CET

COMPETENCIES COVERED

Dispensing opticians: Standards of Practice, Optical Appliances, Refractive management
Optometrists: Standards of Practice, Optical Appliances

STANDARDS OF PRACTICE | OPTICAL APPLIANCES | REFRACTIVE MANAGEMENT | STANDARDS OF PRACTICE | OPTICAL APPLIANCES

Low add boost, occupational or degressive lenses: what are they all about?

by Andrew Sanders FBDO

As technology and smart communication systems evolve, our visual demands become more intense and complex. Colleges encourage the use of laptops and tablets for notetaking and project work whilst the internet is considered the go-to source for research of any kind. In our offices, many of us now use laptops, multiple screens and tablets as well as our smartphones – with a staggering 70 per cent of us using more than one digital device at a time.

In our home lives, our televisions have increased in size and laptops and tablets have replaced bulky computer systems, newspapers and, in many cases, books.

With this in mind, it is no surprise that a recent study found that 90 per cent of people use digital devices for more than two hours a day, whilst 60 per cent of people use these devices for more than five hours a day[1]. The use of technology is by no means limited to the younger market – with 30 per cent of 60-year-olds and over using digital devices for more than two hours a day for the last 15 years.

The net result of our technology-led visual requirements is visual stress, which may be considered as digital eyestrain: a physical eye discomfort felt by many individuals after sitting for two hours or more in front of digital screens. This is often referred to as computer vision syndrome (CVS).

CVS is a temporary condition where the normal blink rate drops from 16 to 20 blinks a minute down to as low as six to eight blinks a minute accompanied by eye fatigue, eye strain, headache, neck/shoulder pain, irritation of the eyes, itching of the eyes, back pain, blurred vision and general fatigue, these symptoms often being aggravated by ergonomics and air conditioning. We should, of course, always give advice on sensible digital eyecare such as the 20/20/20 rule (looking away from the screens every 20 minutes for 20 seconds at something 20 feet away) and without question, the use of an appropriate spectacle lens correction.

When dispensing, all presenting issues should be considered, such as the patient's wants/needs, the enviroment where the spectacles are to be worn and their lifestyle, including any task-specific requirements as well as the patient's age and prescription.

ACCOMMODATIVE STRESS

When we view objects closer than infinity, our eyes automatically accommodate. The generally accepted mechanism of accommodation occurs in response to a blurred retinal image whereby the ciliary body contracts and pulls forward, thus slackening the zonular fibres that hold the crystalline lens capsule taut. This, in turn, causes the lens to become more 'round' and thicker, giving additional positive power to the eye and enabling near objects to be seen in focus.

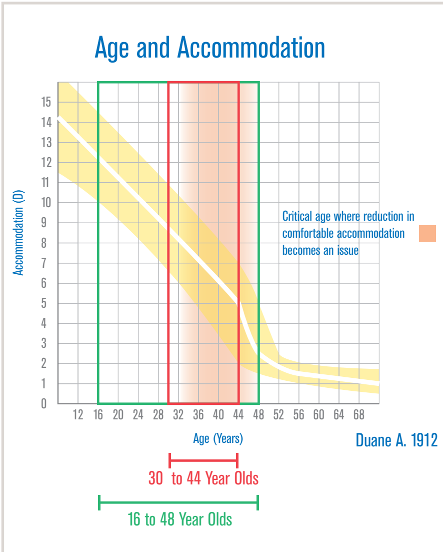

Figure 1: Duane's amplitude of accommodation vs. age graph

This article has been approved for 1 CET point by the GOC. It is open to all FBDO members, and associate member optometrists. The multiple-choice questions (MCQs) for this month's CET are available **online only**, to comply with the GOC's Good Practice Guidance for this type of CET. Insert your answers to the six MCQs online at www.abdo.org.uk. After log-in, go to 'CET Online'. **Questions will be presented in random order.** Please ensure that your email address and GOC number are up-to-date. The pass mark is 60 per cent. The answers will appear in the August 2017 issue of *Dispensing Optics*. The closing date is 3 July 2017.

