



world of denim

Competence in Denim Finishing



AHEAD OF PROGRESS



► Proven success.

The Monforts range combinations for denim finishing are now even more cost-efficient and eco-friendly: The Monforts ECO Applicator is now used for liquor application.

Drying, stretching and skewing functions for the denim fabric are performed by a modified Thermex-Thermo-Stretch unit. This configuration allows fabric speeds of up to 40 m/min to be achieved with 14.5 oz/yd² denim on the "single rubber" version.

The "double rubber" version comprises two compressive shrinkage units and two felt calenders in line. Together with the innovative Thermex stretching unit, fabric speeds of up to 80 m/min can thus be achieved with 14.5 oz/yd² denim.

On both range versions, the denim fabric is stretched and skewed far more gently than with conventional range combinations. Ask our denim technologists.

We will be happy to advise you.



A. Monforts Textilmaschinen GmbH & Co. KG
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GERMAN 
Technology



Pioneering change

Every year, around 15 billion metres of denim fabrics are produced globally, to go into around 10 billion garments, with the key manufacturing countries being China, Bangladesh, India, Pakistan, Mexico and Brazil.

Some 66,000 tons of indigo powder have been needed for this production, but until recently hazardous chemicals have been required to make it water soluble, and after dyeing, tons of wastewater containing these chemicals have been discharged into the environment, often without treatment. The denim dyeing process has been one of the major pollution problems within the textile industry as the demand for denim continues to grow – each of us already owning four or more denim fashion items.

Now, however, things are changing, and Monforts is proud to be one of the companies pioneering this change.

One of our customers, Bossa Denim in Turkey, for example, lists the procedures it is adapting aimed at reducing environmental impact as:

- Sustainable materials
- Energy efficiency
- Water savings
- Process engineering
- Certification
- Social responsibility
- Re-use
- Collaboration
- Co-creation

Responsible technology companies can play an active role in all of these areas.

As our Head of Denim Hans Wroblowski explains in the interview starting on page 30 of this issue of **Monforts World of Denim**, we have recently been enjoying success with our Eco Line concept for denim, which is based on two key technology advances – the Eco Applicator and the Thermo Stretch.

This is allowing significant savings to be achieved in water use, energy and raw materials.

It's only the start of what we intend to achieve in the next few years.

Hans Wroblowski



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BLUECOMPETENCE
Alliance Member

Partner of the Engineering Industry
Sustainability Initiative

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Front Cover: 'Midnight' from Lenzing's Refibra fashion collection, with denim manufactured by Spain's Santanderina.

Monforts customers featured in this issue:

Advance Denim, Albiate, Artistic Denim Mills, Artistic Fabric Mills & Garment Industries, Artistic Milliners, Arvind, Azgard 9, Berto, Black Peony, Bossa, Çalık, Cone Denim, Crescent Bahuman, DNM, Freedom, Iskur, Kassim, Kilimdenim, Kipas, Kurabo, Naveena, Orta, Prosperity, Rajby, Raymond Uco, Santanderina, Soorty, Tusa, Vicuhna, W Denim.

"This is no longer the 1950s..."

Hans Gerhard Wroblowski, Head of Denim at Monforts, outlines new possibilities with the company's latest integrated technologies for denim production.

World of Denim: Could you tell us a little bit about what sets Monforts machinery apart?

Hans Wroblowski: We specialise in advanced technology for fabric finishing based on successive industry developments since our foundation in Mönchengladbach in Germany (where we are still headquartered) back in 1884. Monforts Montex stenters (stretching, drying, heatsetting and coating systems) are the industry standard for the denim fabric finishing industry, providing a number of advantages in terms of production throughput and especially in energy efficiency and savings.

We have recently been enjoying success with our Eco Line concept for denim, which is based on two key technology advances – the Eco Applicator and the Thermo Stretch.



In many denim mills globally, the cost of energy for running integrated manufacturing lines – especially those for denim fabric finishing that can involve numerous sequences of heating and subsequent drying – is now eclipsing the cost of paying people to operate them and the ability of the Eco Applicator to significantly reduce overall manufacturing costs has seen it rapidly accepted on the market.

As an alternative to conventional padding – where the denim fabrics are immersed in a bath of the required finishing chemicals – the Eco Applicator can significantly reduce the energy and water required for achieving perfect finished denim via a precise direct application system.

Finishes can be applied on just one side of the fabric, or both, and even separately on each side, or to specific areas of a fabric, and sealed in place via different heating zones in the stenter. This allows endless differentiation possibilities.

The ThermoStretch unit can then handle the skewing (the weft-direction straightening necessary to ensure jeans don't twist out of shape when you put them on), the bow correction

and the stretching (to ensure they don't shrink after washing), and the drying or light heatsetting, in a continuous one-step process.

Arvind, for example, has recently installed India's first integrated Monforts Eco Line which is operating alongside four of our Montex stenters.

WOD: How has automation impacted what you're doing?

HW: Our evolution in textile engineering and machine building has progressed through mechanical, steam and water-powered technologies to the first mass production lines, electronic drives and highly modular machines. The move towards the current state of the art initially involved data transfer and storage via internet/intranet, along with teleservice solutions, and has been followed by full automation concepts which assure an overall quality control.

Now we are truly in the digital age, and we are committed to investing in the digitization of our technology.

WOD: What are some innovations you're working on for the denim market in the coming year?

HW: We are already embracing many Industry 4.0 principles in our approach to new machine concepts and our Qualitex 800 control system, for example, has



all the intuitive features operators will be familiar with from touchscreen devices, making navigation extremely easy, cutting down the time required for becoming familiar with a new system and allowing complete control of all machine parameters. This has a significant impact on productivity, availability and in general machine and production efficiency.

WOD: What's next for Monforts?

HW: A completely automated stentering range requiring no human operation at all – or only via a remote link – is within our sights, but there will be other announcements in the first half of 2019.

WOD: What are your plans for ITMA?

