EyeLT® STEP 1-3

RODENSTOCK
See better. Look perfect.

Agenda

1. EyeLT® Step 1
2. EyeLT® Step 2
3. EyeLT® Step 3

Rodenstock unique selling propositions.

EyeLT® Step 1

Superior, clear vision from far to near.
Up to 25% better vision at near and intermediate distances.

EyeLT® Step 2

Brilliant vision experience with exceptional detail and high contrast. Up to 40% better vision at near and intermediate distances.

EyeLT® Step 3

Pin-sharp vision in all distances and all light conditions. Full exploitation of 100% of the personal vision potential.

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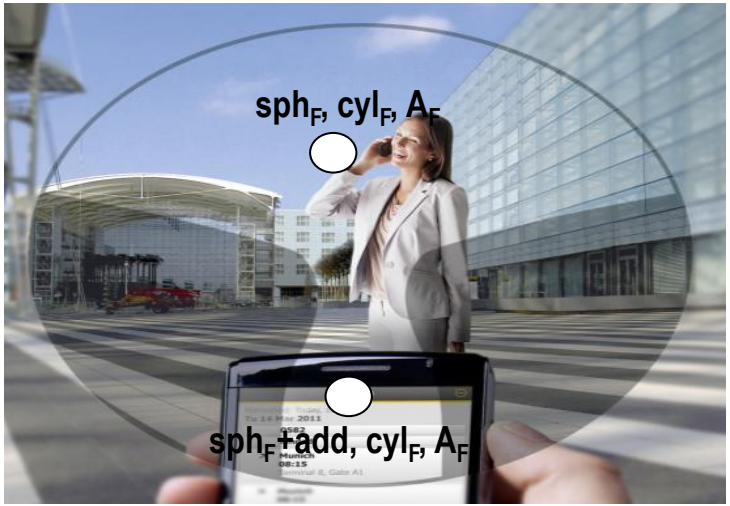
PRODUCT.

EyeModel

Until recently:
refraction far + addition

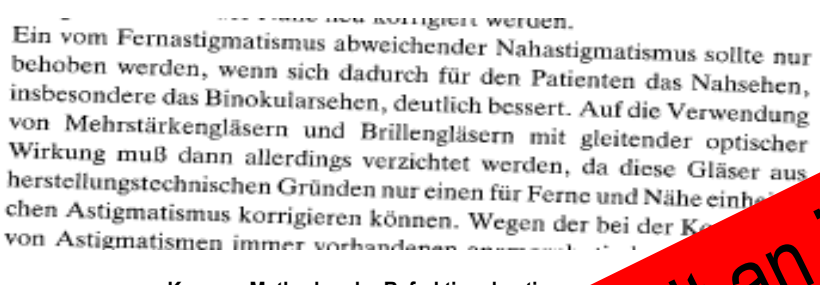


Innovation 2011: EyeLT
refraction far + refraction near

Until recently, far **and** near refraction could not be implemented in a progressive lens.

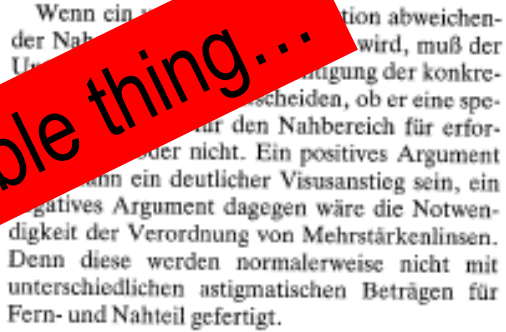
Due to the development of the Eye Lens Technology
Rodenstock is the first lens manufacturer that is able to do this!

PRODUCT.
EyeModel



Ein vom Fernastigmatismus abweichender Nahastigmatismus sollte nur behoben werden, wenn sich dadurch für den Patienten das Nahsehen, insbesondere das Binokularsehen, deutlich bessert. Auf die Verwendung von Mehrstärkengläsern und Brillengläsern mit gleitender optischer Wirkung muß dann allerdings verzichtet werden, da diese Gläser aus

Krause „Methoden der Refraktionsbestimmu

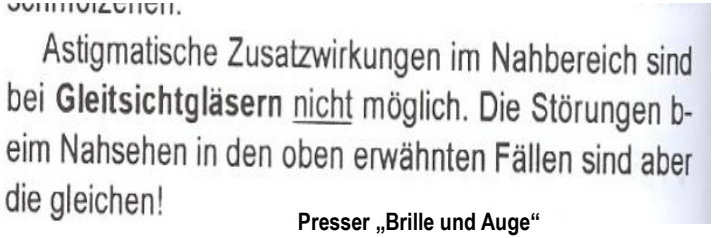


Wenn ein tion abweichender Nah wird, muß der Un tigung der konkre- scheiden, ob er eine spe- ür den Nahbereich für erfor- der nicht. Ein positives Argument nn ein deutlicher Visusanstieg sein, ein gatives Argument dagegen wäre die Notwendigkeit der Verordnung von Mehrstärkenlinsen. Denn diese werden normalerweise nicht mit unterschiedlichen astigmatischen Beträgen für Fern- und Nahteil gefertigt.

Methling, Maxam „Optometrie: Bestimmen von Sehhilfen“

Nur bei speziell führungen gemäß Abb. 2 1.4) ist es möglich, im Nahte ylindrische Wirkung zu realisieren a teil. Bei Gleitsichtlinsen ist dies jedoch n möglich.

Methling „Bestimmen von Sehhilfen“



verschmolzenen.

Astigmatische Zusatzwirkungen im Nahbereich sind bei **Gleitsichtgläsern** nicht möglich. Die Störungen beim Nahsehen in den oben erwähnten Fällen sind aber die gleichen!

Presser „Brille und Auge“

All sources call it an impossible thing…

PRODUCT.
EyeModel

Rodenstock makes the technological break through happen!

6.3.5.2 Astigmatische Komponente

Auch ein einwandfrei gemessener Nahastigmatismus sollte nu… Nahzusatz führen, wenn er so groß ist, dass die Korrektion … Sehschärfe bewirkt. Im Zweifelsfalle sind sphärische Na… zwei wesentliche Gründe:

1. An jede astigmatische Korrektion muss si… sie mit einer gewissen unsymmetrischen Verzeichnu… sche Korrektion in der Nähe anders ist als in der Ferne… niederholter Umstellungen, die die Gewöhnung erschwe… n.
2. Grundsätzlich ist es zw… ser mit astigmatischem Nahzusatz herzustellen, das ist aber aufwänd… noch selten gemacht. Entsprechend hoch ist der Preis, wenn man die Gläser … bekommt. Gleitsichtgläser lassen sich derzeit grundsätzlich nur mit sphärisch… z fertigen. Wenn man einen astigmatischen Nahzusatz vorsieht, verbaut man de… g den Weg zum Mehrstärken- oder Gleitsichtglas und zwingt ihn, eine Einstärken-Nahbri… zu tragen.

Ob man bei Vorliegen eines Nahastigmatismus, den man nicht ausgleichen kann oder will, das Augenpaar für die Ferne optimal korrigiert und Restfehler beim Nahsehen unberücksichtigt lässt oder

Diepes „Refraktionsbestimmung“

Wurde ein Nahastigmatismus ermittelt … rrigiert, stellt sich die Frage, ob … mit einer Brille korrigiert … oll.

… äufig ergibt sich der Nachteil, … e Gleitsichtgläser zum Einsatz … können. Lediglich Einstärken- … spezielle Bifokalgläser können … verwendet werden.

Liegt jedoch eine deutliche Verbesserung des Sehens in der Nähe vor, und war genau dieser Bereich das „Problem“ unseres Probanden, sollten wir keine Scheu haben, eine „Spezialbrille“ zum Lesen zu empfehlen.

„Die Praxis der Augenglasbestimmung“

PRODUCT.
EyeModel

EyeModel Background

What is the reason for a difference for cylinders and axes in near and far?

