wenn ja dann gut riechen oder nicht mehr frieren, denn die Bekleidung passt sich der Temperatur an. Form-, Farb-, Material- und Dessinaspekte können das Wohlbefinden des Konsumenten positiv beeinflussen. Wellness-Bekleidung wird neben der Freizeit- auch die Businessbekleidung beeinflussen. Neben Freizeitaktivitäten wird Wellness stärker im Bereich der Hausbekleidung zum Relaxen wichtig.

Well-being - a matter of structure: potentials of atmoFil|Wohlbefinden - eine Frage der Struktur: Anwendungspotenzial mit atmoFil

RIETHMÜLLER-CHRISTOPH|SCHINDLER-STEFAN

Overhead presentation. The continuation of the mega trend well-being could be observed in recent years. Typical examples thereof are combinations of textiles with elements out of cosmetics. However, as a basic principle a textile requires wearing comfort for well-being. An inherent wearing comfort with favourable physiological wearing properties is determined by the structure of the fibres and the fabric. atmoFil differential-shrinkage-elongation-yarn (DSE-yarn) offers huge possibilities for the creation of optimized wearing comfort textiles by the special structure of atmoFil yarn and atmoFil fabric surfaces. atmoFil is a combined filament yarn out of polyester. It consists of one core component yarn for tensile strength and shrinkage potential and one functional component with an elongation potential of up to 30 % when heat treated. Thus the functional component creates a loop- and structure effect. AtmoFil is processed to woven or knit fabrics as a nearly flat yarn. Shrinkage and elongation of the yarn components is released during finishing. By the difference in length of the yarn components of approx. 30 percentage points the typical atmoFil fabric structures are produced. They have fine or coarse structures. Fabric surfaces similar to natural fibres can be made. The influences of atmoFil yarn properties and fabric construction on the fabric surfaces are demonstrated with examples. Prospects and future possibilities for tailor made textile creations and for functionalized textiles with atmoFil are discussed.

Biologische und chemische Prüfverfahren zur Bestimmung der Hautverträglichkeit von Textilien|Biological and chemical test procedures for the evaluation of the skin tolerance of textiles

DOSENER-MICHAEL|SCHREIBER-HANS|PLANCK-HEINRICH

Folienpräsentation. Das Institut für Textil- und Verfahrenstechnik Denkendorf hat mit Unterstützung des Landes Baden-Württemberg und einiger Firmen ein Prüfverfahren entwickelt, das eine umfassende Bewertung von Textilien auf mögliche gesundheitsgefährdende Risiken zulässt. Die Aufgabe der Körperverträglichkeitsprüfung besteht in der Erfassung der Wirkung des Textils und der

Gesamtheit seiner Inhaltsstoffe auf die Haut bei realitätsnaher Tragebeanspruchung. Die Prüfung simuliert das Tragen des Textils mit einer Kunsthaut und bestimmt die Wirkung der dabei übergegangenen Substanzen mit einem Test entsprechend der Norm zur Beurteilung von Medizinprodukten (ISO 10993-5) und einem Test auf Irritation mit lebenden humanen Hautzellen. Neben dem Transfertest werden Zytotoxizitätstest, Keratinzitentest sowie eine chemische Analytik durchgeführt. Das Prüfverfahren ersetzt dabei eine Vielzahl von Einzelprüfungen auf Leitsubstanzen durch einen wirkungsbezogenen Test auf Toxizität und Irritation. In mehr als 4.000 Prüfungen konnte die Praxistauglichkeit unter Beweis gestellt werden. Allerdings sind Aussagen zum sensibilisierenden Potenzial reklamierter Textilien zurzeit nur über chemisch-analytische Allergenbestimmungen möglich, wobei zusätzlich zu den Farbstoffen weitere textil-relevante Allergene methodisch erschlossen werden müssen. Als Fallbeispiele werden vorgestellt das Taschenfutter einer Hose mit schlechter Farbechtheit und Hautreizung durch Disperse Red 1, ein Stoff mit Pigmentdruck und im Binder eine hohe Konzentration des monomeren Reaktantharzes, aber nur schwacher Formaldehydgehalt, Hautirritation durch BH bei nur einer Farbe aufgrund unzureichender Aushärtung eines PUR-Klebers, durch wasserbindende Ausrüstung sowie die schlechte Fixierung eines Weichmachers, nachdem in einer Vorstufe quarternäre Silikonverbindungen eingesetzt wurden.

Health and well-being - Medical textiles versus wellness trend|Gesundheit und Wohlbefinden - Medizintextilien versus Wellnesstrend

STEGMAIER-THOMAS|SCHMEER-LIOE-GABRIELE|HORTER-HANSJÜRGEN|PLANCK-HEINRICH

Overhead presentation. The terms 'wellness textiles' and 'medical textiles' are often used synonymously in current publications. 'Wellness' is used as a buzzword for textiles with caring properties e.g. aloe, ginkgo; for textiles with odour e.g. essential oils and perfumes; or for textiles with stimulating properties and massage effects. It is used in the context of well-being. Medical textiles could also have these properties but have a diversified field of application: in particular these textiles are used for palliative or therapeutic medication e.g. in transdermal systems for pain therapy. Sensors based on or integrated in textiles can have functions for prophylaxis which can help to keep in good health e.g. fibre materials respectively dotations and coatings for restraining nosocomial infections. Bio-physiological requirements to wellness and medical textiles are defined by examples, overlaps are pointed out and the transition from medical textile to medical device is illustrated. OP gowns and drapes are used as an example for barrier properties. Test methods are agar diffusion, shake flask, inoculating test as well as tetrazolium dye test. An ITV testing device is used for the determination of shielding at low frequency electrical fields. This device can also carry out tests for shielding against magnetic fields.

Wellness-textiles - what do we mean by that?|Wellness-Textilien - was verstehen wir darunter?

UMBACH-K-H

Overhead presentation. 'Wellness' is composed of 'Wellbeing' and 'Fitness', and expresses the state of physical, mental and spiritual comfort. To this, among others, clothing and their textiles can contribute. Particularly, by wellness-textiles we mean fabrics of which either a cosmetic or a biological or a medical function is expected. This wellness function is aimed at by active agents, which are derived from plants, micro-organisms, animals, metals or synthetic substances. They are embedded in the textiles via microcapsules, cage molecules, tubular filaments, fibre coating or as additive in the spinning process, respectively. These active agents, released by skin moisture or mechanical friction, can be transferred to or penetrate into the skin. To determine their efficacy, today qualitative as well as quantitative test methods are available. An important aspect of Wellness-textiles is their toxicological and dermatological safety. To ensure this by respective specifications and test methods, is one of the tasks of the Working Group 'Cosmeto-textiles' which was founded 2006 within the European standardization. Besides the functions cited above, Wellness-textiles must also effect a good physiological wear comfort. Today, this can be measured quantitatively, and at the Point of Sale it can be proved to the customer e.g. by means of the Hohenstein Quality Label 'Wear comfort vote'. From market analyses for the segment of intelligent textiles with wellness-function in the future high growth rates can be expected. Thus, especially for the man-made fibre industry, they are of particular economical interest.

New perceptions about the production of biologically degradable spunbonded nonwovens of polylactides and polylactide blends|Neue Erkenntnisse zur Herstellung von biologisch abbaubaren Spinnvliesstoffen aus Polyactiden sowie Polyactid-Blends

ERTH-HOLGER|BLECHSCHMIDT-DIETER|BRÜNIG-HARALD

Overhead presentation. New potential for innovative process engineering solutions and product developments in the nonwovens industry arise by the use of bio polymers, particularly regarding the production of spunbonded nonwovens. At the Leibniz Institute of Polymer Research in Dresden, experimental investigations with Polyactid Recyclat (PLA-R), Polyactide NatureWorks (PLA-NW) and Polyactide Blends (PLA with modifier) were accomplished to determine the spinning behaviour of bio polymers. Filament speed between 2,000 and 6,000 m/min were realized in order to determine the threshold regarding minimum attainable filament titre. The addition of up to 10 % modifier improved the spinning behaviour without impairing the textile-physical characteristics. Filament strength up to 25 cN/tex were achieved. On the basis of these perceptions investigations for the production of spunbonded nonwovens were carried out on laboratory spunbond plant (suction air principle) at Saxonian Textile Research Institute e.V. The results of PLA-R and PLA-NW essentially confirmed the spinning ability and textile-physical parameters of the filaments. Nonwoven bonding was accomplished by calendaring, spunlacing and needle-punching. The best results regarding mechanical characteristics were achieved by spunlacing and needle-punching, while calendaring still showed potentials for improvement. Examinations of the biological degradability showed that spunbonded nonwovens are ready for composting.

NatureWorks PLA: A responsible and renewable raw material option for packaging and nonwovens|PLA: verantwortungsvolle und erneuerbare Rohmaterial-Option für Verpackung und Vliesstoffe

CAWA-S

Overhead presentation. NatureWorks LLC has been established in 2000. The recent commissioning of the world scale polymerization facility of NatureWorks LLC, has enabled their NatureWorks PLA resins and Ingeo fibres to begin meeting the need for renewable raw materials. These products are being adopted in a variety of packaging, textiles, and nonwovens products. Since PLA is derived from

100 % annually renewable resources while also being melt spinnable, and compostable under the proper conditions, it is uniquely positioned as an alternative to petroleum based polymers in a broad spectrum of processes and applications. The range of packaging and nonwovens applications where PLA has either been commercialized or is currently in development are discussed. A typical spunbond line for Ingeo fibres consists of chip dryer, extruder, filter, pump, spinneret, quenching zone, heated compaction roller, bonding calender as well as take-up unit.

Functional surfaces for non wovens|Funktionelle Oberflächen für Vliesstoffe

JAGER-H|WYPKEMA-A|WESSELS-D-J|FIALA-A

Overhead presentation. The nonwoven production in Europe grew by 5 % in 2005, the production in East Asia exceeds European production. By improving existing or realizing new functionalities on the surface of nonwovens, producers are able to meet ever increasing customer demands. New functionalities can improve processing characteristics further down the chain of production or can open up new application areas and markets. The classic way is the deposition of chemicals on the surface using water as a carrying agent. The challenge is to apply uniform, closed functional coatings around all fibres throughout the nonwoven with a minimum add-on. The treatment of nonwovens by dielectrical barrier discharge plasma is shown. The addition of chemical precursor results in the formation of almost completely uniform closed coating layers on all fibres in the nonwoven. Because of this exceptional behaviour, new functionalities can be added to nonwovens. The surface properties of glass fibre nonwoven can be changed from hydrophilic to hydrophobic using HMDSO polymerization in a plasma atmosphere. Treatment of polypropylene webs by surface barrier discharge plasma in nitrogen during one second changed a polypropylene web from hydrophobic to permanent hydrophilic, not only on the outer surface but also in all inner parts of the web. Polyester nonwovens were treated in a similar fashion. Subsequently it was demonstrated that a uniform and permanent Ni coating could be applied to the surface. Plasma induced grafting of antimicrobial compounds on nonwovens results in bio-active surfaces. To make this technology available for industry, an up-scaling of the surface reactor is underway. Future work will be done on new functionalities such as flame retardancy, catalytic behaviour as well as improvement of mechanical characteristics.

Spin finishes and lubricants - Optimising the performance of nonwovens|Avivagen und Ausrüstungen - Optimierung der Eigenschaften von Vliesstoffen

NIESTEGGE-R

Since the mid-1990's nonwovens have been a thriving business with an annual growth rate of 6 %. The success is not only based on the limited number of processing steps but very much on highly developed and complex nature of the textile auxiliaries used. Besides increasing the efficiency during the processing of the goods textile auxiliaries are very important in imparting specific characteristics to the finished article e.g. PP spunbond by nature is non-polar and hydrophobic. To make this material suitable for the use as a cover stock in diaper industry a product such as Duron OS 4012, a hydrophilic Spin finish, has to be applied. When man-made fibres started to be converted into needle-punched nonwovens lubricants were used to imitate wool's felting properties. The auxiliaries main tasks were the adjustment of friction to decrease needling forces and protection against tribothermal damage to ensure nonwovens with highest possible quality. Developments in technology have, however, led to the creation of nonwovens for a wide variety of applications many of which demand new and unique properties. In order to satisfy these new requirements Spin finishes and lubricants have had to evolve and now play an increasingly important role in the functionality of nonwoven. Duron OF 4012 comprises a special additive combination to ensure low skin wetness even after several insults, thus it enhances the performance of nonwovens without a significant investment in new equipment.