HW: It's too early for us to announce our plans for ITMA in Barcelona in June, but suffice to

say, Industry 4.0 is driving much of our R&D, in addition to mechanical and engineering refinements. We will have a considerable presence at ITMA 2019, because it's the crucial show for us.

WOD: Which mills are you working with?

HW: We work with the majority of the mills in Bangladesh, India, Mexico, Pakistan and Vietnam, as well as with close partners in Europe and the Americas.

Among our customers at the recent Denim PV in London, for example, were:

- Artistic Denim Mills, Artistic Fabric Mills & Garment Industries, Artistic Milliners, Azgard 9, Crescent Bahuman, Kassim, Naveena, Rajby and Soorty, all of Pakistan.
- Bossa, Çalık, Kilimdenim, Iskur, Kipas, Orta and W Denim of Turkey.

- Arvind and Raymond Uco in India.
- Advance Denim, Black Peony, Freedom and Prosperity in China.
- Albiate and Berto in Italy.
- Cone Denim (Mexico), DNM (Egypt) and Kurabo (Japan) and Vicuhna (Brazil).

WOD: When does a jeans stop being a jeans?

HW: It doesn't have to really, does it? If a pair of denim jeans is engineered for jogging, say, in the so-called 'athleisure' trend, then it's still a pair of jeans at the end of the day, if they can meet the performance requirement. Denim fabric doesn't have to stop being denim, with all of the variation in texture and drape that's possible. The latest fashion collections are as far removed from the concept of 'classic denim jeans' as you can get. This is no longer the 1950s. ●



Less is a lot more in these eye-catching denims from Pakistan's Rajby Industries. Representatives from the company has been giving away plants and promotional materials made from organic cotton waste and flowering seeds to emphasise their sustainable messages at recent denim trade fairs.

Creative risks as opportunities

The eagerness of Monforts denim customers to highlight their developments in respect of eco-responsibility is certainly reflected in the denim trends for 2020 and 2021, as identified by Première Vision's design team.

Brands are now embracing new body shapes, with models proud to be different, as Millennials (those reaching young adulthood in the early 21st Century) begin to

call the shots, says Première Vision fashion product manager Marina Coutelan.

"For decades there have been very narrow standards in



PV fashion product manager Marina Coutelan.





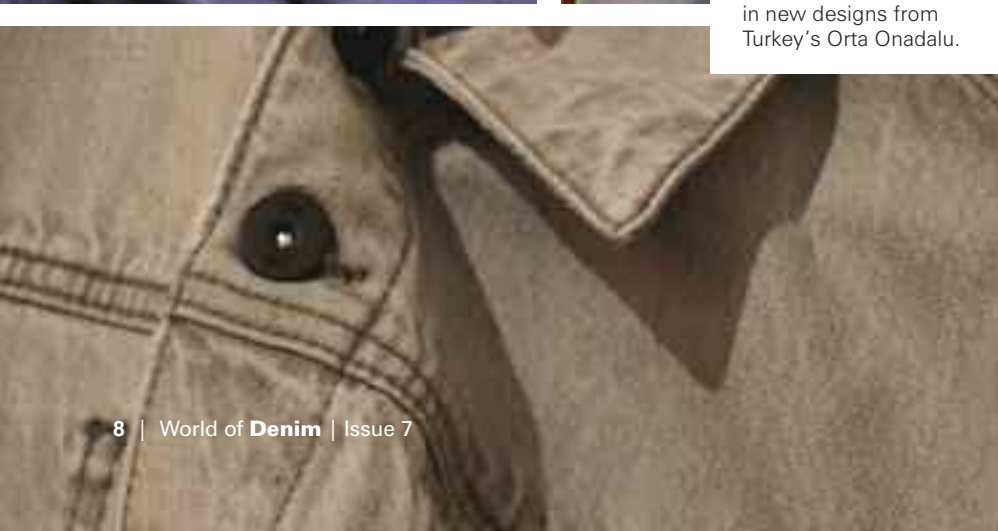
3D effects and over-stitching from companies including Advance Denim and Naveena are much in evidence in the latest denim collections.



There is much use of open weaves, as in this shirt from India's Arvind Mills.



Assertive paleness features in new designs from Turkey's Orta Onadalu.



respect of what is conceived to be beauty, but that's changing," says Coutelan, "and there is now in general a determination to view creative risks as opportunities across the industry."

"There is much use of recycled cotton evident in the latest denim collections, as well as recycled polyester and polyamide, enhanced by new finishes for ever-softer handles, she adds. The technologies for manufacturing denim with no or limited water are advanced and there are a variety of other eco-finishing techniques coming to the fore, as well as the use of vegetable-based dyes as alternatives to conventional indigo."

Structures

In terms of structures, diagonal, open weaves are common, along with the use of stripes within the denim structures, as exemplified by new collections from Turkish mills such as Bossa and Kilimdenim. 3D effects and composite materials are also prominent.

Many of the latest denims have a new lightness and subtlety, as well as suppleness, as is evident in the latest collections from companies such as China's Advance Denim and India's Raymond Uco. Manufacturers are emphasising paleness and clean weaves, with colour stressed through over-dyeing and fine overlays.

Stretch fabrics remain as important as ever to the market, with Turkey's Çalık Denim, among others, emphasising sculpted garments that allow free movement yet retain their shape, and special fibres such as Cordura and Dyneema being employed to provide solidity and strength.

"For women in particular, the emphasis is very much on the silhouette," Ms Coutelan stresses. ●



Denim and digital – moving beyond catwalk concepts

Monforts denim customer Soorty commissioned the Amsterdam-based digital design studio The Fabricant for the promotional launch of its Cradle-to-Cradle-certified Gold Standard denim fabric.



In 2018, The Fabricant's DEEP Digital Fashion Collection saw the first collaboratively-designed fashion collection between a human and a non-human, with Amber-Jae Slooten and artificial intelligence algorithms dreaming, learning and creating together.

The Fabricant really made the fashion and technology industries sit up and take notice in 2018 with the DEEP Digital Fashion Collection, devised by its co-founder and creative director, Amber-Jae Slooten.