1. **Geometric-optical effect: Near astigmatism**
   Due to the distance of the lens to the eye, a stronger cylinder for near vision will be required

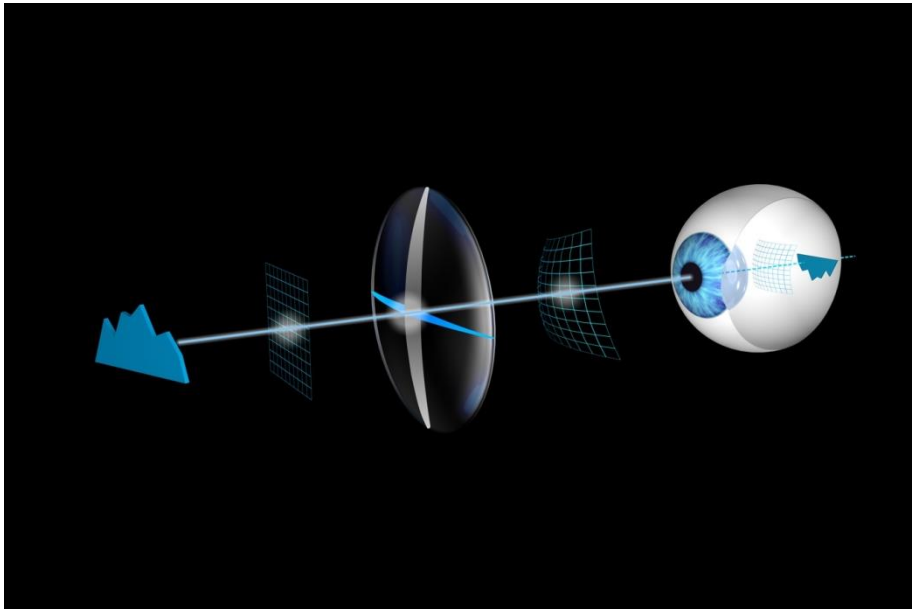
2. **Physiological effect: Listing far/near**
   The torsional movement of the eye with convergence leads to a change of the axes

PRODUCT.
Effective Near Astigmatism

EyeModel
1. Effective near astigmatism

- A cylindrical lens for far vision will lead to a blurred vision in near distances caused by the effective near astigmatism
- This is a pure optical effect based on the distance of the lens to the eye
- To correct the astigmatism of the eye for near-vision, a higher cylinder is required

PRODUCT.
Effective Near Astigmatism

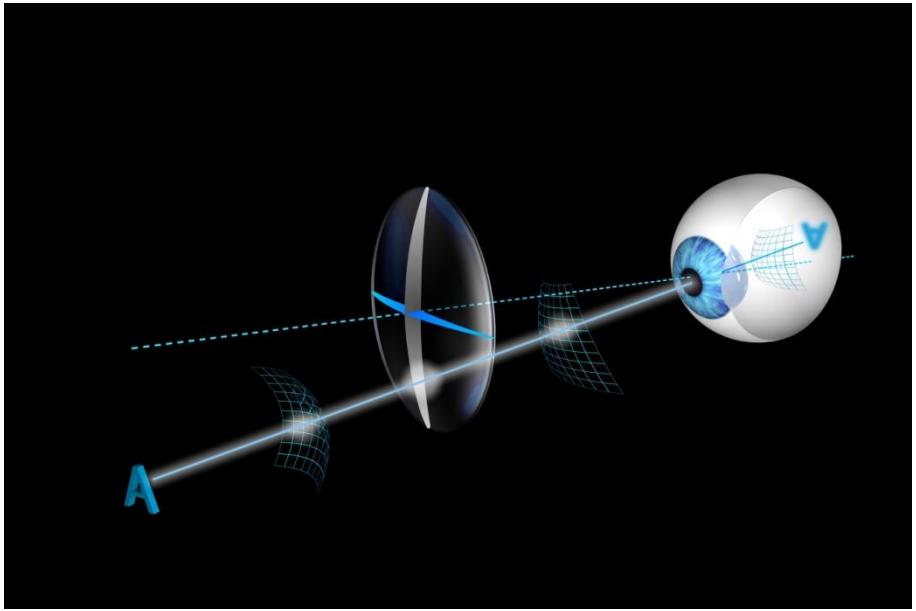


Far vision

Cylindrical prescription:
View through the area of the lens for far vision of a PAL with low addition

➔ Sharp image on the retina

PRODUCT.
Effective Near Astigmatism

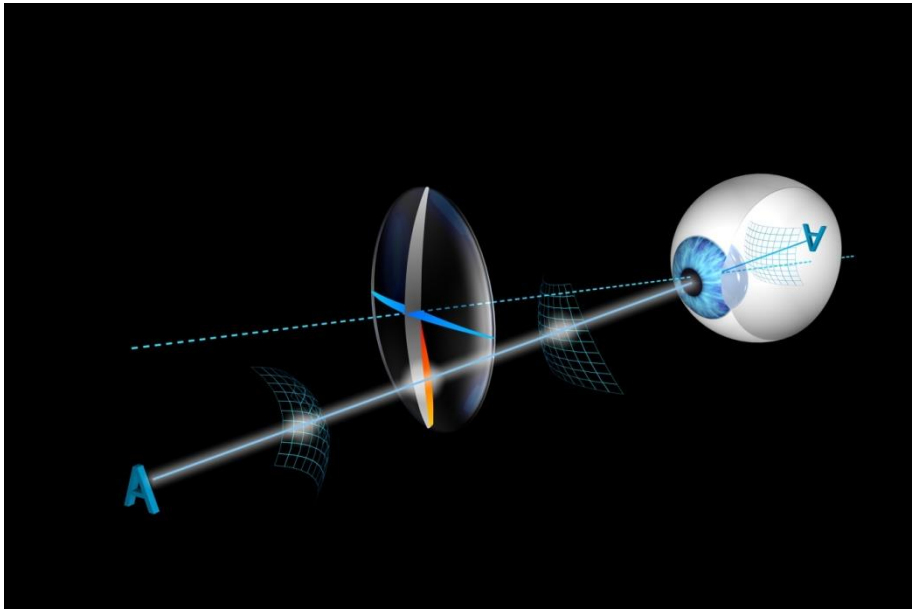


Near vision - without EyeModel

Cylindrical prescription:
View through the area of the lens for near vision of a PAL with low addition

➔ Blurred image on the retina

PRODUCT.
Effective Near Astigmatism



Near vision - with EyeModel

Cylindrical prescription:
View through the area of the lens for near vision of a PAL with low addition

➔ Sharp image on the retina with correction of the effective near astigmatism

PRODUCT.
EyeModel

Effective Near Astigmatsm

- A lens which is astigmatically fully corrective for far vision causes an unsharp image for the view in near distances. This is caused by the effective near astigmatism.
- Therefore the lens is not any more fully corrective.
- To correct the astigmatism of the eye for near distances a different cylinder in the lens is needed.
- This is a pure geometrical/optical effect caused by the distance lens → eye and it has nothing to do with the eye itself.

PRODUCT.
Effective Near Astigmatism

EyeModel
1. Effective near astigmatism

Effective near astigmatism will increase…
... with increasing cylinder prescription
... low addition and small object-distance
... increasing CVD

The effective near astigmatism has an impact on the cylinder prescription

Taking effective near astigmatism in account, near objects will appear point-shaped and sharply on the retina

This leads to noticeable vision improvements and larger vision fields in near vision

PRODUCT.
EyeModel

EyeModel Background

What is the reason for a difference for cylinders and axes in near and far?