General Optical Council – Approved CET For Dispensing Opticians
General Optical Council – Approved CET For Optometrists

C-55477

Studies have shown that as we age, the eye's ability to accommodate decreases by 0.25D to 0.40D per year[2]. This diminishes to only 1.00D by the age of 60, as shown in **Figure 1**. This gradual reduction can become troublesome, usually around the age of 40, although this can vary with factors such as ethnicity.

When reading becomes difficult, presbyopia is said to occur but this can be a grey area because there is no standard distance for near work – especially since the advent of smartphones, personal digital assistants or tablets where brightness and font size can easily be increased. The reluctance of some patients to accept the inevitable need for a near vision correction can itself also bring additional challenges as the patient holds reading matter further and further away, upsetting the natural accommodation/convergence relationship.

When using smartphones and tablets, the viewing distance is usually considered to be between 25-30 cm and the viewing position closer to the torso, resulting in eye lowering of around 27 degrees. Conversely, when reading a book or newspaper, eye lowering of only around 15 degrees is required and these are generally positioned around 40cm from the eye.

Given the closer proximity when using smartphones and tablets, one is required to exert greater accommodative effort than when reading traditional media.

Approximately 50 per cent of total amplitude of accommodation is usually classed as the amount of comfortable accommodation required for extended periods of near vision[3]. If we consider a viewing distance of around 28cm for mobile devices, accommodative demand would be 3.57D (the reciprocal of 0.28m), which in turn would mean a requirement of 7.14D amplitude or of accommodation.

Looking at **Figure 1**, it can be seen that because of this short viewing distance the critical age for accommodative support potentially drops to around 30 years of age, or less in some cases.

Young adults under 30 experience the highest rates of digital eye strain symptoms (73 per cent compared to other groups) with some experiencing accommodative lag due to long hours spent in front of computer screens and tablets in addition to social media activity on smartphones.

LOW ADD BOOST LENSES

Low add boost is the term given to accommodative support lenses, which were first introduced in the noughties to help pre-presbyopes, young adults and students who were experiencing difficulty with close work. The lenses usually have a slow smooth progression as the eyes look down, with low additions ranging from 0.37D as utilised by the 'A' version of the Norville Booster lens right up to 1.25D as used by the Zeiss Digital in its highest boost specification.

Whilst the add boost is specified, looking further down these lenses gives additional power, as is the case with Hoya's Nulux Active 'A' design which, in its +0.53D boost, actually provides addition up to 0.75D 18mm below the eye position. Due to the slow power progression and asymmetrical design characteristics, supporting binocular function, these lenses feel to most users like standard single vision lenses.

The add support should ideally be assessed on an individual basis taking into consideration the patient's age, media use, symptoms of accommodative lag and eye fatigue – although some manufacturers publish recommended age groups for the different add boosts available in their portfolio, such as the Essilor Eyezen lens, which has add boosts of 0.40D (20 to 34 years) 0.60D (35 to 44 years) and 0.85D (45 to 50 years).

Fitting should be carried out in the same way as progressive lenses, to monocular pupil centre distances and vertical heights. These lenses can be an excellent solution to relieve visual fatigue. However, given the relationship between accommodation and convergence, a knowledge of the results of the patient's binocular assessment is required, as a controlled exophoria may become decompensated or be stressed by the lenses creating additional issues.

MODERN PROGRESSIVE LENSES

The correction choices for presbyopic patients has become more complex over recent years with the introduction of a whole plethora of advanced progressive lenses, enhanced reading or degressive lenses as well as full blown occupational lens designs.

If we firstly consider modern progressives, the Nikon Digilife and Shamir Autograph In Touch have both been developed and optimised to respect the patient's head-eye-hand position whilst using digital devices such as tablets and smartphones. Both designs are said to give up to 25 per cent more addition power than standard progressives in the 40-70 cm vision range.

Premium progressives, such as Hoya MyStyle V+, Zeiss Individual 2 and Rodenstock Impression Freesign 3, can all be biased towards intermediate and reading. However, in all these designs by definition, distance will still be a key requirement and, as such, the width of clear vision in the intermediate and near zones will always be smaller than an occupational or degressive lens will afford.

DEGRESSIVE LENSES

Degressive lenses are sometimes called enhanced reading lenses and can be considered as lenses that start off with the reading prescription in the lower part of the lens, which reduces in power by the degression amount to give an increased working distance as the patient looks towards the top of the lens.