Using artificial intelligence algorithms, the creative experiment saw the world's first collaboratively-designed fashion collection between a human and a non-human, with Amber essentially asking the computer to dream, learn and create alongside her. The resulting surreal digital collection was exhibited at major fashion fairs across Europe last summer and gained further attention for The Fabricant at Dutch Design Week.

The Fabricant's sustainability credentials then came into play with the commission from Pakistan-based Soorty, which supplies to global retailers such as Tommy Hilfiger and C&A.

Leadership

During 2018, Soorty established a new denim garment manufacturing plant in Karachi, Pakistan, which is LEED Platinum certified.

LEED – Leadership in Energy and Environmental Design – is the most widely used green building

rating system in the world and a globally recognised symbol of sustainable achievement.

To achieve Platinum status, 80 of a possible 100 points must be achieved across six credit categories – Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality and Innovation in Design.

Soorty had already established a LEED Gold garment manufacturing plant in Bangladesh and continues to pioneer sustainable developments across all of its operations.

Employing some 22,000 people, Soorty began as a garment making operation in 1983 and expanded into denim fabric manufacturing a decade ago. Its denim mill was first expanded in 2009 followed by the establishment of a spinning mill in 2011.

The LEED Gold Bangladesh garment manufacturing operation was established in 2014, when the company also opened a development centre in Amsterdam.

During 2016, a second denim manufacturing plant was opened in Karachi, along with an open-end spinning mill and a

dedicated recycling unit. In respect of the latter, the company now has the capacity to recycle some 2.5 tons of spinning, fabric and garment waste material per day and is also collaborating with I:Collect to establish post-consumer waste processing.

Following a systematic expansion programme, the company now has three Monforts Montex stenters as well as three Monforts sanforizing units. This brings the company's finished woven denim capacity to a monthly 5.5 million metres.

Soorty also recently became the first company in Pakistan to install the new Monforts EcoApplicator with which it has been achieving very substantial finishing cost savings.

Nothing but data

As designers using nothing but data to create fashion collections and imagery, The Fabricant's work exists beyond the current concepts of catwalks, photographers, studios and sample sizes. It was a proposition that naturally co-existed with Soorty's innovative new Cradle-to-Cradle certified Gold Standard denim fabric.

“ Digitisation helps clients to promote and visualise ideas without wasting unnecessary resources. ”

*Amber Jae Slooten,
The Fabricant*



The 60-second film created by the Fabricant in response to Soorty's brief showcased the look, texture and movement of the new denim while only existing in the non-physical digital realm.

The use of 3D rendering perfectly complimented Soorty's mission of reducing fashion's environmental impact via the use of sustainable practices.

"Cradle to Cradle is a method that we believe is fair and necessary, and using digital design tools we were able to promote this method without wasting any material but data," says Amber Jae Slooten. "What we are trying to tell is a story of fairness in combination with technology."

The Fabricant created an abstract landscape alluding to the sustainability concerns of the

brand by using visual cues from the natural world, creating an appropriate environment for the digital recreation of the denim to exist. The backdrop also functions as a means to deliver powerful facts on the brand's anti-waste credentials.

For Slooten, the key to the concept was visually communicating the constant C2C cycle.

Endless loop

"We tried to visualise an endless looping process," she says. "Like the C2C process, the video is constantly repeating itself but constantly reinventing too. Because of the highly hypnotising content, the viewer keeps on seeing new details. The underlying message of the video was a constant loop that tied to the endless circle of life."

"To me, whenever I create any content, it has to tap into a certain feeling – people vaguely recognising it or experiencing a certain mood. Next to the emotional value, I am trying to visually tell a story with content that works graphically and colour-wise with each other."

"Digitisation helps clients to promote and visualise ideas without wasting unnecessary resources. 3D visualisation gives a multitude of possibilities on lighting, materials and backgrounds. With the virtual world yet unexplored, we have the visual means that will set brands apart from the overused film and photo-shooting techniques. It will truly take fashion into the 21st century." ●

The Fabricant's 60-second film in response to Soorty's brief showcased the look, texture and movement of the new denim while only existing in the non-physical digital realm.





Portraits in a universal fabric

Turkish artist Deniz Sağdıç has been demonstrating her meticulously-assembled portraits based on repurposed denim scraps at recent exhibitions, in collaboration with Bossa Denim.

"I started my Ready-Remade project around four years ago, based on transforming used objects into works of art," she explains. "One day I was cutting denim trousers and rearranging them using this approach and realised its almost limitless possibilities as a material, as well as its conceptual significance. Denim has a huge number of

“Denim has been accepted by everyone in our world and in that sense it is unique.”

Artist Deniz Sağdıç

colours, tones and textures and you can use numerous techniques all together – stitching, cutting, pasting, lacing, fraying and engraving.”

Unique

"You see denim on people living the furthest from civilisation in the world and those in the most sophisticated metropolises, as well as on both people with extremely limited economic capabilities and those who are extremely rich. Denim has been accepted by everyone in our world where – unfortunately – even the colour of someone's skin is a matter for discrimination, and in that sense it is unique. That's why I produce mainly portraits of people whose names and identities are unknown and each portrait makes eye contact with you."

When she started her work, Deniz was acquiring the fabrics and clothing from different companies and second-hand shops. Her collaboration with Bossa, which has its headquarters in Adana, began after her work was spotted by the company's head of marketing Özge Özsoy.

"Bossa is also using its own waste to create recycled fabrics and is a very environmentally-friendly company," says Deniz. "I believe we are on the same path and Bossa interacts with so many people at the exhibitions it takes part in and carrying my art to an international platform is very important for me."

Re-Set

"We introduced our first Re-Set collection in 2006, employing not only organic cotton, but also

“ We use a thousand old pairs of denim jeans for the production of 2,000 metres of denim containing 20% recycled cotton. ”

Özge Özsoy,
Bossa



ecological dyes, chemicals and finishes,” says Özge Özsoy. “In 2010, recycled denim was added to the Re-Set collection, based on the company’s system in which old jeans are shredded by a partner in Gaziantep and then turned into new yarns for use in our ranges. Approximately a thousand pairs of denim jeans are used to produce 2,000 metres of blended denim containing 20% recycled cotton yarn content.”