Bikomponenten-Spinnvliesstoff für technische Anwendungen|Bi-component spunbonded nonwovens - technical applications

HEYE-ULRICH|SCHILDE-WOLFGANG|BLECHSCHMIDT-DIETER|TAUBNER-RALF|ERTH-HOLGER

Die Herstellung von Spinnvliesstoffen aus Bikomponenten-Filamenten eröffnet neue Anwendungspotenziale von Vliesstoffen. Damit lassen sich die spezifischen Eigenschaften von zwei verschiedenen Kunststoffpolymeren in einem Filament verbinden. Man unterscheidet dabei grundsätzlich vier Konfigurationen, bei denen jeweils verschiedene Anwendungsbereiche abgedeckt werden können. Dies sind 'Island in the sea', 'Segmented pie', 'Core/sheath' und 'Side by side'. Mit der Reicofil-4-Spinnvliesanlage können Biko-Filamentvliesstoffe mit den drei letztgenannten Konfigurationen hergestellt werden. Es werden daher Anwendungen betrachtet, die sich auf diese Konfigurationen beziehen. Im Falle von 'Core/sheath' (Kern/Mantel-Struktur) muss noch zwischen konzentrisch und exzentrisch unterschieden werden. Es wird nur die konzentrische Struktur betrachtet. Das Anwendungsgebiet der Struktur 'Segmented pie' liegt in der Herstellungsmöglichkeit von Splittfaservliesstoffen. Damit kann die Filamentfeinheit durch eine nachträgliche Wasserstrahl-Behandlung auf 1/16 der ursprünglichen Filamentfeinheit auf Werte um 0,1 dtex reduziert werden. Dies ergibt eine hohe spezifische Oberfläche und eröffnet Anwendungen im Bereich der Feinstfiltertechnik. Mit der Struktur 'Core/sheath' kann der Mantel durch Einsatz eines niedrigschmelzenden Polymertyps zur Verbesserung des Verfestigungseffekts beim Kalandrieren genutzt werden. Des Weiteren können im Mantel durch Zugabe von Additiven funktionale Eigenschaften appliziert werden. Mit der Struktur 'Side by side' können unterschiedliche Schrumpfungs-/Dehnungseigenschaften für die Erzeugung hochvoluminöser Spinnvliesstoffe genutzt werden.

FIDYST - Fiber Dynamics Simulation Tool|Simulation von Faserdynamiken mit FIDYST

HIETEL-DIETMAR

Overhead presentation. The use of simulation methods in the design and development of products and production processes are gaining more and more in importance. Currently there are no appropriate software tools to treat the specific problems in the field of nonwovens and yarns. Fraunhofer ITWM has developed FIDYST - fibre dynamics simulation tool - to compute the dynamical behaviour of fibres in a surrounding airflow. This software allows production processes of nonwovens or yarns to be simulated and the resulting product properties to be predicted. The underlying physical models are balance laws for mass, momentum and energy. Hereby, a drag force takes into account the influence of the air onto the fibre dynamics. The heat exchange is considered by a source term in the energy balance. The balance laws of a single fibre are reduced to one-dimensional equations along the fibre by means of mathematical analysis. This enables the study of the behaviour for hundreds of filaments. The application potential of FIDYST is shown by examples concerning spunbond and fibre production. The high speed of air flows in these processes leads to

turbulent air flows which results in a chaotic behaviour of the filaments. This is modelled by a stochastic air drag force. FIDYST is especially able to describe the typical irregular base weight distribution in nonwovens. With the help of FIDYST simulations the considered production processes are improved. For specific products the optimal process parameters are determined. The simulation is shown on a Neumag spunbond process.

Development of environmentally friendly geotextiles|Entwicklung umweltfreundlicher Geotextilien

HONNA-HIROSHI

Overhead presentation. Geotextile is the material for civil engineering for drainage water, filtration, separation, reinforcement etc. Teijin group has been developing environmentally friendly applications with a view to using environmentally friendly materials (Ecopet, bio-plastic, etc.) and developing technology to reduce pollution (dioxin, CO₂, etc.). There are many development targets, and the main parts are: (i) Water environmental restoration: bottle unit is the net of recycled materials (Ecopet). Using it as a bank protector, the bank will be covered with plants. (ii) Polluted soil (including water) management: Guardianbag is a geo-container for the treatment of polluted soil (including water). It can dehydrate and filtrate the lead compounds, polychlorobiphenyl and dioxin from water and pack the polluted sludge inside it. (iii) Waste management: capping-sheet for landfill is used in order to manage waste easily. It can control moderate water-permeability and breathability to decompose the pollutant. (iv) Construction waste recycling: to reuse of the constructional soil, it needs to be reinforced by fibre. This is done by using environmentally friendly materials Ecopet, bio-plastic (PLA).

Physical principles of bilateral electrospinning|Physikalische Prinzipien des bilateralen Elektrosinnens

LUKAS-DAVID|SARKAR-A

Electrospinning represents a new age in spinning technologies, and in some features it resembles biological procedures in which most common natural nanofibres like cellulose and collagen are created thanks to self-organization. As opposed to classic spinning technology the devices and equipment for electrospinning are free of complex passive or rotating mechanical components. The aim of this work is to describe an operation of an unusual bilateral spinner, which design has been motivated by the disintegration of rain droplets in a thundercloud that provides two simultaneous jets carrying opposite charges. So an electrospinner is proposed based on a liquid body remaining a motionless rain droplet hanging in the air. The prolonged 'droplet' shape is supported by two hypodermic needles laying along one straight line with their orifices mounted toward two disk collectors. The critical voltages of this device are presented and the features of polymer solution jets and collected patterns of nanofibrous masses are of primary interest.

Engineered short cut polyester staple fibers for wet laying processes|Technisch veränderte Polyester-Kurzschneidfasern für das Nassverfestigungsverfahren

WITSCHAS-MICHAEL

Overhead presentation. The polyester short cut fibres by Advansa can be used for traditional paper making processes in blend with woodpulp as well as on modern inclined wire machines for up to 100 % synthetic fibre based materials. In general, the fibres have to be water dispersable. This requires absence or low degree of crimp, short cut lengths typically between 5 and 15 mm and a very uniform quality. The surface finishing should deliver aid in dispersion without negative interaction with further components of paper making chemistry. Undispersable bundles of fibres that stick together as well as mis-cuts directly result in unacceptable, visually detectable defects on the nonwoven sheet. In applications such as wallpaper, tablecloth, special document and technical grades, the synthetic component forms a backbone that increases tensile and tear strength and improves dry and wet dimensional stability. Furthermore, wet-laid nonwovens containing polyester fibres are excellent filtration substrates with improved efficiency and lifetime compared to 100 % woodpulp based material. Fibre fineness, cutlength, surface and mechanical properties of Advansa's polyester fibres can be engineered in a broad range to meet the technical requirements of the final product. For 100% PES, the modification increases wet tensile strength by factor 2 and dry strength nearly by factor 7. Wet strength increase is very interesting to overcome wet-laying process difficulties like transfer of web from wet end to pressing/drying section. Dry tensile strength increase is expected being only gradually for finished products - binder application will partially compensate H-bond effect - requires further testing.

New developments in polyester spunbond|Neue Entwicklungen bei Polyester-Spunbond

MIGLIAVACCA-MASSIMO

Overhead presentation. The most significant technology developments obtained over the years are analyzed, the novel techniques and specific improvements that have been introduced by the equipment manufacturers in the spunbond lines and which led to a dramatic increase of the output and also enhanced the finished goods quality. Followed by a close-up of the specific requirements for the roofing substrates manufacturing and the technical improvements developed over the years and implemented in the new Freudenberg-Politex line. Among others, the main features of the spunbond process like flexibility are discussed, allowing the economical exploitation in a wide range of polymers, products weight, and qualities; the filament extrusion process with the possibility to set the required structure and therefore influence the finished product strength: the lay down and web formation as a key step to control the product mechanical properties.

2006 worldwide & North American nonwoven industries|Aussichten für die nordamerikanische Vliesstoff-Industrie

BUTLER-IAN

AB ==Overhead presentation. North America's nonwovens producers in 2005 made an estimated 1.3 million tons of nonwoven fabric valued at close to USD 5 billion. The nonwoven industry's growth over the previous 5 years averaged slightly over 5 %/year. The coming 5 years is will see continued growth. Driving this growth has been strong growth in several markets and led by consumer wipes, air and liquid filtration materials, house wrap, roofing materials and agriculture/landscape materials. However, the North American nonwovens industry is evolving and the combined spunlaid processes will produce higher quantities than the combined carded staple fibre technologies by 2010. Rapid changes are also occurring in the carded staple fibre technologies. The paper reviews the changing industry

and how it is expected to impact on the nonwoven technologies used in North America over the next 5 years. Also, forecasts will be provided for the consumption of key resins used in spunbonded processes, as well as staple fibres consumption by carded, air-laid pulp and wet-laid nonwoven technologies. For consumer wipes 41 % spunlaced, 34 % air-laid, 19 % spunlaid/coform, 3 % resin bond and 3 % wet-laid nonwovens are used.

Textile materials based on bionic principles for solarthermal applications|Textile Werkstoffe nach bionischen Prinzipien für solarthermische Anwendungen

STEGMAIER-THOMAS|LINKE-MICHAEL|PLANCK-HEINRICH

Overhead presentation. In Germany, the energy density coming from the sun is between 3.2 and 2.6 kWh per day and square meter. Solar collectors for heating up water or air used at present consist of rigid and heavy materials, which is the reason for their immobility. Therefore, the aim of this development was new collector systems, which are above all flexible and can be set everywhere. In the frame of a bionic research work the missing flexible, easy and unbreakable translucent heat insulation could be developed by the transfer of the light technical properties of the polar bear skin into an industrial fibre based product. The material consists of a spacer textile based on transparent or light conducting polymer fibre coated with translucent silicone rubber. For incident light of the visible spectrum the system is translucent, but impermeable for UV radiation. Due to its structure it shows a strongly reduced heat loss by convection. A heat loss by emission of long wave radiation can be prevented by a suitable coating. The suited treatment of the silicone surface protects it against soiling.

Conductive textiles using ICP's|Leitfähige Textilien durch Verwendung inherent leitfähiger Polymere

RUYS-LUC|DECKER-SANDRA-DE|WITTE-INGE-DE

Overhead presentation. Recent tendencies to develop high added value textile products, by incorporating additional functionalities, are strengthening the need to create yarns and textiles with a specific level of electrical conductivity. Potential applications are countless as well in existing as in more future applications: antistatic clothing, heated textiles, intelligent textiles, electroluminescence, electro-shielding, filtration, medical textiles, etc. In order to realize these perspectives it is necessary to incorporate a well defined level of conductivity into the textiles. An overview of the different approaches that can be followed to realize the desired conductivity level in fabrics, yarns and tapes is presented. Starting from the classical systems of antistatic polymers to possibilities of permanent antistatics, IDP's (inherently dissipative polymers), metal fibres, metal coatings carbon black, carbon nanotubes and ICP's (inherently conductive polymers). Some results based on the use of ICP's will be discussed in more detail. Measurement methods are EN 1149 concentric ring electrodes for surface resistance and volume resistance, EN 1149/3 electrostatic charge decay time for induction charging and tribocharging as well as IEC 61340-5-1 point-to-point en sleeve-to-sleeve. Antistatics can be applied at fibre surface with spraying of solution on the materials, application in spin-finishes, in finishing, etc. and as fibre additive in the form of an addition via master-batch or by migration towards the surface. Carbon nanotubes are also used in order to produce conductive textiles. Advantages are high conductivity can be reached, lowered concentration threshold, permanent conductivity and other properties can be improved. Draw-backs are high costs (although reducing fastly), still in experimental phase, quality of available products, compatibilisation and processing, and black colour. Conductive textiles are only at the start of their possibilities. There are different possibilities to introduce and control the electric conductivity level. Optimal selection will be function of the conductivity level needed, the other properties requested and the final application. ICP's offer some possibilities both in extrusion and coating or finishing applications. Further optimisation will be needed in order to obtain more stable and specific dispersions for individual applications and to guarantee the permanency.

