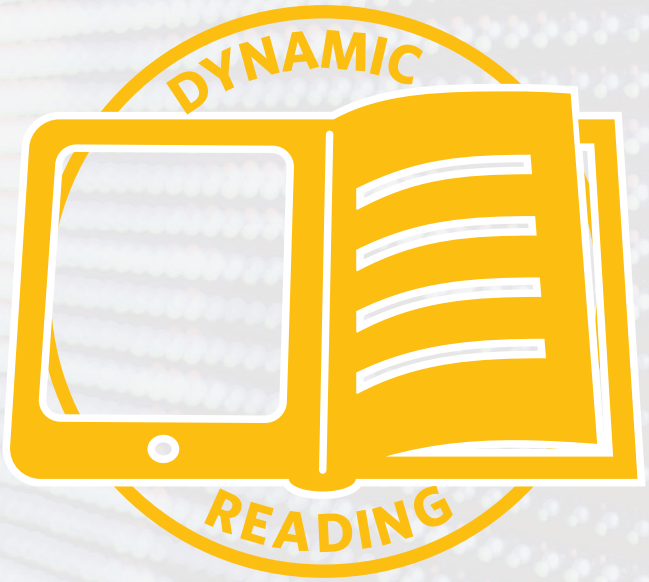


Dynamic Reading Optimization™
Technical Report

Kodak LENS

Introduction

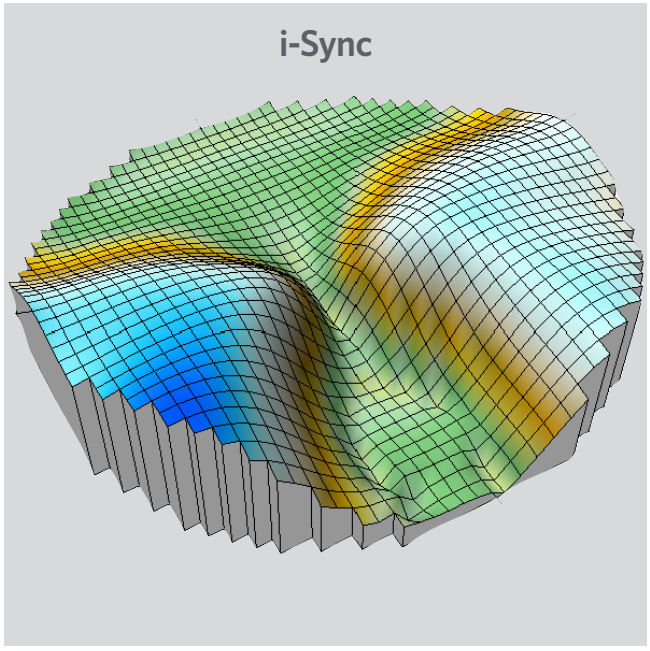
With the ever-increasing use of electronic devices in our everyday lives, we are relying more and more on our near vision. For modern progressive lenses, it is vital that the near vision performance is maximized to cope with the different devices we all use and the extended periods of time we use them, without reducing distance vision performance.

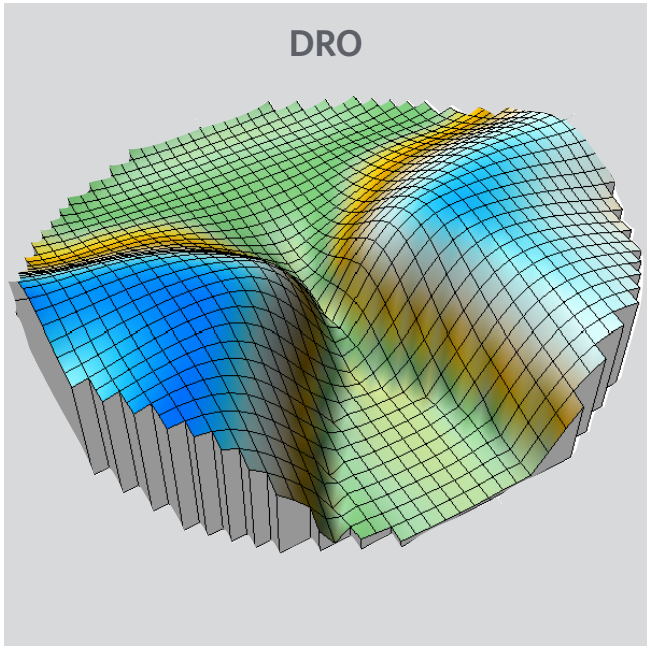
We have developed **Dynamic Reading Optimization** (**DRO**) for this very purpose.

KODAK Unique Lens currently features **i-Sync™** Technology. In addition to **i-Sync, KODAK Unique DRO™ Lens** features **DRO**, which builds on the success of **i-Sync** by adding another level of sophistication to the freeform lens surface calculation.

This report explains the benefits of **KODAK Unique DRO Lens** compared to **KODAK Unique Lens** with **i-Sync**.

Comparison Plots





Oblique Astigmatic Error Plots

i-Sync™: How does it work?