Often it is assumed that these lenses have around half the degression at the eye point, but this is rarely the case. For example, Hoya's Add Power lenses have a

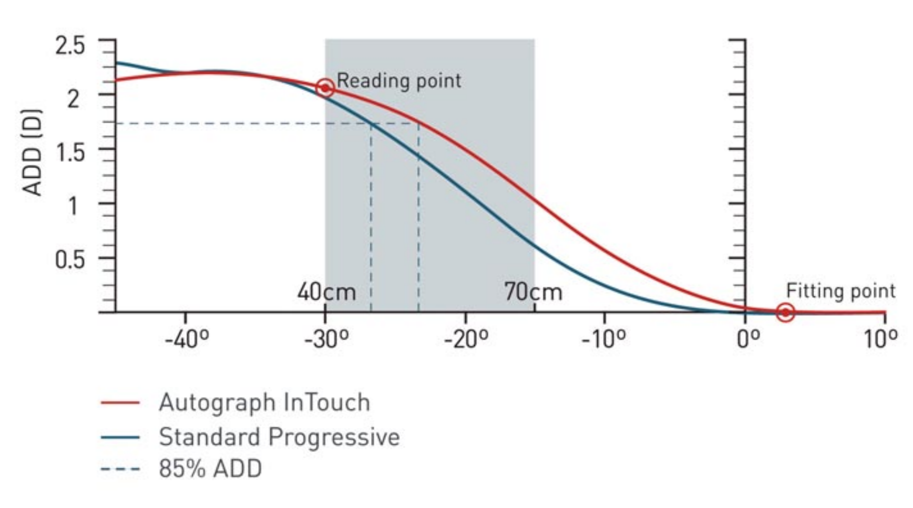

Figure 2: Power profile for the Autograph InTouch compared with a 'standard' PPL (courtesy of Shamir)

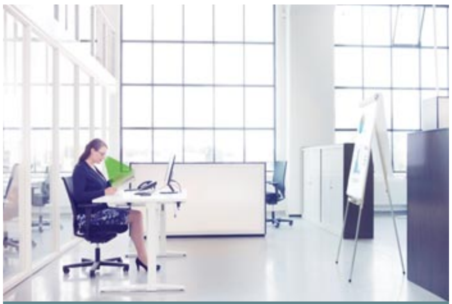

Figure 3a: The limitation of reading spectacles

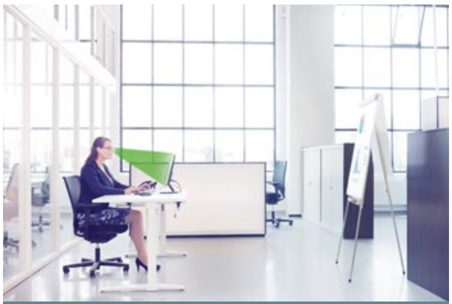

Figure 3b: The Enhanced Reader solution (courtesy of Hoya)

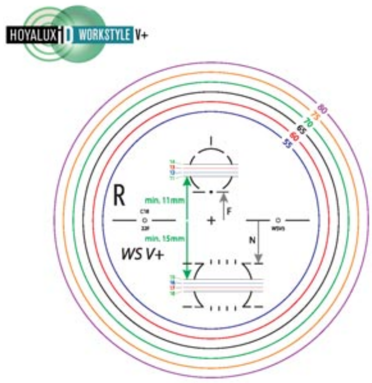

Figure 5: The Hoyalux id Workstyle has a variable corridor/inset (courtesy of Hoya)

degression of approximately 33 per cent at the eye point, whereas the Nikon Online Wide has 65 per cent; Essilor's Interview and Varilux Computer 2V both have the full degression at the eye point.

In order to successfully dispense degressive lenses, a full understanding of the manufacturers' fitting guidelines, power distribution and power profiles (an example is shown in **Figure 2**) is key, along with the relevant centration charts for verification. Full consideration of the required working distance should be given along with posture considerations and the work station enviroment.