1. **Geometric-optical effect: Near astigmatism**
   Due to the distance of the lens to the eye, a stronger cylinder for near vision will be required

2. **Physiological effect: Listing near and far**
   The torsional movement of the eye with convergence leads to a change of the axes (near)

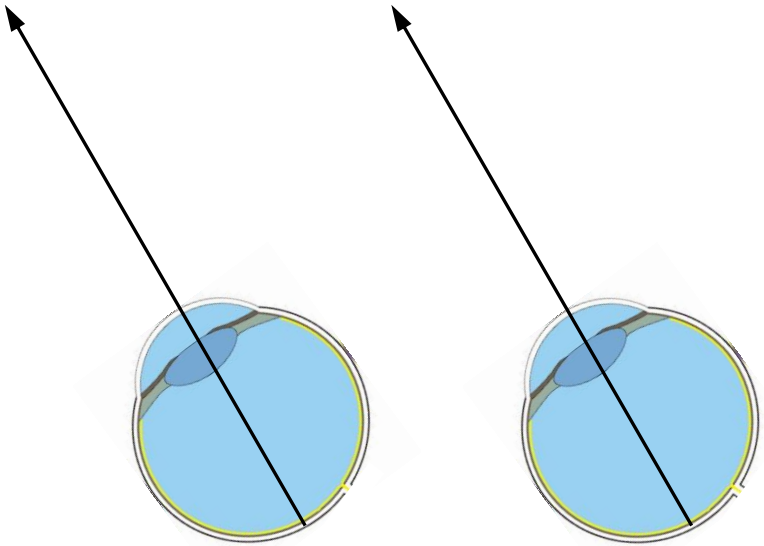
PRODUCT.
Listing's Law

EyeModel
2. Listing´s law far

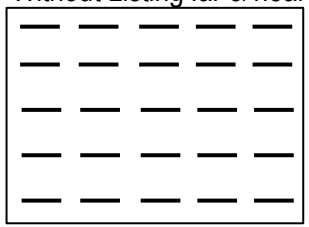
- Torsional movements of the eye occur with peripheral viewing
- Therefore the cylinder axes has to change slightly in direction to the edge of the lens
- Target: a horizontal line in the room has to be imaged on the corresponded part of the retina of the eyes
- If the axes position of the eye and the lens do not match together, a blurred image will be created

PRODUCT.
Listing's Law

Same eye movement (Version)

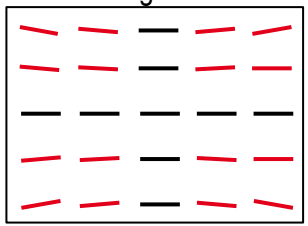


Without Listing far & near



Left lens, cylinder axes 0°

With Listing far



Left lens, cylinder axes 0°

Within the red-marked area of the lens, torsional movements of the eyes are visible
With Listing´s Law for far the axes of the lens will be different depending on the area of the lens.

PRODUCT.
Listing's Law

EyeModel
2. Listing´s law near

- As the eyes perform different torsional movements with convergence when looking at near objects, different cylinder axes for near and far are generated
- Therefore the cylinder axes within the lens has to adapt to the physiological eye movements when looking at near and far

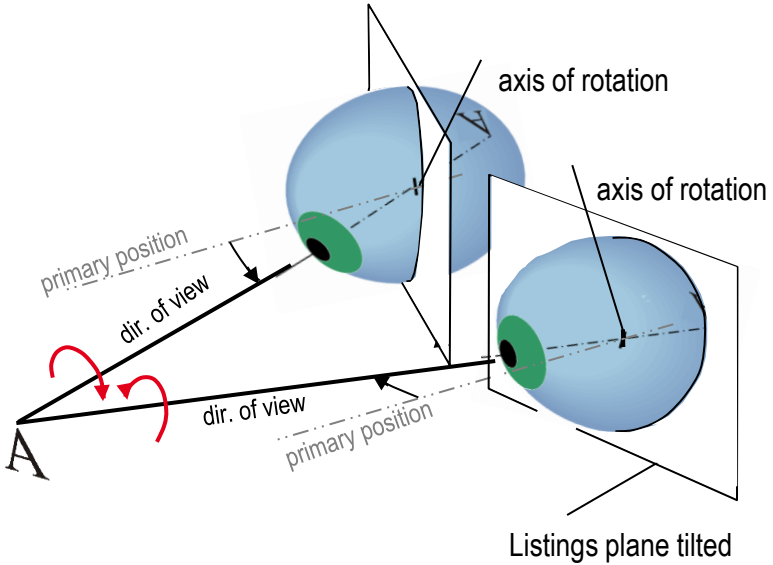
1. Technical Features

Eye Lens Technology: Eye Model – Listing Near

Background

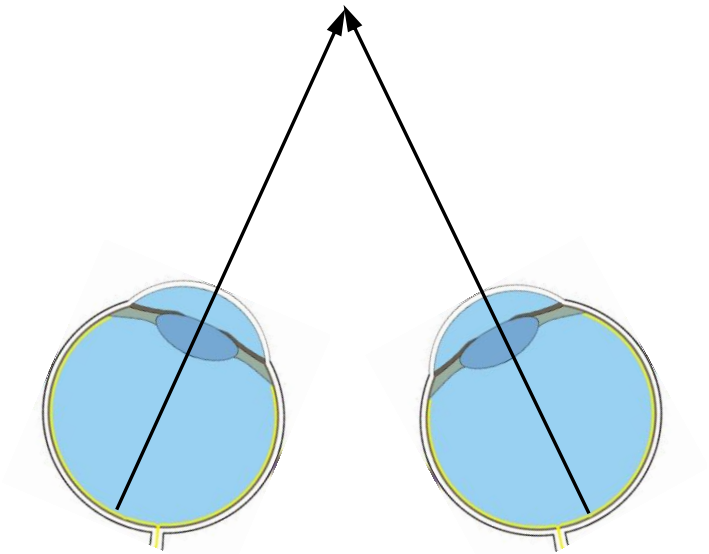
Listing (far vision) does not work for near vision

opposite movement of eyes left/right

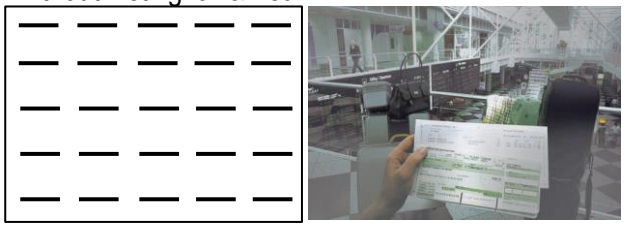


PRODUCT.
Listing's Law

Opposite eye movements (Convergence)

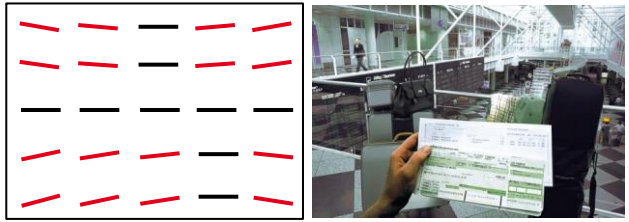


Without Listing far & near



Left lens, cylinder axes 0°

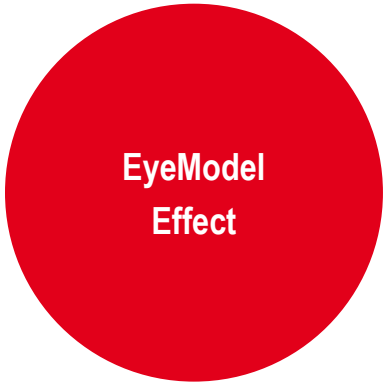
With Listing far & near



Left lens, cylinder axes 0°

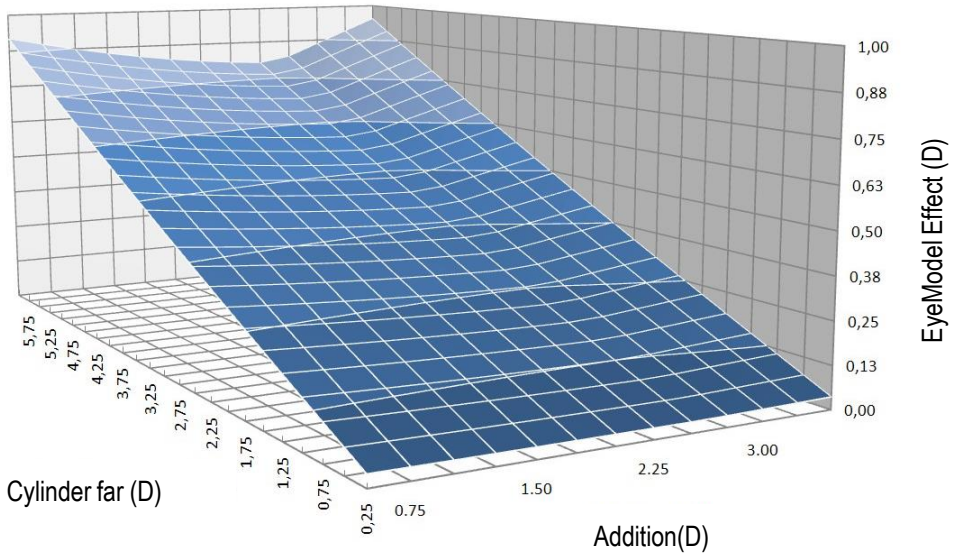
Within the red-marked area of the lens, torsional movements of the eyes are visible
With Listing´s Law for far and near the axes of the lens will be different depending on the area of the lens.