Diofort takes fibers to new levels|Innovatives und neues PPS-Garn Diofort

DORTMANS-JAN

The new high-tenacity multifilament polyphenylenesulphide (PPS) yarn Diofort by Diolen Industrial Fibres is highly chemical and temperature resistant so that it can be used in extreme environments such as filtration, hoses, and composites. Compared to the present PPS yarns, as multifilament or based on staple fibre, the tenacity of Diofort is 30-100 % higher, which makes it unique in the world. The R&D group of Diolen Industrial Fibres has developed a special spinning and drawing technique for realizing the high strength. Patent applications have been filed. The attractiveness of PPS as a reinforcement material, is based on the fact that this thermoplastic polymer belongs to the group of semi crystalline high performance polymers. PPS-polymer is characterized by excellent chemical resistance, high temperature stability up to 190 degrees C, high flame retardance as indicated by the LOI-index of 40, good hydrolysis-, acid- and alkali resistance. Furthermore for temperatures below 200 degrees C it is non-dissolvable in most organic solvents. The uniqueness of Diofort lies in the fact that Diolen focused on three of the intrinsic PPS polymer properties, being chemical resistance, heat resistance and flame retardance. As the first and only producer world-wide we were able to specifically combine these properties with high tenacity performance in the multifilament yarn, which resulted in Diofort.: a unique PPS-fibre. Compared to other fibres such as m-aramid, polyimide, PTFE, the tenacity, flame retardance and chemical resistance to acids, alkalis and hydrolysis are excellent, while the continuous temperature is relatively high. This makes Diofort an interesting product for a large variety of applications. In hot gas filtration it is expected that the life time of the end product will increase considerably and through a better dimensional stability the filter performance will improve. In hose reinforcement the performance of the end product will improve considerably due to the high tenacity in combination with good chemical and thermal resistance. The market development effort of Diofort, increased considerably. Besides in Europe it is also introduced in the USA. Furthermore the areas of e.g. liquid filtration, composites and sewing yarns are getting more attention.

High quality nylon 6.6 yarns for cap ply applications in radial tyres|Hochqualitäts-PA 6.6-Garn für Cap ply-Anwendungen bei Radialreifen

VATANSEVER-ALI

Overhead presentation. Kordsa Global is one of the largest industrial Nylon 6.6 yarn and tire cord fabric producer in the world. It owns 15 % of the dipped tire cord fabric capacity of the entire world. With the advent of radial tires, cap ply enveloping the heavy steel belt was introduced to minimize the tire growth and to keep the belts from separating from the body especially when running at high speeds. More recently a new technology has been developed to prepare cap ply tapes from single end cords using a cross-head extruder where uniformly distributed individual cords are encapsulated by rubber

to give a good adhesion to the tire rubber. Later mentioned technology requires each cord to go through holes with slight clearances in the co-extrusion die which in turn requires stringent yarn mechanical quality where the yarn is free from faults, slubs, and any kind of protrusions to avoid breaks during running the cords through the co-extrusion holes. Kordsa has developed a direct spun PA 66 yarn with improved mechanical quality for Single End Cord, SEC, applications with optimized tensile and thermal properties. The modulus of the cap depends on a large extent on the dimensional stability of the yarn used. It is preferable to use a yarn with low EALS and shrinkage for a maximum dimensional stability. The cord construction 1400/1 T728 offers 14 % lower fabric weight, an improved tire uniformity and 7.3 % weight saving in the calendered fabric. Cords with reduced twist levels have higher modulus, moderate lower Testrite shrinkage levels and higher Testrite shrinking force. Nylon 66 demands for cap ply applications will continue to grow in the future.

Applications of planomers in textile fibers|Anwendung von Planomern in Textilfasern

LUIKEN-ANTON|BATENBURG-LAWRENCE

Overhead presentation. The focus of TNO in the research area of nanotechnology applied to textile fibres is on the modification and application of clay-platelets, also called planomers. In realizing the optimal properties, the exfoliation of the clay is an important step in order to get a uniform distribution of the clay into the matrix. By chemical modification of the clay, the clay can be made miscible with a large variety of polymers. Important properties that can be improved by introduction of small amounts of nano-clay are strength, barrier-properties (water, oxygen), abrasion resistance and flammability. A special class of planomers developed by TNO is Planocolours. Due to the ionic charge of the clay platelets and the chemical modification of the clay, organic dyes can be attached to the clay. This results in improved properties of the dyes concerning temperature and light stability. Due to a better distribution of the planomers in the polymer matrix, a higher colour intensity is reached.

Development in protective wear based on membrane systems. Functional modifications of membrane surfaces|Neue Entwicklungen im Bereich von Schutzbekleidung auf Basis von Membransystemen

WITTMANN-GABRIELE|VEN-HARRY-VAN-DE|VELINGS-DICK

Overhead presentation. In a Sympatex membrane water drops cannot pass through and water vapour molecules can pass through. The membrane consists of hydrophilic/elastic and hydrophobic/thermoplastic polymers. Furthermore, it offers increased thermal insulation by reflection/preservation of body heat. Sympatex REFLEXION is produced in 4 steps: (i) extrusion of PEE membrane, (ii) plasma treatment of PEE membrane, (iii) aluminium vapour deposition in vacuum environment, and (iv) PU coating. The plasma treatment ensures the bonding between PEE and Al. REFLEXION is a compound membrane consisting of a 10 micron PEE membrane, 50 nm vaporised aluminium and 2 micron PU coating. The garment construction consists of an inner fabric, the PEE hydrophilic membrane as well as an inner layer. The protection against cooling is shown. Sympatex REFLEXION is based on PEE hydrophilic membrane, which has a complete even surface. Vapour deposition of aluminum ensures an optimum reflection of waves within the sophisticated production process. Sealing with PU coating cares for high mechanical resistance. But it is thin enough that a minimum in reflection is lost and ensures easy care. In laminates, optimum reflection can be achieved by using a spacer fabric between skin and Sympatex REFLEXION.

New binding fibre for polyester needle-felt carpets|Neue Binfaser für Polyester-Nadelfilzteppiche

LINSBAUER-HERMANN|HAMMERSCHMIDT-JOHANN

The EU-end-of-life-vehicles directive (2000/53/EG) requests since January 1, 2006 a quota of re-use or recycling with a ratio of 80 % of the total weight of a car. In view of this directive, Asota has already developed a latex free needle-felt made of 100 % polyolefin fibres. Meanwhile the situation/philosophy within the European automotive industry has changed slightly and it is no longer necessary to go for a 'single material solution'. The same trend is also going on in America where the developments are moving away from latex into solutions with binder fibres. Since it is no longer necessary to work solely in a single material solution, development work also went in the direction of PET face material with polyolefin binder fibres. Mouldability was one of the basic requirements. Mainly due to an environmentally friendly philosophy, the development work is mainly based on a latex free construction with binder fibres involved. The new binder fibre Asota CLI 0 offers a solution. It is latex free, mouldable and textile recyclable. One of the major opportunities is the possibility to reuse the cutting waste from the needle-felt production in a textile recycling loop. The resulting regenerated material can be used without major problems for a bottom or an insulating layer.

Dyneema; an ultra stretched high strength polyethylene fiber, production properties and applications|Hochfeste Polyethylenfaser Dyneema - Herstellung, Eigenschaften und Anwendungen

WERFF-HARM-VAN-DER|MARISSSEN-ROEL

Overhead presentation. Dyneema fibres have been commercialized from about the beginning of the 1990's. The fibres show an extremely high tenacity and some other peculiar properties. The fibre is produced by an extrusion process. The fibres are made from ultra high molecular weight polyethylene. These large molecules are highly aligned in the direction of the fibre axis and kept that way because of crystallization. Thus, the strong covalent bonds are utilized for the strength of the fibres. The tensile strength is excellent, due to the molecular morphology. However, the axial compressive strength is low. The fibres show compressive yielding. This is related to the flexibility of the molecular chains, and to the moderate interactions between the chains. On the other hand, this compression yielding behaviour, together with the possibility for transverse yielding, makes the fibre extremely damage tolerant and therefore suitable for cut protection. Typical applications of Dyneema fibres are discussed, such as applications for strong ropes, cables and nets, for bullet resistant vests, for protection against cutting injury, and recently as an implant material in the human body. It is explained how the performance of Dyneema in such applications is related to the typical fibre structure. Dyneema is an 'extreme tension material'. Tension properties are obtained by aligning extremely long molecules using gel-spinning. Understanding Dyneema starts on a molecular scale, applying Dyneema reaches up to large structures scale. Dyneema is versatile, it is used for protection, transport, and for human body implants. Further development and application is a multi disciplinary process.

New commingling yarns for reinforcing application of concrete|Neuartige Verwirbelungsgarne für den Bewehrungseinsatz in Beton

KOLKMANN-A|GRIES-THOMAS

Overhead presentation. Textile-reinforced concrete, a new composite material, is the focus of activities at several research institutes. Textile-reinforced concrete combines the advantageous material properties of concrete with those of technical textiles. Concrete is still the lowest-priced building material in the building industry for the take-up of pressure loads. Because of its low tensile strength, in bending and tensile load areas a reinforcing structure is needed. The tensile stress is taken up by non-corrosive textiles. As opposed to the reinforcing material steel, which needs a concrete cover as corrosion protection, thin-walled concrete construction units can be realized with textile reinforcements. With this new material, completely new areas of applications can be opened, which range from thin-walled carrying constructions up to consumer durables. As non-corrosive materials, alkali-resistant glass (AR-glass) or carbon is used. The capability of those materials is not completely exhausted because only the outer filaments of the rovings are in contact with the concrete matrix and therefore have a good bonding. A possibility is shown to improve the performance of the yarns is described. With commingling yarns made of two components, of which one is water soluble, open regions for the concrete matrix in the roving are realized. Machine technology, processing parameters and test results of the composite structure with commingling yarns are presented.

Carbon fibres with different end-use specific properties|Kohlenstofffasern mit verschiedenen anwendungsspezifischen Eigenschaften

SCHNEIDER-MARKUS|WOHLMANN-BERND

The sales volume of carbon fibres is increasing in the classical applications and at the same time new products and post-processing methods are created. In the past, carbon fibres were mainly processed with thin epoxy resin layers under continuous conditions to so-called prepregs (pre-impregnated carbon fibre layers) which were then used as aerospace semi-finished products. Tenax HTA 5131 has been developed for this application. This yarn can be spread almost proportionally to the applied yarn tension and thus one yarn is suitable for different area weights. Moreover, the tension and compression properties are excellent in most aerospace epoxy prepreg systems. In order to produce components out of carbon fibres more efficiently, textiles in combination with closed resin processes and liquid resins are increasingly used. For this purpose flexible yarns are necessary which pass the discontinuous textile processes without filament damage, e.g. Tenax HTS 5631 with a processing tolerable preparation. This yarn is directly produced with a flat yarn cross section to avoid additional yarn spreading. In addition, a carbon fibre is developed as sewing yarn to create textile preforms. Latest developments show carbon fibres which already provide a resin portion of the final matrix. This resin is used for a direct placement of the carbon fibre to a preform without any intermediate steps. Prototypes of this so-called binder yarn and the possible post-processing methods are shown.

