

DIGITAL RAY-PATH® 2



Pushing the limits of geometry in
lens personalization

.....
The potential of accommodation

iot

Digital Ray-Path® is the foundational technology used by IOT to minimize oblique aberrations in personalized and compensated FreeForm lenses. Its evolution, Digital Ray-Path® 2, adds the intelligent use of the wearer's accommodation to the calculation methodology.

Lenses with Digital Ray-Path® 2 Technology offer greater comfort, impeccable visual quality, and more precise focus.

 **DIGITAL** RAY-PATH® 2

1

Pushing the limits

Oblique aberrations, found in any lens, include **astigmatic and spherical power errors**. These errors cause blurred vision as the wearer's gaze moves away from the optical center of the lens.



Digital Ray-Path® Technology already minimizes aberrations in personalized lenses. However, eliminating them completely is not mathematically possible. **As a result, some residual power error remains, causing a slight blur.**



Digital Ray-Path® 2 pushes the limits of geometry in lens personalization by incorporating the wearer's accommodative capacity in the calculation of the final lens.

Digital Ray-Path® 2 harnesses the intrinsic potential of the visual system to refine the optimization process for personalized lenses.



2

Precise focus in the accommodative object space

The **object space** with
Digital Ray-Path®



A point on the lens corresponds to a focal distance.

Digital Ray-Path® associates each gaze direction with a single focal distance. This technology assumes the **wearer will change their direction of gaze to focus at different distances.**

The **accommodative object space** with **Digital Ray-Path® 2**

A lens wearer can focus on different distances, without moving their eyes or head, by stimulating or relaxing accommodation. Digital Ray-Path® 2 incorporates this factor into each individual lens calculation.

Relaxed, less accommodation

Stimulated, more accommodation

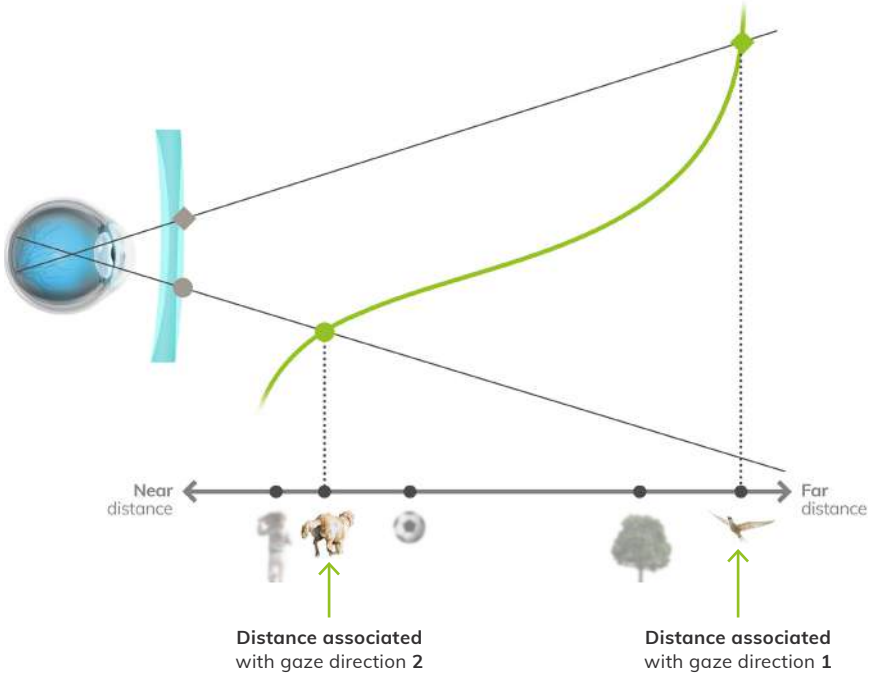
Each point in the lens corresponds to a range of focal distances.

Digital Ray-Path® 2 considers the **accommodative object space**, the volume defined by the points within the clear visual range, for each direction of gaze.