PRODUCT.
EyeModel Effect



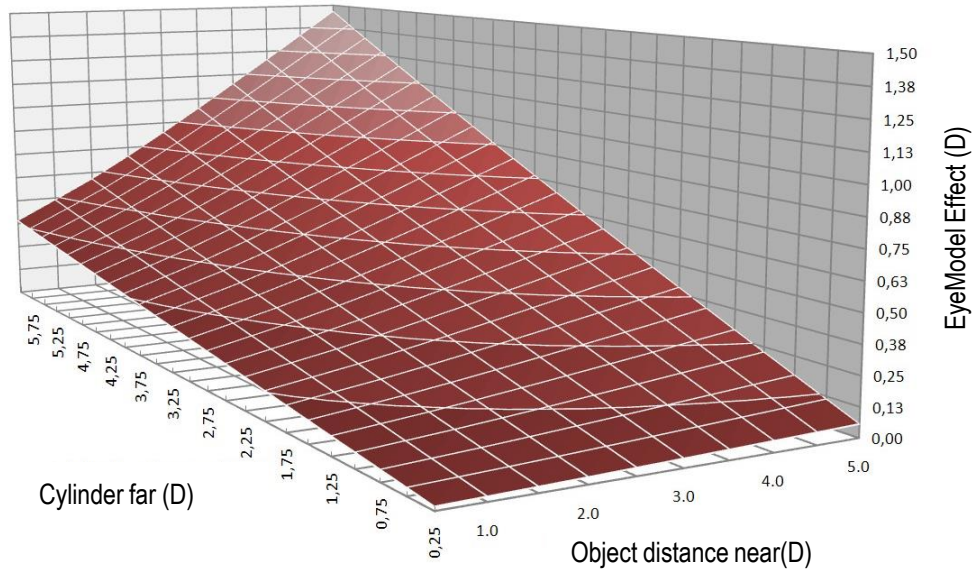
- The improvement with the EyeModel optimization of the vision in the near segment of the lens is measurable: the EyeModel Effect
- The EyeModel Effect eliminates the astigmatic error in near which results when near astigmatism and Listing´s law for far and near within the lens are not taken into account

PRODUCT.
EyeModel Effect



With an addition up to 2.50D the EyeModel Effect will decrease as the influence of the effective near astigmatism with increasing addition will become smaller whereas the error of the axes will stay constant with unchanged object distance and unchanged convergence.
With an addition higher than 2.50 D, the EyeModel Effect will increase caused by a smaller object distance and higher axes error.

PRODUCT.
EyeModel Effect



With near objects and high cylinders, the EyeModel Effect can be more than 1.0D.

PRODUCT.
EyeModel

EyeModel Summary

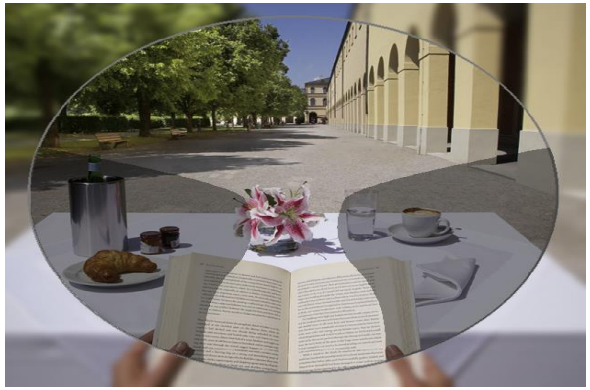
- Improvements for the vision will be noticeable for all astigmatic prescriptions (more than 80% of all prescriptions)
- Rodenstock is the first and only lens manufacturer with this optimization of lenses
- Taking the effective near astigmatism and Listing‘s law for near vision into consideration to calculate the physiologically correct near refraction values, **up to 25% better vision in the near & intermediate range will be achieved**

PRODUCT.

Eye Lens Technology: Eye Model – The Effect

The advantage for the wearer

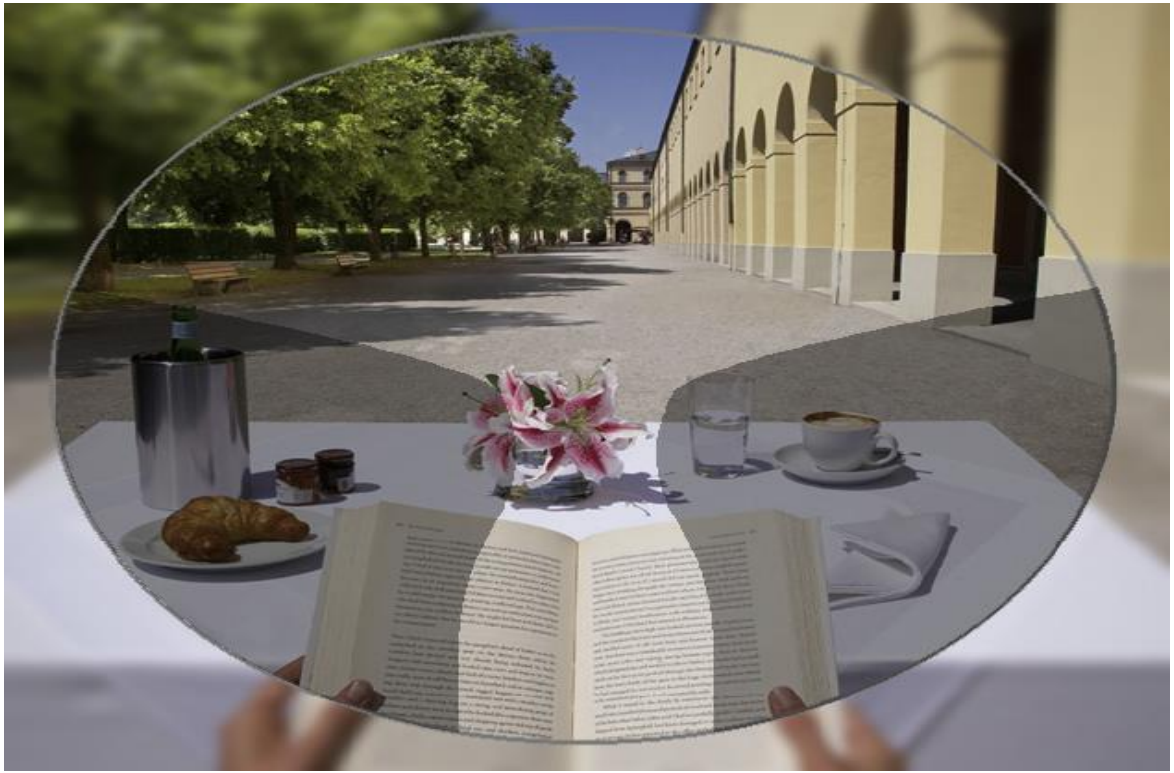
- Improvements of visual quality. Especially in the near vision area
- Larger near vision zone
- Higher visual acuity



85% Performance

PRODUCT.

