

Varilux Comfort®

Technical Paper and Wearer Studies

A woman with short brown hair and glasses is rock climbing a light-colored rock face. She is wearing a light blue tank top, black shorts, and a climbing harness with various gear attached. She is looking back over her shoulder towards the camera. The background shows a hazy mountain landscape under a clear sky.

Comparative
wearer studies
evaluate
Varilux Comfort®
lenses in clinical
and real-world
situations.

Varilux Comfort® Lenses

The visual demands of contemporary life challenge our eyes in ways they have never been challenged before. Over the last two decades, screens providing all kinds of digital information have become a universal part of life: we work at computers, we text on cell phones, we rely on GPS devices to guide us. Compared to 1990, the world is suddenly full of screens.

For people over 40, this new visual environment demands progressive lenses that can meet new challenges. Varilux Comfort®, the world's most popular progressive addition lens (PAL), has been engineered for optimized performance in a visual environment dominated by new technologies for reading, communicating, and working.

The results are striking.

Varilux Comfort® lenses contain features that improve upon the original design in three key ways: 1) the progression is shorter for easier access to the near zone, 2) the distance and near zones have been widened for increased visual comfort during daily activities, and 3) reduced astigmatism in the intermediate zone reduces swim and speeds adaptation (Figures 1 and 2).



FIGURE 1 Both the distance and near vision zones are wider in the Varilux Comfort® design, allowing wearers to more easily use peripheral vision for visual multitasking.

The following studies will demonstrate how Varilux Comfort lenses meet the needs of many different patients, including patients new to PALs and those who are currently wearing other PAL designs. In numerous wearer tests, 100% of subjects readily adapted to Varilux Comfort lenses regardless of their previous form of correction.

An advantage of the short progression length of Varilux Comfort lenses is a short minimum fitting height (17 mm), which provides patients with greater options in frame selection (Figure 3). Patients who select even smaller frames will benefit from the specially designed Varilux Comfort Short™ lenses, which can be fit down to a minimum height of 14 mm.

Both Varilux Comfort and Varilux Comfort Short lenses are also available as digitally surfaced designs. Varilux Comfort DRx™ and Varilux Comfort Short DRx™ lenses are specifically compensated for placing the design on the back side of the lens.

Varilux Comfort Enhanced™ lenses offer the eyecare practitioner a new level of performance. All Varilux Enhanced

lenses use the DualOptix™ format which distributes progressive design elements on both surfaces of the lens. By utilizing both surfaces to create the design, Varilux engineers are able to simultaneously improve focus and minimize distortion to levels not possible in single surface design formats (i.e., traditional or digital back side). DualOptix lenses are also customized to the wearer's visual requirements.

Science-driven Technology

Varilux Comfort lenses were developed using rigorous scientific methodology and state of the art optical technology to assess vision not only with an eye chart, but in a dynamic “real world” environment. As part of Essilor’s proprietary Live Optics™ process, Body Head Eye Movement (BoHEM) technology enables researchers to capture how lens wearers move their heads, bodies, and eyes in response to the type of visual stimuli they encounter every day (Figure 4). The BoHEM is a mobile system which is capable of analyzing head and eye movements during routine activities. For example, the system revealed that wearers rely heavily on peripheral vision when using mobile phones.



FIGURE 2 Astigmatism in the intermediate zone of the Varilux Comfort® lens has been reduced, providing markedly less swim and improved dynamic vision.

The Live Optics process, through which new optical designs move from the laboratory to human testing and then back to the laboratory, culminated in wearer tests of Varilux Comfort lenses using double-blind, randomized methodology.



FIGURE 3 The Varilux Comfort® lenses are available with a fitting height of 17 mm.

Wearer Tests Support Varilux Comfort

Data from wearer studies confirm that Varilux Comfort lenses improve not only progressive lens performance, but also patient satisfaction. This publication highlights two pivotal studies sponsored by Essilor and conducted by independent eyecare practitioners and researchers. These studies reflect the real-world lens utilization patterns and patient preference issues that practitioners encounter in daily practice. In each comparative study, patients preferred Varilux Comfort lenses over competing progressive lenses.

