

TUTORIAL 1 (9h-12h)

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Testing and evaluation of night vision devices and image intensifier tubes

Night vision is a fully matured technology that has found mass applications in both military, security and defense sectors. NVDs are offered on international market in form of a long series of devices of different design configuration, type of image intensifier tube, type of night vision optics, and performance. Proper understanding and evaluation of NVDs is a complicated task as many details are to be taken into account.

Big numbers of night vision devices used all over the world, impressive progress of night vision technology during last several decades, and importance of this technology for defence&security sector could suggest that metrological situation in area of night vision technology should be very good. However, metrological situation in modern night vision technology is bad in spite earlier mentioned factors.

It is quite common to find on the world market two night vision devices (or two image intensifier tubes) of the same data sheet parameters but of totally different image quality. Inverse situation is possible, too. Next, it is quite common that test systems from different manufacturers generate significantly different (over 20%) measurement results. Finally, there are literature sources presenting conflicting claims of different manufacturers about superiority of one types over other types of NVDs. In this situation ability for proper testing and evaluation of night vision devices and image intensifier tubes have become a valuable art.

This course consists of three main parts that combined together give good review of present status night vision metrology.

First, a review of modern night vision technology. NVDs are classified in dependence on design configuration of NVD, type of image intensifier tube, type of night vision optics, targeted market, type of aviator NVD, and compatibility to aviation regulations. Second, characterization of night vision devices and image intensifier tubes. Here, parameters proposed by standards or literature sources for characterization of night vision devices and image intensifier tubes are discussed. Set of parameters optimal for acceptance tests, maintenance tests and mission readiness tests are presented.

Third, equipment for testing night vision devices and image intensifier tubes. An overview of requirements of MIL standards on equipment for testing NVDs and II tubes is an introduction to this part of the course. Later a review of test equipment offered on international market for testing NVDs and II tubes is presented. Sources of potential errors during tests of NVDs/II tubes are discussed. Finally, practical recommendations for calibration of the test systems to assure traceability to national standards are presented.

Intended Audience

This material is intended for engineers, scientists, and managers who need practical knowledge on testing and evaluation of modern night vision devices and image intensifier tubes.

Krzysztof Chrzanowski

Krzysztof Chrzanowski received his Ph.D., and D.Sc. both in Electronics, from Military University of Technology in Warsaw, Poland. He works currently as Professor in the mentioned above university. His main scientific interests include testing and simulation of electro-optical surveillance systems and modules (thermal imagers, night vision devices, VIS/NIR cameras, SWIR imagers, laser systems, multi-sensor surveillance systems, image intensifier tubes, IR FPA/CCE/CMOS sensors, optical modules), non-contact thermometry and general metrology. Krzysztof Chrzanowski is also a founder and CEO of Inframet (www.inframet.com) - a high-tech company that specializes in high-tech equipment for testing, evaluation and simulation of surveillance electro-optical systems and modules. Nowadays, Inframet is a global high-tech company and one of top world leaders in optronic metrology.