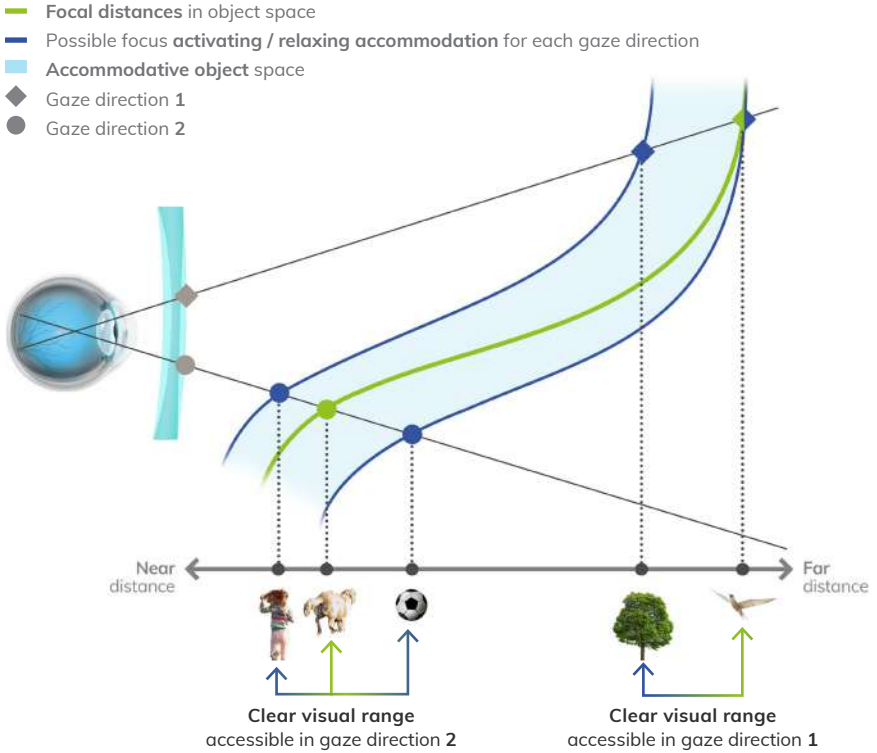
Minimization of oblique aberrations with Digital Ray-Path®

- Focal distances in object space
- ◆ Gaze direction 1
- Gaze direction 2



Digital Ray-Path® minimizes oblique aberrations to provide **improved visual quality at a specific distance** associated with each direction of gaze.

Minimization of **oblique aberrations** with **Digital Ray-Path® 2**

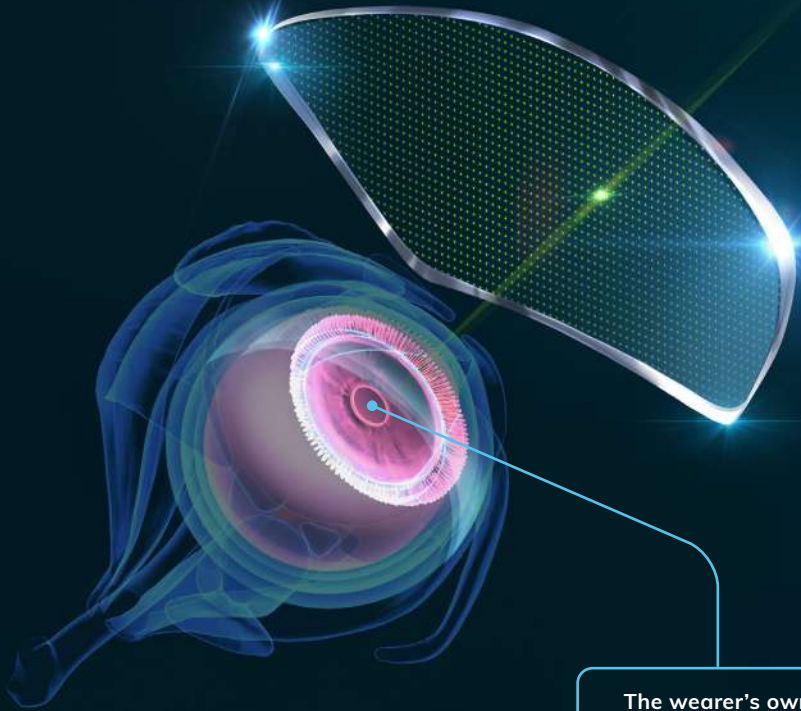


Digital Ray-Path® 2

analyzes oblique aberrations at various focal distances for each direction of gaze. **Minimization of oblique aberrations is balanced throughout the accommodative object space**, providing extremely clear vision and precise focus.

