



by Howard Larkin

New SCHWIND AMARIS 'total tech' laser aims to advance refractive state of the art

Excimer system offers quicker ablations with unprecedented power, speed, and control

Rolf Schwind thinks laser refractive surgeons and their patients deserve the best of everything – power, speed, and control. So he developed the AMARIS “total tech” laser to make sure they get it. “Our goal was to integrate everything that is technically possible in one device, with every feature a step higher,” says the CEO of SCHWIND eye-tech-solutions, Kleinostheim, Germany.

Mr Schwind believes he's reached his goal. AMARIS offers more laser power, faster and more sophisticated eye tracking, online pachymetry, superior particle and vapour evacuation, and the most precise and flexible treatment software – including ocular wavefront, corneal wavefront and “aberration free” options – of any refractive laser on the market, he says.

The result is a system that ablates at about 2.5 seconds per dioptre, leaving a smooth and accurate ablation that typically generates 20/20 vision within 24 hours. Indeed, a study of 364 eyes with spherical equivalent ranging from -0.50 to -8.25 dioptres pre-op found that three months after surgery 55 per cent achieved 20/16 uncorrected, with 95 per cent at 20/20, 99 per cent at 20/25 and 100 per cent 20/32 or better. Refractive outcome was within 0.25 dioptre of the target in 75 per cent of the eyes, within 0.50 for 92 per cent and 1.00 for 100 per cent. Mean cylinder value dropped from -0.74 D before surgery to -0.16 D after.

Refraction stability was also good, going from an average of -3.57 dioptres spherical equivalent before surgery to -0.16 at one month and -0.15 at three months. Safety, as measured by Snellen lines of best corrected vision, was also strong at three months, with 44 per cent of patients gaining one or more lines, 55 per cent unchanged, one per cent losing one line and no patient losing more than one line.

Several early adopters report that the laser significantly improves outcomes. “Previously, our re-treatment rate was two per cent,” says Maria Clara Arbelaez, MD, medical director of Muscat Eye laser Center, Muscat, Oman. Based on 550 consecutive patients she treated with AMARIS prior to its market launch “we found at six months’ follow-up, the re-treatment rate was reduced to 0.18 per cent”.

AMARIS was designed with practicality in mind as well. The microscope is adjustable, the controls are ergonomically placed, and the system provides 235mm of working clearance beneath the laser to provide superior physician comfort. “With other lasers you are close to the laser, but many controls are pretty much far away from your sitting position,” notes Francesco Carones, MD, medical director, Carones



AMARIS laser

Ophthalmology Center, Milan, Italy, who also evaluated the laser before its release. With AMARIS “you work in a convenient position almost like in a comfortable driver's seat in a car – all your operational controls are very easy to reach and clearly arranged.”

AMARIS also is designed for patient comfort. Its swing-arm design makes it easy to position patients on the table, and then move the laser into place for the procedure. The table, too, pivots, making it easy to move patients from a femtosecond laser to the excimer platform during LASIK procedures. When not in use, the laser pivots away, allowing the operating room to be used for other procedures, such as cataract removal.

“AMARIS is a new excimer laser that sets a new benchmark for refractive surgery,” Mr Schwind says. “The technology leader in the industry has changed – it is now SCHWIND.”

Pushing the technology envelope

A quick look at the specifications demonstrates that AMARIS establishes new market standards in many performance areas.

Speed – A true 500 Hz repetition rate bests the previous top speed of 400 Hz. This faster laser delivers a super-Gaussian profile beam just 0.54 in diameter, smaller than the more typical 0.7mm to 1mm found on other machines. Moreover, the system offers automatic fluence adjustment, shifting from full power for rapid ablation of large volumes, down to 20 per cent power to precisely finish the job. In addition the system automatically compensates for the increased angle of contact toward the periphery of the ablation, and uses a pulse sorting routine that minimises heat build-up. The result is very fast ablation times with a smoother profile, Mr Schwind says. “For lower corrections it takes only three or four seconds; for higher corrections it takes about 20 seconds – not time enough for [the patient] to get worried,” Dr Carones adds.