Bossa is also a member of the Alliance for Responsible Denim (ARD) which is promoting the use of post-consumer recycled denim.

The recycled cotton actually has certain advantages, in that being first made from indigo dyed yarns and fabric it is already blue and after rope dyeing takes on a richer indigo hue. It also has a slightly slubbier character providing extra texture and dimension.

The Re-Set collections now offer a range of options including power stretch, over-dyed fabrics and selvedge denims.

Save Blue

The company’s Future Denim concept combines organic cottons, recycled cottons and polyesters and Lenzing Refibra, with yarn dyeing via the Bossa Save Blue process.

The results from the Save Blue process have been analysed at Cukurova University and found to achieve 85% savings in water compared to conventional dyeing, with comparable efficiency and no difference in the fastness values of the denims woven from these yarns.

Bossa also uses the Made By classification system in which twenty fibre types are scored based on the following six criteria:

- Greenhouse gas emissions.
- Human toxicity.
- Eco-toxicity.
- Energy and water input.
- Land use required in fibre production.

“Conventional textile processing has very high water and energy consumption and a large amount of wastewater discharge and the conservation of water resources and the environment have become key issues of concern,” said Özge. “We have designed our Spring/Summer 2020 collection to be as sustainable as possible as a result of the careful collection of fibres and dyeing techniques.”

Founded in 1951 and headquartered in Adana, Turkey, Bossa is planning to grow its turnover by 25% over the next few years by selected investments in sustainable technologies. ●



A wonder material across weft and warp

Graphene holds much promise as a route to new functional finishes for fabrics, believes Monforts key customer in India Arvind.

The isolation of graphene earned Manchester University scientists Andre Geim and Konstantin Novoselov the Nobel Prize in 2010.

Hailed as a wonder material, graphene is the thinnest compound known to man at one atom thick, the lightest material known, the strongest compound discovered to date, the best conductor of heat at room temperature and also the best conductor of electricity.

In theory, graphene's potential applications are endless and the European Union has made it the subject of its largest-ever research project – the €1 billion Graphene Flagship.

Now Arvind has launched the world's first graphene-enhanced denim jeans and jackets, following an agreement signed with Italian

graphene manufacturer Directa Plus early in 2018.

Vision

"I was very impressed by the Directa Plus story of setting up the company and building a complete manufacturing plant without having sold a single gram of product," said Stefano Aldighieri, Arvind's creative director. "That showed real vision, as well as courage. I read about the company's success with Colmar in outdoor apparel and started to wonder if graphene was something we could use in denim. So we got together and started to experiment."

"In general, graphene is the magic product that has been able to do anything so far but get out of the lab," he added. "For a number of years, R&D centres have been

talking about all of the wonderful things it could do, but when we decided to become involved the crucial thing was to get things out in the market as soon as possible, and we opted to go for the low-hanging fruit, which was simply wear and comfort in denim and textiles."

Thermal distribution

The positive effect of printing a graphene layer on the inside of denim jeans and jackets is to increase the thermal distribution of the fabric, so that the denim clothes can be worn comfortably even in very hot climates. At the same time, while it does not kill bacteria, the graphene prevents its formation and provides an anti-odour effect.

"We believe this innovation will help drive the demand for jeans and other items of denim attire in India in particular, where consumers have expressed a desire for fashionable denim products that are more compatible with hot temperatures," Aldighieri noted. "In addition Directa Plus is the only company doing it without chemistry, which fits directly with Arvind's sustainable strategy."

"Not only is our Graphene+ chemical-free and made from an abundant, safe and non-toxic raw material – graphite – we are attaining high purity and consistent quality," added Razvan Popescu, Directa Plus chief operating officer.



Razvan Popescu, Directa Plus COO and Stefano Aldighieri, Arvind's creative director.

Plasma super expansion

The company's production process, he explained, uses a proprietary technique called 'plasma super expansion'. Starting from natural graphite, each step of the process – expansion, exfoliation and drying – creates graphene-based materials ready for a variety of uses and available in different forms such as powders, liquids and pastes. An important factor for commercial customers is the highly-consistent graphene that results from this process and no chemical or solvent additives are required.

The company's production capacity is currently an annual 30 tons, which may not sound a lot when compared to commodity products, but can go a very long way in apparel applications, since very minimal quantities can be applied in order to achieve the desired effect. So while in terms of price per kg it is not cheap, the impact on cost at the production run level can be negligible.

"In the apparel industry, we are in any case at the stage where we need to start talking about value and not price, because this is really depressing our industry," Aldighieri said. "Look at the car industry – you can buy a car for five thousand euros or for five million and if it was only about price everyone would drive the cheap one. It's down to how value is perceived."

Abrasion resistance

The next stage in the partnership between Arvind and Graphene Plus, he added, will be to "really



exploit the potential for abrasion resistance in apparel, with a product that is two hundred times stronger than steel."

"We are only at the beginning of what we see as a sustained evolution and a further idea is the creation of electronic circuits on apparel for applications such as heating and power charging."

In October, the two companies signed a second agreement covering two additional vertical markets in India – composites and water purification. They will now

collaborate to expand applications in these fields for G+ graphene, as well as for Grafysorber, a product developed for the removal of hydrocarbons from contaminated water made from fibrous graphene sheets.

Headquartered in Ahmedabad, India, and employing over 25,000 people, Arvind is India's largest manufacturer of denim and a major player in knitted and woven apparel, as well as having interests in engineering, retail, telecoms, advanced materials, agriculture and real estate. It achieved sales of around US\$1.5 billion in its financial year to March 2018.

