



Press Release

Freeform Lens Design into Finished Single Vision Lenses

ZEISS ClearView Finished Single Vision lenses represent a milestone in optics and aesthetics of stock lenses

AALEN/Germany, 22/February/2022

Finished single vision or stock lenses are the most sold ophthalmic lens type worldwide. Now ZEISS has identified a way to get many attributes of complex single vision freeform lens designs into these “stock” lenses. The result is ZEISS ClearView Finished Single Vision lenses. It offers high optical quality in order to provide clear vision from the lens center to the periphery and is very thin and flat at the same time.

As mentioned above, whether it’s used for reading or distance vision, finished single vision (FSV) lenses are the most purchased type of eyeglass lenses. Statistics confirm that worldwide, 75 percent and in Asia, as many as 83 percent of spectacle lens wearers who obtain eyeglasses for vision correction purchase single vision lenses.¹ The vast majority of these single vision lenses are sold as stock lenses, as they offer the advantages of low cost and fast delivery times for both the retailer and the spectacle wearer. However, FSV lenses often cannot reach the full precision potential a freeform-optimized lens can offer. With ZEISS ClearView FSV, it’s precisely this challenge that is addressed. The new lenses offer many of the advantages of freeform-optimized single vision lenses, but with cost and speed benefits of a stock lens.

A closer look at different single vision lens designs

To get a better understanding of this ZEISS innovation, it makes sense to take a closer look at single vision lens designs. The choice of lens design impacts the aesthetics, comfort of the lens, and optical performance. Spherical (SPH) single vision lenses, for example, are typically optimized using only one free parameter (the radii of curvature of the lens surface). Aspheric (AS) single vision lenses have a more complex shape. Typically, the lens front surface is optimized with a low number of free parameters in one meridian. Double aspherical single vision lenses are generally optimized using twice the number of free parameters. But in summary, all these lens designs do not adequately address the peripheral optics of most prescriptions.

¹ Strategy with Vision (September 2020). World Lens and Frame Demand Study 2020.



Freeform lens design – stepping beyond spherical, aspherical, or double aspherical

In the 1990s ZEISS pioneered freeform lens design technology in surfaced lenses – which are made to order. And now it is also ZEISS who has introduced single vision freeform lens design to improve the optics and aesthetics of the FSV lens category. This is possible due to a specially created freeform lens design for FSV and the new ClearForm manufacturing process that incorporates this design into the finished lens. The lens design includes point-by-point optimization with the use of around 700 free parameters across the lens. This ClearForm process utilizes the latest computer numerically controlled (CNC) generators that use special diamond cutting and polishing tools to surface the complex shaped molds for ZEISS ClearView FSV lenses. The final lens delivers, on average, a three times larger zone of excellent clear vision,² to provide the wearer with more clarity from the lens center to the periphery. It is therefore designed to deliver a higher level of comfort and satisfaction for the spectacle wearer. In addition, the complex lens shapes allow wearers to experience this vision clarity in a flatter and thinner lens than conventional FSV lens designs that rely on steeper base curves to provide just acceptable optical performance. In numbers, this means: ZEISS FSV ClearView lenses are on average 34 percent flatter across all prescriptions and up to 16 percent thinner compared to typical spherical single vision lenses.^{3,4}

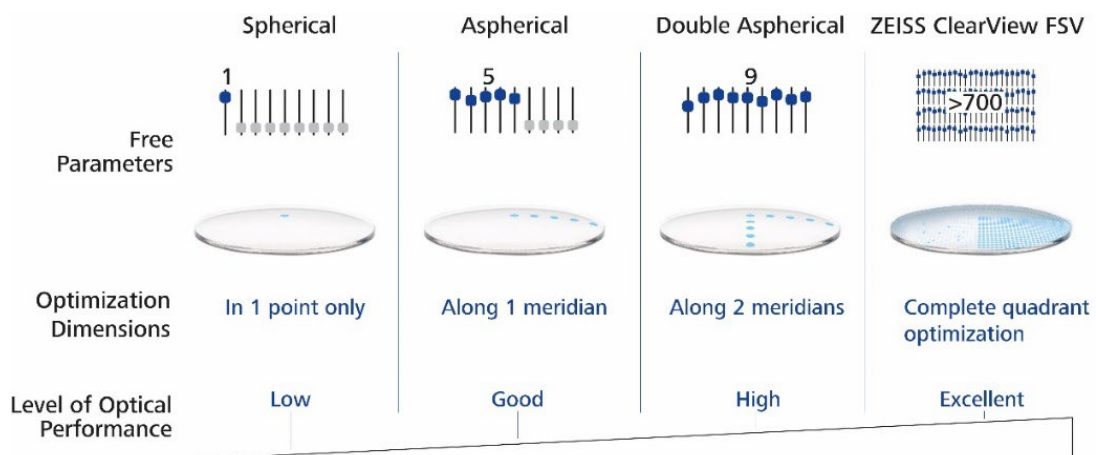


Image Caption: Principles of lens design optimization for spherical, aspherical, double aspherical and ZEISS ClearView FSVs.

