

Experience EXPO With Us!

- **Main Stage – Exhibit Hall – Booth P1586**
 - OptiCon General Session: Presented by United Opticians Associations (UOA) - A Conversation with Scott Shapiro, Thursday, 12:30pm – 1:30pm
 - UOA College Bowl, Friday, 12:30pm – 1:30pm
- **OptiCon Hub – Exhibit Hall – Booth P1271**

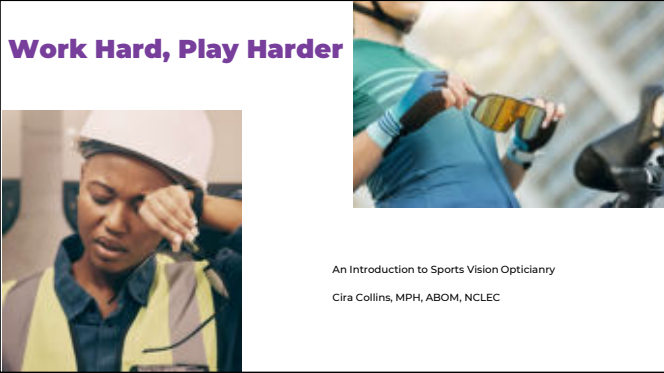
The OptiCon Hub is brought to you by the United Opticians Association (UOA). The UOA is the international member-based organization that represents Opticians, Contact Lens Technicians and Ophthalmic Allied Professionals.
- **Exhibit Hall Hours**

Thursday, Feb 20	9:30am – 6:00pm	Conferee Happy Hour	Wed, Feb 19	6:00-7:00pm
Friday, Feb 21	9:30am – 6:00pm	Conferee Happy Hour	Thur, Feb 20	6:00-7:00pm
Saturday, Feb 22	9:30am – 3:00pm	Tropical Cocktail Reception	Fri, Feb 21	6:00-7:30pm
- **Socials @ Poolside – Rosen Centre**



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Work Hard, Play Harder




An Introduction to Sports Vision Opticianry
Cira Collins, MPH, ABOM, NCLEC

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Cira Collins: Credentials

- 1. Professional Certifications**
 - Master of Ophthalmic Optics from the American Board of Opticianry
 - Certified Contact Lens Examiner by the National Contact Lens Examiners
- 2. Industry Recognition**
 - 2024 Most Influential Women in Optical by Jobson
 - 2024 Game Changer by Eyecare Business
- 3. Education and Experience**
 - Master of Public Health from Tulane University
 - 20 Years' Experience
- 4. Diverse Background**
 - Worked in Corporate/Private, Optometry/Ophthalmology, Buyer/Vendor
 - Former Swimmer



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Course Overview

Safety in Sports Eyewear

Protecting our eyes when we move keeps our fun in play.

Optician's Role

What does an optician do?

Athletes' Visual Needs

How does an optician think about the visual needs of athletes by sport?

Eyewear Impact Factors

How do the following impact eyewear needs: Speed, Safety, Conditions, Focal Length, Visual Range?

Athletic Eyewear Products

What products address the specific needs of athletes?

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Why should we care?

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Licensed States

States requiring a license to practice opticianry

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Unlicensed States


States without licensing requirements for opticianry

What does that mean?

What portion of your revenue is attributed to eyewear sales?

Sports Solutions Sales can enhance your practice revenue and the performance of the athletes we support.

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Name your Sports:


Common Sports


What sports are your patients participating in?


Unique Sports


What is the most bizarre sport you've been approached with?

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 Pickleball
A fast-paced paddle sport combining elements of tennis, badminton, and table tennis.

 Swimming
An aquatic sport involving propelling the body through water using coordinated movements

 Ski Joring
A winter sport where a skier is pulled by a horse, dog, or motor vehicle.