Patient satisfaction is key to the success of any PAL. In a survey assessing wearer satisfaction with Varilux Comfort lenses in seven countries worldwide (the U.S. accounted for 44% of



FIGURE 4 The Body Head Eye Movement System (BoHEM) consists of a motion-sensing helmet, backpack, and spectacles. Body and eye movements in response to controlled stimuli are tracked and analyzed, allowing researchers to gain a comprehensive understanding of wearer’s posture and direction of gaze.

the 445 survey participants), the response of wearers was overwhelmingly positive (95%) in favor of Varilux Comfort. Up to 93% observed Varilux Comfort lenses provided a wider field of vision than their previous correction, and 89% would recommend these lenses to others.¹ Most importantly, 84% of participants reported that with Varilux Comfort lenses they saw clearly when changing fields from distance to near vision. This represents a major benchmark for progressive lens design—and a vital parameter in the new visual world.

Varilux Comfort® vs the Competition

A series of three studies compared Varilux Comfort lenses to various competitive PALs. In every study, Varilux Comfort lenses outperformed the competitive products. All of the comparative lenses in these studies were high-end, general use PALs, and each study incorporated a double-masked, non-dispensing, randomized protocol to eliminate bias on the part of either the subject or the examiner. Evaluations involved both real-life simulations and standardized office evaluations. The majority of subjects enrolled in these trials were experienced PAL wearers, although some were transitioning from single vision (for either distance or near) or contact lenses.

The first of these studies compared the performance of traditionally surfaced Varilux Comfort lenses against a competitor's traditionally surfaced PAL design (TSPAL, introduced in 2001). Of the 30 subjects enrolled, 20 were experienced PAL wearers. Varilux Comfort lenses significantly outperformed TSPAL lenses in near visual quality, extent of vertical field, and overall wearer preference.² In terms of distance visual width, subjects preferred Varilux Comfort lenses 2:1 over the TSPAL lenses.

A Varilux Portfolio of High-quality Lenses

To give dispensers flexibility to precisely meet patient needs, Varilux Comfort lenses are available in several versions: Varilux Comfort, Varilux Comfort DRx™, Varilux Comfort Short™, Varilux Comfort Short DRx™, and Varilux Comfort Enhanced™.

Varilux Comfort lenses are user friendly. First, the near and distance areas are wide for relaxed vision in all daily activities. Second, the progression length is short for easy access to the reading area. Third, there is less astigmatism in the intermediate zone for limited swim and easy adaptation.

Varilux Comfort Short lenses give patients the option

of choosing more stylish frames down to a minimum fitting height of 14 mm. In terms of performance, Varilux Comfort Short lenses have three main advantages over Varilux Ellipse: up to 24% more distance area, a 141° distance angle for wider fields of view, and a shorter progression length.

Varilux Comfort Enhanced lenses are the top of the Total Comfort Vision platform (which is comprised of all Varilux Comfort lens products). These lenses are customized through the DualOptix digital process and provide all the benefits of Varilux Comfort lenses, customized to the wearer's ametropia and ADD power. These include: additional width of clear vision in all zones, less peripheral distortion for better side-to-side viewing, and customized fitting heights starting at 14 mm, which enable the fitting of these lenses in smaller frames.

Recommendations for Practitioners

For eyecare practitioners, Varilux Comfort progressive lenses provide an opportunity to increase patient satisfaction with high-performing eyewear. With their wide near and distance zones, minimal peripheral distortion, and short progression, Varilux Comfort lenses raise the design and performance standard for PALs.

Varilux Comfort lenses perform so well because they are specifically designed to meet the visual needs of the contemporary world. These lenses allow wearers' eyes to quickly move between a larger environment and screens of all sizes at all distances. In doing so, these lenses meet the challenge of helping wearers keep up with modern life in a world of increasingly complex visual demands.