Eye tracking – Operating at 1050 Hz, or faster than twice the laser repetition rate, and a 3 ms response time, the AMARIS eye tracker is able to adjust laser aim far quicker than other systems on the market, Mr Schwind says. By comparison, most eye

trackers typically operate at speeds between 60 Hz and 400 Hz, and can take as much as 36 ms to respond, he adds. In addition, the new system has a much more sophisticated aim adjustment routine, providing what SCHWIND calls “five dimensional” tracking. It compensates not only for horizontal and vertical eye movement in the iris plane, but also for horizontal and vertical eye rotation. Mr Schwind says adjusting for rotation is very important because most eye movements on the table are rotations, and as they occur, the point on the cornea that the laser hits shifts along an arc relative to the reference points being tracked on the iris. Unless the system adjusts to follow that arc, rather than just the iris aiming points, the laser ablates the wrong point of the cornea. The AMARIS eye tracker also adjusts for both static cyclotorsion experienced when the patient lies down, and any dynamic rotation around the visual axis that occurs during the ablation. “Some systems correct for one or the other, but this is the first that does both,” Mr Schwind says. The system also tracks points on the limbus and the sclera in addition to the iris, which means the system will not decentre on the cornea due to pupil centre shifts resulting from iris contractions. This reduces the need for mydriatic agents to control iris movement during surgery.

Online pachymetry – AMARIS integrates high-resolution pachymetry, showing changes in corneal thickness in real time as the surgeon operates.

Particle aspiration – AMARIS includes a particle evacuation system that not only eliminates unpleasant odours during surgery, it pulls particles out of the path of the laser beam, and stabilises the operative environment regardless of air movement in the operating room without dehydrating the cornea.

Guidance software – AMARIS incorporates advanced software routines, allowing surgeons to choose between “aberration free” approaches that leave patients’ higher order optical aberrations intact to preserve the “feel” of vision after surgery; ocular wavefront guided procedures designed to reduce overall aberrations; and topography wavefront guided procedures for correcting decentred ablations or other corneal irregularities. The system also adjusts the ablation per pulse depending on whether a surface procedure or LASIK is being performed, reducing the need for nomograms to come up with a treatment plan.

In addition, the system incorporates a diagnostic slit lamp and a Treatment Assistant Manager routine that can be pre-programmed with standard settings for 10

or more surgeons, and guides surgeons step-by-step through procedures.

Together, these features meet just about every need of the laser refractive surgeon, making AMARIS a highly desirable package, says Tobias Neuhann, MD, medical director, Augenlinik am Marienplatz, Munich, Germany. “Until now, the unique combination of all conveniences... was not to be found on the market.”

SCHWIND was able to develop the AMARIS quickly in part because the firm is still independent, Mr Schwind says. “All-out competitors are big international firms who are interested in their stock price, which makes it harder to invest in new products. We are a family business so we can be very flexible.”

The issue is particularly pronounced for manufacturers building primarily for the US market. “The US manufacturers are coming out with developments that are four or five years old because they have to go through the FDA process. Then they don't want to touch the laser for a while.” SCHWIND, on the other hand, does most of its business in European, Asian, and South American markets. “We can adapt very quickly to the recommendations of our reference surgeons,” says Mr Schwind.

Founded in 1958 by Mr Schwind's father, who manufactured diagnostic equipment, the firm entered the excimer laser market in 1992. It has sold more than 660 systems since. The latest systems include six AMARIS ones sold on the first day that AMARIS was released – at the ESCRS Congress in Stockholm.

Mr Schwind believes that most of his sales, particularly in Europe, will come from surgeons looking to replace an existing system. The advanced features of AMARIS give the firm an edge with these customers, he believes. He expects to see significant growth in Asia, particularly China and India, as well as South America. For customers seeking a more affordable option he will continue to offer the Esiris system.

Recognising surgeons' need to keep systems running, SCHWIND has built a worldwide network of distributors and maintenance teams offering service 365 days a year from 6am to 9pm German time. “When they need a part we fly it out the next day,” he says.

And customers can count on the firm maintaining this level of service, Mr Schwind says. “We have no intention of being acquired. We are going to stay close to our customers.”

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