SMARTNote

How can you maximize productivity in lightweight metal scrap sorting?

Use our LMQS mode.

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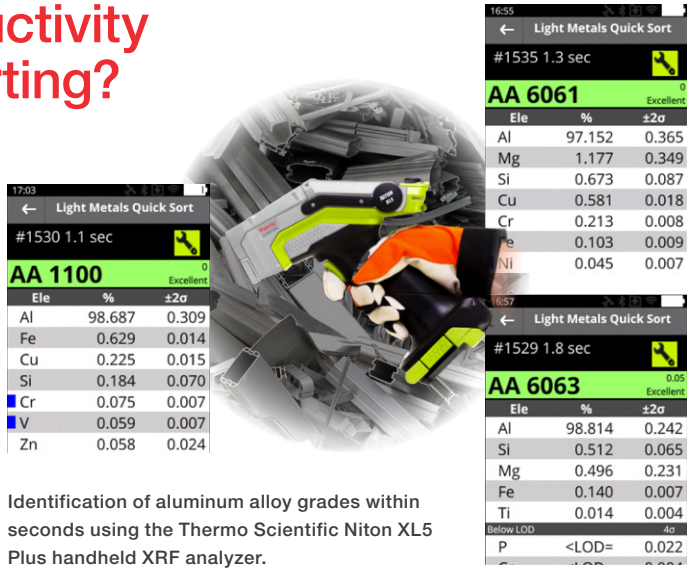
Lightweight metals are utilized in a wide range of applications due to their low density, high strength-to-weight ratio, and good corrosion resistance. Numerous grades of aluminum alloys and magnesium alloys, each with different compositions and properties, are used across industries like aerospace, automotive, construction, packaging, and electronics. As a source of aluminum for such applications, recycling from scrap metal is a highly efficient and environmentally friendly process. It saves up to 95% of the energy required to produce aluminum from raw materials and reduces greenhouse gas emissions as compared to primary production.

Handheld XRF (HHXRF) has long been an important tool for sorting scrap metals. While handheld XRF can identify most grades of stainless steel, as well as titanium, nickel, cobalt, and copper alloys within 1 to 2 seconds, sorting aluminum alloys can take significantly longer. This is especially true if those alloys cannot be specifically identified by the content of their transition metals, such as manganese, copper zinc, nickel, iron chromium or titanium. The separation of grades within the AA 1000, AA 5000 and AA 6000 series, as well as casting alloy family grade separation, requires the measurement of light elements such as magnesium or silicon. Those elements are generally measured using an X-ray beam with a lower voltage, which results in longer measurements of typically 10 seconds or more. About a decade ago, handheld laser-induced breakdown spectroscopy (LIBS) emerged as an alternative for sorting aluminum and magnesium alloy grades within a few seconds. These include the smaller spot size and fluctuations related to the transient nature of the laser-induced plasma. Compared to a wider, continuous beam of X-rays, LIBS analysis is intrinsically more sensitive to surface roughness and surface contamination, and thus less precise than HHXRF.



Identification of aluminum alloy grades within seconds using the Thermo Scientific Niton XL5 Plus handheld XRF analyzer.

More recently, the Light Metal Quick Sort (LMQS) mode available on the Thermo Scientific™ Niton™ XL5 series of handheld XRF analyzers uses a different logic than conventional HHXRF instruments. Provided with a 5W (up to 500µA) tube and a state-of-the-art silicon drift detector (SDD) with a graphene window, the analyzer starts measuring, at low voltage, elements from magnesium to zinc. This enables identification of most aluminum and magnesium alloy grades within one to three seconds, as well as the identification of other families of alloys. Longer measurements can be set for the few aluminum alloy grades that are identified based on zirconium, tin, lead, or bismuth contents.

As shown in the illustration, the LMQS mode is highly effective for the fast sorting of aluminum alloy grades with similar concentrations of transition elements, but with different light element contents, like these:

- Casting aluminum alloys containing high silicon levels from wrought alloys grades
- Twin alloys that differ only by magnesium content, such as AA3003 and AA3004 or AA2014 and AA2024 grades
- Alloys differing by only a few tenths of a percent in silicon and magnesium content, AA1100, AA6061, and AA6063

Summary

The LMQS mode, available on Niton XL5 series analyzers, enables recyclers who process high volumes of lightweight metals, such as larger scrap yards, aircraft dismantlers, or foundries, to maximize their productivity by quickly and accurately identifying magnesium and aluminum alloy grades within a few seconds.

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