The eye-catching optical effects of retroreflection, fluorescence and phosphorescence are breathing new energy into active sportswear. Beyond the unmissable safety feature of high visibility, luminescence is sparking an array of innovative plays with light.

Let there be light

The flash of light reflected in the headlights of cars thanks to the presence of a retroreflective trim or print now adorns countless running and cycling clothes. The conspicuous trend reached a turning point at the London Olympics, when Team USA athletes wore all-over retroreflective Vapor Flash jackets made by Nike. The glowing garment has since sparked off a trend of its own, seen at Lululemon, with the 'Get up and glow' all-over reflective running jacket, and at New Balance, with the 'Way to glow' running jacket in neon yellow with retroreflective details, showcased at Outdoor Retailer in January.

What's next? Glow-in-the-dark! JRC-Reflex, a manufacturer of retroreflective stretch trimming and fabrics that supplied the textile used by Nike, is currently working on a new material that is both photoluminescent combined with retroreflective. Demand is high for all types of luminescent effects, says Bernard Cugerone, at JRC-Reflex: "Retroreflection is stronger than ever, and though not new, neon and phosphorescence remain popular." Pairing photoluminescence with light-reflection, something no one has yet developed, is the next logical step for the company.

Fabric applications, recent additions to its classic retroreflective trimming, are JRC-Reflex's fastest growing segment. The mechanical stretch woven initially developed for Nike has been transposed to a piqué knit that has a slightly raised texture. For cold weather cycling apparel, a new stretch retroreflective fabric with a brushed back is now available. The company prides itself in sourcing all of its fabrics in Europe. "We spent a lot of time looking for a fleece fabric suitable for our coating," says Mr Cugerone. JRC-Reflex has been able to expand its product offering thanks to a second production line recently installed in the company's factory in Italy.



Skiwear brands have rediscovered the high optical impact of neon against pristine snow, as seen in the Head Sportswear 2013-14 collection that features high visibility details on clothing and equipment.

Head

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Schoeller's Reflex fabrics come in vibrant pink, orange, silver or beige and light up the entire silhouette.

Schoeller

Retroreflective fabrics are achieved by coating glass beads on a silver or aluminium ground, a technology invented by 3M and marketed under the Scotchlite brand. "Glass beads are superior to microprisms in that they have a wider angle of reflectivity," says Nicolas Moreau, Scotchlite and Thinsulate sales manager for France, Spain and Portugal. The quality of the glass beads determines their refractive index, or how much light they transmit. Variations in quality mean there can be a "50% difference in the amount of light reflected," says Mr. Cugerone.

Glowing colours

Silver grey is said to offer the highest degree of light transmission (up to 400 candelas), and though other colours are available, they are not as powerful. Black, for instance, the second-best seller for JRC-Reflex, comes far behind. The company's Super Black reference achieves a level of 120 candelas via a special process. "If we found a way to make a high-reflection white product, many of our clients would be interested," says Mr Cugerone, adding that the white reference currently measures 30 to 40 candle power. Retroreflective gold is another colour in demand, and it may be one of the highlights of the next Tour de France.

Specialising in many high-tech fabrics, Swiss weaver Schoeller is reintroducing retroreflective fabrics in response to growing demand for functional urban cycling clothing. The light-reflecting fabrics come in an array of nuanced shades that emit a soft luminous sheen. "We focused on avoiding the street worker look," says Schoeller spokesperson Dagmar Signer. In addition to the all-over glass-bead coated fabrics, Schoeller also weaves retroreflective yarns in abrasion-resistant fabrics for motorcycling apparel.

Italian converter Extreme, a 3M Scotchlite partner, applies the microbeads all-over via coating or as a yarn woven in Cordura or polyester-blend fabrics. The newest development at Extreme is a stretch transfer material that comes in varied colours, says sales manager Massimo Corna.

In workwear, retroreflection is often paired with fluorescence to offer high visibility in a broader range of low light conditions, such as the early morning or evening. Here again, the degree of visibility varies with colour. Yellow and orange are the most efficient, all other tones offering lower levels of luminosity. Neon colours are achieved with special dyes that are three times brighter than standard dyes. The glowing effect is due to their ability to reflect colour in longer wavelengths.

Light-emitting patterns

German trimming specialist Regine proposes a range of luminescent products in its IQ Seen range, and sees the market for high-visibility materials taking a new creative turn. Retroreflective prints are one of the new products developed by IQ Trim, including reflective logos as well as a photorealistic and camouflage motifs. The company's retroreflective product range includes stretch and non-slip silicone-treated trimming, fold-over elastics, embroidery yarns as well as transfer films and fabrics.

"Reflectivity possesses many more possibilities than customers know," says Regine-IQ trim



Historic French snow-board manufacturer Apo has launched its first apparel collection for winter 2013-14. The edgy range makes generous use of yellow and orange neon fabrics.

Apo Snowboards

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Brilliance, Craft's new running range, combines high visibility, elasticity, warmth, moisture management and ventilation.
Craft

managing director, Uli Jenter, mentioning prints, embossing and embroidery. "Woven into ribbons, retroreflective materials are quite discreet by day, and create a glowing stitch effect by night." A new market is emerging with the rise of electricity-powered bicycles. "Used to go to work, e-bike cyclists tend to wear city clothing because they won't sweat. This means it is all the more necessary to integrate reflective details into all types of garments," says Mr Jenter. For true safety on the roadside, "it is always better to outline the silhouette, and even a small tag is better than nothing," he adds. Regine's IQ Seen hangtags graphically illustrate the distance at which retroreflective details are visible (160m compared to 30m). "A luminescent detail leaves more time for drivers to react, which can be a matter of life or death."