Applikation optischer Fasern in Textilflächen|Applications of optical fibers in textiles

THIELE-ELKE|ERTH-HOLGER|ARNOLD-ROLF|HABEL-WOLFGANG|KREBBER-KATERINA|DÖRING-HEINZ|GLÖTZL-RAINER

Folienpräsentation. Das STFI befasst sich seit 1998, in Zusammenarbeit mit Partnern aus der Industrie und Forschung mit Untersuchungen zur Verarbeitung von optischen Fasern auf Textilmaschinen. Ziel der Untersuchungen war zunächst die Erzeugung aktiv leuchtender Strukturen. Verwendet wurden optische Fasern aus Glas oder Kunststoff, die bei Lichteinspeisung an der Mantelfläche leuchten. Leuchtende Textilien wurden auf Web-, Wirk-, Strick- und Stickmaschinen für folgende Einsatzgebiete entwickelt: gestrickte leuchtende Accessoires für Damenoberbekleidung, gewebte leuchtende Raumteiler und gestickte bzw. gewirkte Leuchtbänder und Fensterlamellen für den Bereich Haus- und Heimtextilien, gewirkte Leuchtnetze für den Outdoor-Bereich oder für Bühnen und Effektbeleuchtung. Seit 2003 beschäftigt sich das STFI mit der Entwicklung von sensitiven Textilstrukturen durch Integration optischer Sensoren in Textilflächen. U.a. für die Bereiche Bautechnik und Objektschutz werden Textilstrukturen entwickelt, die neben ihrem klassischen Eigenschaftsprofil auch sensorische Aufgaben übernehmen sollen. Zu diesem Zweck wurden Versuche auf einer Vliesraschelmaschine RS 3 MSUS-V mit Magazinschusseintrag von Karl Mayer Malimo GmbH - durchgeführt, wobei handelsübliche Standard-Glasfasern in eine Geomatte fixiert wurden. Im Ergebnis der Untersuchungen sollen Geotextilien vorliegen, die neben klassischer Deichertüchtigung auch Deichmonitoring ermöglichen. Dabei sollen mit dem Monitoringsystem mögliche Deichschwachstellen infolge kritischer Durchfeuchtung bei Hochwasser oder das Setzungsverhalten von Binnen- und Küstendeichen zuverlässig und frühzeitig erfasst werden. Erste Leistungstests des Systems laufen momentan in einem Muldedeich bei Dessau.

High-tenacity rayon for technical applications|Hochfeste Viskosefasern für technische Anwendungen

ZIMMERER-B

Overhead presentation. Technical rayon (regenerated cellulose fibres), based on cellulose from wood, is an ideal reinforcing material for modern, innovative technical applications. The properties of the 4 most important types of technical yarns polyamide, polyester, rayon and aramid will be introduced and their advantages and disadvantages for different technical applications discussed. High-tenacity rayon is used mainly in passenger car tires as carcass material. As rayon is replaced as reinforcement for standard car tires by the cheaper polyester, it dominates in European (ultra-) high-performance tires and new tire developments such as run-flat tires. The particular advantage of rayon is its thermostability compared with melting spun fibres like polyamide and polyester. This high temperature resistance, the high modulus, negligible shrinkage, good chemical resistance and excellent adhesion to rubber or plastic material make rayon the material of first choice for applications like ultra-high-performance tires, run-flat tires, brake-hoses, radiator hoses and fibre-reinforced plastics for the automotive industry and the building sector. The global consumption of rayon is low compared with polyamide and polyester because rayon supplies market niches. While the market increases rapidly for technical thermoplastic fibres, you will find a steady consumption of rayon up to moderate market growth of 1 - 2 % in the foreseeable future.

Aerostar - innovatives Abstandsgestrick für technische Anwendungen|Aerostar - innovative weft-knitted spacer fabric for technical applications

MOSEER-WERNER

Folienpräsentation. Bei Abstandsgewirken ist ein Abstand von mehr als 2 cm möglich und der Abstandsbereich kann bindungstechnisch verändert werden. Es muss jedoch eine mehrbarrige Raschelmaschine mit Jacquardmaschine eingesetzt werden. Abstandsgestricke sind flexibel einsetzbar, es ist eine einfache und schnelle Musterung möglich und es sind keine hohen Investitionen erforderlich. Abstandsgestricke haben eine hohe Luftdurchlässigkeit und einen weichen Griff. Es können jedoch keine Filetstrukturen auf der Oberfläche erreicht werden. Die Vorteile von AEROSTAR, wie Oberfläche kann gemustert werden, wenig Materialaufwand, filetartiger Charakter -vergleichbar mit Wirkware, sowohl mit Buntgarne als auch als Stückfärber, unglaubliche Farbenvielfalt, sortenrein, Elastizität in beide Richtungen, ohne weitere Hilfsmittel, wie z.B. Elasthan, Investitionen im Bereich von 100 -150 T EUR, Platzbedarf und Technologie überschaubar und nur wenige Konen für Gestrick werden erläutert. Gegenwärtig ist der abstand auf maximal 10 mm begrenzt.

Innovative reinforcing structures from knitted fabrics for composites|Neuartige Verstärkungsstrukturen aus Maschenwaren für Kunststoff-Composites

ERTH-H|HUFNAGL-E|ARNOLD-R|HELBIG-R

Overhead presentation. On the basis of structure examples it is shown that multi-axial warp-knitted fabrics with different thread rates in reinforcement directions, different number of thread layers as well as arrangement, local reinforcement/grading and component outline conditions etc. can be manufactured by technological and mechanical engineering variations. Beside already produced samples, the STFI works on the technical conversion of warp knit constructions to develop gradient materials for profiles as well as preforms for fibre composite plastic constructions in the context of current research projects. The suitability of the new warp knittings for their use in plastic reinforcements can be proven by investigating composite formations. The good draping ability and the convenient impact behaviour prove to be particularly favourable. The past results show several potentials for the efficient supply of new composites.

International test and evaluation standard for protective clothing against thermal risks of an electrical arc|Internationaler Prüf- und Bewertungsstandard für Schutzkleidung gegen thermische Gefahren durch Störlichtbogen

BEIER-HENDRIK|ERTH-HOLGER

Overhead presentation. Information about the research and development for the Box-Test-Standard are given, an international standard for testing and evaluation of the protection effect of textiles against the thermal risks of an electrical arc. Such accidents can occur during the work on electrical power supply equipment under live-working conditions and confront the worker with extreme temperatures up to 10,000 degrees C, flame exposures, radiant heat and splashes of molten metal. Based on the cooperative work with the TU Ilmenau/Germany, Department of Electrical Power Supply, for the European standard ENV 50354 a practice-oriented test and evaluation standard was developed. The standard allows the test of textile fabrics as well as whole garments in the given protection classes. The special design considers the amplifying effect of installations back and side walls which can be expected in the practice. As an internationally accepted test procedure the calorimetric measurement of the heat flux energy exposure offers objective statements about the protection effect of textile materials against 2nd degree skin burns.

Textile finishing for technical and protective textiles|Textile Ausrüstungen für technische Textilien und Schutztextilien

SEEGER-THOMAS

Overhead presentation. As in other areas, the technical progress in the textile industry is only possible in small steps and all round solutions are normally not possible. Yet the effort involving in achieving these steps is huge. The functions of soil release are optimal wash out effects of obstinate stains, slight water-and oil-repellent effects, no special pre-treatment of stains necessary, and special eye on work flow because of residuals. Nanoparticle application can be found in the cosmetic industry with transparent high protection sun screen. Similar particle working now on technical textiles as UV protector. Target of research is to increase the life time of a balloon shell. In antimicrobial treated fabrics, silver has a very strong revival since it is available in nano-scale. Therefore costing is not any more a knock out argument. The key problem is that mainly all silver products have the necessity of binders. The Bruck system doesn't require binders. Because of the micro-structure of the pigments (TiO₂ loaded with silver chloride) the product is mechanically bonded (like smut/carbon black) in the fibre inter-spaces and via hydrogen bonding. No additional binder is necessary. The advantages are no influence to the handle, no influence to the colour, very good durability, active product availability for the whole life time of the product, and less problems in the effluent. New effects are also arriving in the new world. General solutions aren't possible today. Beside of new effects we are also looking for strategic technical co-operations. Even be part of the western world we can offer good access to the Asian market.

Carbon fibers in architecture and in bridge engineering|Kohlenstofffasern in Architektur und im Brückenbau

MEIER-URS

It is demonstrated how carbon fibre reinforced polymers (CFRP) developed for high-performance aircraft can offer major advantages in architecture and bridge engineering. Since 1982 the Swiss Federal Laboratories for Materials Testing and Research (EMPA) in Dübendorf/Switzerland have been successfully conducting R&D in the application of carbon fibres on the one hand for the rehabilitation and retrofitting of existing structures by external bonding of CFRP-strips to such structures and on the other hand for CFRP tendons for bridges. In 1991 externally bonded CFRP-strips were applied based on the research of EMPA as world firsts in the retrofitting of a bridge and a building. Examples of important applications are presented. Retrofitting with CFRP strips has been shown in cost comparisons with classical rehabilitation methods superior in most cases. Originally it had been assumed that this technique would only be cost-efficient if there were very high requirements relative to corrosion, fatigue performance and light weight. However after further price decreases of carbon fibres this method has also become cost efficient for applications in which not all of these requirements are present. Easy handling on structural sites due to the light weight of the CFRP strips helps to reduce labour cost. For this reason commercial use has increased dramatically worldwide.

In architectural application also the aesthetics of the thin CFRP strips played an important role. Tendons in bridge engineering are subject to severe fatigue stresses, frequently compounded by corrosion loads. Comprehensive studies have shown CFRP to exhibit ideal properties for use in tensile members. Successful applications are presented.

Radiation technologies for advanced textiles|Strahlentechnologien für fortschrittliche Textilien

PARYS-MARC-VAN

Overhead presentation. According to the latest information by EURATEX from 2003, the total textile production can be divided into 43.5 % apparel, 33 % interior and home textiles as well as 23.5 % industrial textiles. In respect to textiles, the term 'innovation' has three pillars: (i) from commodity to specialty products, (ii) new textile applications and (iii) from mass production to customisation. New technologies are necessary in the view of the facts (i) that fossil fuel resources will be exhausted in 25 - 30 years, (ii) of ever increasing prices for chemicals, (iii) of ongoing imports, and (iv) of shorted time for completion. The new technologies comprises techniques such as plasma, laser and UV radiation as well as digital finishing/coating. The atmospheric plasma treatment can be divided into 3D-Corona and two-side Corona technique. The results of an atmospheric plasma treatment are shown at the example of polyamide dyeing. RadMagic is a new project in which the dyeability of fibres and surface structure can be modified. RadMagic is characterised by flexibility, versatility, low energy consumption etc. The chemistry and physics of UV curing systems is discussed. The UV curing technology requires only little energy and can be applied to thermo-sensitive fibres. The digital printing technology is suitable for sampling/proofing as well as short production runs. The actual situation and the most challenging aspects of ink jet printing are discussed. The applications of adaptive or stimuli sensitive textiles, shape memory coatings and coatings with microcapsules for a controlled drug delivery are presented. Coating with microcapsules can be used in order to integrate fragrances, aromatherapy oils, antimicrobial agents, antifungal agents, deodorants, insect repellents, moisturisers etc. into textiles. In near future microcapsules will be used to produce polychromic, self diagnostic, radar absorbing etc. textiles.

The world market for technical textiles|Weltmarkt für technische Textilien

MORRIS-D

Overhead presentation. In Europe, for example, while the textile and clothing sector employs some 2.3 million and comprises 170,000 companies, 96 per cent are small and medium sized enterprises with divergent interests and little political influence. However, as a political sop, national governments and supra national authorities appear to be concerned by disbursing funds to universities, research institutes and laboratories and the very large number of trade organisations. Commodity to speciality products is the first priority of the Strategic Research Agenda. The relationship between a commodity product and a speciality product is a vital issue confronting the man-made fibres sector in general and, in particular, the industries in Europe, North America and Japan. In Asia, synthetic fibre production and production capacity has also increased as a result of subsidies. During the late 1980s and early 1990s the Republic of Korea, Taiwan and Indonesia, aided by subsidies from chaebols, invested heavily in synthetic fibre production in the mistaken belief of selling large quantities of commodity products to China P.R. At the same time as these capacities came on stream, China P.R. as well as India also invested heavily in synthetic fibre production, particularly polyester staple and polyester filament yarn. In Europe and the United States of America, the expiry of the Agreement on Textiles and Clothing in January 2005 has had a devastating impact on the domestic man-made fibres industry. The reintroduction of quotas against China P.R. on ten import categories into the European Union until 2007 and some product categories into the United States of America until 2008 has had little positive impact on the sector. The second priority of the Strategic Research Agenda relates to new textile applications. This includes wipes, security products, disposable nappies, nanotechnologies, etc. Mass production to customisation is the third priority of the Strategic Research Agenda. While there is no doubt that there is a market for customised textile products, there is nothing particularly novel about the idea. For other technical textiles, notably mechanical rubber goods and sewing thread, annual growth in consumption is set at 10 per cent and 8 per cent respectively. For nonwoven products, the highest annual growth rates until 2012 are forecast for wipes, followed by medical and sanitary applications, coverstock, civil engineering end uses, shoe fabrics and interlinings. The world market for technical textiles is certain to expand in the medium term. As has been the case for apparel, most of the expansion in production and consumption will occur in Asia.

