

Imaging Total Stations

The Integrated Concepts



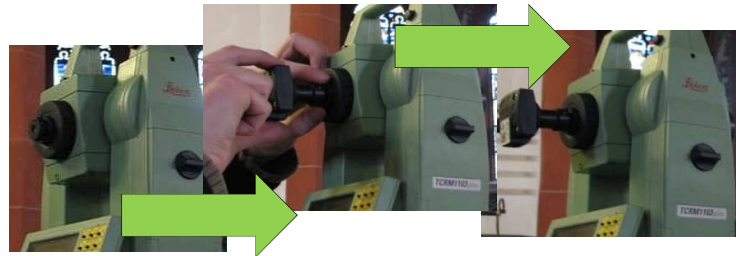
Producers of Total Stations with fixed integrated digital cameras are Trimble, Pentax, Topcon and Leica Geosystems. They develop different kinds of concepts to integrate a digital camera in a Total Station.

Trimble VX Spatial Station and Pentax Visio-Models have located its cameras adjacent to the telescope, the cameras have a wide-angle lens with a fixed focal length. The resolution of both sensors are about 3 megapixels.

Topcon Imaging Station has two cameras. One camera is located adjacent to the telescope and has a wide-angle lens for overview-images. The second camera is arranged coaxial in the telescope of the total station and uses the same focusing. Both camera sensors have a size of 1,3 megapixels.

The system from Leica Geosystem is still a prototype. The camera sensor is in the level of the crosshair and use the telescope optic.

The Modular Concept

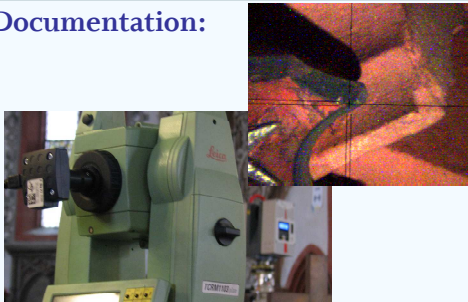


The hardware part of the modular concept consists mainly of an interchangeable eyepiece adapter offering opportunities for digital imaging and motorized focus control. Actually, we use cameras with a resolution of 3 -5 megapixels (color and monochromatic). The software part consists of a control for camera, focus and total station. In addition the digital image processing and algorithmic procedures allow to reach several levels of calibration concerning the geometry of the external digital camera and the total station.

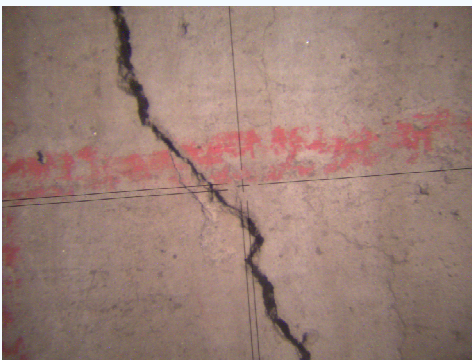
The modular concept enables an easy assembling and disassembly in the field. It is possible to switch between the classical and the imaging usage of a robotic total station. The eyepiece adapter allows an easy and cheap upgrade for "old" total stations to a Imaging Total Station. With modular concept is it possible to change several parts of the hardware or software, for example to change and upgrade the camera into a new model with higher resolution or a different sensor for IR-wavelengths.

Ideas and Applications

Documentation:



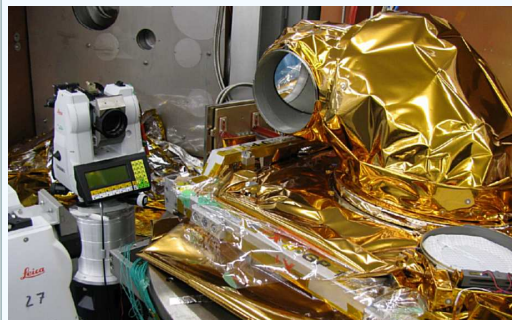
Documentation of reference points for laser scanning and photogrammetry



Crack Measuring and Monitoring

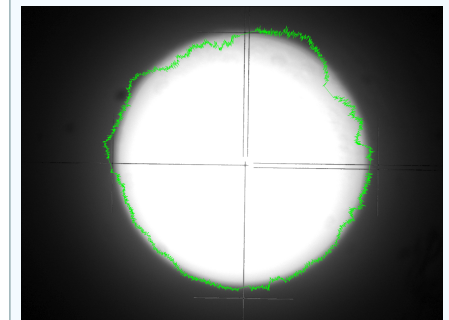
High-Precision Alignment:

In the area of industry and aeronautics, e.g. high-precision collimation of laser lines



Astronomical Azimuth:

Detection of the orientation of a total station from one position world wide. You only need one GPS-Position, geoid information and an observation of the sun or stars



Education:

For instruction and training in the use of total stations, e.g. collimation and auto-collimation.