Of notable importance is the relationship between addition power and the distance at which clear vision is achievable and this can easily be calculated by using the reciprocal of the dioptre power:

Distance in metres = 1/reading addition power in dioptres

So, for a patient requiring a +2.50 addition, a pair of reading spectacles will give a maximum clear range of 40cm and past this vision will become progressively blurred. If the same patient was given a lens with a degression of -1.50D this would give a maximum range of 1m or 100cm

Reading addition +2.50 – 1.50 degression = +1.00 reciprocal of 1 = 1m or 100cm

This particular lens would, therefore, have a range of up to 100cm for a 2.50 addition. However, if this lens were only to have a 50 per cent reduction of addition at the eye point, extended periods of comfortable viewing would be reduced to between 40-57cm.

Reading addition +2.50 – (0.5 x 1.50) = +1.75D addition power at eye point 1/1.75 = 0.57m or 57cm

This is an extremely important consideration in the dispensing of any degressive or occupational lens design, so it is of vital importance to understand what power is being placed at the eye point or fitting cross.

Degressive lenses based primarily around the near vision prescription can be particularly useful for desk work (**Figure 3**), reading, knitting and more static occupations, as moving around with the lenses on will (as a rule) produce a feeling of drunkenness. However, this generalisation does not always follow as, when fitted with smaller frames, patients requiring little or no distance correction will pull the glasses down to look over the frame for distance vision.

One perhaps underutilised application is for older patients with higher additions where a large stable reading addition is required but a low degression value gives the flexibility to enjoy improved functional range; a colleague suggested the designation of 'super readers' when dispensing.

Current health and safety guidelines[4] suggest that in an office environment, the top of a computer screen should be in line with the user's distance gaze (**Figure 4**) when their chin is slightly lowered. However, this cannot be taken for granted and rarely occurs in the case of laptop and tablet users.

OCCUPATIONAL LENSES

Although in recent times the distinction between degressives and occupational lenses has become less defined, occupationals can generally be considered as being the cousins of 'softer' design longer corridor progressives

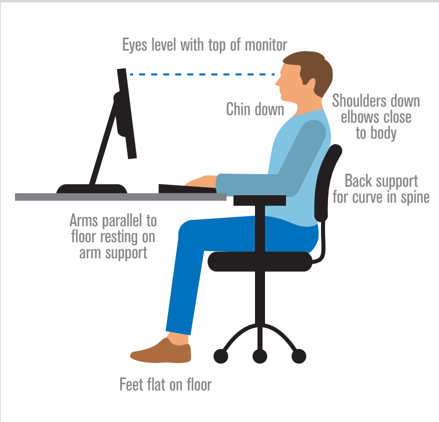

Figure 4: The correct sitting position for a desktop PC

that offer wider intermediate zones and narrower, limited 'distance' range.

Modern designs are often available in a number of corridor lengths and three design directions defined for more dynamic office use, screen or PC bias where the 'distance' is limited to around 2m, and close or reading bias that give a visual range out to around 1m.

Hoya produces the Workstyle V+ occupational (**Figure 5**) available in Space, Screen and Close definitions with seven different corridor lengths to fit most modern frame types. Providing the minimum height above the fitting cross is observed (the patient will need to dip their head downwards to look through the top of the lens), the Space design will afford the patient clear distance vision. When the head is in the normal position of gaze, approximately 43 per cent of the addition is delivered making the lens ideally suited for dynamic office use, board meetings and the like.

The Screen and Close designs place a percentage (20-40 per cent) of the reading addition at the top of the lens rather than an arbitrary, say +0.50D, and in this way the patient benefits from the use of their own comfortable accommodation, the net result being deeper and wider fields of view.

The Screen gives approximately 56 per cent of the addition at the fitting cross and is most suitable for immersed office use for computer and close work. The Close definition has around 66 per cent of the addition at the fitting cross and is ideal for concentrated reading and generally closer intermediate work.

In contrast to the Hoya design, the Zeiss Officelens Superb has three design definitions: Room, Near and Book where, 6mm above the fitting cross, an arbitrary add is placed (**Figure 6**).