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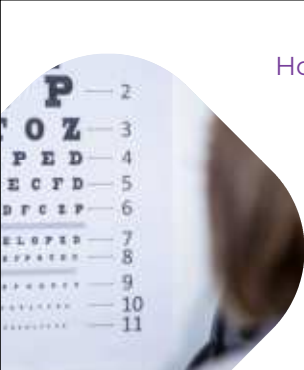
Athlete:
Someone who seeks a state of flow through movement with tenacity.



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How to talk to an athlete:

1) You NEVER stop at 20/20.



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How to talk to an athlete:

2) You are providing a complete performance-based solution to improve their game play.



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How to talk to an athlete:

3) Most athletes play multiple sports. Never stop at the primary one.

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How to talk to an athlete:

4) Explain proper care for this/these piece(s) of gear.



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What do sports vision practices do?

Enhancing Game Play

Seek the best possible visual acuity and cognitive ability to enhance game play.

Injury Recovery

Return injured players with visual and cognitive impacts to game play faster.

Extensive Testing

- Visual Acuity
- Binocularity
- Eye tracking
- Speed of response times
- Visual and Cognitive impacts of injury, especially TBI

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Visual Training Enhancement



And use visual training to enhance pain-free play

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Learn More About Sports Vision Optometry

www.sportsvision.pro



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Challenges: 1) Speed



Speed in Visual Processing



Quick Decision Making



Speed in Movement

Most sports require speed.

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Challenges: 2) Safety

- **Vision Correction:** Ensuring athletes can see clearly during their sport activities
- **Eye Protection:** Safeguarding the eyes from potential injuries and impacts



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Challenges: 3) Conditions



Indoor/Outdoor



Wet/Dry



Wind



Debris



Color



Lighting Conditions



Humidity



Condensation

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Challenges: 4) Visual Range



Frame Selection Impact

Lens Design Choices

Combined Solutions

Visual range in eyewear is almost always limiting to the sport, but these limitations can be controlled through strategic choices in frames, lenses, and vision correction methods.

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Challenge: 5) Focal Distance and Accommodation

Not all athletes are under 40.



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1) Speed: Visual Acuity and Contrast Sensitivity

Visual Acuity and Contrast Sensitivity are needed to enhance visual processing.



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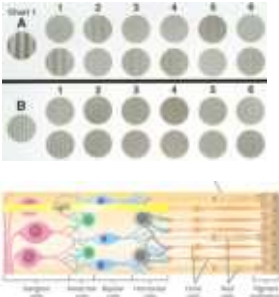
1) Speed: Visual Acuity in Sports

- 1 Exam Lane
Perfect conditions, direct gaze
- 2 Optician's Role
Translate to lived conditions
- 3 Sports Requirements
Consider focal distance and motion
- 4 Right Lens
All wrap frames should be compensated


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1) Speed: Contrast Sensitivity Basics

- Definition of Contrast Sensitivity
Contrast Sensitivity is defined as the ability of the eye to differentiate between shades of grey or shades of color.
- Where It Begins
It begins in the Retinal Ganglion Cells long before the image ever reaches the eye.



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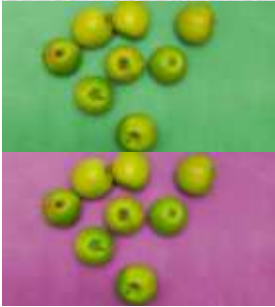
1) Speed: Enhancing Contrast Sensitivity

- Contrast Sensitivity in Athletes**
Athletes have greater contrast sensitivity than non-athletes (see Dr. Mark Bullimore)
- Using Colored Lenses**
We can use colored lenses to make the most necessary colors appear more prominently
- Key Elements for Opticians**
Two elements opticians are concerned with:
 - Light transmission
 - Hue
- Benefits of Enhanced Contrast**
Enhanced contrast in the lens can increase speed as we simplify what the eye needs to do at the subcellular level

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1)Speed: Contrast Sensivity, cont.