Self control polyester fiber for smart textiles|Selbstkontrollierende Polyesterfaser für Smart Textiles

YASUI-SATOSHI

Overhead presentation. The self control polyester fibre MRT by Teijin Fibres changes its length under watery conditions. Even more important, MRT has the ability to build smart textiles, which change their structures and properties according to the environmental change. MRT expands when water is absorbed and shrinks, getting back to its original length, when it becomes dry (these changes are at least two times longer as the usual expansion of hydrophilic fibres). The absorption and the expansion properties of MRT by using a new polymer and spinning technologies. MRT is built of elastic polymer that makes possible the absorption of water and further elongation. In addition to the chemical technology devoted to MRT, special textile technologies were developed in order to make smart textile with MRT (for example twisting, weaving and knitting, dyeing and finishing). The result of these developments leads to two types of smart textiles. Type 1 changes its surface from a flat one to a three-dimensional one when water is absorbed (the stickiness of textiles, even during excessive sweating, can be reduced). Type 2 increases its permeability at least twice when water is absorbed (stiffness under sweating conditions is reduced). Both types can change their properties in order to reach a comfortable feeling when the textile is worn under wet conditions. Furthermore, the changes in textile structure (swelling) are visible.

Manufacturing of elastic 3D-spacer-fabrics by using two-component yarns|Herstellung elastischer Abstandsgewirke unter Verwendung von Bikomponentengarnen

SCHWABE-DANNY

Overhead presentation. The manufacturing of elastic spacer fabric structures by using the newly developed bi-component yarn T400 of Invista requires new technological appendages for manufacturing and finishing. The lecture describes the manufacturing principle and features of inelastic spacer fabrics. The structure of spacer fabrics comprises two surfaces consisting of meshes and can have

different weaves. Knitted spacer fabrics show a good pressure-elastic behaviour, a lengthwise elongation of 30 - 200 %, a transverse elongation of 40 - 250 %, a very good drapeability etc. The results of the cooperation between the TITV Greiz and Invista are shown which contained the manufacturing of elastic spacer fabrics for the use in corsetry. Structures with or without Lycra were compared in it's special features. The main focuses were the tension behaviour and the finishing technologies. Furthermore, the results in the development of elastic three-dimensional compression bandages are introduced. By simulating a product life cycle of these bandages important information for the permanent preservation of elasticity were gathered. For elastic 3D- compression bandages T 400 yarns have been used. Altogether 16 versions, thereof 4 versions with T 400 yarns in a yarn count of 78 dtex in both fabric surfaces and 2 mixed versions (T 400 plus Lycra 44 dtex) have been produced. Elongation values in a range of 20 und 30 % achievable without Lycra yarns. The manufacturing of short traction bandages is possible. A high mesh-densification in the 3D- compression bandages has been recognized. There was no significant elongation reduction in the mixed versions even after 25 use- and reprocessing processes.

Transfer line injection for added fiber properties|Additiv-Zugabe in die Schmelzeleitung zur Herstellung von Fasern mit speziellen Eigenschaften

ILBAY-ISIK|GUGGEMOS-RUDOLF

Overhead presentation. The idea is to produce 'value added, special polyester' parallel to 'commodity polyester' in continuous (CP) lines in order to decrease cost, and increase flexibility. The key for this technology is melt conditioning (MC) and melt modifying (MM) processes. This technology follows the consideration 'commodities should guarantee the full plant capacity and cover basic costs while special polyester generates earnings'. The melt conditioning system leads to modified polyesters by incorporation of solid additives into the melt. This leads to an extraordinary flexibility in the polyester production. Today this process is available for modification with different properties such as carbon black, TiO₂ optical brightener, colour pigments, antibloc pigments etc. The subject of the lecture is a new application named cationic dyeable (CD) masterbatch (MB) injection. Milestones on this route are; production of CD MB with highest possible concentration of SSIPA groups, spinning POY with special attention to mixing elements and residence time to get homogenous distribution of SSIPA in the melt, texturing, dyeing and testing fabrics. Final target of the project is production of CD fibres/filaments in a continuous polyester plant with addition of a CD masterbatch after the finisher to one or more melt branches using above mentioned Uhde Inventa-Fischer and Advansa technology.

Microcellular polyester: A one-step process for creating foamed fibers|Mikrocellulares Polyester: Einschritt-Prozess zum Herstellen aufgeschäumter Fasern

TRAVELUTE-FREDERICK-L

Overhead presentation. MCP is a polyester fibre with microcellular texture extruded directly as a foamed plastic. The microcellular bubble texture is necessary to maintain the tensile strength of a small fibre cross-section. Foam generation is a complex process involving many mechanisms, but there are several fundamental steps in the generation of an extruded thermoplastic foam. The initial fibre spinning experiments using conventional foam technology was conducted on a single spin pack line. The polymer was 0.62 IV fibre grade PET blown with HFC 134A refrigerant and no nucleating agent was added. We observed only a few large bubbles forming in the fibres and much of the blowing agent exited the spinneret capillaries as free gas not enclosed in a void. The few voids generated in the fibres were approximately 150 to 200 µm in diameter, the size of conventional sheet foam voids and too large to maintain the tensile integrity of the fibre. Many of these large bubbles broke out at the fibre surface. Increasing the melt strength by increasing the molecular weight stabilizes the bubbles as they are formed and an extrudate with a uniform bubble size and texture can be produced. The combination of the voided cross-section and the brittle polymer severely restricts the ability of the extruding foam to stretch and drawn out from the extrusion velocity to the take-up velocity. The need to evaluate blowing agent technology was greatly diminished by the success with the PTFE nucleating agent, who formed bubbles at such a rapid rate and frequency that gas diffusion rate and pressure within the melt became a secondary factor. A high efficiency nucleating agent produces a high void level with only a small amount of blowing agent. The addition rate of blowing agent falls to about 0.5 % by weight or less with efficient conversion of blowing agent to void level. For completeness, a high molecular weight, low vapour pressure fluorocarbon fluid was evaluated but it's reduction in diffusion rate and gas pressure did not give significantly better results than the HFC 134a when combined with the rapid nucleating properties of the PTFE. The HFC 134a remained the preferred blowing agent. Porous materials are useful for sound absorption and the MCP fibre was tested for acoustic damping behaviour using a standing wave apparatus. Airlaid nonwoven fabrics were prepared at 200 grams/square meter using the porous fibre and a fibre of equal denier without voids.

Optimizing mechanical properties of PP fibers and nonwoven through a novel vis-breaking technology|Verengung der Polypropylen-Molekulargewichtsverteilung mittels Schmelzadditive und deren Einfluss auf die mechanischen Eigenschaften

SCHNEIDER-ARMIN|KOLB-MARKUS

Overhead presentation. The mechanical properties of polypropylene fibres are the result of the selection of the polypropylene grade (melt flow rate) and processing conditions. Whereas specific polypropylene grades can be produced by optimizing process and catalyst system it can be economically much more favourable to modify a standard PP grade in a post-reactor process. Especially for fibre spinning, resins with more narrow molecular weight distributions obtained through a controlled degradation of a high molecular weight PP grade during extrusion (also known as 'controlled rheology' or 'vis-breaking' process) show processing advantages over conventional reactor made polypropylenes. Ciba Irgatec CR 76 represents a new class of radical generators, circumventing drawbacks associated to the use of state-of-the-art peroxides. The novel vis-breaking additive provides a controlled 'on-line' degradation of the polymer during the fibre spinning process leading to a significantly narrowed molecular weight distribution of the starting polymer combined with mechanical improvements of the final filaments. The utilization of Irgatec CR 76 allows an adjustment of the MFI of the fibre material just by varying the processing temperature and/or by changing the concentration of the additive. Furthermore, Irgatec CR 76 can also be used to produce polypropylene meltblown fabrics from a spunbond polypropylene grade. Due to the controlled degradation, the fabrics show a more uniform fibre distribution and a higher web density compared to fabrics based on a commercial PP meltblown grade resulting in improved barrier properties.

Innovative applications of biopolymers|Neue Chemiefasern und Anwendungen auf Biopolymerbasis

SAEDELLEIR-DIRK-DE|GOOSSENS-ALAIN

Overhead presentation. The subject of this presentation finds its origin in a few trends: increasing oil prices, the fact that oil-depletion scenarios are coming nearer, the increasing world population, policies and measures, and globalization. Can 'white' biotechnology provide an answer? Some studies talk about a substitution potential of about 33 %, what about textiles. DS Textile Platform is active in the product groups fibres and yarns, carpets and technical nonwovens. The company was able to spin a PLA staple fibre on an industrial compact spinning line. Sommer Needlepunch, a leader in event-carpets, made the first fully biodegradable carpets (patent registered). An answer for environmental issues is to reduce waste by Biocolor (100 % recyclable polyolefin) and Bioplus (100 % biodegradable carpet made from polylaktid). The properties of biopolymers such as starch polymers, polylactic acid (PLA), polytrimethyleneterephthalate (PTT), polybutyleneterephthalate (PBT) and polybutylene succinate (PBS) are discussed. Biopolymers are sustainable and give a future to our textile industry. Alliances are needed with complementary economic sectors. Biopolymers meet the increased awareness of citizens to guarantee future for our children. Interaction with governmental bodies for regulations and policies is necessary.

New conjugate filament yarn based on acetate|Neues Bikomponenten-Filamentgarn basierend auf Acetat

ITSUMI-A|KURODA-H

Overhead presentation. In order to satisfy consumers' needs for 'comfortable clothing', Mitsubishi Rayon has developed the acetate conjugate filament yarn Ventcool and the 'breathing' fabrics made using this yarn. Ventcool is the snowman shaped cross-section conjugate filament yarn formed from triacetate and diacetate side by side. This is the first triacetate/diacetate conjugate filament yarn in the world. By complete saponification of the diacetate side, Ventcool changes its form to triacetate/cellulose conjugate yarn, and this change creates about 30 % of crimp ratio in dry conditions, due to the difference of shrinkage between the triacetate and the saponified diacetate. In wet conditions, on the contrary, this conjugate yarn gradually starts to become straight and as a result it has 0 % of the crimp ratio as the cellulose side increases its size to be the same length as triacetate side. Using this characteristic of this Ventcool yarn, Mitsubishi Rayon has made fabrics which have very good dimensional stability and flexible breatheability. By placing Ventcool on the inner side of multi-layer knit fabric, it can actively adjust the breatheability of the fabric corresponding to the change of the humidity inside clothes. When absorbing the moisture, namely sweat, fabric open stitches wide and start ventilating the humidity inside clothes to prevent excessive rise in body temperature. After ventilating air, the fabric dries up and again closes the stitches as it originally was. The interior condition can therefore be kept comfortable. This active breatheability control function is based on the characteristic of yarn and its semi-permanent effect, which is totally different from other finishing techniques onto the face side of textile.

