

## EVOLUTION OF HANDHELD ED-XRF ANALYZERS AND THEIR IMPACT ON QUALITY OF OUR LIVES

Stanislaw Piorek, Thermo Niton Analyzers, LLC, 900 Middlesex Turnpike, Billerica, MA 01821  
*Stan.piorek@thermo.com*

The last two decades were signified by rapid pace of development in portable, energy-dispersive X-ray analyzers. Gone are the large and bulky, two-component systems of the early nineties replaced by the lightweight, one-piece, truly hand-held devices of the present (Fig. 1). This has been possible only because small, “room” temperature silicon detectors and miniature x-ray tubes, became a reality. When combined with the latest in microprocessor and Li<sup>+</sup> battery technologies, they enabled the design of a handheld ED-XRF analyzer weighing only about 1.5 kG, yet in terms of analytical capabilities, the equivalent of its laboratory, bench-top version.

Hardware improvements were accompanied by equally important improvements in analytical and user interface software. The ruggedness and reliability of construction required of field-portable instrument are likewise expected of the analytical and user interface software. The epitome of XRF analysis – the fundamental parameters – is now a common feature on a handheld system and its practical implementation does not require the operator to hold a higher academic degree.

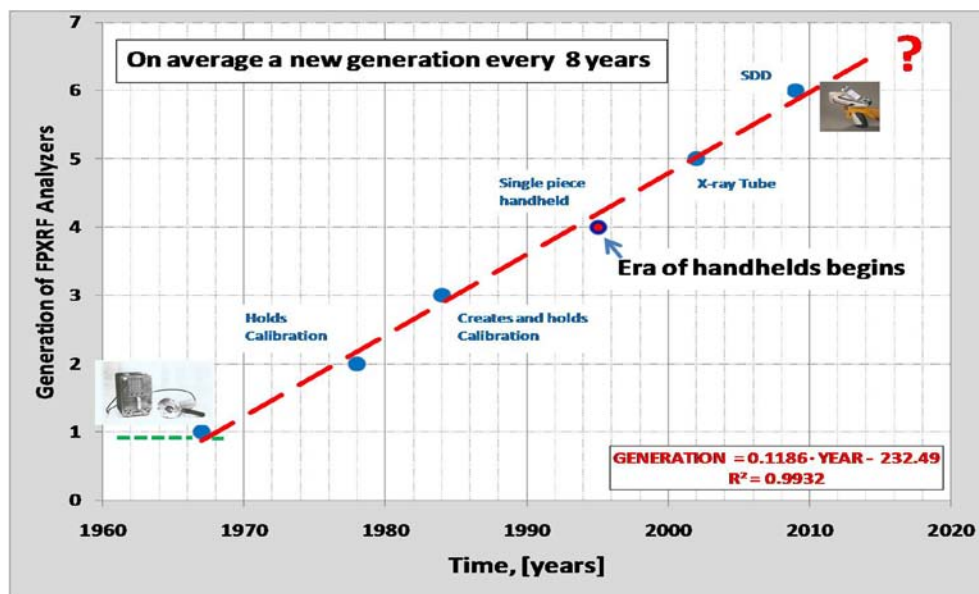


Figure 1. Timeline

It is estimated that well over 35 thousands of handheld XRF analyzers alone are presently deployed throughout the world. Majority of them are used for analysis and identification of alloys by metal producing, recycling and fabrication industries, followed by risk critical industries such as aviation, oil refining and nuclear power. The second most popular application of the analyzers is soil screening for metallic contaminants. However, in recent years handheld XRF analyzers became a routine tool of choice for screening consumer electronic products for compliance with the RoHS and WEEE Directives and for screening toys and consumer products for toxic elements such as lead, cadmium, mercury, etc. restricted by state or federal regulations. Speed of a single analysis which translates into large number of tests, its nondestructive character and the economics of use, are those features that made handheld XRF analyzer a tool of choice for industry, inspection and enforcing agencies.

We will briefly review the evolution of field portable XRF instrumentation and focus on its current state-of-art. We will show typical applications and performance of these instruments and will also point out the challenges facing specifically portable XRF. Finally, we will discuss future development trends one may expect of this versatile and powerful technique in the area of instruments' improvement and new applications.