



[Understanding Vision](#) 16 Oct 2017

How modern prescription spectacle lenses maximise your vision potential

In conversation with ZEISS on holistic eyeglass lens determination and prescription spectacle lenses optimised for binocular vision.

All spectacle wearers are familiar with sight tests or subjective refraction. The optometrist fits a trial frame and asks us to read letters, numbers or state the opening direction of rings in different sizes projected onto a surface. After inserting different measuring lenses in the trial frame, we indicate whether they make us see better or worse. In this step-by-step process, the optometrist finds exactly the prescription spectacle lenses which allow us to see clearly and distinctly. But is there a better and more precise way? BETTER VISION spoke to the Product Manager for ophthalmic optical instruments at Carl Zeiss Vision, Carsten Kreß.

BETTER VISION: Eyeglass lens determination is the most important part of the spectacle buying process. What characterises modern subjective refraction today?

Carsten Kreß: That's right. At ZEISS, our goal for eyeglass lens determination is to maximise the vision of every individual patient. That might sound obvious, but we really want spectacle wearers to get precisely the prescription spectacle lenses that allow them to use all of their available vision. We don't try to reach what is commonly termed "100%" visual acuity - instead we aim for the maximum and this can vary greatly depending on the individual.

BETTER VISION: What are the requirements for this?

Carsten Kreß: The test conditions for subjective refraction are crucial. Traditionally, eyeglass lens determination is still frequently done with projectors which project the optotypes onto a wall. However, the sight test room must be darkened to see the optotypes with as much contrast as possible. That can be a disadvantage, as the light conditions generally differ from those experienced when wearing the subsequent correction.

As a result, at ZEISS we have been developing measuring instruments with backlit optotypes since 1958. That means that subjective refraction can be performed in daylight conditions. The device currently used for distance measurement is the electronic i.Polatest[®], which shows the optotypes on a specially modified LCD. Another advantage of this vision testing instrument is that new optotypes are generated every time. Accordingly, the tester can offer patients a new selection to read whenever required, effectively preventing fatigue or memorising. It also allows optometrists to use different optotypes, such as letters, numbers, Landolt rings, Snellen E-types or even symbols for children or illiterate persons

A similar instrument is also available for near vision eyeglass lens determination, for reading glasses or [> spectacles for the workplace](#). A sight tests are performed with a mobile hand-held device, Polatest[®] N Classic, at the patient's usual reading and working distance. For example, picture a musician who has to be able to read their score precisely at a certain distance. Prescription spectacle lenses can be optimised precisely for this reading distance if it is taken into consideration precisely during the subjective refraction.

BETTER VISION: Is it true that with i.Polatest[®] eyeglass lens determination can be done on both eyes simultaneously? Why is that so important?

Carsten Kreß: The workflow is as follows. The optometrist first optimises the prescription spectacle lens for one eye with i.Polatest[®], and then separately for the other – a standard monocular measurement. However, as the patient generally has two eyes involved in the vision process, the interaction of both eyes must always be tested. That is why we offer polarising tests for Polatest[®] devices - hence the name Polatest[®].

We also integrate binocular testing which allow associated heterophoria to be diagnosed. At the end of the day, the binocular tests have one goal: good and fatigue-free vision with both eyes at the same time. The measuring lenses found in this way can be transferred to prescription spectacle lenses for day-to-day use.

Carsten Kreß: Many people do not even know that they have binocular problems. For example, there are patients who suffer from serious strain-related complaints (such as headaches, burning eyes or great sensitivity to light), reading problems, reduced depth perception or permanent muscle tension due to a slight, unnoticed tilt of the head, which have not been diagnosed in spite of in-depth examinations. These people often suffer from an undiagnosed associated heterophoria, which can frequently be corrected with prism spectacles. Don't worry though; the prescription spectacle lenses are not cosmetically unattractive for the wearer. A polarising or binocular eye test can clarify matters, in conjunction with a comprehensive medical history.

BETTER VISION: How do these tests work?

Carsten Kreß: As with monocular measurements, the patient looks at the sight testing device. A special technology – similar to 3D projection – only shows parts of the test to one eye at a time, while the test environment is viewed normally with both eyes. Corrective steps which can improve measurement of binocular vision are derived from the statements of the patient on how they perceive this test, i.e. whether all test components are seen simultaneously or parts of the test are offset from one another.

A method for correcting binocular vision which is common in German-speaking countries was developed by H.-J. Haase as early as 1953 and named after him: the Haase measurement and correction method, abbreviated to MKH in German. However, depending on the medical history findings, optometrists can also use other binocular tests and methods with i.Polatest[®] to balance binocular vision.

BETTER VISION: Can children also suffer from associated heterophoria?