Ein Problemlöser für elastische Artikel - T-400|Problem solver for elastic fabrics: T-400

REGENSTEIN-KLAUS

Folienpräsentation. Es wird die neue T-400 Faser von Invista vorgestellt, die zu der neuen Fasergattung Elastmultiester geführt hat. Es handelt sich um eine Bikomponenten-Faser, deren Einzelfilamente sich aus zwei unterschiedlichen Teilfilamenten zusammensetzen, die wiederum aus zwei unterschiedlichen Polyester-Polymeren bestehen. Diese unterschiedlichen Polymere lösen bei einer bestimmten Temperatur ein unterschiedliches Schrumpfverhalten aus, welches zu einer 'chemischen' Texturierung führt. Diese Kräuselung ist nicht reversibel und führt zu einem, dem 'normalen' Texturieren überlegenen Dehnungs- und Rücksprung-Verhalten. T-400 wurde zuerst in der Denim-Weberei eingesetzt. Die Nachbehandlung der Stoffe war teilweise schädigend für das eingesetzte Elastan, speziell die Verwendung von Chlor. Gefordert wurde eine Faser, die die Nachbehandlung ohne Probleme überstand und kein Fremdkörper im Stoff war. Konkret hieß das, das z.B. ein ca. 2 %-iger Anteil von Lycra durch ca. 15 - 20 % T-400 ersetzt wird. Diese Mischung macht keine Probleme in der Weberei und Ausrüstung, bringt aber die gleichen Kraft-/Dehnungseigenschaften wie ein z.B. mit 156 dtex Lycra hergestellter Stoff. Zwischenzeitlich sind erfolgreich Versuche durchgeführt worden, bei denen auf Stapellänge geschnittenes T-400 versponnen und zu 100 % oder in Mischungen verwendet wurden. Einsatzgebiete sind z.B. elastische Blusen- und Hemdenstoffe. Durch das problemlose Verhalten des Fadens setzte sich T-400 schnell bei Problemfällen in der Denim-Weberei durch. Das wiederum veranlasste uns, auch andere Einsatzgebiete zu prüfen, die technisch anspruchsvoll, sprich problembehaftet sind. Diese liegen im Wesentlichen in der Kettenwirkerei und Bandherstellung. Die mit einem namhaften Schweizer Bandhersteller entwickelten Bänder entsprachen in physikalischer Hinsicht nicht den ursprünglichen Vorstellungen des Kunden. Im Vergleich mit Bändern aus Lycra war die Dehnung deutlich kürzer und die Rücksprungkraft deutlich geringer. Für die Kettenwirkerei ist eine Entwicklung mit einer Feinheit von 55 dtex vorgesehen. In diesem Bereich wird die Faser jedoch noch nicht für Bekleidung, sondern für technische Artikel auf Raschelmaschinen eingesetzt.

Influence of polymer modification on the structure formation and processing of PET-POY-yarns|Einfluss der chemischen Modifizierung auf Struktur und Weiterverarbeitbarkeit von PET POY

SCHWEIZER-MICHAEL

Overhead presentation. The influence of a modification of PET (via copolycondensation) on the thermal and on the stress-induced crystallization during yarn spinning was investigated. Copolyesters with different comonomers were synthesized by a standard polycondensation process. The thermal crystallization, which was investigated by DSC, showed that with increasing amount of comonomer the onset of crystallization is shifted to lower temperature, heat of crystallization is reduced and crystallization velocity is decreased. The copolyesters were melt-spun at winding speeds from 3,000 - 6,000 m/min. Density and DSC measurements showed that the crystallization behaviour can be purposively influenced. With increasing amount of comonomer, the beginning of the stress induced crystallization occurs at higher winding speeds. The resulting degree of crystallinity is significantly decreased. For characterizing the amorphous orientation, chain-intrinsic polarized fluorescence was investigated. It could be proved that comonomer modification leads to a high orientation in amorphous regions. In practical use this modification could have the potential to improve productivity. The drawing of fibres spun at 4,000 m/min is readily feasible. This indicates good processing properties of the modified fibres. The dyeing properties of the as-drawn fibres improve with increasing comonomer concentration. Copolyester fibres can be successfully dyed with disperse dyes at temperatures below 100 degrees C.

Technologies for producing finest cellulose fibres according to the direct dissolution process|Technologien zur Fertigung von Cellulosefeinstfasern nach dem Direktlöseverfahren

NIEMZ-FRANK-GÜNTER|RIEDEL-BERND

Micro fibres within the fineness range from 0.5 to 1.1 dtex are accessible by common melt- and solution spinning processes in an industrial scale and are commercialised by all important fibre manufactures. Such technologies require dopes or melts of extreme purity and make high demands on the plant performance. Due to its distinctive structural viscosity the system cellulose/N-methylmorpholine-N-oxide monohydrate (NMMNO-MH) represents a peculiarity among the solvent systems possessing practical relevance for producing fibre-like shaped bodies. The dry-wet spinning principle for producing cellulosic fibres is suitable for spinning in an electric field. Under certain preconditions, such as low viscosities or cellulose concentrations, respectively, Lyocell electro spinning of cellulose dissolved in NMMO yields fine cellulosic nonwovens. Nonwovens produced by electro spinning show a very dense structure and are distinguished by very high water retention behaviour in its never-dried state. This particular property might be the starting point for making use of the very large external and internal surfaces in medical and biotechnological applications. Functional fleeces obtained by Lyocell-electro spinning filled with e.g. inorganic additives, may find their application as niche products. The manufacturing of micro fibres from synthetic polymers having finenesses of less than 0,3 dtex becomes possible by bi-component spinning techniques through spinning multi-component fibres followed by separating the ultra-fine fibrils from the matrix. Usually, two non-miscible polymer melts are processed together to form a matrixfibril-fibre of standard fineness. The formed micro fibres are separated by dissolving the matrix with a suitable solvent or stretching (mechanical distortion) or water steam treatment (swelling) afterwards, respectively. Another pathway for producing finest cellulose fibres as investigated by TITK, is the spinning of cellulose-NMMO-solutions following the shear-coagulation principle. It succeeded to get fibril fibres of diameter less than 4 µm and length from 80 to 160 microns through coagulating agents, especially concentrated NMMO-water-mixtures, realising a slow coagulation. The melt blown process has also turned out to be a technically feasible method for producing filled and non-filled finest cellulose fibres and fleeces. Using Laval-nozzles it succeeded to get cellulose fibres having diameters from 2 to 20 microns.

Sorption studies on regenerated cellulosic fibers in salt-alkali mixtures|Sorptionsmessungen an Celluloseregeneratfasern in Salz/Alkalimischungen

JATURAPIREE-ADISAK|MANIAN-AVINASH-P|BECHTOLD-THOMAS

Man made fibre based on the natural raw material cellulose exhibit excellent accessibility to water and aqueous solutions which is of importance both for textile chemical processes and consumer oriented wear properties. The efficacy of chemical reactions in textile fibres during processing is affected by the accessibility of fibres to reagents and catalysts. Salt are commonly used in chemical treatment of textile substrate such as MgCl₂ use in textile finishing, NaCl use in dye process. Three fibre types were used in this investigation: Lyocell with spin finish (CLY-sp), Lyocell without spin finish (CLY), and Viscose (CV). About 0.5 g of regenerated cellulosic fibres were accurately weighed and immersed for a minimum period of 24 hr in aqueous solutions of salt-alkali mixtures (MX + MOH), wherein the alkali concentration ranged from 0 - 8 M and the salt concentration was maintained at 0.02 M. In all mixtures, the salt and alkali contained the same cation (M⁺), while the salt anions (X⁻) varied. The SRV (Solution Retention Values) in the CLY fibre types, from treatment liquors containing the different salt-alkali mixtures with varying alkali concentrations, are shown. Among the three fibre types, the SRV was consistently higher in CV fibres as compared to the two CLY fibre types, with no significant differences between the two CLY fibre types. However, the trend in SRV of three fibre is similar. The treatments with NaOH mixtures resulted in higher values than treatments with KOH mixtures. With increasing alkali concentration, the SRV first increased and then decreased, and distinct maxima were observed in all fibres at specific alkali concentration intervals: in the range of 2 - 3 M alkali in NaOH mixtures and 6 - 7 M alkali in KOH mixtures. The degree of alkali/salt sorption in fibres as calculated from their SRV maybe regarded as the theoretical or expected value of alkali/salt sorption, since the composition of the liquor in fibre is assumed to be the same as the liquor composition in bulk solution. The degree of alkali/salt desorption in wash liquors as calculated maybe regarded as a measure of the true degree of alkali/salt sorption by fibres from treatment liquors. The salt D/S ratios in all fibre-treatment combinations were less than unity, indicating that the degree of salt sorption was less than what was expected from fibre SRV. It is observed that comparing salts with the same anion without alkali, the D/S ratios for the Na⁺ salts were greater than those for the corresponding K⁺ and comparing salts with the same cation without alkali, the D/S ratios for the Br⁻ salts were greater than those for the corresponding Cl⁻ salts.

State of the art in online monitoring of filament productions|Stand der Technik der Online-Prozesskontrolle für die Filamentgarnproduktion

BAUMGARTINGER-J

Overhead presentation. Folienpräsentation. The turbulences in the textile market, triggered by the substantial competition from Asia, rising oil prices and with its raw material and energy cost increases, no improvement of the current situation can be expected in the near future. In order to remain competitive, this situation requires a rapid introduction of activities to improve the current cost situation. In addition the optimization of the production yield combined with a quality level of the products within a small tolerance field play an important role. With online quality monitoring systems the adherence of product specifications can be ensured. Higher production yield, avoidance of complaints due to the complete monitoring of defects and a reduction of production costs is possible. Different technologies for online process monitoring are available. Quality parameters such as broken filaments, interlace knots, diameter and/or titre, thick places, thin places, yarn breaks, finish content, yarn tension etc. are detectable in real time. Depending on the application, several different sensor technologies for POY, FDY, DTY, etc. processes are available. The relation of price/performance of online sensors in addition with cost reduction in the process, improvements in first quality outputs ensure in most cases return on investment of less than one year. Heated godets are equipped with temperature sensors. There is no question that such a sensor is a must. Many innovative and active companies have recognized the necessity and the benefit of the installation of online sensors to control and improve their production process. This is a precondition to survive in the filament business.

Systematische Entwicklung von sensorbasierten Online-Überwachungssystemen für die Chemiefaserverarbeitung anhand der Beispiele Streckspulen, Wickeln und Texturieren|Systematical method for development of sensor-based quality monitoring of man-made fiber processing - drawing, winding, texturing

RAMAKERS-RICHARD

Die Qualitätssicherung in der Produktion ist ein umfassendes System von Maßnahmen, das zur Vermeidung von Fehlern und daraus resultierenden Schäden angewandt wird. Im Rahmen eines Qualitätsmanagement-Systems übernehmen die Online-Überwachungssysteme eine tragende Rolle als produktionsbegleitende Maßnahmen. Dieser Vortrag befasst sich mit einer Systematik in neun Arbeitsschritten zur Entwicklung von innovativen sensorbasierten Online-Überwachungssystemen für die Chemiefaserverarbeitung. Die Systematik basiert auf dem 'Nine Step Online'-Tool. Der erste Abschnitt, der sich zusammensetzt aus den ersten beiden Arbeitsschritten der Systematik, klärt, welche Prozessstufen als qualitätskritisch angesehen werden müssen. Eine Liste mit Produktkennwerten, die beim Durchlaufen der qualitätskritischen Prozessstufe beeinflusst werden, wird erstellt. Ein Konstruktionskatalog ermöglicht schnell einen umfassenden Informationsüberblick über vorhandene Messtechniken, auch für branchenfremde Benutzer. Aus diesem Grund wurde am ITA der so genannte Konstruktionskatalog 'Sensortechnologie für die Online-Überwachung von Produktionsprozessen' erstellt. Das Ergebnis der Wirtschaftlichkeitsbetrachtung als Querschnittsthema ist ein vernünftiger Umgang mit Mitteln und Kapazitäten für die geplanten Entwicklungen. Von vornherein als aussichtslos identifizierbare Entwicklungen werden vermieden. Entwicklungen, die sich als aussichtslos erweisen, werden nicht länger als nötig verfolgt. Eine wirtschaftliche Unternehmensführung aufgrund von rationellen Entscheidungsgrundlagen wird unterstützt. Diese ausgewählte Wirtschaftlichkeitsbetrachtung basiert auf dem Amortisationsprinzip. Mit dem rechnergestützten und aus einzelne Produktmodule bestehenden ITA-Programm 'Ecofil' werden schnell und zuverlässig die Herstellungskosten und Jahresproduktionen für Chemiefasern ermittelt. Die Wirksamkeit der Systematik wird anhand von einigen aktuellen Beispielen aus dem Gebiet der Chemiefaserverarbeitung demonstriert.