In addition to visual performance, Varilux Comfort lenses support today's modern frame fashions, with designs such as Varilux Comfort Short, Varilux Comfort Short DRx, and Varilux Comfort Enhanced—all of which can easily fit small, stylish frames; so patients can get the vision they want in a frame they love. And perhaps best of all, no matter what kind of correction patients wore before, all will quickly adapt to their Varilux Comfort lenses.

Eyecare practitioners who understand the optical improvements of these products are in a position to help presbyopic patients choose optimal lenses to correct their vision. Now more than ever before, practitioners can select PALs that fit a patient's needs for ease of transition, maximum field width, and distance area. Both new and experienced PAL wearers find Varilux Comfort lenses provide them with a level

of visual acuity and function that makes it easier for them to thrive in the new visual environment.

REFERENCES

1. Essilor. Varilux Comfort® — Wearer Study.
2. Essilor. Varilux Comfort® vs Traditionally Surfaced PAL (TSPAL) — A Comparative Study.

The Visual Landscape

A modern presbyope's visual world is very different from what it was 20 years ago: today's presbyope has to contend with frequent and rapid visual shifts. In addition to the ubiquitous desktop computer, we are now confronted with the tiny screens of MP3 players, GPS devices, and credit card payment devices. Most problematic is the smart phone, which plays multiple roles in contemporary life (Figure 1). The size and resolution of the screens on these devices make each of them visually taxing, and difficulties increase as a user moves quickly from one modality to another.

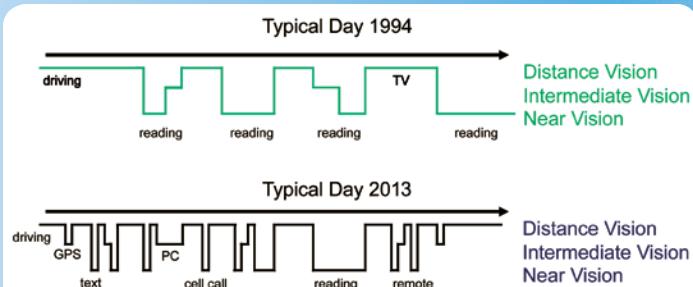


FIGURE 1 Compare the frequency of transition between visual fields in 1994 and 2013. A typical day in 2013 involves more switching, less time at each visual distance, and more time using devices in the intermediate distance.

Efficient use of multiple small-screen devices requires that the gaze move quickly through several different parts of the lens. In order to make the way as smooth as possible for presbyopes, Varilux Comfort® lenses are specifically adapted for a world of visual multitasking.

Varilux Comfort®

— International Wearer Assessment

PURPOSE

To assess the satisfaction with Varilux Comfort® lenses by wearers from different countries in real market conditions.

METHODS

Wearer satisfaction survey: Initial questionnaire to collect patient history and prescription.

Satisfaction survey (completed by patient and reviewed with practitioner after 3 weeks of wear).

Assessment of Varilux Comfort & comparison vs previous form of correction:

- Overall quality of vision
- Quality of distance vision
- Quality of intermediate vision
- Quality of near vision
- Width of distance vision
- Width of intermediate vision
- Width of near vision
- Dynamic vision (during motion of subject)
- Ease of access to near vision
- Overall visual comfort
- Speed of adaptation
- Ease of adaptation

Subjects were also asked if they would recommend Varilux Comfort to friends/family.

At the conclusion of the study, practitioners were surveyed regarding their impressions of Varilux Comfort.

All subjects paid normal retail price for their eyewear.

All lenses had Crizal® anti-reflective surfaces.

All lenses were clear 1.50 or Airwear®.

