Revitalizing the eyeglass market with UV+420cut™ lens

In recent years, beyond the original function of visual correction, there’s been growing demand for eyeglass features that protect the eyes and enhance QOL. It’s been two years since Mitsui Chemicals introduced UV+420cut™, a functional material that blocks High Energy Visible light (HEV) up to 420 nm. The emergence of UV+420cut™ had significant impact on the market, and many lens manufacturers have followed suit by marketing products that block HEV. This issue will focus on trends in functional lenses that protect the eyes and improve QOL, including UV+420cut™.

Mr. Takashi Minobe, Editor in Chief of The Optical Monthly

Eyeglasses are becoming a functional product, and the focus now is on eye health

I t’s been 700 years since the first eyeglasses were made. Lenses that were originally made of glass are now made of plastic, and we’ve seen dramatic improvements in eyeglass function and performance. The foremost function of a pair of eyeglasses is improving vision. For this reason, lens manufacturers have worked endlessly to develop better lens designs capable of eliminating various undesirable effects, such as spherical aberration and astigmatism. In particular, the problem of distortion in the peripheral areas of the lens in progressive power lenses, which offer gradually changing lens power for viewing objects in the distance to those nearby, is still a theme of ongoing research and development. With regard to the theme of improving vision, much effort has been made to improve transmittance, with the development of new plastic matrixes and coatings. In addition to lenses offering a comfortable field of view, demand is also high for thin and light lenses. When plastic lenses were first developed in 1942, the highest possible refractive index was a mere 1.50. After the appearance of the MR-4 lens in 1987* with a refractive index of 1.60, lenses of higher refractive indices have been developed. Now, all manufacturers offer eyeglass lenses with light weight, thinness, and low base curve and aspheric lenses that have enabled the production of thinner, lighter lenses. The second function of eyeglasses is to protect the eyes against strong light, like sunlight. Perhaps the best-known example is the Ray-Ban sunglasses designed for pilots and first commercially introduced in 1930. Some claim the history of sunglasses may go back as far as the Roman Empire. In terms of eye protection, ski-snow goggles have been used for ages by people living in cold regions to prevent snow blindness. In Japan, awareness of the dangers of UV light began to grow in the 1990s, resulting in the full-scale commercial introduction of UV-block lens products. Initially, these products were capable of blocking UV light up to 380 nm. Now, drawing on improvements in wavelength filtering technology for eyeglass lenses, mainstream products incorporate lenses capable of filtering the full UV spectrum up to 400 nm. Other factors driving this technology include growing awareness of eye health in an aging society and general awareness that UV light contributes to cataract formation.