Sensor fibers for the load control in braided and woven ropes and belts|Sensorfasern zur Überwachung der mechanischen Belastung von geflochtenen und gewebten Bändern

SCHEIBNER-W|MÖHRING-U|STÜVE-J|GRIES-THOMAS

Overhead presentation. The operational reliability of hoisting ropes and belts is generally kept under surveillance using visual inspection which has to be carried out by skilled personnel. Monitoring systems that provide advanced warning of impending failure due to overload, fatigue, and wear are restricted in terms of sensing devices and reliable measuring quantities. Therefore the focus of R&D efforts has been placed on sensor fibres which are easy to integrate into textile load-bearing ropes and belts during the manufacturing process. The following sensor fibres were developed, tested, and incorporated into textile hoisting devices: (1) Fibres which indicate overstress by rupture at well defined loads. The response threshold of the sensor fibres is adjustable using various materials and types of weaves in the belt. (2) Electrically conductive threads which change the electrical conductivity with respect to their elongation for in-situ inspection requirements. (3) Friction spun yarns consisting of a resistant core and a wrapping which is sensitive to abrasion, ultraviolet radiation, chemicals, or moisture to indicate environmental attacks. (2) Optical sensor fibres. Load and wear monitoring components are implemented by detection of fibre damages or by generation of electrical or optical signals. Each System comprises an indicator to display the load and control outputs that may be required. Some examples of evaluation procedures are described. The presentation also gives an outlook at prospective applications of the sensor fibres which are non-expensive and easy to implement.

Engineered spider silk. A new material for textile applications|Spinnenseide als neues Material für textile Anwendungen

RÖMER-LIN

Overhead presentation. Biological materials often exceed the characteristics and properties of man-made ones. One well-known example is spider silk. This fascinating material is studied due to its superior mechanical properties such as strength and toughness. For decades a lot of effort has been put into obtaining artificially spun fibres in sufficient amounts for various applications. Unfortunately, manufacturing the proteins that form silk threads encountered many problems in the past. The new biotechnological production technique allows industrial-scale fermentation of silk proteins. Proteins are macromolecules, built of carbon, hydrogen, oxygen, nitrogen and sulphur. The building blocks are 20 different amino acids, connected by peptide bonds. Taking 20 different amino acids and connecting 100 of them in a random sequence, the result will be 20¹⁰⁰, i.e. 10¹³⁰ different proteins. Further, properties can be 'engineered' in order to yield precision materials. In an advanced downstream process the means to transform the silk feedstock into different shapes such as threads and films exist. The controlled design of silk proteins and their states thereof will result in new materials for a variety of textile processes. The properties of spider silk such as high tensile strength, high extensibility, low density, hypoallergenic, and biodegradable are discussed.

High efficient super micro spinning and texturing machines|Spitzentechnik für Spinnen und Texturieren von Supermicro-Filamentgarnen

REICHWEIN-MARKUS|HERWEGH-FELIX-M

Overhead presentation. Driven by fashion and functional criteria, there is a steady, worldwide rise in demand for PET micro-and super-micro filament yarns. Super-micro filament yarns definitely pose extraordinary requirements in all phases of its manufacture and textile processing. However, the use of cutting edge machinery and sophisticated process know-how today, permits these types of yarn to be produced reliably and economically, including those products destined for package dyeing, which is known to be a difficult process. Using a PET 110 dtex f333 as an example, the complete textile chain of a super-microfibre, spinning, texturing, package dyeing and finally use as a weft supply package are described. The description reveals that with use of the latest manufacturing technology an efficient and economically optimized production sequence can be achieved. Barmag provides complete solutions for spinning as well as false-twist texturing to the synthetic fibre and textile industry.

Schmelzspinnen von PVDF-Multifilamentgarnen für neue Anwendungen|Melt-spinning of PVDF filament yarns for new applications

SCHEDUKAT-N|GRIES-THOMAS

Folienpräsentation. Seit Jahren wird Polyvinylidenfluorid (PVDF) in vielen technischen Anwendungen eingesetzt und unter unterschiedlichsten Bedingungen erforscht. PVDF zeichnet sich durch gute mechanische Eigenschaften im Temperaturbereich von -40 Grad C bis +140 Grad C aus, ist beständig gegenüber den meisten Chemikalien und schmilzt bei einer Temperatur von ca. 170 C. PVDF ist schwer entflammbar und selbstlöschend in der Erdatmosphäre und weist eine gute Alterungsbeständigkeit in der Atmosphäre auf. PVDF-Monofilamente bzw. -Hohlfasern werden in der Filtertechnik, in der Medizintechnik und in der Fischereitechnik eingesetzt. Zur Abwasserreinigung und zur Trinkwasseraufbereitung werden Filter aus PVDF-Hohlfasern eingesetzt. Auch werden Filter aus PVDF-Vliesen hergestellt, die im Schmelzblasverfahren produziert werden. Am Institut für Textiltechnik der RWTH Aachen (ITA) konnte im zweistufigen Verfahren ein vollverstrecktes Multifilament mit $T_t = 7,7$ dtex hergestellt werden. Aus diesem Material werden am ITA verschiedenartige Textilstrukturen und Vliese für unterschiedliche medizinische Produkte entwickelt. Beispielsweise werden künstliche Blutadern, künstliche Kreuzbänder, künstliche Hornhaut (Kerato-Prothese) hergestellt. Die untexturierten PVDF-Multifilamente werden auch zu Stapelfasern konvertiert und zu Vliesen verarbeitet, wobei die Faserlänge variiert werden konnte. Ausgehend von einer Materialauswahl und von einer Lokalisierung des Prozessfensters wird ein Versuchsprogramm entwickelt. Die Zusammenhänge zwischen Spinnparametern und POY-Eigenschaften werden ermittelt. Für Versuche in der Weiterverarbeitung werden geeignete Garne produziert. Die Weiterverarbeitung des POY erfolgt im Streckspul- und im FD-Texturierungsprozess. Im Streckspulprozess wird der Einfluss der Verstreckparameter auf die Eigenschaften des vollverstreckten Garns untersucht. Die Zusammenhänge werden dargestellt, um einen verständlichen und beherrschbaren Prozess zu bekommen. Für den FD-Texturierungsprozess werden die Zusammenhänge zwischen den Eigenschaften des Vorlagematerials, der Verarbeitbarkeit im Texturierungsprozess und den Garnparametern des texturierten PVDF-Multifilamentgarns ermittelt.

Anwendungen von Nanopartikeln in und auf Fasern und Textilien|Applications of nanoparticles in and on fibers and textile fabrics

EFFENBERGER-FRANZ|BRAUN-MARKUS|HERMANUTZ-FRANK

Folienpräsentation. Weltweit gibt es wohl kein Forschungsinstitut der Materialwissenschaften das sich nicht mit Problemen der Nanotechnologie auseinandersetzt. Nanoporöse Materialien sind von fundamentaler Bedeutung in biologischen Systemen z.B. als Zellwände. Sie sind aber auch für technische Anwendungen z.B. als Barrierschichten, Filter oder als Katalysatoren unverzichtbar. Ausgangspunkt unserer Untersuchungen für die Herstellung nanoporöser organischer Materialien war das vorhandene große Know-how über cellulosische Materialien. Die Herstellung Porenenthaltener Cellulose regenerierte ist lange bekannt, da diese Produkte als synthetische Schwämme große Bedeutung haben. In allen bisher beschriebenen Verfahren zur Gewinnung poröser Cellulose regenerierte mittels wasserlöslicher Salze waren die Durchmesser der angewandten Salzpartikel in Mikrometerbereich. Da jedoch das intrinsische Porensystem von Cellulose mit Porendurchmessern < 5 nm wesentlich kleinere Dimensionen aufweist, waren bei den großporigen Cellulose regenerierten bezüglich des WRV keine wesentlichen Steigerungen zu erwarten. Vorrangiges Ziel unserer jetzigen Arbeiten war es deshalb, als erstes die reproduzierbare Herstellung und Stabilisierung nanoskaliger (< 400 nm) NaCl Partikel, sowie deren Verwendung als Template in Cellulose regenerierten zu untersuchen. Eine zuverlässige und reproduzierbare Bestimmung der Partikelgröße in der DMA-Suspension war notwendige Voraussetzung für die durchzuführenden Arbeiten. Zur Herstellung der NaCl-Partikel enthaltenen Lösungen von CC in DMA/LiCl wurde das CC erst in Methanol gequollen. Das für die Lösung von CC notwendige LiCl wurde in DMA in der Hitze gelöst und nach Abkühlen mit der notwendigen Menge an NaCl-Suspension versetzt. Es wurden Folien mit Schichtdicken von 200 - 400 Mikrometer hergestellt und anschließend die Regenerierung des Cellulosederivats untersucht. Als Lösungsmittel für eine Koagulation hat sich Isopropanol als besonders vorteilhaft erwiesen, da sich darin NaCl sehr schlecht löst (0,0027 Mol% bei 20 Grad C). Es konnte gezeigt werden, dass das WRV nanoporöser Carbatocellulose mit ca. 250 % das WRV von Viskose mit ca. 80 % und dem der Baumwolle mit ca. 40 % deutlich übertrifft. Werden die anderen Faktoren die das Wasserrückhaltevermögen beeinflussen entsprechend berücksichtigt, dann sollten optimale Verhältnisse für ein Gesamtsorptionsverhalten für spezifische Anwendungen zu erreichen sein.

New polyamide high performance yarns broaden the horizon for technical applications|Neue Polyamid-Hochleistungsfasern erweitern das technische Anwendungsspektrum

FLACHENECKER-ANDREAS

Overhead presentation. Two newly developed yarn types of Polyamide High Performance (PHP), with outstanding properties are presented: a technical polyamide 66 yarn with super high breaking tenacity and a technical polyamide 46 yarn with high thermal dimensional stability and outstanding stress relaxation behaviour. The brand name is Enka Nylon 142HRT. The breaking tenacity (BT) is > 950 mN/tex, the elongation at break is > 16 % and the hot air shrinkage (HAS) is 6 -- 7 %. The material is used for aircraft tyres, air springs, etc. Stanylenka are polyamide 4.6 yarns. Stanylenka has been approved and is used in automotive airbags and automotive airbags and in elastic belts. PA 4.6 shows more than 30 % higher shrinkage forces at elevated application temperatures. Only PA 4.6 is about to keep initial pre-tension. The thermal stability of PA 4.6 at elevated temperatures shows significant less tension decay. PA 4.6 shows good hydrolysis resistance at elevated temperatures.

New polyester textile filament|Neue Polyester-Filamentgarne

FELDI-GIANFRANCO|PIVOTTO-EMANUELE

Overhead presentation. In the world of weaving, looms and other equipment, more and more evaluated and high performing, need yarns with adequate properties to withstand the stresses produced during operation. REQUIREMENTS of yarns for weaving include adequate tensile strength - stress to withstand during warping and weaving, adequate filament cohesion - absence of loose filament, cause of breaks and stops during warping and/or weaving, and adequate dimension and evenness - absence of the so called 'flashes' on the fabric. The common answer of most yarn producers has been to switch from sized and/or twisted yarns to high intermingled ones. Intermingling, which consists of creating cohesion points through the filaments along the yarn, by mean of compressed air,

requires specific properties carefully controlled and maintained. Sinterama has been carrying out a study on the entire intermingling process, obtaining innovative results. The new interlacing process has been developed in order to improve and even knots distribution, to adapt point tenacity to every specific end-use, to improve processability and to reduce process costs. The new process consists of a methodical customer requirements analysis, new in-house lab method to control, a new interlacing tool as well as adapted texturing parameters. The results are better weaving performance, and reduced air consumption of 50 % compared to standard interlacing jets.