- 1 Light Absorption
Chromophores in the lens absorb light
- 2 Equal Absorption
Decreases light transmission, lens appears darker
- 3 Unequal Absorption
Across electromagnetic spectrum, lens appears tinted



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Example of Chromophore Absorption: Chlorophyll



Chlorophyll in Nature
Chlorophyll is the primary pigment responsible for the green color in plants, absorbing light for photosynthesis.

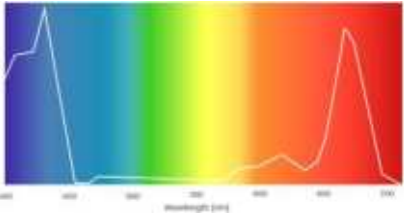
Absorption Spectrum
Chlorophyll absorbs light most efficiently in the blue and red regions of the visible spectrum.

Light Absorption Effects
The absorption properties of chlorophyll affect how we perceive plant colors under different lighting conditions.

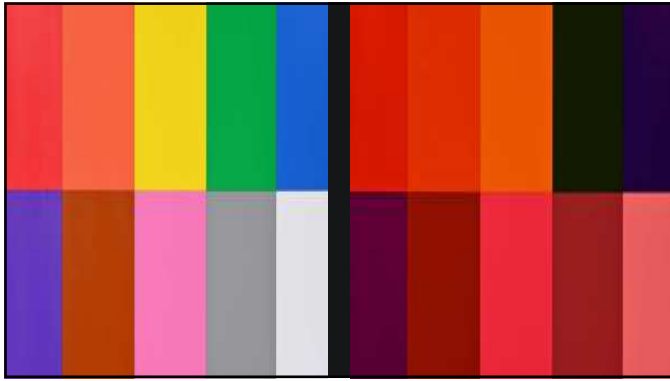
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Reflected Light – Chromophore Absorption

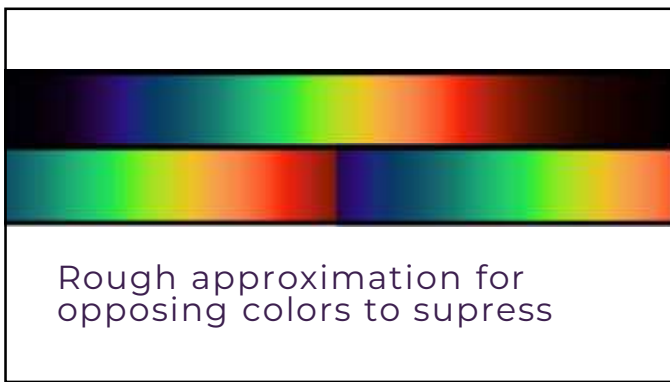
Chlorophyll Absorption Spectrum



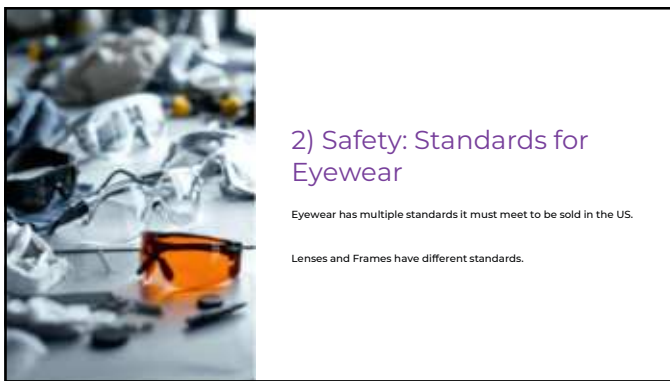
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2) Safety: ANSI Standards






ANSI Standards
The American National Standards Institute sets recommended standards for lenses



Good for Commerce
Standards are based on what is good for commerce



Manufacturing Capacity
Standards consider the capacity of manufacturers to produce lenses without undue spoilage

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2) Safety: ANSI, Cont.




Laboratory Production
In the absence of requirements, laboratories consistently follow ANSI standards in lens production

Quality Validation
Opticians validate technical correctness using these same ANSI standards

Images courtesy of Cherry Optical

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Many opticians believe that sport eyewear must adhere to Safety Eyewear standards set in Z87.1.