Eye Lens Technology: Example



- **Refraction data**

  Far vision : sph 0.00 cyl 3.50 A 10

  Near vsion: sph 1.25 cyl 3.75 A 16

- **Order values**

  Far vision : sph 0.00 cyl 3.50 A 10 Add 1.50

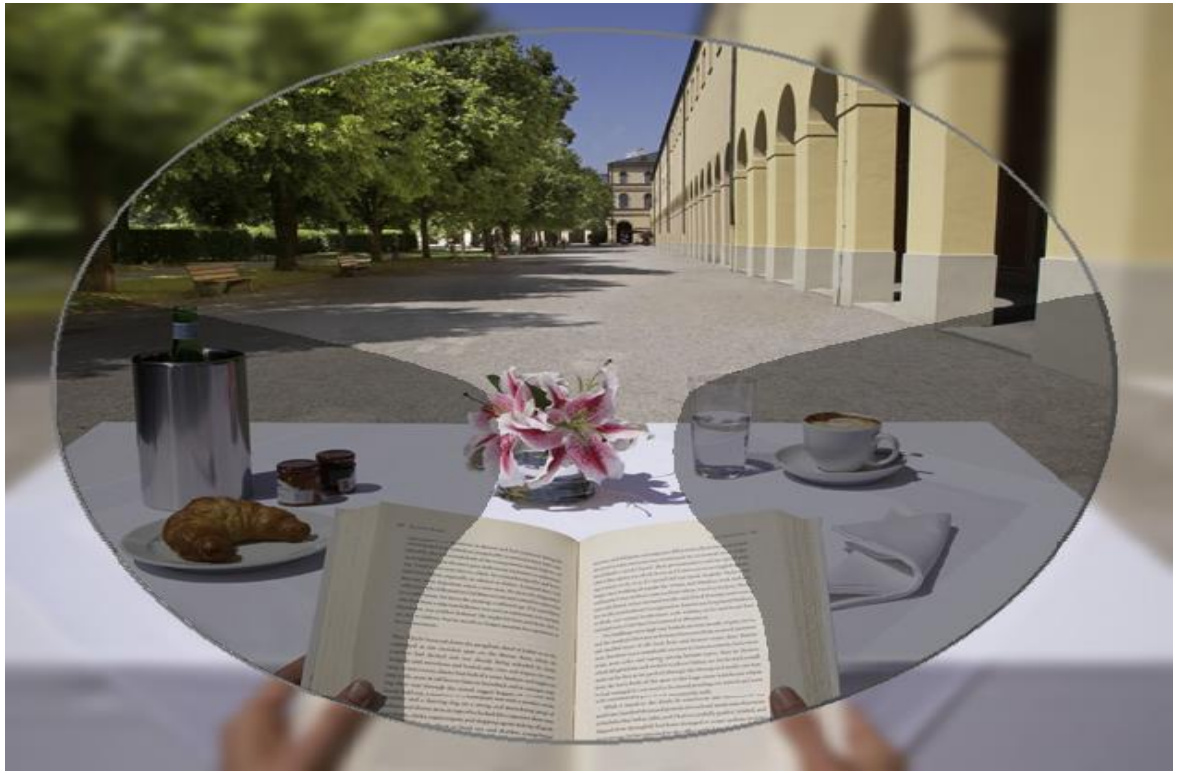
- **Lens values**

  Far vision : sph 0.00 cyl 3.50 A 10

  Near vsion : sph 1.50 cyl 3.50 A 10

PRODUCT.

Eye Lens Technology: Example



- **Refraction data**

  Far vision: sph 0.00 cyl 3.50 A 10

  Near vsion : sph 1.25 zyl 3.75 A 16

- **Order values**

  Far vision : sph 0.00 cyl 3.50 A 10 Add 1,50

- **Lens values**

  Far vision : sph 0.00 cyl 3.50 A 10

  Near vision: sph 1.34 cyl 3.61 A 13

A further improvement of visual acuity can only be achieved by an individual near refraction.

1. Technical Features

Eye Lens Technology: The Effect

Facts

- Improvements are visible with all astigmatic prescriptions (= 82% of all orders)
- significant improvements (astigmatic deviation > 0.13 D) occur in 23% of all orders.
- High cylinders and near objects cause axis deviation up to 9°
- The value of cylinder can differ up to 0.5 D.
- The combined maximal astigmatic deviation can reach values higher than 1.0 D!

PRODUCT.

Eye Lens Technology: Eye Model

Simple and efficient

What‘s to do for the optian for the EyeModel Step 1?

- The order procedure stays unchanged.
  No addidtional parameters are necessary.

How can the optician benefit?

- Improved lens performance for all lenses
  with a astigmatic prescription.
- Better correctioan and better lenses.
- With the EyeModel calculated near values will be printed
  on the lens envelope.

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3. EyeLT® Step 3

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EYELT® STEP 2: PERSONAL EYEMODEL.

Background

Differences between near and far cylinder

Causes

1. **Physiological** (Listing's Law for Near Vision)
   Eye movements

2. **Geometrical-optical** (Effective near astigmatism)
   Distance spectacle lens-eye

3. **Anatomical** (individual near refraction)
   Astigmatic accommodation

EYELT® STEP 2: PERSONAL EYEMODEL.

Background

Differences between near and far cylinder

Causes for astigmatic accommodation:

- Asymmetric (astigmatic) change in curvature of crystalline lens during accommodation, especially for large lens astigmatisms.
- Tilt of crystalline lens during accommodation and resulting astigmatisms of skew ray bundles.
- Change of crystalline lens position during accommodation.
- Asymmetric hardening of crystalline lens (Presbyopia).

EYELT® STEP 2: PERSONAL EYEMODEL.

Background

Differences between near and far cylinder

The effects of astigmatic accommodation can only be determined by an individual near refraction!

EYELT® STEP 2: PERSONAL EYEMODEL.

Background

Benefits for the optician

- Higher customer satisfaction due to individually improved optical performance of the lens.
- Strengthening of the core competence (subj. refraction) of the optician.
- Positioning as an expert of vision.
- Differentiation of traditional opticians against optical chains.

Benefits for the end consumer

- Wider near vision zones for all progressive lens wearers with near astigmatism.
- Individual improvement of visual quality for near vision.
- Higher visual acuity.
- Highest customer satisfaction.

EYELT® STEP 2: PERSONAL EYEMODEL.

USP

Up to 40% better vision in the near and intermediate zones.

EYELT® STEP 2: PERSONAL EYEMODEL.

Educational Film

The film shows a customer refraction with focus on the near refraction. It is:

- Informative
- Comprehensible
- Illustrative

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EYELT® STEP 3: DNEYE®.

Background

DNEye®

What´s behind all this?

Calculation of the ideal lens correction based on the subjective refraction data and the aberrometric measurement data of the eye …

… for far and near

… and in consideration of the variation of the individual pupil size.

EYELT® STEP 3: DNEYE®.

Background

DNEye® Scanner

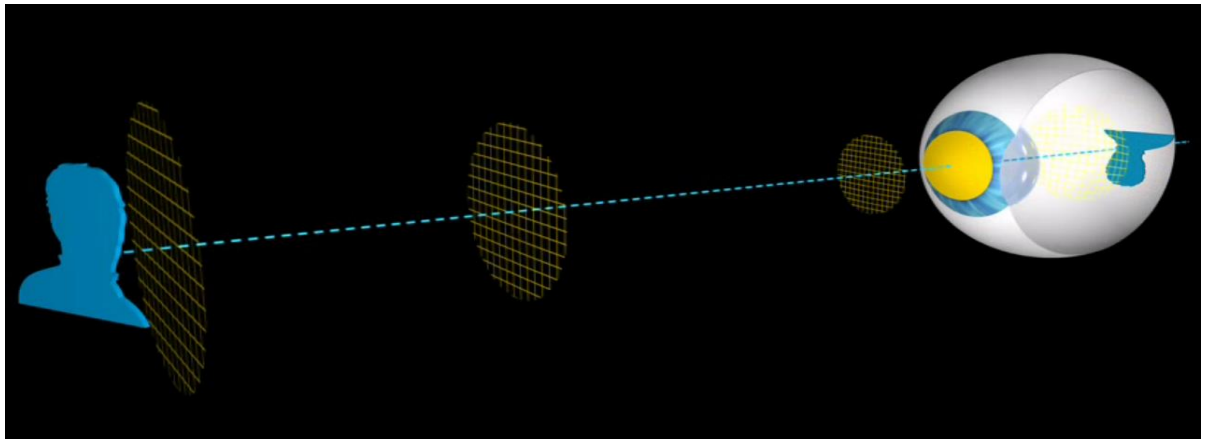
EYELT® STEP 3: DNEYE®.