SUBJECTS

N = 445 subjects at 123 practitioner locations

Rx Range -4.25 to +3.50

Sphere	>-1.00	-1.00 to +1.00	>+1.00
Subjects	103	169	173

Cylinder 0.00 to -2.00; ADD +1.25 to +3.00

ADD	<+2.00	+2.00 to +2.50	>+2.50
Subjects	94	289	62

Previous Correction

	PALs	Other
Subjects	75%	24%

International research conducted by independent eyecare practitioners —
sponsored by Essilor of America

FINDINGS

95% of subjects had a very positive evaluation of their overall vision with Varilux Comfort.

% Subjects with Positive Evaluation

Overall quality of vision	95%
Distance vision	96%
Intermediate vision	90%
Near vision	93%
Dynamic vision (subject moving)	91%
Dynamic vision (object moving)	91%

The majority of subjects found the performance of Varilux Comfort to be “clearly better” compared to their previous correction.

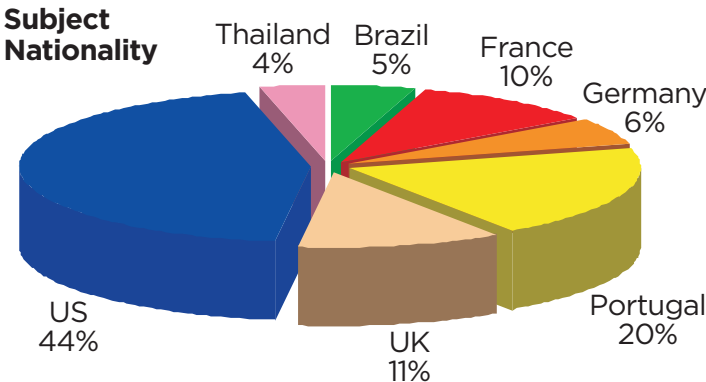
% Subjects ranking performance of Varilux Comfort as “clearly better”

Distance vision	64%
Intermediate vision	66%
Near vision	69%
Dynamic vision (subject moving)	58%
Dynamic vision (object moving)	59%

Up to 93% of subjects experienced equivalent or wider fields of vision with Varilux Comfort compared to their previous form of correction.

% Subjects ranking fields of vision as “equivalent to clearly wider” with Varilux Comfort

Distance vision	93%
Intermediate vision	89%
Near vision	84%



CONCLUSIONS

- 84% of subjects see clearly and instantly when changing from distance to near vision.
- Up to 93% of subjects indicate Varilux Comfort provides wider fields of vision vs previous correction.
- 89% of subjects would recommend Varilux Comfort lenses to others.

Varilux Comfort lenses provide high levels of satisfaction in real life wear.

Varilux Comfort® vs Traditionally Surfaced PAL — A Comparative Study

PURPOSE

To compare the performance of two PAL design formats:

1. Varilux Comfort® — traditional format, general-use PAL introduced in 2010 providing quick access to near with a smooth periphery
2. Competitive traditionally-surfaced — general-use PAL introduced in 2001

METHODS

Double-masked, non-dispensing, randomized

Fitting parameters:

- Monocular Pds
- FRP at center pupil
- Min. fitting height = 18 mm
- Min. 10 mm between FRP and superior edge of lens

Testing parameters:

Standard lighting (100cd/m²)

Tested activities:

- **Standardized Evaluations**

Distance visual quality (standard chart)

Subjective visual quality at near (standard chart)

Extent of vertical field (intermediate to near)

Ease of changing focus (distance to near)

Overall preference

Identical frames and fitting parameters for each subject. All lenses were 1.50 index plastic with scratch-resistant coating.

SUBJECTS

N = 30 subjects; Age = 45 to 64 years (average = 52.8)

Rx Range -6.75 to +3.00 (average = -1.40 D)

Sphere	>-1.00	-1.00 to +1.00	>+1.00
Subjects	16	7	7

Cylinder 0.00 to -2.00 (median = -0.63);

ADD +0.75 to +2.50 (average = +1.88)

ADD	<+2.00	+2.00 to +2.50	>+2.50
Subjects	13	17	0

Previous Correction

	PALs	DVO/NVO	CLs
Subjects	20	5	5

Fitting Height Range = 18-28 mm (average = 21 mm)

No subject was currently wearing either design.