A new texturised micro polyester yarn with improved properties|Neues texturiertes Micropolyester-Garn mit verbesserten Eigenschaften

SEZEN-MUTLU (BURSA)

Overhead presentation. The functional properties of a new development of polyester micro textured yarn are shown. It is produced from 100% polyester super micro-POY by a newly developed texturing process in order to give the yarn a natural fibre look with high number of filaments. It provides additional properties to polyester micro yarn to enhance final fabric performance in certain textile applications. As well as providing a natural fibre look and touch, it improves drapeability of the fabric. Most importantly the water absorption and burst resistance of the fabric are much better than 100 % cotton fabrics. In comparison to cotton fabrics, the improved properties of fabrics with this natural looking polyester micro yarn are the air permeability, twice the burst resistance, stain resistance and sweat fastness. The original pilling and after washing pilling values are better than cotton. The results also show that it gives similar crease resistance and shrinkage to 100 % cotton fabrics. The process is applicable to texturing of channelled cross-section POY as well as classic round cross-section filaments. This provides additional advantages and better moisture management in performance fabrics. Sportswear, performance wear, underwear and even home textiles are the possible application areas of the new micro textured polyester yarn with natural look. DRY TOUCH is made from high-tech functional channel cross-sectioned yarns that are produced at the Korteks yarn factory employing special techniques. Advanced technology and functionality come together. o DRY TOUCH Performance Fabrics made from filaments with 5 -channel cross-sections can have a more natural look than normal processed PES fabrics do, thanks to TAC Cotton-like texturing process. The DRY TOUCH Performance Fabric dried completely in 52 minutes, so dried twice faster than other garments made from cotton. In performance tests, garments made from DRY TOUCH Performance Fabrics absorbed water twice faster than garments made from cotton. Higher wicking values show greater water transport ability. The water on the DRY TOUCH Performance Fabric was transported to a height of 14 cm in 10 minutes.

High performance rayon filament in tire and other applications|Hochleistungs-Rayon-Filamentgarne für Reifen und andere Anwendungen

BRICE-RICHARD

Overhead presentation. Rayon was widely used for tyre and industrial rubber product reinforcement in the 1950s and 1960s. In the mid-1990's Western Europe was the sole remaining market for rayon tire yarn, and demand was falling in this market as the in-tire price differential between rayon and HMLS polyester, and the steady improvement in the properties of HMLS polyester tire yarn encouraged the substitution of rayon by HMLS polyester tire yarn. By the late 1990's many industry participants were confidently predicting the final demise of rayon tire yarn over the next decade. But by 2002 demand for rayon tire yarn had begun to recover and this recovery has gathered strength in subsequent years. This resurgence in rayon tire yarn demand stems from advances in tire design and tire technology alongside developments in consumer attitudes regarding the tires fitted to their vehicles. The key developments that are driving this rising demand for rayon tire yarn are examined and it is looked at how these developments are generating demand for rayon tire in new markets alongside Western Europe. Potential alternatives to high tenacity rayon industrial filament yarn in tire and non-tire applications are also considered and their potential as substitutes for rayon yarn is assessed. Today, the tire cord consumption reached 1.05 million tons. Retention of modulus at elevated temperatures ensures the tyre's dimensional stability over time by maintaining the tyre's uniformity and toroidal shape. Increase in light vehicle weight and performances impose loads on the tyre and raises the tyre's operating temperatures. Rayon reinforced tyres do not flat spot. Flat spotting causes when the glass transition point of the polymer is low relative to the tyre's operating temperature but high relative to the ambient temperature. Demand for rayon tyre yarn is set to continue to rise, but at a lower pace than over the past five years. This is because of the high oil prices, which are encouraging less driving and a switch from high performance to more economical auto models. And the declining sales in North America of large personal pickups and SUVs, many of which were fitted with rayon reinforced ultra-large tyres, and a switch to smaller models, which will be equipped with conventional polyester reinforced tyres.

New developments in dissolving and processing of cellulose in ionic liquids|Neue Entwicklungen zur Lösung und Verarbeitung von Cellulose in ionischen Flüssigkeiten

MASSONE-KLEMENS|UERDINGEN-ERIC

Overhead presentation. Ionic liquids (IL) are new direct dissolving systems for cellulose characterized by unique dissolving properties and simple technical handling. IL systems consist of 100 % ions and have a melting point below 10 degrees C. Selected IL-systems are non-toxic and chemically as well as physically neutral which represents an advantage as compared to the commonly used direct solvent N-methyl-morpholine-N-oxide (NMMO). Fibres can easily be prepared by coagulation in water. BASF, as a leading producer of ionic liquids, investigates the technical conversion of the preparation of cellulosic fibres using ionic liquids in cooperation with the Institute of Textile Chemistry and Chemical Fibres (ITCF), Denkendorf. The major targets of this project are the selection of appropriate IL-systems, IL recycling, rheology of spinning dopes and the characterization of resulting fibre profiles. For the investigations EMIM-OAc (1-ethyl-3-methylimidazolium acetate) has been used. The ionic liquid EMIM-OAc (1-Ethyl-3-methylimidazolium acetate) dissolves up to 25 wt.% Cellulose. The preparation, filtration and degassing of the spinning dope is technically simple, No formation of gel particles takes place. No marked sensitivity to air could be detected. The spinning dopes have excellent heat stability and the addition of stabilizers was not necessary. The spinning dope viscosity can be adjusted in a wide range (50 -3000 Pas) providing a high spinning process flexibility. The presented method is an interesting process for environmental friendly production of man made celluloses. It offers high flexibility in producing man made celluloses with a broad range of mechanical properties.

Ionische Flüssigkeiten als Lösungsmittel für Cellulose|Ionic liquids as cellulose solvents

BENTIVOGLIO-GINO|RÖDER-THOMAS|FASCHING-MARIO|SCHOTTENBERGER-HERWIG|SIXTA-HERBERT

Als ionische Flüssigkeit (ionic liquid, IL) bezeichnet man eine Flüssigkeit, welche nur aus Ionen besteht. Im weiteren Sinne beinhaltet dieser Begriff alle Salzschnmelzen, wie beispielsweise Natriumchlorid (Kochsalz) bei Temperaturen über seinem Schmelzpunkt von 800 Grad C. Ionische Flüssigkeiten bestehen üblicherweise aus großen, asymmetrischen organischen Kationen, wie z.B. 1-Alkyl-3-methylimidazolium-, 1-Alkylpyridinium-, 1-Methyl-1-alkylpyrrolidinium- oder Ammoniumionen. Charakteristische Eigenschaften ionischer Flüssigkeiten sind ihr nicht messbarer Dampfdruck, ihre thermische Stabilität, der große Temperaturbereich der flüssigen Phase, die elektrische Leitfähigkeit sowie bemerkenswerte Löseeigenschaften für zahlreiche Substanzen. Aufgrund ihrer besonderen Eigenschaften gibt es für ionische Flüssigkeiten in vielen Bereichen Anwendung, wie z.B. als Reaktionsmedium in der organischen Synthese oder als Elektrolyt für elektrochemischen Anwendungen. Entwicklung cellulosebasierender Materialien voranzutreiben, für deren Produktion dann geeignete Lösungsmittelsysteme benötigt werden. Von den zahlreichen bisher beschriebenen Lösungsmittelsystemen für Cellulose gibt es bislang nur ein kommerziell verwendetes System, das Ähnlichkeiten mit ionischen Flüssigkeiten aufweist - N-Methylmorpholin-N-oxid Monohydrat. 2002 wurde der Begriff ionische Flüssigkeit erstmals im Zusammenhang mit Cellulose genannt: Verschiedene ionische Flüssigkeiten wurden im Hinblick auf ihre Celluloselösefähigkeit getestet. Dazu wurde versucht, 3 %-ige Lösungen von Cellulose in ionischen Flüssigkeiten herzustellen. Es zeigte sich, dass die Stabilität der gelösten Cellulose eindeutig vom verwendeten Lösungsmittel abhängt. In allen untersuchten Lösungsmitteln findet bei 100 Grad C ein deutlicher Abbau statt. Ein Vergleich mit dem NMMO-Prozess zeigt keine Verbesserungen der Fasereigenschaften, insbesondere der Fibrillierneigung. Ionische Flüssigkeiten eignen sich prinzipiell zum Auflösen von Cellulose und zur Herstellung von Cellulose regeneratfasern. Die resultierenden Fasern gehören zur Gattung der Lyocell-Fasern und weisen ähnliche bzw. gleiche Eigenschaften auf, wie die aus NMMO gesponnenen Fasern.

Polymer and metal nanofibers via electrospinning and their application|Polymer- und Metallnanofasern via Electrospinning und deren Anwendungen

GREINER-ANDREAS

Overhead presentation. In recent years electrospinning of polymers has been developed to a highly versatile method, which allows processing of polymer fibres in different dimensions, shapes, and compositions. Numerous applications of electrospun fibres have been envisioned and some of them have already been successfully commercialized. Fibre properties can be further modified by spinning and modification of polymer blends and block-copolymers. In addition, polymer nanofibres can be loaded by numerous additives such as catalysts, nanoparticles, enzymes etc. Usually, nonwovens are obtained upon electrospinning, however, special design of electrodes also oriented arrangements of fibres are possible. Highly porous fibres can be realized by suitable control of solvents and deposition conditions. Even core/shell fibres can be prepared by electrospinning. Variation of fibres properties can be also accomplished by manifold chemical variations of functional polymers forming electrospun fibres. For new applications electrospun fibres with entrapped drugs, enzyme and other bio-objects were generated.

The U.S. manufactured fiber and textile industry: Overview and prospects|Der amerikanische Fasermarkt

HORN-FRANK-J

The decade 1995 through 2005 has been one of radical change for the North American manufactured fibre industry. General economic conditions have been favourable - with the exception of the 2001/02 period - and fibre consumption at the consumer level has continued to show exceptional growth. In addition, the expansion of preferential trade agreements from the NAFTA base has provided strong support for the industry, allowing the national market to become regional, linking Canada, the U.S., Mexico and CBI countries in a more efficient and more competitive supply chain from fibre to retail. Nonetheless, starting in 2000, the North American industry has been challenged by: the run-up to MFA quota elimination in 2005; dramatically increased customer-based import penetration; mounting global fibre overcapacity in Asia; and, in 2005, unprecedented raw material cost increases, made even more severe by hurricane Katrina. These difficulties have resulted in declining production for all fibres and have driven massive restructuring of the industry. The path ahead will depend on conditions in the industry's major customer bases, as well on innovative new fibres and technologies, bringing with them new uses and new customers around the world.

Modification of nonwoven fiber surfaces|Modifikation von Faseroberflächen für Vliesstoffe

KUTSENKO-MICHAEL|FOX-STEVE

The objective of this paper is to analyze recent advances in fibre surface modification for nonwovens which may be achieved during the synthetic fibre forming process commonly known as spinning. The surface is the topmost boundary of an object. These fibre making processes, which are commonly conducted at tremendously high speeds, require immediate fibre surface modification to control friction, electrostatic charge and abrasive wear. Moreover, fibres have to bring a certain complement of surface characteristics such as specially engineered hydrophilic/hydrophobic/oleophobic balance, which make them more valuable for further processing and/or application. This type of fibre surface modification can be achieved by high speed application of specially designed liquid lubricating systems and, in some cases, with the addition of migration-controlled polymer additives. Physical surface treatments include cold plasma, steam explosion, mechanical treatment, laser, UV and flames. Finishings for nonwovens are normally applied from water based emulsions. The surface tensions of the emulsions are 32 - 40 dynes/cm, whereas the surface tension of the polymer are 42 - 43 dynes/cm for PET, 44-46 dynes/cm for Nylon and 26 - 28 dynes/cm for PP. the application speed is up to 500 m/min. Static dissipation is controlled by WSP 40.1 and EN 1149 and WSP 40.2 and NFPA-99. SMS medical fabric need comfort, alcohol repellency and antistatic behaviour. Goulston Technologies offers Hydrepel melt additives for PP. Hydrepel is for barrier fabrics and specifically for alcohol repellency.