FROM WASTING TO SAVING BOTH ENERGY AND MONEY

Aerial Thermography and More

In recent years, the trend has been to save energy â€“ not only because of its increasing cost, but also to preserve our environment from the adverse effects of energy consumption, such as greenhouse gas emissions. One way in which cities can play a role in saving energy is through heating systems in buildings. Results are then communicated to the inhabitants in order to create awareness, both of the overall use of energy resources and of their own heating consumption in particular. The ultimate goal is to change the mindset from wasting to saving both energy and money.

Planck’s law forms the basis of temperature measurements by radiation. It is used in the Stefan-Boltzmann law which expresses the total energy emitted by a body based on its temperature. However, this is only valid for a theoretical body with perfect absorption characteristics, called a ‘black body’. The basic equations do not apply to objects of our environment, whose characteristics can be very different from those of the black body. Therefore, the emissivity of an object was introduced, which is the ratio between the energy emitted by the object and the energy emitted by a black body heated to the same temperature. This emissivity factor is then used to extend the application of the Stefan-Boltzmann law to all objects. The measurement of the energy emitted by an object associated with the knowledge of its emissivity allows its surface temperature to be determined. It is this basic principle which is used in thermography to measure temperatures of remote objects.

Nowadays, temperature measurements can be performed using imaging systems containing many pixels. The thermal infrared sensors (TIR) on the market obtain fairly small matrices, the largest of which is 640 x 512 pixels. Such matrices lead to strong constraints in aerial thermography, especially on flight times. To limit these constraints, Aerodata has developed its own thermal system by combining two sensors to make one with an equivalent matrix of 1,200 x 512 pixels. This new feature significantly enhances the flying efficiency.

Aerodata’s FLIR system works in the 3-5µm spectral range. This specific range represents the maximum emission of a body worn around the ambient temperature while enjoying a great spread in the atmosphere with very low attenuation. Thus even at a flying altitude of 1,000 metres, Aerodata’s system measures the surface temperature of an object with a resolution better than 0.1°C in favourable weather conditions (i.e. clear skies).

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