



Savvy Optics Corp Seminar Understanding Waviness and Roughness

Summary

Surface roughness causes scatter and system transmission loss, while waviness and mid-spatial frequency ripple can cause loss of resolution, image quality, veiling glare, beam modulation and a host of other issues. In the past 30 years, new manufacturing technologies have evolved using molding, diamond turning, synthetic lap polishing and deterministic figuring which have dramatically altered the surface finish of optics. In order to control the resultant surface texture errors, new specifications like gradients, correlation values, PSDs and MSF ripple specifications have been introduced. Most users do not completely understand these new notations however, and the meaning of even a simple RMS roughness specification has become obscure, or even meaningless.

The course begins by defining the terms and parameters used to control surface texture in the modern optical manufacturing world. Next we will cover the key factors associated with surface texture and roughness on optical surfaces, and how to understand their impact in optical system performance. The national and international standards for specifying texture are introduced, and the derivation of meaningful specification for texture and waviness for common applications is discussed. Finally, the identification, measurement and reduction of these manufacturing errors is treated.

Learning outcomes

This course will enable you to:

- describe the surface texture of a polished optical surface
- explain the meaning of the most common surface texture and ripple specifications
- compose a meaningful texture specification using MIL, ASME and ISO notations
- assess the impact of waviness and roughness on system performance
- quantify the requirements for surface texture using a variety of notations
- identify these surface errors in measurement data
- identify the sources of surface texture errors in modern manufacturing processes

Target Audience

This course is intended for optical design, manufacturing and quality control and assurance engineers and managers. Some understanding of algebra is beneficial.

Course Length

Half day (3.5 hours)

Instructor

Dave Aikens has been writing on the subject of surface texture and ripple for more than 20 years and is one of the foremost experts on optics mid-spatial frequency ripple today. He is President and founder of Savvy Optics Corp., is the head of the American delegation to ISO TC 172 SC1, and is the Secretary of the American Standards Council for Optics, ASC OP.