THIS IS NOT TRUE.

OSHA: The Occupational Safety and Health Administration DOES use this standard in the workplace.



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2) Safety: ASTM



The American Society for Testing and Materials evaluates many industrial materials and develops voluntary safety standards.

F08

For Sport Safety, this is the F08 Division, responsible only for protecting the eye and the adnexa.

Standards are called Technical Standards and are available for purchase through the Vision Council

For example:

F3077-21 is the Standards Specification for Eye Protectors for Women's Lacrosse.



Indicators

Achieving ASTM standards is indicated by a hang tag or sticker on the frame and should be removed by the patient at dispense.

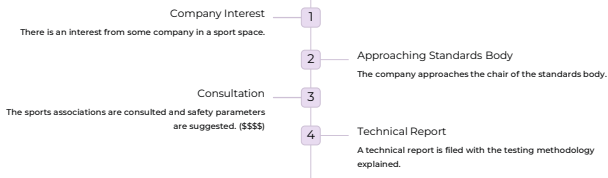
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How a Sports Safety Standard is born:



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The Process Begins



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Testing and Publication

- Frame Testing Development**
The testing of the frame has to be developed to ensure the standard is met. (\$\$\$\$)
- Standard Publication**
The standard is published and testing is required in order for the eyewear to earn the hang tag.
- Time Frame**
This takes approximately 5 years.

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Safety and the FDA: CFR 801.410

In the impact test, a 58-inch steel ball weighing approximately 0.56 ounce is dropped from a height of 50 inches upon the horizontal upper surface of the lens. The ball shall strike within a 58-inch diameter circle located at the geometric center of the lens. The ball may be guided but not restricted in its fall by being dropped through a tube extending to within approximately 4 inches of the lens. To pass the test, the lens must not fracture; for the purpose of this section, a lens will be considered to have fractured if it cracks through its entire thickness, including a laminar layer, if any, and across a complete diameter into two or more separate pieces, or if any lens material visible to the naked eyes becomes detached from the ocular surface.

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2) Safety: ISO Standards

- International Organization for Standardization (ISO)**
While American Standards are often the gold standard for the world, certification by the ISO (CE for example) must be validated by that body.
- ISO Certification Requirements**
Many countries REQUIRE ISO standards be met.
- US Approach**
In the US we are guided by "Consensus Standards"



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2) Safety: The Vision Council

- **ANSI Secretariat:** The Vision Council serves as the Secretariat for ANSI in Eyewear, playing a crucial role in setting and maintaining standards for eye protection.
- **Mike Vitale's Leadership:** Mike Vitale, Vice President of Membership, Government Relations & Technical Affairs, holds several key positions in safety standards organizations:
- **ASTM Co-Chair:** Co-Chair at ASTM for Sport Safety, contributing to the development of safety standards in sports eyewear.
- **ANSI Committee Chair:** Chair of the ANSI Committee for Eyewear, overseeing the creation and implementation of eyewear safety standards.
- **ISO Representative:** Technical Advisory Group Leader for ISO, where he represents ANSI, ensuring international alignment of safety standards.



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3) Conditions and Environmental Factors



Indoor/Outdoor
Different lighting conditions and glare considerations



Wet/Dry
Moisture management and lens fogging prevention



Wind
Eye protection and lens stability in windy conditions



Debris
Shielding eyes from dust, dirt, and other particles



Color
Lens tints for optimal contrast and visibility



Lighting Conditions
Adapting to varying light levels and transitions



Humidity
Managing lens fogging and comfort in humid environments



Condensation
Preventing and addressing moisture buildup on lenses

Let's go back to our examples:

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3) Conditions: Example: Pickleball



Indoor Pickleball
Can be played indoors, providing a controlled environment with consistent lighting and no weather interference.