In its extensive collection of ribbing, ribbons and tapes (some 50,000 references), Japanese trimming specialist Shindo combines all types of luminescent effects into one of its most elaborate products: a ribbon combining a lamé thread that shines by day, a retroreflective yarn that lights up at night, and a phosphorescent element that glows at home. "It covers all possibilities," says senior manager Hiroyuki Iwata of the new product presented at the ispo exhibition in February. Reflective piping is available in ten stock colours, in stretch and non-stretch qualities. An openwork knit trim made with a neon back yarn, which appears only when the garment is stretched, produces a discreet high-visibility effect.

Picking up on the trend, Bemis has added retroreflective references to its range of stretch taping, now available in silver (400 candelas) and black (25 candelas). "Candle power is not a priority for brands looking for subtle effects, the black reference is perfect for some of their needs," says Bemis sales manager Chris Parlee.

Glow-in-the-dark returns

Often considered a gimmick that has little functional use, phosphorescence - the ability to emit radiation in the dark - is making a comeback in the quest for new plays with light. Elisabeth de Senneville, a fashion and sportswear designer who has a passion for techno fabrics, says that progress made in the light-absorbing material has triggered new interest.

Among the new products presented by YKK under the heading "Flash of colour" for spring-summer 2014, the Lumifine reference features glow-in-the-dark teeth on a Vislon injection-moulded zipper available in six neon tones. The Japanese company is also introducing neon Shockonloc buckles and hook-and-loop fasteners. In addition to the fluorescent Aquaguard zippers lined with a retroreflective tape, a new item caters to those looking for subtler luminous effects: by creating a minute separation in the tapes of a



The Tiger jacket by Hungarian functional children's wear manufacturer Spotlight combines a striking tiger motif over a retroreflective ground. It is one of three ispo awards won by companies working with Sympatex this year.
Sympatex

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(Left) Within a growing collection of high visibility references, YKK's Aquacheat reflex coil zipper combines neon colour, in yellow, orange and green, with a retroreflective silver coating.

(Right) A reflective race stripe on the back is the signature detail of Ashmei, a new English running apparel brand awarded the HeiQ Sportswear BrandNew prize.

YKK / Ashmei

reverse coil zipper, a fine ray of light emitted by the plaited chain discreetly glitters on the outside of a finished garment.

Finnish fastener manufacturer Salmi also develops a range of high visibility products, including zippers with neon teeth, retroreflective pullers and zipper tapes. "In Nordic countries, children's apparel and equipment must incorporate high visibility elements by law, while sports fashion brands tend to prefer more discreet effects," says Salmi's head of sales Marketta Stenberg.

Guiding light

The move towards more discreet plays with light does not exclude the quest for enhanced safety. Swedish brand Craft Sportswear launched a high visibility range for autumn 2013 made with an elastic retroreflective fabric. The glass-bead coated material complies with EN 1150 and is perforated for ventilation.

Ashmei, a new English brand spotted by the ispo BrandNew jury, has made high visibility a founding design principle. "Reflectivity is key to Ashmei and we have chosen 3M over other products that I call 2M," jokes founder, Stuart Brooke. He combines white and silver reflectivity for high contrast against a black fabric. "We found that high contrast and reflective were the two most important factors when running in low light and you can't get more contrasting than black against white reflectivity," he adds.

Italian company Esse has invented a novel minimalistic piece of clothing called the Weby, a string-like retroreflective vest made with 3M Scotchlite tapes to slip on over a garment. A manufacturer of retroreflective bicycle spoke accessories for the German market, Esse is working on several other innovative light-reflecting accessories for cyclists and runners.

While high visibility standards require 360° reflectivity and a combination of retroreflection and fluorescence for safety in various degrees of low light conditions, many sportswear brands don't feel obliged to follow the strict guidelines of official norms. For Céline Cugerone, head of JRC-Reflex, "the two strongest trends are all-over reflectivity, seen at Nike, Lululemon, Oakley and Under Armour, or the more discreet approach based on layering a light-reflecting material under an openwork, perforated or tulle fabric." Upstart yoga, running and loungewear brand Anatomy, based in Israel, has opted for the latter. The designer Ilan Eshel embeds retroreflective strips under flatlock seams for a discreet effect by day and a luminous flash by night.

Retroreflective details are a key trend in sportswear as well as in fashion, says Bente Elmer, Paris-based independent colourist and trend forecaster. She believes "they will maintain their appeal on condition they be used in more sophisticated ways with pearlescent, metallic, glazed or shot finishes".

Signal effects are perennial favourites in sportswear, concurs Gaëlle Berlioz, fashion designer for the sport and streetwear sector at Paris-based trend forecasting agency Promostyl: "High visibility accessories perk up the minimalist trend and infuse a cool edge to authentic looks." She also sees neon being used in new shades such as apple green and turquoise blue emerging as alternatives to classic pink and yellow.

Whether they infuse a discreet design highlight or provide added safety for cyclists, runners and pedestrians in low light conditions, luminescent materials are being used in ever-more creative ways, inspiring suppliers to remain focused on light-emitting effects of all kinds.

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