Room has +0.25D the near +0.50D and the Book +1.00D, giving a maximum working distance out to 4m, 2m and 1m respectively,

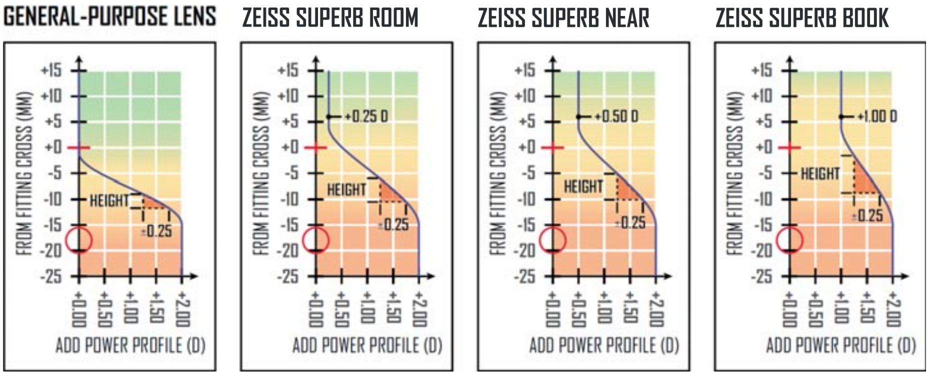

Figure 6: The power profiles of the Zeiss Officelens Superb designs (courtesy of Zeiss)

whilst the Rodenstock Impression Ergo 2 and Multigressiv Ergo 2 designs place a percentage of the addition directly at the fitting cross, approximately 20 per cent Room, 33 per cent PC and 43 per cent Book.

Essilor's recently launched Digitime lens also has three design definitions: Room, Mid and Near; the top of the lens (not the fitting cross) allows vision to 220cm, 100cm and 80cm respectively. All three designs also have a so-called 'ultra near vision function' where by the full prescribed addition is reached 12mm below the fitting cross, but looking further down the lens the add increases by +0.125 Room, +0.25D Mid and +0.50D for the Near design. This concept was first seen in the Tokai Optical Pro/Hi reader, which gives an additional +0.50D boost when looking past the reading sweet spot, which is said to help with smartphone use.

When considering occupational lens solutions, we should not ignore some of the more unusual lenses currently on the market such as the Norville Pilotor RD 40, incorporating a progressive in the lower part of the lens and an up-curve bifocal in the top, or indeed the Pilotor Up and Down Progressive, both adds being independently specified. And whilst no-line lenses are generally considered as first choice, the trusty trifocal in a variety of guises still has its place in modern dispensing.

SUMMARY

Progressives, low add boost, occupational and degressive lenses all have their place in the modern day dispensing practice and we should all keep abreast of these lens designs, their fitting, and their verification procedures in order to give our patients the very best and most comfortable eyewear suited to their specific needs. An Excel table, showing currently available low add boost, degressive and occupational lenses from a range of companies in the UK, can be downloaded from this link: http://www.abdo.org.uk/wp-content/uploads/2017/03/Low-Add-Boost-degressive-and-Occupational-lenses-2017.xlsx

REFERENCES

1. The Vision Council. Eyes overexposed: The digital device dilemma. Available at https://www.thevisioncouncil.org/sites/default/files/2416_VC_2016EyeStrain_Report_WEB.pdf (accessed 31 January 2017).
2. Hofstetter HW. A longitudinal study of amplitude changes in presbyopia. *Am. J. Optom. Arch*. 1965; 42:3-8.
3. Rabbetts RB. Bennett & Rabbetts Clinical Visual Optics 4th ed. London: Elsevier; 2007.
4. Health and Safety Executive. Working with display screen equipment (DSE) 2013 [online]. Available at http://www.hse.gov.uk/pubns/indg36.pdf (accessed 1 February 2017).

ANDREW SANDERS qualified as a dispensing optician in 1988 and has more than 30 years' experience in both manufacturing and technical dispensing optics. He has previously worked for large optical chains, smaller regional groups and independent high street practice. Andrew's current role as UK professional services manager for Hoya UK, involves him in a variety of support, management and training roles. He is a regular lecturer and tutor at Hoya's European facility in Budapest and is currently chair of the ABDO/Federation of Manufacturing Opticians (FMO) Education panel, chair of the FMO standards panel and vice chair of the FMO lens focus group.