







During the neonatal period, hyperopia is commonly manifested. As age increases, the ocular axis gradually changes. Most myopia occurs because the ocular axis is too long, and it gradually increases as myopia deepens.





### The Concept of Defocus

"Defocus" refers to the situation where the focal point formed by parallel light passing through the refractive medium does not fall on the retina. "If the focus falls in front of the retina, it corresponds to what is commonly referred to as myopia. This defocus state is called myopic defocus (or positive defocus). Conversely, if the focus falls behind the retina, it corresponds to a hyperopia state. This defocus is called hyperopia defocus (or negative defocus)."



The Relationship Between Defocus and Myopia

The relationship between defocusing and myopia is a well-known theory of peripheral defocusing proposed by Professor Earl Smith, dean of the College of Optometry at the University of Houston in the United States at the end of the last century. He found that during the formation of myopia in children and adolescents, the fovea of the retina in myopic patients presents myopic defocus (positive defocus), while the periphery of the fovea of the retina presents hyperopic defocus (negative defocus). Retinal hyperopia defocus is the main cause of increasing retinal power.

When hyperopia defocus occurs, especially when children's peripheral scenery is imaged behind the retina for a long time, it can create an illusion to the brain that the eye axis is too short, so the brain will send a signal to the eye axis to continue to grow, leading to sustained lengthening of the eye axis. Research has shown that most myopia is caused by the lengthening of the eye axis, and the normal 1mm myopia degree of the eye axis will increase by -3.00 °, and myopia caused by this factor cannot be avoided and reversed.





### Why do lenses require Defocus?

After myopia occurs, refractive correction is necessary. Although traditional single lens lenses can correct central vision, they can affect the imaging quality of the peripheral retina. The central object is projected onto the central fovea of the retina, and its periphery is projected onto the rear of the retina, which will promote the retinal membrane to elongate backward, accelerating the speed of eye axis elongation.

Applying a positive defocus (focusing in front of the retina) to the developing eye and letting this focus fall in front of the retina, the brain will send a signal to prevent the backward growth of the eye, ultimately achieving the goal of controlling the growth of the eye axis and delaying the development of myopia

PS: The research results show that in order to slow down the growth of the eye axis, the applied myopic defocus stem pre stress occurs within a field angle of 20  $^{\circ}$  from the central fovea of the retina. When the applied myopic defocus occurs within a field angle of 15  $^{\circ}$  from the central fovea of the retina, the effect is best.



with a fixed defocus amount.

growth.



eyeball.



### Design of Defocus Amount

Inner third circle+3.00, middle circle+1.50, outer circle+1.00

Design principle: From a field of view angle, a large amount of defocus in the inner circle is the best effect. Gradually decreasing outward can make the visual effect clearer and provide better comfort.

Inner circle microlens diameter is smaller than outer circle diameter

Design principle: As the field of view angle changes towards 20 °, the defocus amount of the outer circle decreases while increasing the diameter of the microlens, allowing the object to achieve the same effect as the large defocus amount of the inner circle.



### Design Optical Map of Defocus Amount





### Design Optical Map of Defocus Amount









The design of the defocusing amount Optical image Plano eye baby has no effect?

Plano or low degree multi focal defocusing also has the effect of delaying the development of myopia.

Because the peripheral defocusing microlens is now a spherical mirror, it has the

effect of small aperture imaging when viewed at a distance, and can normally view

objects; Near term peripheral imaging falls in front of the retina and has a reverse

regulatory effect on the lens, reducing eye fatigue.



Power range

#### Finished lens: -6.00D/2.00D

RX: combined powers  $\leq$  -8.00D, Cyl maximum -4.00D (7 working days)



2

#### Precautions for quantitative variable multi point defocus:

### Frame requirements

All functional lenses have requirements for frames and cannot be arbitrarily selected. Currently, the popular large loop type frames are not suitable for fitting, because according to the pupil height, the lens ring (recommended frame height of 30 to 35mm is the best effect) exceeds too large, making it difficult to meet the pupil height.





3

### Optometry precautions

- A. Refraction: For patients with refractive errors who do not have other organic disorders, the optometry prescription should be fully corrected.
- B、Pupil height: The measurement should be accurate and the pupil height should be as sufficient as possible.
- C、 Other optometric data are based on standard optometric data without special requirements.



PUREOPTIK

1111

### Precautions for quantitative variable multi point defocus:

4

Processing precautions

A. Assemble using the "geometric center point" for installation.

#### Description:

0.00D and 0-cyl lenses cannot find the optical center, so they are directly installed using the geometric center; The power between ± 0.25 and ± 1.50D will have an optical center offset of 1 to 3mm, The prism value generated by the offset is far lower than the national assembly standard, so please use.

The geometric center point is assembled with a "+" character.



4

Processing precautions

#### B. The pupil height assembly must be standard.

Guiding principle: Assemble according to the upper limit of pupil height.



4

Processing precautions

#### C、PC material.

For models with PC mode, select PC mode for processing. In this mode, the first half is water mist or fine flow, and the water does not directly

spray onto the grinding wheel and lens. The lens is in a dry grinding state.

For models without PC mode, slow down the machine speed, disconnect the water circuit, and dry grind the entire process. This mode causes

significant damage to the machine and is not recommended.



4

Processing precautions

#### D、Please use EIN or 3M anti-slip stickers for polishing lenses.

The lens is made of PC material with high toughness, and the grinding difficulty coefficient of the edging machine is very high. The best grinding

method is: dry cutting with a diamond knife (there are few such equipment in China). For ease of processing, the lens is SHMC.



Processing precautions

#### E, Polishing of shaped lenses.

PC lenses generally use soft polishing. First, add polishing mud to the soft polishing wheel. The polishing process is light polishing and the speed of

rotating the lens is slightly faster.

Note: The PC lens material is tough and difficult to polish, and it is easy to burn the surface due to excessive temperature during polishing.



5

Processing problems and solutions

#### A, Why is PC easier to run than resin?

The matching edging machine for PC lenses is [Diamond knife dry cutting]. Currently, the domestic processing is all based on edging machine (PC

mode) dry grinding 80%+water grinding 20%. The material toughness of PC lenses is more than 10 times that of resin lenses, so the stress during the grinding process of the edging machine is significantly increased. If the clamping force of the edging machine is insufficient or the antiskid film on the

lens surface cannot meet the requirements, PC lenses will easily run away during the processing process.



Processing problems and solutions

#### B. Why is a PC with good coating easier to run than a PC with poor coating?

There are many measurement values for the coating quality of coated lenses, such as: reinforcement film, hardening film, antireflection film, top film, etc. The main factor that affects the shaft running is the waterproof film layer in the top film. The higher the waterproof grade, the smoother the lens, the better the waterproof and antifouling effect, and the easier the shaft running during the corresponding processing process.



5

#### Processing problems and solutions

#### C. Why are lenses with a high number of heights easy to pivot?

"High POWER lenses, CYL lenses, and High CYL lenses are more prone to axial movement during the processing process. In addition to the two points mentioned earlier, there are also serious uneven forces on these lenses during the polishing process. Different lens shapes, different pupil heights, and different pupil distances cause different forces on the lenses during the processing process, making it easier to axial movement.".

#### [Summary]

Precautions for PC chip cuttin: 1, Check whether the machine has PC mode and whether the PC mode operates normally;

- 2. Detect or test whether the chuck pressure of the edging machine itself is normal;
- 3. Use EIN or 3M special anti-slip stickers.