On the other hand, the commercial introduction of JINS PC (currently, JINS SCREEN) in September of 2011, launched a trend toward zero power products that offer protection against blue light. These glasses ranked high in the year’s top-selling product lists, achieving sales of 1 million in 2012, the following year. With the success of JINS PC, lens manufacturers rushed to develop eyeglass lenses and coatings that offer blue light blocking properties. Blue-light-cut glasses became a hit product, with this feature increasingly incorporated into products sold in general eyeglass stores. Eye health concerns are a major factor driving demand for these eyeglasses. The popularity of personal computers, smartphones, and LCD TVs has resulted in more people suffering from eye fatigue. The astute marketing strategies of JINS PC promoted awareness of the dangers of blue light in popular media, and ads for the products have fueled demand for blue-light-cut glasses. As these examples of blue-light-cut glasses show, the foremost issue is to increase consumer knowledge of eyes and eyeglasses and to provide greater access to information: in other words, how to increase the volume of information and knowledge imparted to consumers. The first step is to inspire consumer awareness. Consumer awareness of and access to information on the potential harm of blue light made it easier for eyeglass shops to recommend blue-light-cut glasses to their customers. But providing information isn’t always so simple. Unless the information concerns health benefits or otherwise interests consumers, most will simply ignore it. Eyeglasses are a product sector in which products are hard to generate. While the approach may be passive, we must strategically publicize information in sync with trends, lifestyles, and outlook of the broad consumer base. We may need to focus on keywords like blue light and lutein. The current issue, then, is to find ways to relay information in simple forms and to educate consumers on the features and conveniences offered by various lenses. As the old saying goes, Seeing is believing; one effective approach may be to have customers experience these features and conveniences. Eyeglass experience booths can be set up with demo kits and customer survey sheets provided by lens manufacturers, or exhibition events can be organized to get people talking about lenses. Many eyeglass stores send their customers reminders for regular eyeglass inspections and maintenance. Why not schedule events involving tools that provide functional lens experiences to coincide with these periodic events? Some stores have boosted numbers of visiting customers by holding lutein measurement events. The key to marketing functional lenses may be to have the customers actually experience the features offered by the lenses, rather than just listening to explanations. To that end, we are seeing growing sales volumes for photochromic and polarized lenses, previously believed to offer a ceiling of 1 or 2% at best. The perspective on photochromic lenses products among employers and employees at eyeglass stores appears to be shifting: they are now more likely to recommend photochromic lenses as products for maintaining eye health. Eyeglass stores are also promoting the benefits of using polarized lenses, whose sales had previously been restricted to specific activities such as fishing. These products can reduce eye fatigue by suppressing glare while driving and during everyday activities. Only eyeglass stores can offer sunglasses to customers based on specific needs such as fashion, functions, and lens power. This is something general stores and hardware stores can’t do. At eyeglass stores, customers are presented with the ideal opportunity to understand that eyeglasses are not just visual correction implements, but products that can provide eye protection, maintain eye health, and allow users to go about their activities in greater comfort. These opportunities can also convince consumers it may be a good idea to have several pairs of glasses and sunglasses suited for various scenarios in daily lives. These 45 years old and above now account for 50% of Japan’s population, making it more important to approach the elderly population. Elderly people these days are far more physically, socially, and culturally active than in days past, with greater participation in movies and plays, hobbies, and athletics and common use of personal computers. Health is prerequisite in pursuing such active lifestyles, and this has promoted a growing awareness of health issues. Naturally, concern for good vision and eye protection is also on the rise. And with consumers choosing to lead more diversified lifestyles, needs are also diversifying. Functional lenses that offer features like UV blocking, blue-light blocking, and lutein protection, as well as functionally tinted lenses, have been proposed by the eyewear industry and warmly received by customers.

Since a pair of eyeglasses is positioned in the center of the face, design proposals that take facial makeup and fashion into consideration are essential. However, it must be remembered that the most fundamental eyeglass functions are associated with maintaining and promoting eye health. Needless to say, the market will focus on lenses whenever a new feature that can enhance eye health emerges, and consumers can enjoy the benefits provided. However, care is needed when promoting new features, as inadequate research and data can lead to misleading advertisements. This explains the need to promote concurrent research on the relationship between certain wavelengths of light and undesirable effects on the eyes.

* While an acrylic material having refractive index of 1.50 had been marketed in 1962, for manufacturers adapted the material for their lenses.
Various Companies Focus on Eye Health

Mitsui Chemicals introduced UV+420cut™ in October 2014. We’ve increased the number of casters, and the material is now sold in countries around the globe. In addition, various lens manufacturers have launched products that offer protection from harmful wavelengths and eye fatigue. At the retail level, we hear that business is strong in stores that carry eyeglasses for visual correction and offer solutions for maintaining eye health. Here, I’ll report on the efforts being made by various companies.

Tokai Optical Co., Ltd. [Lutina ™]

The UV/420 cut™ material was first adopted by Tokai Optical Co., Ltd. for their Lutina series launched in December of 2014. It’s been reported that a pigment called lutein, found in the macular region of the eye, a crucial region for healthy vision, is damaged when exposed to harmful rays such as UV light, resulting in an eye disorder known as age-related macular degeneration. Products in the Lutina series incorporate lenses that efficiently block HEV (High Energy Violet-light) in the range of 400–420 nm, which can significantly suppress the damage inflicted to lutein. Furthermore, Tokai Optical has adopted the concept of eye care design that emphasizes key concepts and phrases like better eye protection for lifelong visual health. The Lutina series is their first product designed based on this eye care concept.

Asahi Lite Optical Co., Ltd. [UV3G ™]

In March 2015, Asahi Lite Optical launched the UV3G, a UV-cut lens that also cuts HEV. The lens blocks HEV in the 400–420 nm range emitted from the screens of PC monitors, smartphones, and TV sets, which conventional eyeglass lenses fail to adequately block. Asahi Lite Optical has highlighted how their lenses significantly block light in the 380–450 nm range, which has the strongest impact on our eyes. At the same time, the lens will also reduce glare and can be expected to alleviate eye fatigue and enhance contrast in outdoor situations.