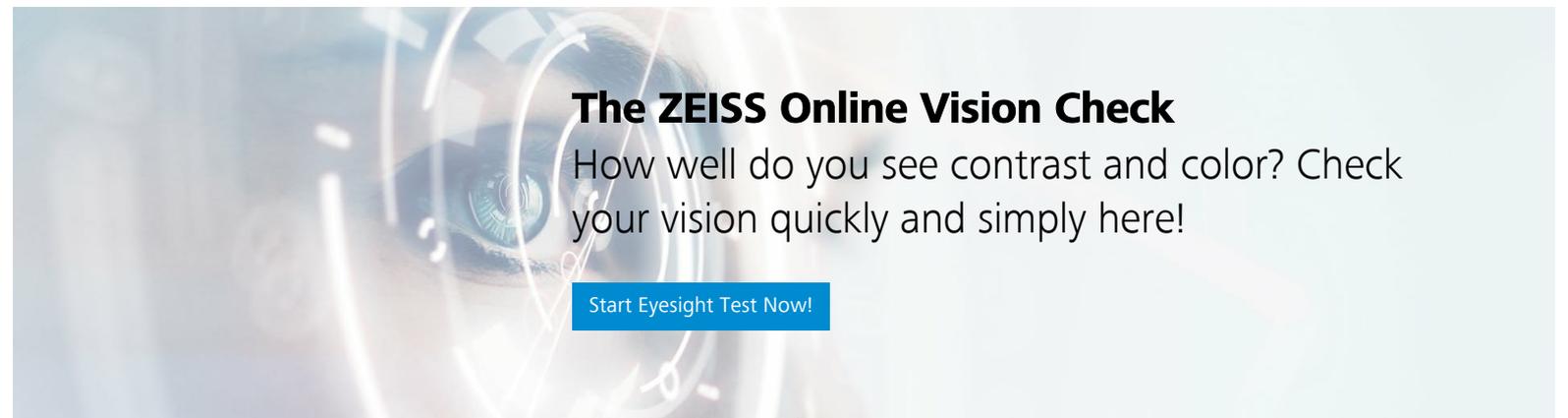
Carsten Kreß: Of course. In general, it is extremely important to check children's and infants' eyesight regularly. It is incredible how many vision problems our brain simply compensates itself – especially in children. The eye with better vision generally does the work and the poorer visual impression is simply suppressed. The earlier it is detected and measures are taken, the better the chances of specifically treating vision deficiencies and helping children to develop binocular vision. It doesn't even always have to be a comprehensive eye test. For example, parents can test eye tracking motions themselves with mobility tests: just move an object through the child's field of vision from various directions and observe how both eyes follow the object, evenly, unevenly or with jumps. If one of the eyes reacts differently, we recommend having it tested by an ophthalmologist.

It is now known that conditions such as illiteracy, restlessness and lack of concentration or ADHD in children can be related to vision problems.

Eye tests can be performed with children as soon as they can speak. Before this, observation or other measurement methods can be used, for [> example for premature babies](#).

BETTER VISION: Why do many ophthalmic opticians perform objective sight testing before subjective refraction?

Carsten Kreß: Autorefractor are generally used for objective sight testing. For this, the patient looks into the device and the ametropia is automatically measured consecutively for each individual eye. At ZEISS, the autorefractor is called i.Profiler® and measures using wavefront technology. This technology allows higher order aberrations to be measured which in turn can be used to optimise prescription spectacle [> lens correction for low light situations \(such as dusk and twilight\)](#). One of the advantages of performing an objective sight test first is clear - not subjecting patients to excessive strain in the sight testing room with lengthy examinations. The i.Profiler® gives ophthalmic opticians very revealing measurement results very fast, which allows them to start the subjective refraction tests immediately and to comprehensively optimise prescription spectacle lenses - with binocular measurement too.



The ZEISS Online Vision Check

How well do you see contrast and color? Check your vision quickly and simply here!

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Legend of the eye test results:

During eye tests, the refractive value of the optical correction of the eye is determined, without letting the eye create a clear image via accommodation (individual dynamic adjustment of the refractive power of the crystalline lens).

0.00 dpt (dioptres) = Normal vision (emmetropia)

Not 0.00 dpt (dioptres) = Ametropias

e.g. sph +2.00 dpt (dioptres) = Far-sightedness or longsightedness (hyperopia) – also for presbyopia; this is then called a near addition (Add)

e.g. sph -1.00 dpt (dioptres) = Myopia

cyl 1.00 dpt (dioptres) = Cylindrical ametropia (astigmatism) - the eye views points as bars or lines

What is associated heterophoria?

If binocular vision is normal, both eyes see the object in question identically. With associated heterophoria, there is an imbalance of the eye movement muscles, which requires a great deal of energy from a person with the condition to make vision possible. If the eyes were to take up the most strain-free position, the result would be double vision. Sufferers of associated heterophoria are subject to the (involuntary) compulsion to compensate this vision problem, which results in a wide range of complaints. The closest comparison is a deviation from the normal bodily structure, e.g.

one leg is slightly shorter than the other. This often results in back pain and tension, which are easy to compensate with an appropriate insole in the shoe. Prism spectacle lenses can compensate for associated heterophoria.

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