3 Precise vision with Digital Ray-Path® 2 Technology

Digital Ray-Path® 2 mathematical methods take advantage of the natural ability of the visual system to compensate for a portion of the spherical component of oblique aberration. Digital Ray-Path® 2 considers small power adjustments wearers can naturally make at each fixation point. **Oblique aberrations are minimized**, in a more effective way, offering wearers impeccable visual quality.

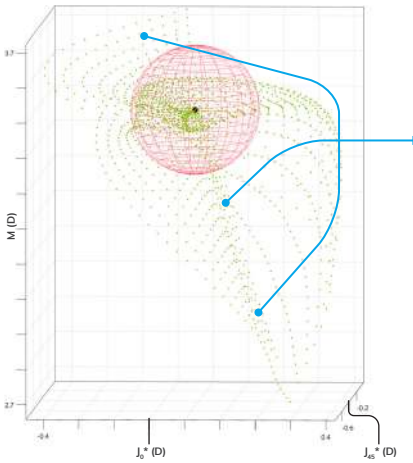


The wearer's own accommodation allows them to make small power adjustments and fine-tune their focus.

Improved lens optimization

Single vision lens, [+3.00 -1.00 x 90], 6 D base curve and 1.5 index

Optimized with Digital Ray-Path®

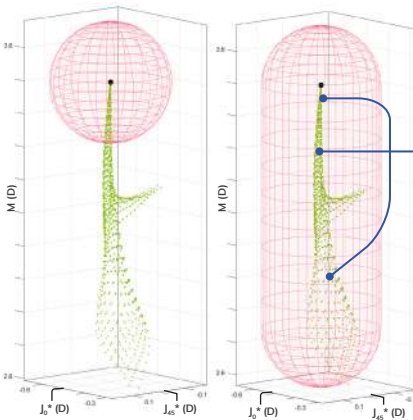


57% of any direction of gaze shows residual oblique aberration errors that fall outside the region of null blur.

The wearer notices **some peripheral blur**.

- Null blur region (error <0.18 D)
- After optimization, oblique aberration remainder in each gaze direction (3149 directions)

Optimized with Digital Ray-Path® 2



99.5% of any direction of gaze is fully optimized, falling within the null blur region when the wearer accommodates slightly.

Digital Ray-Path® 2 lenses have **virtually no full-field blur** in any gaze direction.

- Null blur region (error <0.18 D)
- Null blur region stretched vertically when wearer uses accommodation (error <0.18 D)
- After optimization, oblique aberration remainder in each gaze direction (3149 directions)

*J₀ and J₄₅ determine the astigmatic error. J₀ = -(C/2)cosα ; J₄₅ = -(C/2)sinα

Lenses calculated with Digital Ray-Path® 2 Technology provide a larger area of optimal correction* for the wearer. On average, considering hundreds of real jobs, the optimal correction area is significantly expanded over lenses calculated with IOT's previous technology, Digital Ray-Path®.

Standard frames

+10% Average increase in the optimal correction area



Study conducted with 350 lenses in medium-sized frames and standard base curves.

Up to **3 times** the optimal correction area

Large or wrap frames

+30% Average increase in the optimal correction area



Study carried out with 600 lenses in 6 and 8 base, wrap angle from 15° to 20° and frame size from 55 to 70 mm.

Up to **8 times** the optimal correction area

*Outside the optimal correction area, the wearer would lose one line of visual acuity.

4 Features and benefits

Lenses with Digital Ray-Path® 2 give eyecare professionals the ability to offer their patients the latest in lens personalization technology from IOT. **A unique technology to help them differentiate their businesses.**

Features:

- 1 Minimizes the effect of oblique aberrations by considering the wearer's natural accommodation.
 - 2 Optimized for the wearer's entire accommodative object space.
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Benefits:

- 1 Precise and comfortable focus at all working distances in any direction of gaze.
- 2 Virtual elimination of peripheral blur.
- 3 Automatic centering for thickness reduction.
- 4 Customized for the individual parameters of each wearer, material, base curve, and frame.

Digital Ray-Path® 2 Technology is included in NEW IOT Endless® single vision and IOT Endless® Plus anti-fatigue lenses.

DIGITAL RAY-PATH® 2

Digital Ray-Path® 2 adds the intelligent use of the wearer's own accommodation to optimize the lens for a range of focal distances. Lenses personalized with Digital Ray-Path® 2 Technology have drastically reduced oblique aberrations across the entire visual field and offer the wearer greater comfort, impeccable visual quality, and more precise focus.



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LENS INNOVATION