Outdoor Pickleball
Usually dry conditions, but potentially some wind when played outdoors. Low debris and condensation risks.



Eye Protection
Some protection needed for players' eyes, especially when playing outdoors or in bright indoor lighting.

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3) Conditions: Example: Swimming



Indoor Swimming Environment

Indoor swimming environments present unique challenges with controlled lighting and enclosed spaces affecting visual perception.



Outdoor Swimming Conditions

Outdoor swimming introduces challenges with sun glare, varying light conditions, and UV exposure requiring specialized lens solutions.



Lens Sealing Requirements

Proper lens sealing is crucial for underwater vision, preventing water infiltration and maintaining clear sight.



Humidity Control

The humid environment within swim goggles requires specialized anti-fog treatments to maintain visibility and comfort.

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3) Conditions: Example: Ski Joring



Snow and Debris
Athletes encounter flying snow, ice, and debris, requiring specialized eye protection during high-speed activity.



Snow Glare Management
Intense reflection off snow surfaces creates significant glare challenges, requiring specific lens solutions for visibility.



Condensation Challenges
Temperature differences and physical exertion create lens fogging issues that must be actively managed for safety.



Dynamic Conditions
Athletes must adapt to rapidly changing weather and light conditions throughout their performance.

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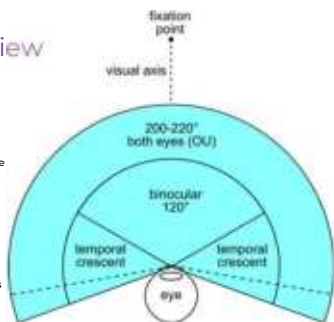
4) Visual Range: Overview

135°


Per Eye Range
Typical horizontal visual range for a single eye

200°

Binocular Range
Total horizontal visual range using both eyes



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3) Visual Range, Cont.

Factors Limiting Visual Range: Eyewear, with the exception of contact lenses, limits that range. To what degree depends on:

- **Frame Fit:** The way the frame sits on the face can affect peripheral vision and overall visual range.
- **Lens Design:** Different lens designs can impact the field of view and visual clarity at various distances.
- **Prescription Strength:** The strength of the prescription can influence the extent of visual range limitation in eyewear.

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3) Visual Range, cont.

In order to maximize horizontal visual range, we need to be mindful of induced prism caused by wrapping **around the face**. This concept was first discovered by Dr. Estelle Glancy in the 1920s at American Optical but not implemented regularly in wrap eyewear until the 1980s.

- 1 1920s
Dr. Estelle Glancy discovers induced prism concept at American Optical
- 2 1920s-1970s
Concept not regularly implemented in wrap eyewear leading to poorer quality or a tendency toward flatter frames.
- 3 1980s
Induced prism concept begins to be implemented in wrap eyewear
- 4 Present Day
Consideration of induced prism crucial for maximizing horizontal visual range

Photo Courtesy of the Optical Heritage Museum

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Formula for Induced Prism

Visual Range: Prism Compensations

Formula for Induced (Compensating) Prism in all lenses:

$$P = [\tan(\theta) / n] BC / T$$

θ = Angle of Wrap Deviation
 T = Thickness in mm
 n = Index of Refraction
 BC = Base Curve

- Angle of Wrap Deviation (θ)
The angle at which the lens wraps around the face
- Thickness (T)
Measured in millimeters, affects the amount of prism
- Index of Refraction (n)
Optical property of the lens material
- Base Curve (BC)
The curvature of the front surface of the lens

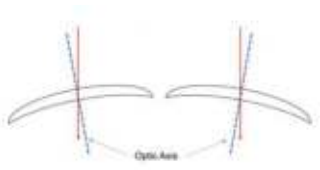


Image Credit: Bob Alexander

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Example: Induced Prism Calculation

Let's calculate the induced prism for a specific lens example:

1

2

3

<p>Initial Specifications</p> <ul style="list-style-type: none"> • Base Curve: 8.0 (plano poly lens) • Wrap Angle: 15° • Thickness: 2.0mm • Refractive Index: 1.586 	<p>Formula Application</p> <p>$IP = \frac{[(\tan \theta) (t/n) (BC)]}{10}$</p> <p>Where:</p> <ul style="list-style-type: none"> • n = refractive index • t = thickness in mm • θ = wrap angle • BC = base curve 	<p>Where is the power?</p> <p>Power is masked in this formula, Do you see it?</p> 
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Example: Prism Compensation




Poly	8.0 Base Curve	15° Wrap Angle	2.0mm CT
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$P = \frac{[\tan \theta^{\circ} (t/n) BC]}{10}$
 θ = Angle of Wrap Deviation
 T = Thickness in mm
 n = Index of Refraction
 BC = Base Curve

Induced Prism = $\frac{[\tan(15) (2.0/1.586) (8.0)]}{10}$
 Induced Prism = $\frac{[(.268) (1.261) (8.0)]}{10}$
 Induced Prism = .27Δ per lens or .52Δ total

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Example: Prism Compensation

-  **Wrapped lenses induce Base Out Prism**
The calculation shows the amount of prism induced by the wrap: .52D
-  **Compensation is necessary**
To counteract the induced prism effect, ANSI tolerance for horizontal prism is .667 Total
-  **Compensation must equal that amount of Base IN Prism**
To neutralize the Base Out Prism induced by the wrap

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4) Visual Range: Unwanted Astigmatism Caused by Wrapping

Wrapping a Lens
Causes unwanted astigmatism

Affects Vision
Not only in the periphery, but also in the central vision

Solution
All prescription lenses should be digitally compensated, even if Rx is minimal

Result
Produces the widest possible visual range

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4) Visual Range: Correcting for Unwanted Astigmatism

Usually the position of wear is calculated in order of impact of the measurement:

Vertex

Pantoscopic Tilt

Wrap Angle

All of these are done in concert in the lens design calculator.
Wrap is significantly more important in a high-wrap frame. The same calculator is insufficient.

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Calculating Power in Wrap Frames

- Martin's Tilt Formula for Wrapped Frames**
We use Martin's Tilt Formula to calculate the power of wrapping a frame.
- Example Lens: -1.50,+1.50 @ 180**
Consider a lens with the prescription -1.50,+1.50 @ 180, wrapped 15°.
- Vertical Meridian Power**
At the vertical meridian there is no power.
- Horizontal Meridian Power**
At the horizontal meridian we have -1.50D of power.

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Calculating Unwanted Astigmatism

When calculating unwanted astigmatism in wrap lenses, we need to consider two key formulas: one for the new lens power and another for the induced cylinder.

New Lens Sphere Power Formula

$$D_s = D [1 + \frac{\sin^2 \theta}{2n}]$$

This formula calculates the compensated sphere power needed for wrapped lenses.

Induced Cylinder Formula

$$D_c = D_s (\tan^2 \theta)$$

This formula determines the cylinder power induced by the wrap, Dc.

Understanding Variables

- Ds is the Induced Sphere Power
- D is the Prescribed Power (or the power after other compensations have been performed) at the given meridian
- θ is the degrees of wrap
- n is the Index of Refraction (in Diopters)

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Example: Astigmatism Calculation

Lens Specifications
Lens is a -1.50 at 180 and the material is Polycarbonate

Calculation Steps
1. Calculate Ds (Spherical Power)
2. Calculate C (Induced Astigmatism)

Let's walk through the calculations for unwanted astigmatism in wrap lenses:

Calculating Ds (Spherical Power)

$$D_s = -1.50 [1 + \frac{\sin^2 150}{2(1.586)}]$$

$$D_s = -1.50 [1 + \frac{\sin^2 150}{3.172}]$$

$$D_s = -1.50 [1 + \frac{0.0669}{3.172}]$$

$$D_s = -1.50 [1 + 0.021]$$

$$D_s = -1.532$$

Calculating Induced Astigmatism

$$C = D_s (\tan^2 15^\circ)$$

$$C = -1.532 (0.0669)$$

$$C = -.10 \text{ Diopters of Cylinder}$$

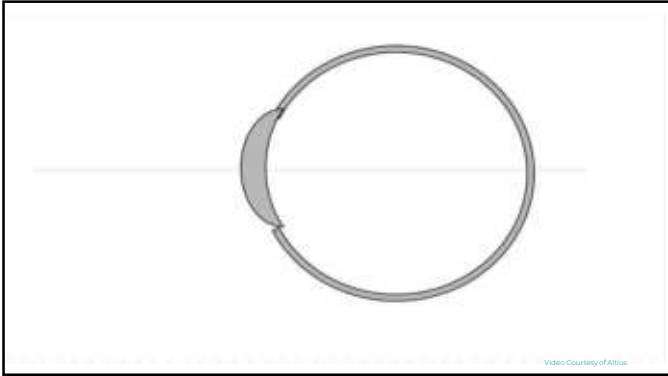
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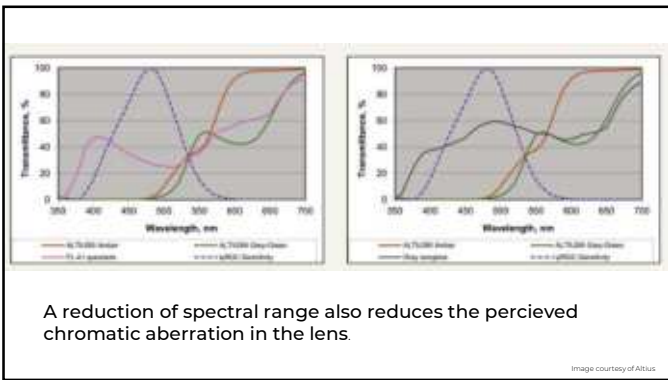
Sports Performance Contact Lenses

There are many colored contact lenses on the market that can enhance or suppress colors intentionally. There is only one contact lens company that delivers specifically sport specific performance lenses.

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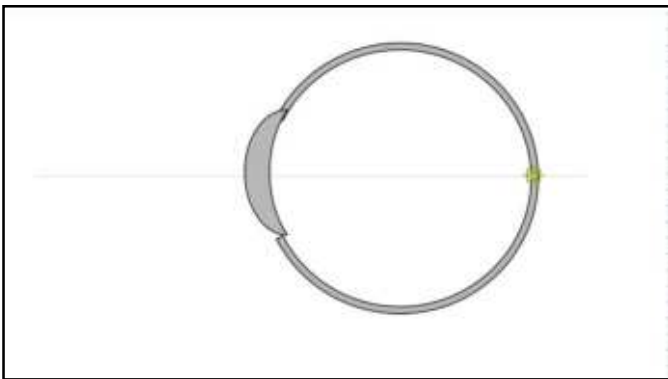


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A reduction of spectral range also reduces the perceived chromatic aberration in the lens.

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Benefits of Sport Performance Contact Lenses



<p>1 Light Control</p> <ol style="list-style-type: none"> 1. No light leakage at lens edges 2. No blockage of any part of the field of view 3. Targeted light filtration 	<p>2 Protection</p> <ol style="list-style-type: none"> 4. Reduction of 100% of UV light and 5. Depending on color, 38% - 50% light transmission 6. Can protect against corneal abrasion 	<p>3 Additional Uses</p> <ol style="list-style-type: none"> 7. Has other potential therapeutic uses
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5) Focal Distance and Accommodation

1	<p>Amplitude of Accommodation</p> <p>The eye's remarkable ability to focus at different distances, like a camera lens adjusting its focus, enabling smooth transitions between near and far vision.</p>
2	<p>Age-Related Changes</p> <p>Over time, the lens becomes less elastic, similar to how muscles lose flexibility, impacting the speed and efficiency of focus adjustments between distances.</p>
3	<p>Daily Fluctuations</p> <p>Accommodation performance varies throughout the day, with decreased efficiency in morning and night hours, potentially affecting athletes' visual performance during training or competition.</p>

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5) Focal Distance and Accommodation

Natural Visual Flexibility in Youth

Young athletes have a natural ability to accommodate, or adjust their focus, through various changes in focal distance. This flexibility allows them to maintain clear vision across different depths of field without the need for additional visual aids.