Background

High Order Aberrations (HOA)

Ideal Eye

Light passes the eye in the form of a wavefront. The wave front is being exactly imaged at the retina.



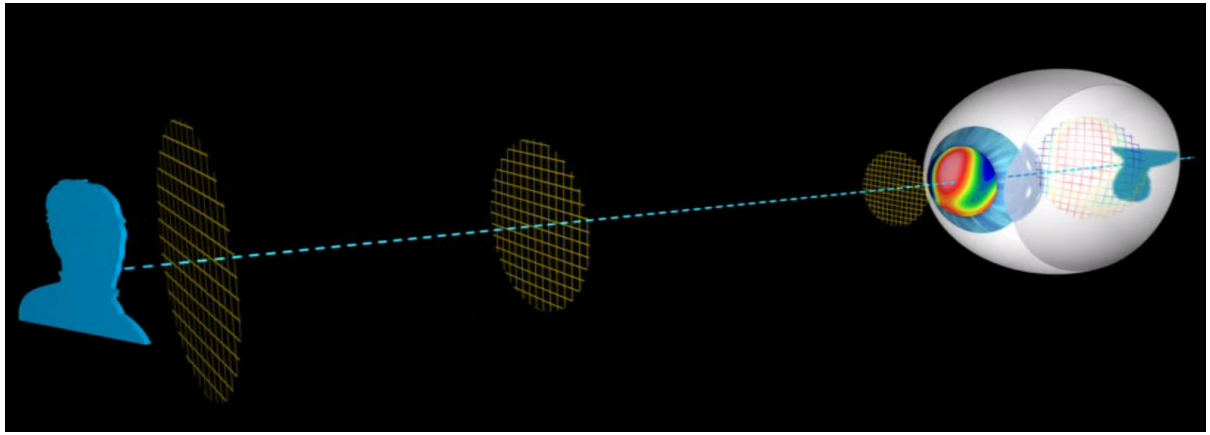
EYELT® STEP 3: DNEYE®.

Background

High Order Aberrations (HOA)

Human Eye

Light passes the eye in form of a wave front. Due to the aberrations (LOA & HOA) of the eye the wave front is getting deformed. The result is a blurred image on the retina.



EYELT® STEP 3: DNEYE®.

Background

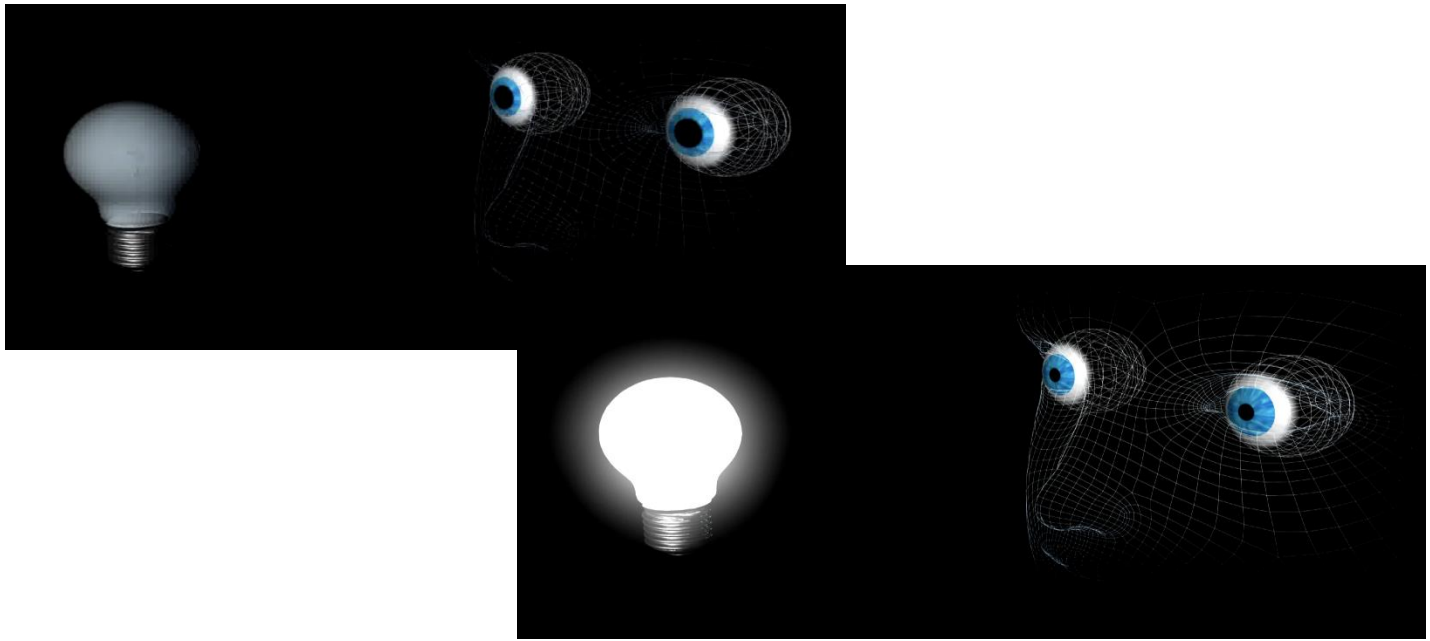
High Order Aberrations (HOA)

- Only the low order aberrations (prism, defocus, astigmatism) can be corrected by a spectacle lens.
- The High Order Aberrations (HOA) cannot be completely corrected.
- However they have an influence on the best sphero-cylindrical correction.
- The influence depends on the pupil size.
- At dusk the influence of the HOA is being rather perceived than by day because of the larger pupil.

EYELT® STEP 3: DNEYE®.

Technology

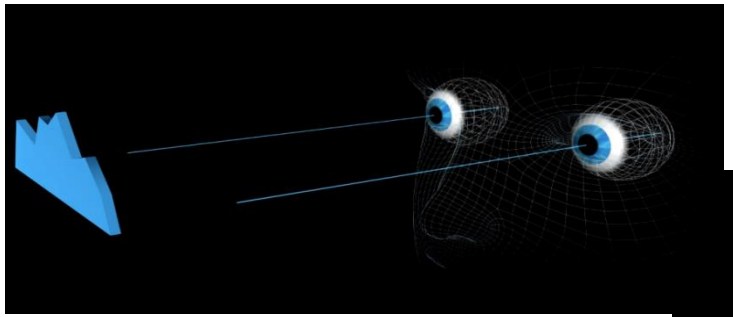
Influence on the pupil size

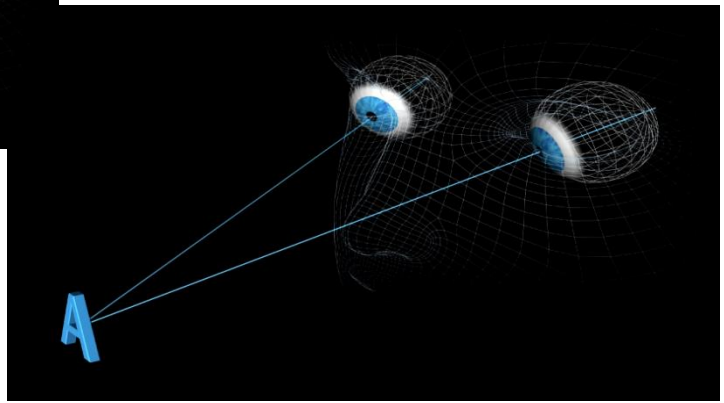


EYELT® STEP 3: DNEYE®.