² Based on a visual clarity simulation on a 50 mm diameter lens area for 1.60 index ZEISS FSV ClearView lenses compared to 1.60 ZEISS AS FSV lenses. Average of +5 D, +3 D, +1 D, -1 D, -3 D, -5 D, and -7 D with and without a cylinder of -2 D. Quantitative analyses by Technology & Innovation, Carl Zeiss Vision GmbH, 2020.

³ Measurements of lens flatness (base curve) on 1.60 ZEISS ClearView FSV lenses compared to ZEISS Spherical FSV lenses. Average of -5, -3, -1, +1, +3, +5 D with and without cyl -2 D. Maximum reduction of 49% of -5.00 D with and without -2 D cyl for minus lenses. Maximum reduction of 25% of 5.00 D with and without 2 D cyl for plus lenses. Quantitative analyses by Technology & Innovation, Carl Zeiss Vision GmbH, DE, 2020.

⁴ Measurements of lens thickness on 1.60 ZEISS ClearView FSV lenses compared to ZEISS spherical FSV lenses over a range of prescriptions (-5, -3, -1, +1, +3, +5 D with and without cyl -2 D). Maximum reduction of 16% for center thickness of +5.00/-2.00. Quantitative analyses by Technology & Innovation, Carl Zeiss Vision GmbH, DE, 2020.



"ZEISS is transforming the single vision market by bringing many aspects of freeform lens design to the FSV lens category," explains David Sinnott, Head of Product Management at ZEISS Vision Care. "Freeform lens design combined with the ClearForm technology used in ZEISS ClearView FSV enables complex lens shapes that were previously only possible in surfaced single vision lenses. ZEISS now offers premium quality optics in finished single vision lenses, combined with fast delivery and affordable pricing to ensure everyone can access the benefits of ZEISS optics," adds Sinnott.

ClearForm is a registered trademark of Carl Zeiss Vision GmbH.

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About ZEISS

ZEISS is an internationally leading technology enterprise operating in the fields of optics and optoelectronics. In the previous fiscal year, the ZEISS Group generated annual revenue totaling 7.5 billion euros in its four segments Semiconductor Manufacturing Technology, Industrial Quality & Research, Medical Technology and Consumer Markets (status: 30 September 2021).

For its customers, ZEISS develops, produces and distributes highly innovative solutions for industrial metrology and quality assurance, microscopy solutions for the life sciences and materials research, and medical technology solutions for diagnostics and treatment in ophthalmology and microsurgery. The name ZEISS is also synonymous with the world's leading lithography optics, which are used by the chip industry to manufacture semiconductor components. There is global demand for trendsetting ZEISS brand products such as eyeglass lenses, camera lenses and binoculars.

With a portfolio aligned with future growth areas like digitalization, healthcare and Smart Production and a strong brand, ZEISS is shaping the future of technology and constantly advancing the world of optics and related fields with its solutions. The company's significant, sustainable investments in research and development lay the foundation for the success and continued expansion of ZEISS' technology and market leadership. ZEISS invests 13 percent of its revenue in research and development – this high level of expenditure has a long tradition at ZEISS and is also an investment in the future.

With over 35,000 employees, ZEISS is active globally in almost 50 countries with around 30 production sites, 60 sales and service companies and 27 research and development facilities. Founded in 1846 in Jena, the company is headquartered in Oberkochen, Germany. The Carl Zeiss Foundation, one of the largest foundations in Germany committed to the promotion of science, is the sole owner of the holding company, Carl Zeiss AG.

Further information at www.zeiss.com

ZEISS Vision Care

ZEISS Vision Care is one of the world's leading manufacturers of eyeglass lenses and ophthalmic instruments. The unit is allocated to the Consumer Markets segment and develops and produces offerings for the entire eyeglass value chain that are distributed globally under the ZEISS brand.