Isho Optical Industrial Co., Ltd. [menimo ™]

In June 2016, Isho Optical Industrial added a product with HEV blocking features to their menimo series. Lenses that target specific wavelengths of light tend to sacrifice transparency due to the yellow or blue tint of the lenses. However, Isho Optical Industrial has succeeded in minimizing adverse effects on transparency while achieving a balance with HEV blocking rates and enhancing transmittance.

Aigun Co., Ltd. [Aigan UV420 ™]

Since April 2015, Aigan, a chain eyeglasses shop in Japan, has sold Aigan UV420, a UV and HEV protection lens developed jointly with Tokai Optical Co., Ltd. In addition to blocking UV light, the technology cuts 94% of the visible light nearest the UV range that poses eye hazards (HEV). It also cuts glare-inducing light (blue light) without undesirable reflections off the front of the lens, enhancing contrast. This lens, which offers both practical usefulness and functionality, is available at stores in both zero-power and prescription versions.

HOYA [Venus Guard Coat RUV ™]

In 2015, HOYA launched a products series that offer the additional features provided by Venus Guard Coat RUV technology, a technology designed to cut UV reflections from the rear surface of the lens by approximately 95%, and Venus Guard Coat Lapis RUV, a technology designed to cut blue light. In addition to protecting against UV light reflected from lens surfaces, these products offer all conventional antistatic, scratch resistant, and water repellent features. It’s an eye-friendly eyeglass lens that protects the eyes from all directions, even the front and back surfaces of the lens.

Nikon-Essilor Co., Ltd. [Crizal UV ™]

To eliminate UV light reflected from the reverse side of the lens back to the eyes and areas around the eyes, something conventional UV cut lenses don’t prevent, Nikon-Essilor is currently marketing its Crizal UV coating, which eliminates UV light reflections from the reverse side. Nikon-Essilor has also introduced its See-Coat Next-Sapphire coating, which both reflects and absorbs blue light to protect in two ways against the blue light emitted from the screens of personal computers and LED devices.

SEIKO OPTICAL PRODUCTS [Seiko Frontier ™]

In June 2016, SEIKO OPTICAL PRODUCTS introduced Seiko Frontier, a new lens material that cuts all UV light and HEV by approximately 80%. Besides high HEV blocking rates, the material cuts blue light by absorption, not reflection. This eliminates the unattractive blue reflections associated with conventional blue-light cut lenses, making their new product an aesthetically pleasing lens.

Zoff [UV ULTRA Lens ™]

Since July 2016, Zoff has offered Clear Sunglasses mounting UV ULTRA lenses, which cut HEV. The Clear Sunglasses were developed to provide easy-to-wear UV protection for people who don’t normally wear glasses or sunglasses. The basic series lineup comes with zero-power lenses. Prescription lenses are available at extra cost.

Overseas Marketing of UV+420cut™ lens

Chemlens (Juxing) Co., Ltd. [China]

The company has set up a promotion system for promoting UV+ lens with Mitsui Chemicals’ lenses by inviting Nikkei Indonesia to give a lecture about UV+420cut™ technology to eye care professionals.

Conant Optics [South Korea]

LENSTEC Optical Group [UK]

To revitalize the eyewear market in Europe, the British firm “LENSTEC Optical Group” has already launched their lenses with UV+420cut™ technology which is getting recognized as a new technology.

Zoff Co., Ltd. [Japan]

The company has set up a Voucher system for promoting UV+ lens with Mitsui Chemicals’ lenses. The Japanese specialist for UV lightisseness can purchase the promotional codes at http://uv420cut.com/jp/sale/.

Aigan Co., Ltd. [South Korea]

Aigan UV420 ™

The UV+420cut™ lens blocks light harmful to the eyes.

Website of UV+420cut ™

The page provides an easy-to-understand introduction to the effects and features of the UV+420cut™ lens in Japanese, Chinese, and English. www.uv420cut.com

Demo kit for UV+420cut™ lens and WEB marketing

Demo kit for UV+420cut™

Users can experience first hand how the UV+420cut™ lens blocks light harmful to the eyes.