Technology

Influence on the pupil size





The pupil size also correlates with the object distance:

far object ➔ large pupil

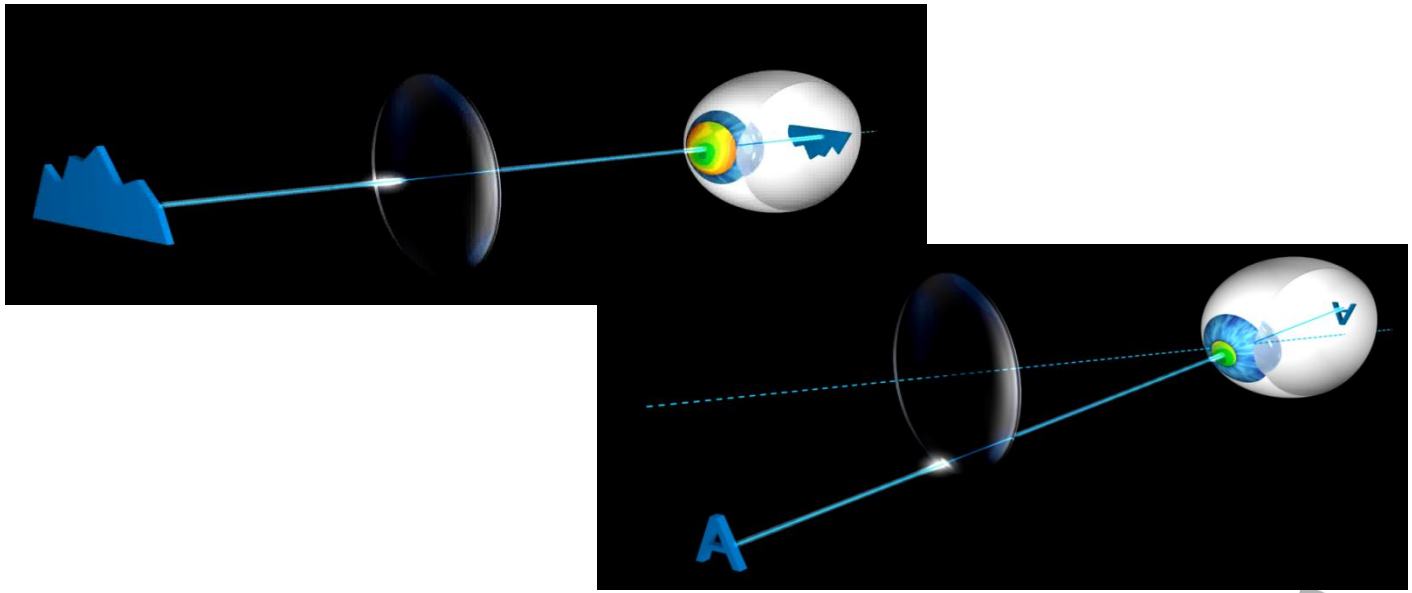
near object ➔ small pupil

EYELT® STEP 3: DNEYE®.

Technology

DNEye®
Optimization

Rodenstock considers the high order aberrations of the eye and of the lens depending on the variation of the individual pupil size in order to calculate the ideal sphero-cylindrical correction for each point of the lens.



EYELT® STEP 3: DNEYE®.
Technology

Functions of the DNEye® Scanner

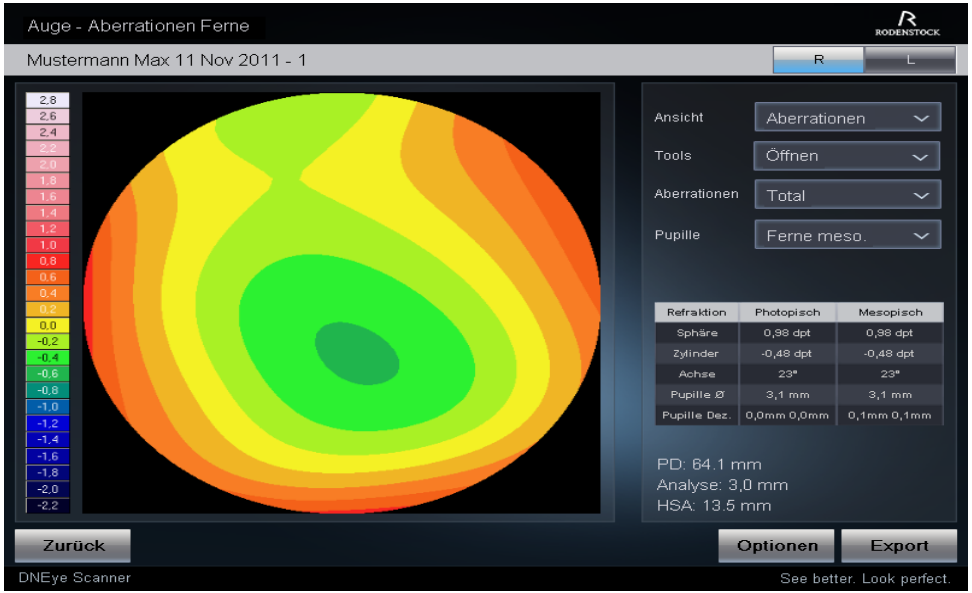
- High precision measurement of the eye in 1/100 D steps
- Low order aberrations (LOA) for far and near
- High order aberrations (HOA) for far and near
- Individual pupil measurement
- Corneal topography

EYELT® STEP 3: DNEYE®.

Technology

Functionality of an aberrometer

The result is a map of the low and high order aberrations of the steady eye.

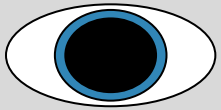


EYELT® STEP 3: DNEYE®.

Technology

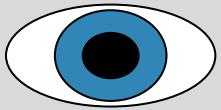
Influence of the pupil size on the refraction data

Large pupil: 6.0 mm



sph -5.82D cyl -0.16D A 52°

Small pupil: 2.5 mm



sph -5.27D cyl -0.37D A 13°

Δ pupil: 3.5 mm

Δ refraction: sph -0.63D cyl 0.37D A 1°
(vector view)

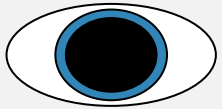
EYELT® STEP 3: DNEYE®.

Technology

Subjective refraction and optimized DNEye® data

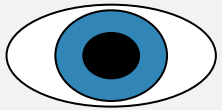
Subjective refraction far:
sph. -5.00D cyl. -0.50D A 20°