The **i-Sync** function is programmed to reduce the oblique astigmatic error as the eye looks through the lens. The computer program calculates the error over many points on the complete surface, and creates an optimized surface which minimizes these errors for distance vision.

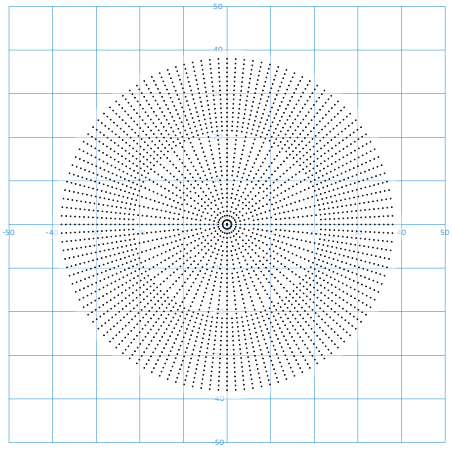


Figure 1
i-Sync Region

DRO: How is it different?

Where **i-Sync** only has one region, **DRO** splits the lens into three regions: distance, intermediate and near. When the eye is working in the near region, it is looking at objects that are closer and through a part of the lens with a different power in comparison to the distance region. The error correction required in each region is different. An optimized surface containing different error corrections for the different regions is then calculated and this improves the vision in all regions of the lens. See Figure 2.

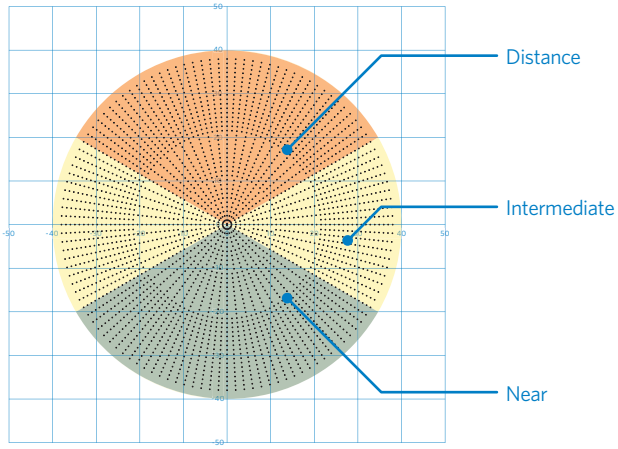


Figure 2
DRO Regions

To accurately measure the performance advantage, we should look at a plot of the oblique astigmatic error of a lens with **i-Sync** and one with **DRO**. The plots (right) are for a 0.00D power, +2.00D addition lens.

It is clear in this comparison that the Oblique Astigmatic Error (OAE) is reduced with **DRO** compared to **i-Sync**.

In fact, at a gaze angle of 35° the error is:

0.24D with **i-Sync**
0.06D with **DRO** **A 75% reduction**

Or, if we add up all the errors at 5° steps the totals are:

0.52D with **i-Sync**
0.23D with **DRO** **A 56% reduction**

Table 1 shows a range of prescriptions with the OAE totals for **i-Sync** and **DRO**.

KODAK Unique Lens - 14mm Corridor				
Prescription	Addition	i-Sync	DRO	% Reduction
+8.00	2.00	4.00	2.76	**31**
+7.00	2.00	2.06	1.39	**33**
+6.00	2.00	3.28	2.13	**35**
+5.00	2.00	1.66	1.03	**38**
+4.00	2.00	2.91	1.83	**37**
+3.00	2.00	1.45	0.86	**41**
+2.00	2.00	2.25	1.40	**38**
+1.00	2.00	1.04	0.62	**40**
0.00	2.00	0.52	0.23	**56**
-1.00	2.00	0.27	0.06	**78**
-2.00	2.00	0.06	0.02	**67**
-3.00	2.00	0.13	0.06	**54**
-4.00	2.00	0.53	0.18	**66**
-5.00	2.00	0.70	0.20	**71**
-6.00	2.00	0.82	0.17	**79**
-7.00	2.00	1.41	0.35	**75**
-8.00	2.00	1.51	0.29	**81**
			Average	**54**