Please watch the demonstration videos at http://uv420cut.com/jp/scene/.

The LW170C-001A is the UV+420cut™ demo kit from Japan and can be purchased at a special price of ¥1,100, plus ¥1,400 in shipping expenses.

Nikkei Indonesia invites Mitsui Chemicals Asia Pacific to give a lecture about UV+420cut™ technology to eye care professionals.

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Revitalizing the eyeglass market with UV+420cut™ lens
News & Events

Development of MR-8™ with Photochromic Feature — SunSensors™ with Refractive Index of 1.60 —

Photochromic lenses have emerged as a technology capable of maintaining eye health. Since 2014, under the SunSensors™ brand name, Mitsui Chemicals has offered photochromic lenses based on in-mass technology. Despite long-standing demand in the eyewear industry for photochromic lenses, the hardness of the MR™ resin inhibits changes in the dye structure that must occur when exposed to radiation. Difficulties in overcoming this problem have led to the continued use of acrylic resin as the matrix material.

Now, with major contributions from the MS-R&D nanotechnology research team, we’ve succeeded in producing a photochromatic lens using MR-8™ material with a refractive index of 1.60. Through joint development efforts with the MS-R&D nanotechnology research team, we’ve induced structural changes in the dye while maintaining the physical properties of MR™ material to produce a product we call SunSensors™ MR-8™. The thin, lightweight characteristics of MR™ allow us to target customers who require high-powered lenses: The SunSensors™ lineup now includes materials with refractive indexes of 1.50, 1.55, and 1.60. We’ve already introduced SunSensors™ MR-8™ commercially, and the response to date has been positive. Offering even greater resin strength, thioacrylate materials will allow us to manufacture lenses for rimless and nylor glasses (semi-frameless design that use microlens). This may be yet another reason the market has embraced the product. Current efforts target the development of a material with a refractive index of 1.67. We expect the potential for SunSensors™ to continue expanding.

Introducing a Reading Stone with 2.0x Magnification, the Highest Achieved to Date

Our company reviewed various ideas since 2014 under a theme that might be worded: developing products our consumers really need. Among these was a suggestion for developing a product that can assist people with weak sight. After numerous meetings with Dr. Tanabe of Nippon Lighthouse, a social welfare corporation that offers assistance to the visually impaired, we learned that the reading stones currently available on the market only have maximum magnification of 1.8x, which falls short of meeting the needs of the people with weak sight. (Reading stones are a type of tabletop magnifying glass.) We embarked on a joint development project with Nippon Light- house and Hopnic Laboratory, an eyeglass lens manufacturer, to produce the Mitemi reading stone that offers the world’s highest magnification factor of 2.0x. The material used to manufacture Mitemi is the MR-8™ high refractive index lens material. Mitsui Chemicals will continue to explore new possibilities for lens materials that help improve your Quality of View.

The Second Round of Do Green™ Initiatives in India

Our group has been developing a plant-derived product named Do Green™ as part of efforts to establish a society that exists in harmony with the environment. Do Green™ MR-60™ and MR-174™ are the world’s first high-refractive index lens materials for visual correction made from plant-derived resins. They’ve won approval as JORA and USDA certified biomass products in Japan and the US, respectively. They offer performance equivalent to conventional petroleum-derived products. In addition to developing the Do Green™ product to help protect the global environment, we’re helping to resolve social issues through activities that we call Do Green™ initiatives.

On the latest occasion, for the four days starting Nov. 12, 2016, our company undertook a Do Green™ initiative in Mathura district in Uttar Pradesh state, India with the cooperation of three organizations and volunteers: the Institute of Cultural Affairs (Executive Director: Ms. Shizuyo Sato; “ICA Japan” hereafter), an authorized NPO; Holistic Child Development India (Director: Mr. N. Thomas Rajkumar; “HCDI” hereafter), and Naujhil Integrated Rural Project for Health and Development (Director: Dr. Shobha Yohan; “NIRPHAD” hereafter). Members of the Do Green™ project team, Representative from Mitsui Chemicals being welcomed to the site.

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Interview with Mr. Frank Z. Fei

— Mr. Fei, can you tell us the background story on the foundation of your company?

