

## Photogrammetric Methods for Trajectory Measurements

Abstract:

by A.J.L. Willekens  
Aircraft Instrumentation Department  
National Aerospace Laboratory of the Netherlands (NLR)

This lecture discusses a photogrammetric method for trajectory measurements in flight testing at short range applications, such as:

take-off and landing performance measurements  
evaluation and certification of an automatic landing system  
tests of a Global Positioning System (GPS)

The lecture starts with a theoretical overview of the method used, being a combination of a camera and equipment on board of the aircraft like GPS or ILS, Inertial Navigation System (INS) and a Baro Altimeter.

On the ground a minimum of equipment is required, only surveyed ground control points are needed. The accuracy further depends strongly on the method used, so different methods are discussed in some detail. Operational aspects also are important for the selected method. The resulting method is relatively simple, quite accurate and can be used under many different conditions.

The practical aspects are discussed in chronological order. This illustrates how the method evolved from a simple camera and equally simple calculations to the equipment nowadays.

The manual work involved decreased with each amelioration. Some operational aspects of the new system will be discussed in more detail, as there are the flight test aspects of aircraft operation and automatic identification of ground reference points.

Based on today's system, some remarks of future evolutions can be made. Here is the question whether and where the CCD (video) camera can replace the film used today. This question has more than only technical relevance, operational issues are equally important.