

MORE THAN HALF OF ALL PILOTS in the United States need glasses or contacts to meet the vision standards required for an airman medical certificate. A third-class medical certificate mandates at least 20/40 or better vision in each eye separately both at distance and near (for reading) as well as at an intermediate distance if the pilot is older than 50 years. For first- and second-class medical certificates, 20/20 vision is required at distance in each eye with or without correction in addition to the near and intermediate vision requirements.

In the past decade there's been tremendous interest in refractive (corrective) eye surgery to provide clear vision without glasses or contacts. This year more than one million Americans, many of them pilots, will undergo the LASIK refractive surgery procedure with the hope of achieving 20/20 vision without needing glasses.

The cornea, the eye's front clear covering, provides most of the eye's focusing power, and it's what doctors operate on during corrective eye surgery. The retina is the thin tissue lining the back of the eye that contains the photoreceptor cells (rods and cones) that we use to see.

In a myopic (nearsighted) eye, light is focused in *front* of the retina instead of *on* it, with the result being a blurry image. In a hyperopic (farsighted) eye, light focuses *behind* the retina, again resulting in a blurred image. Whether you are nearsighted

Laser Eye Surgery

Not everyone is a good candidate

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EAA 542398

Surgery does not alter the aging process, and individuals older than 40 will still need reading glasses for near vision, even if LASIK gives them 20/20 distance vision.

or farsighted, light must be redirected to focus images *on* the retina to have 20/20 vision. Glasses and contacts can refocus the light, and so can changing the cornea's shape with refractive surgery.

Astigmatism is a problem that may accompany myopia or hyperopia, and it's the result of an irregularly shaped (like a football) cornea. Uncorrected astigmatism also results in blurred vision. Finally, presbyopia—the eye's in-

ability to change focus from distant objects to near ones—is a condition that comes with age and degrades the near vision in almost everyone after the age of 40 years, and reading glasses or bifocals become necessary for clear reading vision.

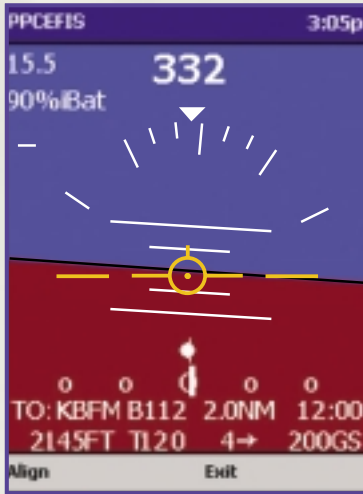
Refractive eye surgery can correct myopia, hyperopia, and astigmatism. A number of other surgical options exist, but almost all refractive eye surgery performed today is the LASIK procedure. LASIK (laser-assisted in-situ keratomileusis) uses a computerized excimer laser to reshape the cornea, thereby changing its focusing power. The surgeon uses a special scalpel, a microkeratome, to cut through the cornea's top layer and create a flap. After lifting the flap out of the way, the surgeon uses the laser to ablate a pre-calculated portion (which depends on the correction needed) of the cornea, and then repositions the flap.

Most patients heal quite rapidly, with only a day or two of minimal post-operative discomfort. After LASIK most patients have fairly good vision within days to weeks, but vision may fluctuate for several months or longer. In up to 10 percent of patients, the initial treatment results in an over- or under-correction, which may require a second procedure, or an "enhancement."

After LASIK, it is estimated that 95 to 98 percent of patients achieve 20/40 or better without glasses. Approximately 75 to 90 percent achieve

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Medical Pilot

20/20 vision without glasses. This means 3 to 5 percent of patients will have a visual acuity less than 20/40 and will need glasses or contacts to meet the third-class medical vision standards. To achieve the 20/20 vision required for a first-class medical, up to 25 percent will require some form of vision correction after refractive surgery!

Most patients are happy with the outcome after corrective eye surgery. But after surgery up to 10 percent of patients have some persistent visual symptoms. Pilots need to understand these LASIK complications because they can cause problems in the aviation environment. Complications include hazy vision, glare, halos around lights at night, poor vision in dim light, and fluctuating vision. Night vision difficulties may be especially problematic for pilots.