DNEye® far:
sph. -5.35D cyl. -0.33D A 24°



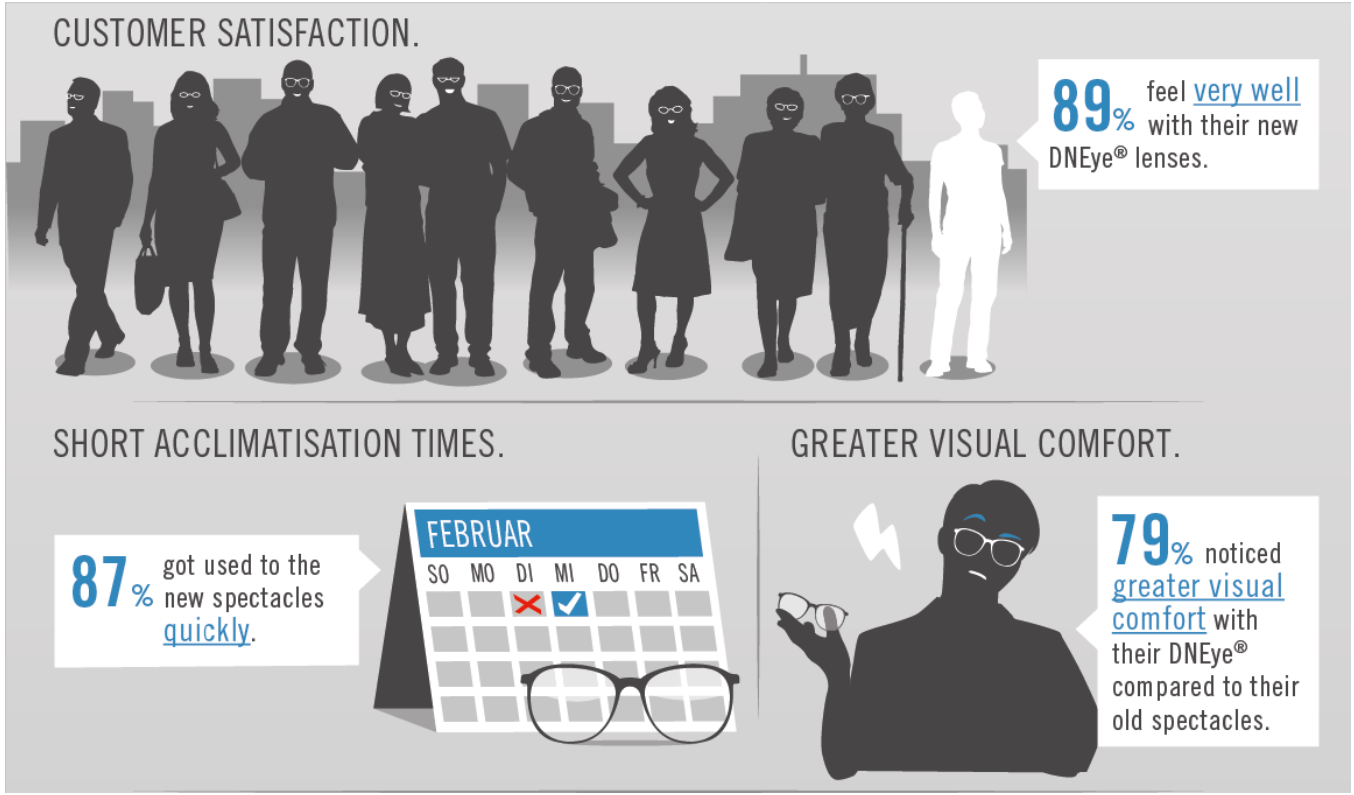
Subjective refraction near:
sph. -3.50D cyl. -0.50D A 17°

DNEye® near:
sph. -3.47D cyl -0.45D A 16°



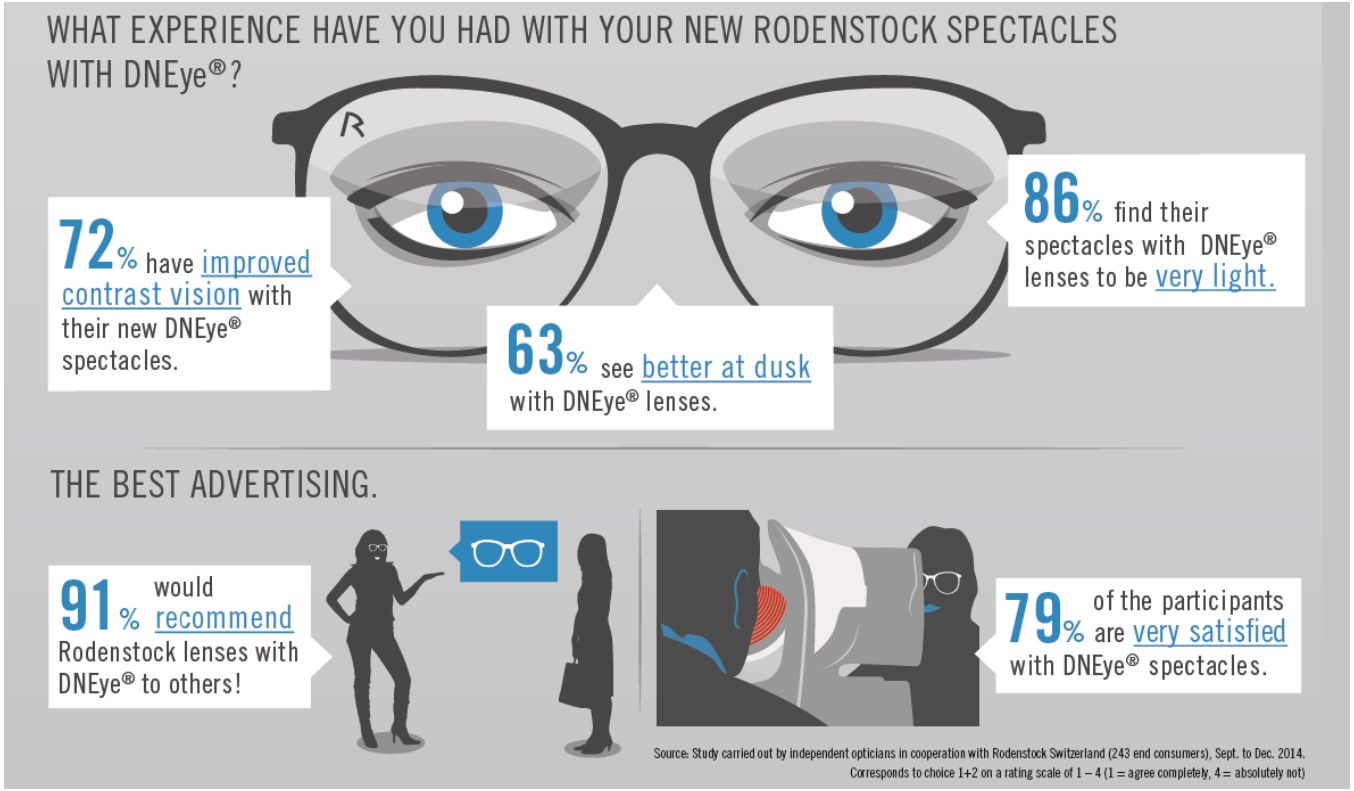
EYELT® STEP 3: DNEYE®.

Statistics



EYELT® STEP 3: DNEYE®.

Statistics



EYELT® STEP 3: DNEYE®.

Technology

Benefits for the optician

- Higher customer satisfaction due to the most precise lens ever.
- Positioning as an expert of vision.
- Differentiation of traditional opticians against optical chains.
- High precision measurement inspires the confidence of the customer.
- Higher added value thanks to a better service.

Benefits for the end consumer

- Complete analysis of the whole vision system – consisting of the spectacles and the eyes.
- Maximum vision due to the fully exhaustion of the individual vision potential of the customer.
- Highest customer satisfaction thanks to best compatibility.
- Innovative and most precise measurement of the eye.

EYELT® STEP 1-3
Availability

RODENSTOCK SUPERIOR

- ✓ **EyeModel (Step 1)**
- ✓ Variable, power-dependent inset
- ✓ Progressiv PureLife Free®: Elimination of the base curve effect
- ✓ Finely stepped base curve system for an aestetically perfect fit
- ✓ Retina Focus Principle
- ✓ Progressiv lenses: Freeform technology

RODENSTOCK EXCELLENCE

- ✓ **EyeModel (Step 1)**
- ✓ PD-optimized inset for maximum binocular vision zones
- ✓ Individual power optimization
- ✓ Finely stepped base curve system for an aestetically perfect fit
- ✓ Retina Focus Principle
- ✓ Freeform technology

RODENSTOCK PERFECTION

- ✓ Pupil-optimized correction
- ✓ **Eye Lens Technology (Step 1-3)**
- ✓ Most exact inclusion of all individualisation parameters
- ✓ Individual optimized inset for maximum binocular vision zones
- ✓ Individual power optimization
- ✓ Finely stepped base curve system for an aestetically perfect fit
- ✓ Retina Focus Principle
- ✓ Freeform technology

THANK YOU FOR YOUR ATTENTION.

RODENSTOCK
See better. Look perfect.