Directa Plus was established in 2005 in Lomazzo, in Como, Italy, to manufacture natural, chemical-free and sustainably produced graphene-based products which are already to be found in commercial applications such as textiles, tyres, composite materials and environmental solutions. ●

“In India in particular, consumers have expressed a desire for fashionable denim products that are more compatible with hot temperatures.”

Stefano Aldighieri, Arvind

Double zero for AFGI

Is it possible to produce denim without generating waste-water? Yes, says Karachi-headquartered Artistic Fabric and Garment Industries (AFGI).

“Our Double Zero technology combines our proprietary True Zero Dyeing and True Zero Finishing for zero waste-water processes that do not sacrifice looks or quality,” explains product manager Ampelio del Lago. “This breakthrough technology allows us to save the tremendous amount of water traditionally used in indigo dyeing, mercerizing and finishing.

“By using only the minimum dyes required to penetrate the fabric, all of our dyeing and fabric finishing water is evaporated at the

end of the process, or recovered, resulting in zero water being discharged, no effluents and no COD – chemical oxygen demand.”

Spray dyeing

The company has introduced a new indigo spray dyeing technology developed in a collaboration between the dye manufacturer DyStar and technology company RotaSpray.

The patented RotoDyer and RotoCoater spraying technologies eliminate the need to repeatedly run yarns through large vats of dyes, and also to prepare and discard huge amounts of chemicals and dyes. They are being employed with DyStar’s Indigo Vat 40% solution and Sera Con C-RDA organic reducing agent at the Artistic plant – the first such system in Pakistan.

AFGI has also collaborated with Denimite to produce a fashion garment hangtag made from recycled denim.

AFGI converts post-consumer recycled denim into fibres by processing discarded jeans destined for landfills, using its state-of-the-art shredding facility.

Denimite is then turning this material into beautiful hangtags.

Indigo marble

The hangtag is made using an innovative seven-step process to turn old denim into new bio-based resin composites. The two companies designed and developed these hangtags to resemble indigo marble, with just the right amount of luster to evoke a sense of intrigue. Produced with such precision, its denim origins are only visible at very close inspection.

Artistic Fabric and Garment Industries has two manufacturing plants that produce over 60 million metres of denim and 25 million garments per year. Its Vision 2020 includes a determination to invest in renewable energy, explore new ways to reuse production waste and bridge differences through global collaborations.

With control over raw materials, yarn manufacturing and subsequent processes, the company provides denims that don’t compromise on fabric performance, shade consistency or finish. ●



AFGI’s hangtags are made from bio-based composite resins made from post-consumer recycled denim.

“ This breakthrough technology allows us to save the tremendous amount of water traditionally used in indigo dyeing, mercerizing and finishing. ”

Ampelio del Lago, AFGI product manager





Berto's Urban Arctic Collection draws inspiration from the landscapes encountered by the pioneering explorer Ronald Amundsen to the South Pole.

Closing the loop in Biella

Italian denim manufacturer Berto recently launched its new Pianeta denim fabrics, in exclusive tailored designs made by the London atelier Black Horse Lane.

"Pianeta fabric is made from Berto's own unavoidable mill waste, which we regenerate and transform into our new Ecotec yarns," explained Vittoria Marchi of yarn manufacturer Marchi and Fildi, based in Biella. "The yarns are produced by a transparent, traceable and certified process and can contain up to 80% pre-consumer cotton waste. With the further involvement of the Everest laundry and dyeing company in Padova, we are establishing a localised, closed loop recycling chain in northern Italy."

"Thanks to Ecotec yarn we save 65% of the water used for standard fabric production," added Francesca Polato, marketing manager for Berto. "During the further indigo dyeing

process, a natural and totally biodegradable sizing is employed, along with a specific new finishing process saving 85% of the water usually needed and significantly reducing CO₂ emissions per metre of fabric."

A strategy of continuous investment has been a key to the Berto's success – it began spinning its own open end yarns and added ring spinning in 2004.

As denim output intensified, an indigo dyeing plant was installed.

Later, as part of a major modernisation and expansion programme, the company took delivery of a Monforts eight-chamber Montex stenter and was an early adopter of the Monforts Eco Applicator for the economic addition of finishing chemicals. ●



Vittoria Marchi of Marchi and Fildi and Berto's Francesca Polato.

“ We are establishing a localised, closed loop recycling chain in northern Italy.”

*Vittoria Marchi,
Marchi and Fildi*



The London denim atelier Black Horse Lane is tailoring jeans made exclusively from Berto's Pianeta fabric.

Winning combination for Cone

Cone Denim's latest Cordura S Gene denims combine an authentic look and feel with hidden performance and engineered stretch benefits based on dual-core yarn technology featuring high strength Invista nylon 6.6 filament technology.

"At Cone Denim, we continue to expand and elevate our S Gene collection of denims to provide customers with high performing, sustainable denims that people love to wear," said the company's vice-president of product design and marketing, Kara Nicholas. "These yarns are made with two core components which optimise stretch and maximize recovery and the dual-core is wrapped in a spun cotton covering to provide a soft cotton hand and natural appearance. Cordura S Gene is the latest development arising from our partnership with Cordura."

175 years of heritage

"Last year we were excited to offer a first-of-its kind Cordura nylon selvedge denim with Cone, but the partnership certainly didn't stop there," added Cindy McNaul, Cordura's global brand and marketing director. "Building on our 175 years of combined heritage, Cone and Cordura have continued to push the boundaries to bring enhanced denim solutions to the market and the new Cordura S Gene Denim collection is testament to this commitment."

Cone offers unique collections of performance, stretch, selvedge,



and natural indigo denims, as well as recreations of Cone's Deeptone denims, which were first manufactured in the early 1900s.

The company is part of International Textile Group (ITG), with manufacturing capabilities in Mexico and China and a global network of sales, product and merchandising professionals. ●



Cone's Kara Nicholas with Cordura's Cindy McNaul.

“At Cone Denim we produce high performing, sustainable denims that people love to wear.”