Age-Related Vision Changes

As we age, our eyes lose some of their natural ability to accommodate, a condition known as **presbyopia**. This means that older athletes often require specialized lenses to help them maintain clear vision at different focal distances during their sporting activities.

Solutions Through Sport-Specific Design

To address these challenges and enhance performance for senior athletes, we can consider designing sport-specific lenses. These lenses take into account the unique requirements of different sports and the visual needs of older athletes. By carefully considering the placement and focal distance of different areas within the lens, we may be able to speed up visual processing and improve overall performance.

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Example: Shooting Sports



Handgun
Frequently indoors
Sight is at arms length
Range is usually beyond 20 ft, but not always.



Long-gun
May require viewing in a mounted sight
Always outdoors
Range always beyond 20 ft
Sometimes moving.



Eyewear is ALWAYS required
So we should make it as functional as possible!

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Example: Billiards



Varying Focal Distances
Players need clear vision at multiple distances, with the top of the lens optimized for viewing the entire table from 7-9 feet away. This enables accurate assessment of shot angles and ball positions.



Specialized Lens Design
Billiards lenses feature specific focal distances at the top for table viewing, while the lower portion is adjusted for closer examination of shots and ball placement.



Customized Solutions
Lens designs can be tailored to each player's height, playing style, and visual needs, ensuring optimal performance during gameplay.

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Example: Golf, Cycling, Fly Fishing



Golf
Focal Length: Addressing the ball, keeping score and spotting ball down-range all while being mindful of handed-ness.

Cycling
Focal Length: Cyclists need clear vision at various distances, from reading bike computers to looking at their gear rings to spotting road hazards far ahead.

Fly Fishing
Focal Length: Anglers require precise vision for tying flies, looking at their line and reel over their shoulders and spotting fish in the water.

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Designing Sports-Specific Lenses

Let's explore the key factors in creating optimal sports eyewear:

- **Speed:** Visual acuity and contrast sensitivity are crucial for fast-paced sports. Athletes need lenses that enhance their ability to track moving objects and react quickly to changing situations.
- **Environmental Conditions:** Sports are played in diverse environments, from bright outdoor sunlight to indoor artificial lighting. Lenses must adapt to these varying conditions while maintaining optimal visibility.
- **Safety:** Protective features are paramount in sports eyewear design. Each lens must meet rigorous safety standards while providing clear, unobstructed vision for the athlete.
- **Visual Range:** Different sports require varying fields of vision and focal distances. Lenses must be designed to accommodate these specific visual requirements for optimal performance.
- **Focal Distance:** Considerations must be made for the varying focal distances required in different sports.

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Accessing Lens Products



- **Talk to Product Companies**
Ask product companies which labs they do business with to gain access to their lens products.
- **Facilitate Introductions**
Make introductions from sport lens companies to your favorite lab to expand your product access.
- **Consult with Labs**
Speak directly to labs about which products you can access through them.


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Special Considerations in Sports Vision



- Height and Focal Length**
The height of the athlete determines much of their focal length needs if the ground is involved.
- Poker Player Eyewear**
Poker Players need their eyewear to NOT reflect the color or count of the cards they are looking at.
- Narrowing Visual Field**
In cases where the visual field needs to be narrowed, frosting or lenticularization could be used.
- WELLNESS and Color**
WELLNESS and Color - It's coming!

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Your feedback is taken very seriously. Please evaluate this session.

Cira Collins
Reach out at cira@cira.me