Another common occurrence after refractive surgery is exacerbation of dry eye symptoms. The most serious potential complication, however, is loss of best-corrected visual acuity. In other words, despite corrective lenses, vision cannot be returned to normal after surgery. While rare (occurring in only 1 to 3 percent of patients), pilots need to be aware that this happens, and it could prevent them from meeting the FAA vision standards—and may end an aviation career.

Not everyone is a good candidate for corrective eye surgery. People who need large corrections, have thin corneas, or have very large pupils are more likely to have post-operative problems. Some medical conditions and other eye problems, as well as various medications, are also contraindications to surgery. Long-term effects (over the course of a lifetime) are also not yet known.

The FAA has approved refractive surgery for all classes of medical certification. After refractive surgery the FAA guidelines state pilots should not resume flying until their eye doctor determines that healing is complete with stable vision, there are no significant side effects or complications, and the pilot meets the appropriate FAA vision standards. Once pilots meet these conditions and are otherwise qualified, they can resume flying immediately. Typically when the treating eye doctor allows a return to normal activities, pilots will meet the FAA requirements and can resume flying. On average, this occurs within four to six weeks after surgery.

The FAA requests that the eye doctor send a summary document to the Medical Certification Division in Oklahoma City once healing is complete without adverse side effects. If the previous medical certificate is still current, the FAA will not issue a new medical certificate, but it will send a letter stating the pilot no longer needs corrective lenses. To avoid potential problems, the pilot should carry this letter with his or her medical certificate.

At the time of the next scheduled FAA medical examination, pilots must report the surgery and have their eye doctor complete a "Report of Eye Evaluation" Form (FAA Form 8500-7, which you can download from the EAA website at

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www.eaa.org). Because most eye doctors don't have this form, pilots should take the form with them when returning for their follow-up visit. If pilots meet the appropriate vision (and other medical) standards, they get a medical certification without the previous lens restriction.

Refractive surgery can only correct the eye for near or distant vision. This isn't a problem for young persons who do not yet have presbyopia. Refractive surgery achieves good distance vision, and the eye will still be able to refocus to see clearly at near distances. Surgery does not alter the aging process, and individuals older than 40 will still need reading glasses for near vision, even if LASIK gives them 20/20 distance vision.

"Monovision" is an option to end the need for reading glasses after surgery because the surgeon corrects one eye for near vision and the other for distant vision. Because each eye separately cannot meet the near and far vision requirements after monovision surgery, pilots who opt for this procedure must adhere to additional FAA rules. For six months after the surgery, pilots must wear glasses while flying to meet the near and far vision requirements. When not flying, they should not wear the corrective lenses to allow their eyes to adapt to the monovision state. After the six-month period the pilot may apply for a statement of demonstrated ability (SODA) with a medical flight test. If you pass the test, the FAA removes the restriction for glasses.

When considering monovision refractive surgery, remember that the amount of near vision correction changes gradually over 10 to 20 years and that surgical near vision correction may not be adequate a few years later. Another word of caution about monovision—by definition it disrupts binocular vision, and not everyone is comfortable with it. Before undergoing a permanent surgical procedure, you should undergo a several-week monovision trial period using contact lenses to make sure you'll be comfortable with the change.

Finally, consider that while monocular vision (vision with one eye) has been demonstrated to be safe in the aviation environment, the overall quality of vision achieved with two eyes (binocular vision) is clearly better than what can be achieved with one eye (that's why we have two eyes to begin with). Beware—while monovision refractive surgery is allowed by the FAA, monovision contact lenses are not.

Most patients have good results with and are happy after refractive surgery, and most pilots will not have difficulty meeting vision certification requirements. But no surgical procedure is completely risk-free, and refractive surgery is no exception. Anyone contemplating these procedures must thoroughly understand the small—but real—risk of vision-threatening consequences that may end an aviation career. Be informed, have reasonable expectations, and consider all your options. What you see is what you get.

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