*Kara Nicholas,
Cone Denim*

A hands-on approach at Advance Denim

Advance Denim's new Acore fabrics incorporate SolucellAir cotton yarns which are engineered with sophisticated hollow channel structures in a special technique developed in Italy.

"This results in fabrics that are extremely light weight, soft touch, thermo-regulating and possess moisture management properties, via a manufacturing route that is entirely free of chemicals," says Amsterdam-based Enrico Forin, who is responsible for the company's development and marketing in Europe.

He attributes the company's forward-looking approach in establishing truly sustainable operations to managing director Amy Wang, who joined the company immediately after graduation and subsequently worked her way up through all of its departments.

"She's very technical and has a hands-on role in all of our new developments," says Enrico. "When we have requests from customers we can take them straight to the top and she will carry things through to their realisation, which is what makes us special I think."

Capacity expansion

Headquartered in Foshan City, Guangdong, Advance has doubled its weaving capacity over the past few years, to over 36 million

metres, while making impressive gains in efficiency. Energy consumption, for example, has been reduced by 31% since 2013 and water consumption by 34%.

"We have installed our own wastewater treatment plants using both anaerobic and aerobic systems capable of processing up to 9,000 tons per day," Enrico says. "Treatments are monitored and tracked in real time to enhance transparency. We are also planning to install a reverse-osmosis recycling system enabling a certain amount of wastewater to be reused on the production lines. Our thermal power plant uses denitrification, desulphurisation and electrostatic precipitation to reduce air pollutants and we track and measure emissions from operations to ensure they are well above the national standards.

"In another project we will install a new technology to recycle the dyed yarn waste into pigment dye powder. Advance Denim is truly putting all of its efforts into demonstrating that a traditional industry can transform and be sustainable, while remaining profitable." ●



“When we have requests from customers we can take them straight to the top, which is what makes us special I think.”

*Enrico Forin,
Advance Denim*



Golden goal for C&A

Monforts customer Arvind Mills has been the trusted denim supplier to C&A in its ambitious project to mass produce an extremely affordable pair of ladies' denim jeans bearing the coveted Cradle to Cradle (C2C) Gold certification.



At the beginning of 2017, Arvind became the first manufacturer in India to install a Monforts Eco Line denim finishing system for faster production, greater savings in energy and better flexibility in design and innovation. The Eco Line is based on two key Monforts technology advances – the Eco Applicator, for minimum application of the selected finishing chemicals, and the ThermoStretch, which carries out weft straightening, stretching and drying in a continuous process.

However, a reliable supply of perfectly-finished denim fabric from Arvind was merely the starting point in the one-year C&A project to achieve the finished C2C-certified jeans, involving a wide range of supply chain partners.

No waste

"Our vision at C&A is to ensure nothing is wasted," explained the brand's denim fabric manager Sevgin Sicim during a panel presentation at Denim Premiere Vision in London. "A starting point is to produce with pure materials and safe chemicals, to reuse as much as possible and to consider water and energy usage at every stage of production."

With approximately 1,500 branches in 18 European countries and more than 31,000 employees, C&A, headquartered in Vilvoorde, Belgium, is one of Europe's leading fashion retailers.

It is the world's largest buyer of organic cotton and currently 67%

Some 100 separate elements had to be assessed in the Cradle-to-Cradle certification process for the C&A Wear the Change jeans.

“ Our vision
is to ensure nothing
is wasted.”

Sevgin Sicim, C&A

of all of the cotton it uses is either certified organic cotton or sourced as Better Cotton, with the target set for achieving 100% by 2020.

In June 2017, C&A introduced the C2C Gold-certified Bio Cotton t-shirt, and has subsequently sold some 1.3 C2C certified pieces.

Continuous cycle

The C2C Certified Product Standard guides designers and manufacturers through a continual improvement process, aiming to achieve a circular economy approach. It examines a product through five quality categories – material health, material reutilisation, renewable energy and carbon management, water stewardship and social fairness.

A product receives an achievement level in each category – Basic, Bronze, Silver, Gold or Platinum – with the lowest achievement level representing the product's overall mark. The criteria at each level builds towards the expectation of eliminating all toxic and unidentified chemicals, and becoming nutrients for a safe, continuous cycle.

Due to the stringency of the system, some of the Bio Cotton t-shirts in C&A stores are currently labelled C2C Silver due to the use of certain inks which the company is working to optimise.

As far as the denim jeans were concerned, some 100 separate elements had to be assessed.



Pictured from the left are Sevgin Sicim and Jens Hesse of C&A with Stephan Huette, production and quality assurance manager for Asahi Kasei/s Roica.

Wear the Change

“Having successfully launched the Bio Cotton t-shirt – which retails at eight euros – under our ‘Wear the Change’ banner, we decided to go for a bigger challenge,” explained C&A design manager Jens Hesse. “The stipulation was that the product had to be possible at a retail price point of twenty-nine euros per pair. The C2C certification programme is without doubt the only holistic one on the market but a huge list of chemicals involved in the denim jeans production chain had to go through the certification process.”

Components and raw materials for the jeans came from suppliers around the world, with Arvind, for example, supplying the basic denim, Coats the sewing thread, Dystar the dyes and finishing chemicals, YKK various accessories and Freudenberg the cotton interlining for the waistband. Pacific Jeans in Bangladesh handled the cutting and sewing.

Challenges

One major challenge was in finding a suitable elastane to add 1-2% stretch in the denims. This was solved by using partner Asahi

Kasei's Roica V550, which is already registered C2C Gold.

However, once all the suitable components were identified and prototype pairs of the jeans were confirmed as C2C Gold, there was a further problem when it came to a full production run.

“The cotton thread we had selected for the stitching needed to be a lot stronger,” Hesse explained. “It was breaking far too much and totally slowing down production. Eventually, it had to be replaced with a polyester alternative in order for production targets to be met and the price point retained.”

Unfortunately, due to the C2C stipulation that the lowest achievement level for a single component should represent a product's overall mark, this meant that a proportion of the production run denims hit the stores bearing only Bronze labels.

