ASPHERIC LENS DESIGN

This is a very basic and simple approach to explaining aspheric lenses. They feature a different lens design than the standard spherical lens. To understand the aspheric concept, you have to consider two components of a lens that affect how light travels through the lens. The first is the index of refraction and secondly is the lens curve. The index of refraction is a function of the material and the lens curve is a function of lens design. By manipulating the curves on the front and back surface of a lens, a prescription power is created. For some prescription powers, spherical lenses require the selection of steep base curves to compensate for the angle at which the eye looks through the lens as it moves from the center to the periphery. The result is thick edges for minus lenses and thick, bulbous centers for plus lenses. When a flatter base curve is selected over the traditional curves, some aberrations increase, particularly oblique astigmatism and off-axis power errors. These distortions are inherent in the design nature of spherical curves. By contrast, aspherical base curves change shape and power across the surface of a lens. That change in power is gradual. This change in power and curve follows the natural movement of the eye as it looks from the center of the lens out to the periphery. Because of this change in power and curve, the lens is flatter and thinner, but the peripheral distortions are minimized, thus off-power axis error are not created. Aspheric designs require computer programs to calculate the numerous power or curve changes. Asphericity is defined by a polynomial function, which is a mathematical expression using variables and coefficients. Basically, they use a mathematical design to flatten the front surface of the lens, without compromising the visual clarity. Why are there so many different aspheric designs? Each manufacturer uses different coefficients in the polynomial equation, creating different design characteristics. Some manufacturer's designs feature more asphericity than other designs, which means that the lens curve has more changes in power. The higher the prescription, the more asphericity is needed to flatten the lens and minimize distortions. Some manufacturers have semi-aspheric design, which will not perform as well as a full aspheric design. You will notice a more dramatic difference when using an aspheric lens for a mid to high powered plus lenses. Although each design is unique, the optics and cosmetics are superior to spherical lenses.

EMPIRE Optical, Inc.

AVAILABILITY OF ASPHERIC LENSES

Plastic

Cosmolit – SV and Curve-Top 28
Bristolite – SV and ST25
Sola Percepta
Perfastar – Blended aspheric lenticular

1.54 Mid-Index

Sola ASL Spectralite
SV clear and Trans III
ST 28 clear and Trans III
Percepta clear and Velocity

1.56 Mid-Index

Varilux SV Ormex
SV Trans III
Kodak SV FT 28 clear and Trans III
Panamic Quantum
Cosmolit SV and CT28

Trilogy 1.53 Mid-Index

Single vision clear
Flat Top 28 (Fall 2002)
Younger Image Progressive

1.60 High Index

Optima, Pentax and Seiko all are available in SV semi-finished or stock finished with a 1.0 center thickness and choice of AR.
Cosmolit single vision

1.66/1.67 High Index

Optima, Pentax and Sekio 1.67 all are available in SV semi-finished or stock finished with a 1.0 center thickness and choice of AR.
Optima Hyperview Progressive
Seiko Proceed Progressive
Sola Visio – SV finished with 1.0 CT and UTMC AR coating only.

Polycarbonate

Focalite – single vision and ST 28
Kodak – single vision and ST 28
Sola – ASL, SV only
Tegra – SV, ST28 and Outlook Progressive
Gentex – SV and ST28

1.74 High Index (2010?)

Optima SV minus range only
Stock finished with 1.0 CT and AR coating
Semi Finished SV