Table 1
Oblique Astigmatic Error Comparison for Near Vision

i-Sync

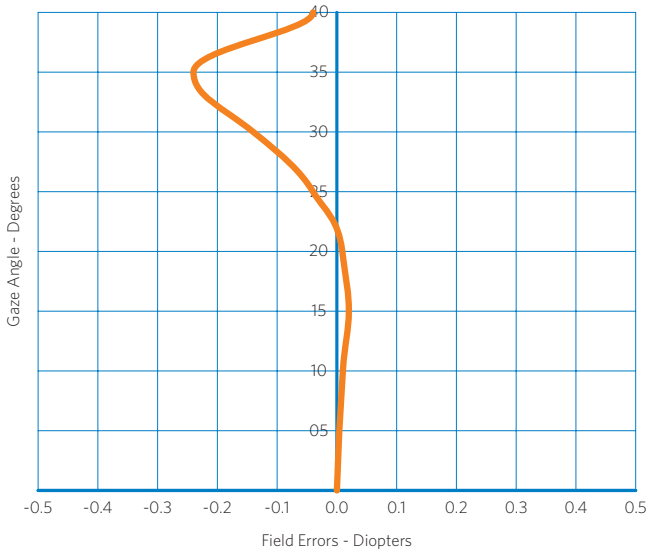


Figure 3
Oblique Astigmatic Errors with **i-Sync**

DRO

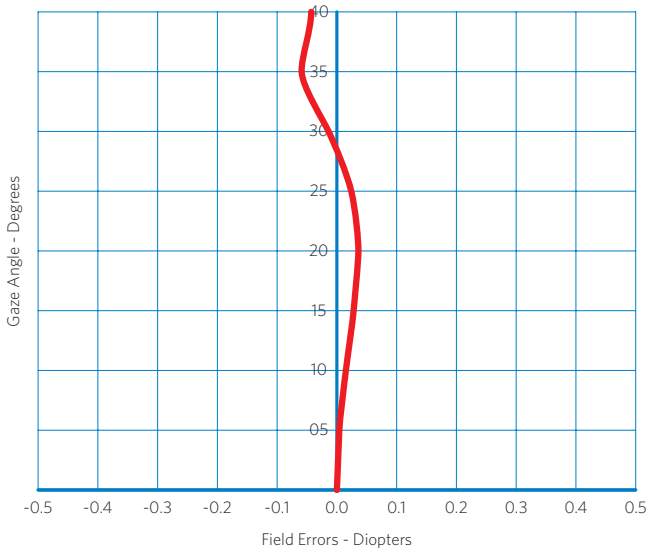


Figure 4
Oblique Astigmatic Errors with **DRO**

We can look at comparison ray-traced plots of two lenses: one with **i-Sync**, one with **DRO**.

Two things are apparent: the plots in *Figures 5* and *6* show that the performance in the distance area is identical in the **i-Sync** and **DRO** lenses. The second point is the improved performance of the near region.

For this 2.00D addition lens, we have shaded the area that is above 1.88D of addition (of mean oblique power) and below 0.50D of oblique astigmatism (equivalent of cylinder in ray traced plots). A constant fit height of 21mm has been used for consistency. The green shaded area is quite obviously larger in the **DRO** lens.

In conclusion, the **KODAK Unique DRO Lens** maintains the excellent distance vision associated with the **KODAK Unique Lens** design while improving the reading area performance so necessary for today's modern world.

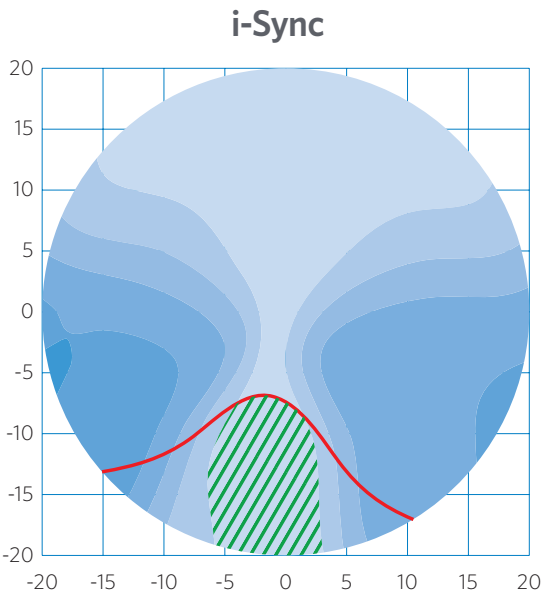


Figure 5
Ray trace plots showing mean oblique power and oblique astigmatism with i-Sync

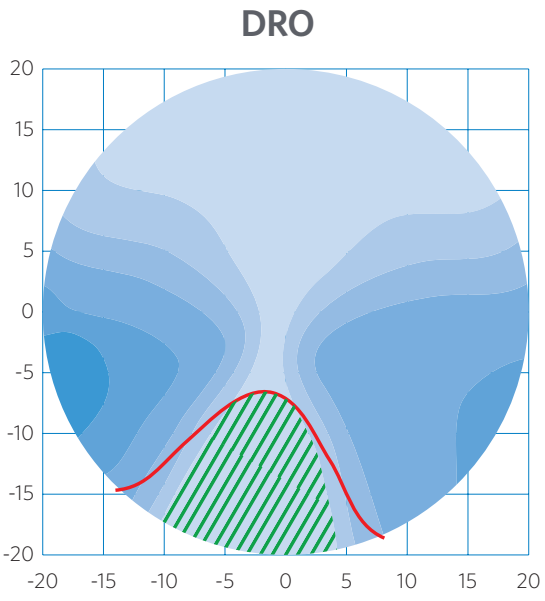


Figure 6
Ray trace plots showing mean oblique power and oblique astigmatism with DRO

For seventy years, Signet Armorlite has introduced ongoing innovation
in the optical industry with quality products and proprietary technologies.

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