“This is a situation that we are currently working to remedy,” Hesse concluded. “C2C Bronze level would be Platinum in almost any other certification system, but we have the ninety-nine elements in place and now we are confident we will soon reach the one hundred.” ●

Value and versatility in black

In the past, black denims often tended to lose their appeal after washing, but the jeans in the new Artistic Milliners Supercharged Noir collection are guaranteed not to fade.

"Our performance denim portfolio is based on a powerful dense black with excellent colour fastness, based on solution dyed fibres and yarns in which the colour is locked in from the start," says Ebru Ozaydin, senior vice-president of sales and marketing at Artistic Milliners. "They are based on Cordura and Tencel fibres to provide a combination of softness and strength which we believe will be the next evolution in performance denim. In addition to excellent colour fastness, they have a very eco-efficient footprint."

Colour fastness

Combining Cordura staple nylon 6.6 Black SDN fibre and spun-dyed Lenzing Tencel Modal fibres with Eco Color technology, the collection is infused with colour-fastness locked in at the fibre level for

excellent shade consistency and long-lasting vibrancy. Solution dyeing also helps to greatly reduce the water used in the manufacturing process.

"For the Supercharged Noir collection, we really wanted to fuse value and versatility," says Ebru, "especially since these features are important for both men's and women's offerings. Over the past few seasons, we've seen a rising interest in black denim in a variety of segments and consumers are looking for a product that stays black after multiple washes."

Gold

Artistic Milliners was also the denim manufacturer involved in the

“ Consumers are looking for a product that stays black after multiple washes. ”

*Ebru Ozaydin,
Artistic Milliners*

creation of Dutch brand G-Star's Cradle-to-Cradle Gold certified denims – a first for the sector.

They are based on the cleanest indigo technology developed to date, employing an organic fixing agent to result in 70% fewer chemicals, no salts and producing no salt by-products during the reduction and dyeing process, consequently saving water and leaving clean and recyclable water effluent.

With its state-of-the-art denim mill in Karachi in Pakistan, equipped with the latest European equipment, including Monforts stentering, Artistic Milliners has an annual production capacity of up to 36 million metres of denim. ●



Ebru Ozaydin, Artistic Milliners.

Farm or factory?

Kilimdenim's Edirne factory has recently been described as "more like an organic farm than a factory" and visitors are surprised to find peacocks frolicking on beautifully landscaped lawns.



The Kilimdenim plant extends across an area of 100,000 square metres in Edirne, Western Thrace.



The lawns are fed by filtered water from the factory and fertilised with by-products from the company's production process. In addition, food for Kilimdenim's staff canteen is provided by a small chicken farm, bee hives and 25 types of fruit trees. Sheep and geese also wander happily around.

The Western Thrace region in which Edirne is situated is blessed with some of Turkey's most agriculturally fertile lands and the Kilimdenim plant extends across an area of 100,000 square metres.

In recent years, a major project has been undertaken to reclaim an area of accumulated slag which

has been replanted with 1,500 Calabrian pine saplings that are fed from waste water which is also purified at the company's refinery.

Commitment

This is all in keeping with Kilimdenim's commitment to sustainability which is reflected in the company's latest denim ranges.

"We employ a range of kinder fibres in our production, including organic and BCI cotton, Lyocell, recycled polyester and both pre- and post-consumer recycled cotton," explained sales executive Bahadır Çapar. "Our Zero Cotton

“ We employ a range of kinder fibres in our production. ”

range consists of three grades made entirely from recycled polyester and post-consumer recycled cotton.

Having invested some €4 million in new technology between 2015 and 2017, Kilimdenim has reduced its consumption of electricity by 40%, its use of steam by 66% and its water usage by 65%.

The company, which is headquartered in Istanbul with its manufacturing plant in Edirne, has modernised its yarn manufacturing operations, significantly increasing capacity while adding resource efficiency and also the ability to manufacture dual-core yarns which are used especially in stretch fabrics.

A further investment during 2018 has seen the installation of 48 new weaving machines to increase the quality and diversity of the fabric it produces. ●

Kilimdenim sales executive Bahadır Çapar with Helene Smits of the Alliance for Responsible Denim (ARD).



The timing is right for Refibra

Lenzing's Tencel has been included in many of the collections introduced by global Monforts denim customers over the past year, and the fibre manufacturer's ground breaking Refibra lyocell has also been rapidly accepted by the industry. *World of Denim* talked to Tricia Carey, Lenzing's director of global business development for denim, about these developments.



Lenzing's director of global business development for denim Tricia Carey.

World of Denim: For the benefit of readers who may not be aware of it, what is the Refibra process?

Tricia Carey: Tencel Refibra lyocell is the first commercially-viable manmade cellulosic fibre using waste to make new lyocell fibre. Refibra technology uses post-industrial cotton waste which is made into pulp. This pulp is combined with wood pulp and utilises the closed-loop manufacturing of lyocell to make new fibre. Additionally, Refibra technology incorporates fibre identification, so there is transparency in the supply chain.

WOD: Who are the partners involved in its manufacturing supply chain?

TC: Lenzing launched Tencel Refibra Lyocell in Feb 2017 and since then we have spinners, weavers and knitters around the world using this fibre. We are in applications from denim and I think in many ways, the timing for our launch of Refibra was perfect, because if we had introduced it earlier there wouldn't have been the terrific interest that it's generating. The denim mills are certainly now ready for it.

WOD: Who are the brands now featuring Refibra?

TC: Those with Refibra technology are Artistic Denim Mills, Artistic Fabric Mills & Garment Industries, Artistic Milliners, Azgard 9, Crescent



Pakistan's Azgard 9 is among Monforts customers now incorporating Lenzing's Refibra regenerated cellulose in its denim collections.



Brazil's Vicuhna is an advocate of Lenzing's Tencel.

Bahuman, Naveena and Soorty, all of Pakistan, Bossa, Kipas and Orta of Turkey, as well as Advance Denim (China) Arvind (India), Cone Denim (USA), DNM (Egypt), Santanderina (Spain) and Kurabo (Japan).

