



Extending the detection limits of Optical Emission Spectroscopy capability



OPTICAL EMISSION SPECTROSCOPY

Optical emission spectroscopy (OES) is used to perform quantitative elemental analysis of metals.

STATE-OF-THE-ART EQUIPMENT

As part of the PRISM programme the Institute has invested in SpectroLab S, state-of-the-art OES equipment capable of analysing families of materials; Al-based, Co-based, Cu-based, Fe-based, Mg-based, Ni-based, Pb-based, Sn-based, Ti-based, Zn-based and W-based.

The equipment induces a spark between an electrode and the surface of the finished sample. While sparking, optical radiant energy is produced and the instrument analyses the wavelengths and energies. The spectrometer compares these to a series of pre-loaded calibration results. The analysis is instant, and the chemical data is recorded at the parts per million (ppm) level. This technology is used in steelmaking to provide rapid information on composition during the melting process.

IMPROVED ANALYSIS WITH OES SOFTWARE ENHANCEMENT

A recent project at the Institute has been to investigate the recycling and melting of scrap steels. During the trials, the measured values for some elements such as Zn, Sn, and Cu were outside of the calibration range. For example, the spectrometer results indicated that the zinc level was too high to calibrate.

To overcome this, new analytical methods were defined using the OES software. Artificial peaks for Zn were introduced into the software calibration data creating a new artificial standard. To check the composition was accurate the actual sample was analysed via Inductively Coupled Plasma (ICP). To cross check this, the Institute produced its own standards and used X-ray fluorescence (XRF) to verify compositional accuracy.

Use of this novel methodology has increased the Institute's capability to measure the chemical composition of unexpected or non-routine analysis results.