At the time of our foundation in 1996, plastic lenses for eyeglasses weren’t yet popular in China. Given the large Chinese market still remaining, I thought there might be a chance for great success if I could start a business here. We started out producing tinted CR-39 lenses made of materials with refractive index of 1.50. We expanded to materials with refractive index of 1.56, and then to high refractive index materials like MR™. In 1999, we began supplying tinted lens products to the US and started targeting foreign markets from 2000. Currently, exports account for 80% of our business.

— Was it a smooth journey? company?

— What product are you most interested in developing for your new products?

In the Western market, demands are growing for high-functionality lenses. Especially for Europe, in the near future, we plan to focus on marketing the tinted NeoContrast™ lens that selectively cuts wavelengths that causes glare, since we’ve received approval for a tinted lens, in addition to a UV++ lens that cuts blue light up to 420 nm. In the US market, we plan to boost efforts to strengthen our relationships with stock lens, RX lens) customers, and a pair of RX lens is produced based on the prescription, which is then delivered to the ECP, where it can be fitted to the frame selected by the customer. The ECP’s function as a medium (advertisement pillar) for informing more customers of the superior properties of our UV++ lens.

— Do you mind if we ask you about your joint efforts with Mitsui Chemicals?

OEM products are sold under the brand names of the respective retailers, and that’s where the MR™ logo comes into play. It’s a guarantee of the high quality of the material and the manufacturing technology. Retailers and wholesalers are always looking for new products. We believe the joint efforts between Mitsui Chemicals, a material manufacturer, and Conant Optics, a lens manufacturer, are invaluable.

Interview with Mr. Genting Cao

— Mr. Cao, what do you see as the direction of development for your new products?

One direction in our current product development is developing a lens with multiple functions. Lenses that can offer eye protection like polarized lenses and photochromic lenses are popular, but at Conant, we’ve developed a lens that adds UV++ features. To meet the needs of each range of ages, we also offer myopia control lenses that can help suppress the progression of myopia for adolescents and young people. For older people, we offer progressive lenses. We’ve added UV++ feature to these lenses as well in response to diversifying needs.

— What product are you most interested in introducing to the public?

The 420 nm cut lens represents the commercial mainstream now. Conant Optics is also putting significant effort into marketing UV++. We’ve also been able to repeatedly confirm the effectiveness of NeoContrast™, our next-generation product, in in-house experiments. Once we’re ready, we intend to begin promoting this.

— What is the motto for manufacturing at Conant Optics?

Conant Optics strives to be sound but innovative, continuously making improvements to achieve high-quality and high efficiency products while placing customers first. Aimed with three key strengths—a team of highly skilled engineers in manufacturing, superior production facilities, and high-quality products—Conant Optics will continue to respond to new market needs and demands.

Product diversification, active expansion into foreign markets, and remaining a step ahead of market demands underscore the remarkable resurgence and growth of Conant Optics following its near fateful crisis. We expect great things for Conant Optics in the coming years.
A Brief History of Sports Vision Studies

While physical skills are generally the most important factor in sports, visual skills matter, too. In the US, sports and vision has been a popular research theme since the late 1970s. In 1978, the AOA (American Optometric Association), an organization of optometrists, created a Sports Vision Section, marking the launch of full-fledged research efforts in the field of sports and vision. In Japan, a visit by Dr. Philip Smith of AOA and his lectures on sports vision in 1986 triggered growing awareness on the subject, ultimately leading to the foundation of the Japan Sports Vision Academy in 1988.

Sports Vision Comes into Focus

To date, the Japan Sports Vision Academy has measured and analyzed the visual abilities of nearly 3,500 athletes, including eight years study of the athletes on players on the Japan national baseball team, claims athletes who excel tend to have superior vision. Furthermore, he had identified differences in the visual abilities required for each sport. Like the ones originally administered above, the eye examinations for sports vision began with an analysis of 14 items associated with vision, based on concepts developed in the US. However, over the 10 years during which Dr. Mashimo and his team have carried out their study, they have developed a measurement method unique to Japan, which currently involves the analysis of the eight items listed below.

Objective Evaluation Based on Quantified Test Results

At the Japan Sports Vision Academy, standards have been statistically defined based on data from more than 3,500 athletes. On the left are the evaluation results of the sports vision abilities of the distinguished professional baseball player. On a scale of 40 points, the score is 33. No athlete to date has achieved a perfect score. On the right are the test results for the two of us right after we took the test. Dr. Iijima explains that sports vision deteriorates with age, even if one has experience playing a sport.