WOD: Presumably it's only possible to recycle 100% cotton products and not blends? Are there any other limitations?

TC: At this time it is only possible to recycle 100% cotton textiles. In theory, we are taking cellulose back to cellulose. There are companies developing technology to separate fibres for blended fabrics. Currently we are only using post-industrial scraps from garment makers' cutting rooms. But we are currently at the first phase in using this industrial cotton waste and eventually the goal is to move to post-consumer waste, where naturally there are many more challenges in ensuring uniform quality.

WOD: Is it possible to manufacture 100% Refibra products or would the price premium be too prohibitive?

TC: Yes it is possible to weave or knit 100% Tencel Refibra lyocell fabrics and several mills already have it in their collections for sampling. Shoppers can now buy 100% Tencel Refibra lyocell in tops and dresses from Patagonia.

WOD: What, if any, are the obstacles to scaling up?

TC: Lenzing is manufacturing Refibra technology in Austria at our lyocell production facility and we do not have obstacles to scaling up.

WOD: Moving on to Tencel, which is your more established sustainable lyocell brand, what is Lenzing's current capacity for this fibre?

TC: Our current capacity for Tencel Lyocell at the four

production facilities in the USA, UK, and Austria is approximately 220,000 tons per year.

WOD: So what benefits is Tencel bringing to denim jeans?

TC: To put it simply, the benefit of Tencel lyocell in denims are enhanced comfort, accelerated performance and a very convincing message when it comes to sustainability.

WOD: Who are the key brands featuring Tencel?

TC: All of the brands I've mentioned in relation to the adoption of Refibra earlier are already using Tencel in their collections. In addition, you can find it in collections from Albiato and Berto in Italy, Black Peony in Hong Kong, Çalık, Iskur, Kassim, Kilim, Tusa and W Denim in Turkey, India's Raymond Uco, Freedom and Prosperity from China, Rajby of Pakistan and Brazil's Vicuhna. ●

Digital transformation at Çalık

Through planned and budgeted investments, Çalık Denim will expand the current annual production of finished denim fabric at its plant in Malatya, Turkey, from 44 million metres to 60 million metres by 2020, but the company's parent Çalık Holding also believes Industry 4.0 will be critical to its success going forward.

"At Çalık Group, we aim to make further advances in innovation and entrepreneurship, use digital tools more effectively, and stay abreast of new developments, in line with our mission to add value to people's lives," Ahmet Çalık, chairman of the board has said in company's latest annual report. "Managing digital transformation requires strong leadership and a visionary approach and digital transformation is among the top priorities of all our companies around the world."

"We are investing in digitalization and taking steps to change our way of doing business with the use of next generation technologies. We see digitalization as an important opportunity to remain competitive in a constantly evolving world and to make our companies leaders in their respective industries."

In 2017, the company established Çalık Dijital in

partnership with GE. It is focused focus on digital transformation efforts at Çalık Group companies. The aim is to develop sustainable projects in cyber security and artificial intelligence for the global market.

"We are evaluating our performances and improving our processes to adapt to rapid changes, ensuring that Turkey and the countries where we operate play a pivotal role in the new industrial revolution," Mr Çalık added. "We have first initiated a digital transformation at Çalık Denim beginning with manufacturing, data collection and analysis, as well as shipping operations. The goal is to conduct our business activities in an uninterrupted, highly efficient and flexible manner."

Çalık Denim's many brand customers include Hugo Boss, Calvin Klein, Diesel, G Star, Guess, Pepe Jeans, H&M, Tommy Hilfiger and True Religion. ●



“ We see digitalization as an important opportunity to remain competitive in a constantly evolving world.”

Çalık Group chairman
Ahmet Çalık

Doing good things

As part of its *Artistic Cares* programme, Artistic Fabric and Garment Industries (AFGI) has committed to planting 27,000 mangrove saplings in Karachi as part of WWF-Pakistan's Earth Hour 2018 Mangrove Plantation Campaign.

The company is committed to reducing its carbon footprint through this campaign, with one tree planted for each employee.

"At AFGI, we believe our responsibility goes beyond just manufacturing fabrics and garments," said director Ahmed Javed. "We hope this initiative will go a long way towards conserving mangrove forests, but also, benefit the communities they support and pave the way for more partnerships like this in the future."

Other CSR initiatives from AFGI have seen:

- A partnership with SINA and Child life, two non-profit organisations providing free or subsidised medical care in remote areas in Pakistan. The clinic is fully funded by AFGI and functions under the expertise of SINA and Child life. Since its inception, the clinic has provided medical care to over 90,000 people.



- The installation of a PET CT scanner at the Jinnah Postgraduate Medical Centre. Used for the diagnosis and monitoring of cancer, this is the first PET scan and cyclotron in a public sector hospital in Pakistan.
- The sponsorship of several schools focused on improving literacy rates.



- In 2017, AFGI launched the PACE programme for its female garment workers. PACE is the personal advancement and career enhancement programme developed by Gap and dedicated to supporting women who work in the global

apparel industry and within its global supply chain. Through this programme women are given foundational life skills, technical training and support that will help them advance in the workplace and in their personal lives. ●

Proven success.



The Monforts range combinations for denim finishing are now even more cost-efficient and eco-friendly: The Monforts ECOApplicator is now used for liquor application.

Drying, stretching and skewing functions for the denim fabric are performed by a modified Thermex-Thermo-Stretch unit. This configuration allows fabric speeds of up to 40 m/min to be achieved with 14.5 oz/yd² denim on the "single rubber" version.

The "double rubber" version comprises two compressive shrinkage units and two felt calenders in line. Together with the innovative Thermex stretching unit, fabric speeds of up to 80 m/min can thus be achieved with 14.5 oz/yd² denim.

On both range versions, the denim fabric is stretched and skewed far more gently than with conventional range combinations. Ask our denim technologists.

We will be happy to advise you.

A. Monforts Textilmaschinen GmbH & Co. KG
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