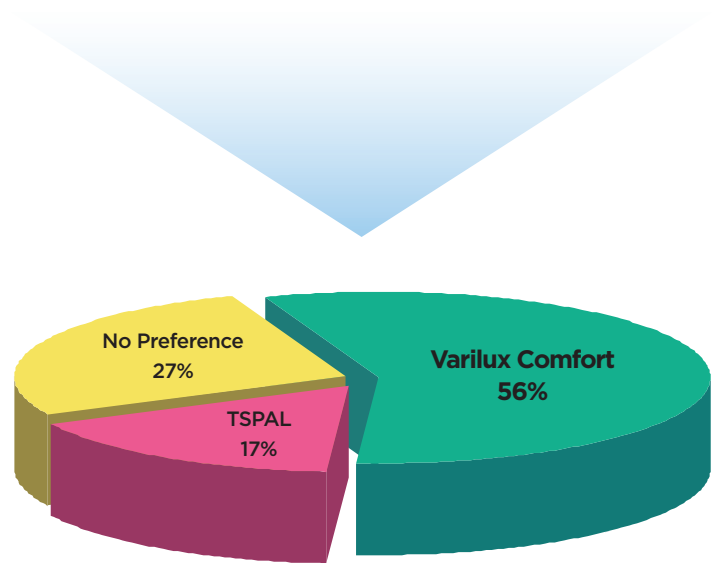
Research conducted by an independent third party —
sponsored by Essilor of America

FINDINGS

The study produced three statistically significant findings.**

STANDARDIZED EVALUATIONS

	Varilux Comfort	TSPAL	NP	p-value
Distance visual width	16	8	6	0.15
Near visual quality**	16	4	10	0.01
Extent vertical field (Intermediate to near)**	12	3	15	0.04
Ease of changing focus (distance to near)	10	6	14	0.45
OVERALL PREFERENCE**	17	5	8	0.02



CONCLUSIONS

- 77% of subjects with a clear overall preference preferred Varilux Comfort over the comparison PAL (73% of all subjects expressed a preference)
- Varilux Comfort was significantly preferred for:
 - Near visual quality
 - Extent of vertical field
 - Overall preference
- For distance visual width, Varilux Comfort was preferred **2 to 1**

The findings indicate Varilux Comfort provides superior near and overall vision.

Choose Varilux®

Wearer-centered R&D

- The patient is at the heart of all Varilux designs
 - Our technology begins and ends with their needs in mind
- PATENTED LIVEOPTICS™ R&D PROCESS
 - Through the LiveOptics R&D Process, Varilux delivers realizable patient benefits for your practice
- WEARER TESTED & APPROVED
 - Every lens design is tested on real wearers in real-life conditions
 - Each product is clinically proven to outperform the competition
- Varilux lenses help you deliver the most advanced lens technology and the finest visual performance to each of your patients



liveOptics™



HUMAN VISION

Exploring systematically the eye/brain link by drawing on fundamental research in optics and physiology by using virtual-reality techniques.



VARILUX VIRTUAL REALITY

Only Varilux adds this step, allowing many lens designs to be tested BEFORE real-world testing.



COMPUTING

Transforming physiological data into optical design, using 3D wavefront optimization technology.



PROTOTYPING

Prototyping lenses and controlling quality.



WEARER TESTING

Live testing of the lenses, using double-blind methods and final adjustments on patients.



Seeing the world better

Essilor International is the world leader in the design, manufacture and customization of ophthalmic lenses. Active on five continents, Essilor offers a wide range of lenses under the flagship Varilux®, Crizal®, Definity®, Xperio® and Essilor® brands to correct presbyopia, myopia, hyperopia and astigmatism.