Simple Training to Improve Vision

Depth perception and visual recognition time are the abilities required to perceive objects in the central field of vision and to detect objects as quickly as possible. It can be improved through simple training, such as opening a newspaper or magazine to a page only for a fleeting second, and then trying to remember what was written or whether pictures were on that page.

DVA, ocular motor skill, and hand-eye coordination requires training that forces a person to swiftly transfer his or her line of sight to the object. One popular training method for DVA is getting subjects to clearly see signs and names of stations through the window of a train. The utility poles along the train tracks are located at regular intervals, so the most effective training method is to focus on each utility pole as it passes by.

Hand-eye coordination

Static visual acuity can’t be improved by training. Shortfalls in visual ability require visual correction. Visual correction techniques include eyeglasses, contact lenses, orthokeratology, and corneal surgery such as LASIK. Improvements in static visual acuity may automatically improve KVA, contrast sensitivity, and depth perception, all correlated skills. In the case of children, eyeglasses are normally the only option. While the game of soccer permits goggle-type eyeglasses, some sports have no regulations regarding eyeglasses, while others are less eager to allow them. This, unfortunately, has resulted in accidents that have led to player injury or kept athletes from reaching their full potential. It should be stressed that visual correction is essential for improving visual perception (sports vision). Eyeglasses with high safety features present an effective solution.

Dr. Isao Mashimo
Dr. Takashi Iijima
The Japan Sports Vision Center
Tokyo Optical Co., Ltd.

Sports Vision test

high speed. The DVA is a crucial ability in ball games, especially for actions such as batting for baseball players.

Static visual acuity

This is the best known eye exam using the Landolt ring. An athlete should have a static visual acuity of 1.2 to 1.5.

Kineti tic visual acuity

This test measures visual acuity by measuring how quickly an individual can detect the direction of the opening in an approaching Landolt ring, a skill that correlates with static visual acuity. On average, KVA will be reduced by approximately 30% from static visual acuity (in other words, a person with static visual acuity of 0.8 will have a KVA of 0.5). This test was first proposed in Japan in 1989 to assess the ability of individuals to see objects approaching from the distance at a speed of 30 km per hour. Since KVA declines with age, this test is used as a part of the test required to renew driver’s licenses for those of 75 years old and above.

Contrast sensitivity

This test measures the ability required to perceive slight differences in the contrast of objects against the background under monochromatic conditions. It is performed by asking subjects to identify dots embedded in a striped contrast chart. Contrast is the relative difference in brightness between the target object and its background. For example, this ability is required to locate and track a fly ball against the ceiling of the Tokyo Dome. Contrast sensitivity correlates with static visual acuity.

Depth perception

This test measures the ability required to perceive depth perception. The depth perception test is used for drivers for heavy vehicles and Class 2 driver’s licenses.

Kinetic visual acuity

It is measured by asking the subject to press down and move the line of sight accurately to the target.

Ocular motor skill

This test measures the ability required to detect large volumes of information precisely and quickly. A 6-digit number appears momentarily on the screen and disappears. At first, this test may appear to have no relevance to athletic performance. However, distinguished athletes are known to have exceptional visual recognition times. It’s an important ability for players in sports that demand instant assessment of positions of players on your side and the opposing side with little time to look at the field.

Sports vision test

A closer look

Visual correction is fundamental to sports vision.

Static visual acuity

Dynamic visual acuity

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Sports vision test

A closer look

Visual correction is fundamental to sports vision.

Static visual acuity

Dynamic visual acuity

Static visual acuity can’t be improved by training. Shortfalls in visual ability require visual correction. Visual correction techniques include eyeglasses, contact lenses, orthokeratology, and corneal surgery such as LASIK. Improvements in static visual acuity may automatically improve KVA, contrast sensitivity, and depth perception, all correlated skills. In the case of children, eyeglasses are normally the only option. While the game of soccer permits goggle-type eyeglasses, some sports have no regulations regarding eyeglasses, while others are less eager to allow them. This, unfortunately, has resulted in accidents that have led to player injury or kept athletes from reaching their full potential. It should be stressed that visual correction is essential for improving visual perception (sports vision). Eyeglasses with high safety features present an effective solution.

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