Analyze That episode transcript

Instant Elemental Answers — The Power Behind Handheld XRF

John: Hi everybody, I'm John Margeson, product manager for Niton Handheld XRF Analyzers. Today I'm joined with Mathieu Bauer, our senior application scientist. And today we 're going to be discussing the value and underlying technology of handheld XRF analyzers. So, Mathieu, thanks for meeting with me today.

John: Just kind of start at a high level. Can you explain what is XRF?

Mathieu: Good morning, everyone and thank you John for the introduction.

Yes, the XRF stands for X-ray fluorescence spectrometry. So, it's a technology of elemental analysis that allows us to detect and measure the concentration of a wide range of elements from the periodic table like the one hanging behind me.

This range will depend actually of the different type of instrument that are available.

John: Yeah, fantastic. I do love the periodic table behind you. Great backdrop. Yeah, so you mentioned different types of XRF. Can you go a little further into detail on those different types?

Mathieu: Yes, there are basically three different types of XRF instruments. First, we have the stationary wavelength dispersive instruments. Then we have the energy dispersive benchtop instruments. So those two technologies are typically used in laboratories.

And then finally, we have portable or handheld instruments like this one that are also used and the history of This technology is almost 100 years old, while the portable instruments appeared in the 1970s. And the really handheld instruments—which operate in point-and-shoot mode— has been developed about 30 years ago and really adopted by various industries within the past 20 years.

John: Fantastic. Thank you. And just for clarity, today's conversation, we will focus on the portable and handheld devices. So, thanks for showing the fine example of the Niton XL5. You mentioned decades of use as a proven technology.

John: Just to confirm a little further, people hear at X-Ray, they want to know this technology is safe to use. Can you confirm that?

Mathieu: Yes, at first glance maybe combining X-ray and Handel instrument might raise some concern to some people, but when properly operated, handheld XRF analyzers are definitely very safe to use.

Of course, training is important and explaining some basic rules such as never holding a sample, being measured or never aim the instrument at any part of the body, as well as some good practices such as analyzing small samples in test stands—that really belongs to that training. And there are also some safeguards in place that will also prevent the accidental exposure of the user.

All the Niton instrument fulfills really stringent compliance rules globally. And so the exposure to X-ray is negligible and not of concern since the radiation levels generally remain below the threshold for occupational exposure.

John: Fantastic. Yeah, thanks for confirming that as I mentioned- decades of proven experience here.

So, I think that it‘s a tried-and-true technology We also mentioned decades of experience last year Niton celebrated 30-year anniversary. So not only does it prove that it‘s safe to use but it proves that it‘s impactful. Can you kind of start explaining why handheld XRF analyzers and specifically the Niton analyzers are so popular?

Mathieu: Yes, so here are some of the keys of success of Niton analyzer. First of all, it‘s very easy to operate even by a non-technical person. People don‘t need years of experience in a lab or a PhD in analytical chemistry to generate lab quality results. When I talk about lab quality result, it means that handheld XRF is very accurate out of the box. So, another major reason why people adopted handheld XRF is that the analysis is done on site and the results are generated in real time.

Mathieu: So, there is actually no need to collect the sample and bring it or send it to a lab and wait for hours, days or weeks for the results. This allows basically the user to make fast and informed decisions based on the XRF results and it improves dramatically the productivity of numerous industries and that‘s the main reason why a Niton analyzer has become so popular.

John: Yeah, perfect. You mentioned numerous industries. I want to get back to that. But real quick, we talked about how it‘s simple, straightforward, and easy to use?

But what about those users who are more interested in the underlying, technical data that is still captured and available with the Niton analyzers, correct?

Mathieu: Yes, definitely. All the data, including the raw data, tables, and spectra are available to our user and can be examined and processed by the user. Also, it‘s possible for the user to adjust really numerous parameters on the instrument to customize the display, to customize the report, and even actually to some models to adjust the existing calibration or build their own calibration from scratch.

John: Perfect. Thank you very much for that. Okay, so coming back, you mentioned numerous industries and I think, we could probably spend hours going into just any of these industries, but it‘s from a higher level.

John: Let‘s focus on maybe some of the industries where handheld XRF has made the biggest impact. Can you talk about a few of those?

Mathieu: Yes, some of the industry, probably the most important industry where handheld XRF had an impact is scrap metal recycling and also the mining industry.

The use of handheld XRF in environmental pollution monitoring also is important as well as maybe more recently with high gold prices in precious metal trading. It‘s also a technology that is very useful. or as a quality control tool in manufacturing industries using metals like aerospace or automotive industry.

John: I love that. And what I find so great about that answer is just how varied all those industries are.

I think it‘s not, if you just list them out, it‘s not obvious how they would be connected? Yet to have these varied industries to all still find significant value in handheld XRF, I think it‘s just fascinating. And so we talk about how the differences in these industries, all getting value from the same tools coming back to the Niton analyzers. The Niton analyzers provide specific modes and calibrations that are tailored to these industries, correct?

Mathieu: Yes, exactly. So the Niton analyzers are basically delivered with pre-calibrated mode or application or apps. And so those modes are fit for purpose and ready to be operated by the end user.

Mathieu: So he doesn‘t have to further calibrate those instruments. And there are different modes for the different applications, such as, for example, industrial metals, precious metals, mining, soil analysis, and also a few more. And for those mode actually the out of the box accuracy is great. And that being said, still the user has a possibility if he wants to fine tune the calibration using his own samples or reference material, but this feature is actually not used by more than about 10 % of our customers.

John: Very good. So I mentioned earlier, I think there‘s an opportunity to go really deep into some of these industries. Just for this episode, let‘s focus on just to me a quick summary of each. If you wouldn‘t mind starting with scrap recycling, why is handheld XRF and in particular, Niton analyzers been so popular amongst scrap recyclers?

Mathieu: Yes, handheld XRF really became an invaluable tool in scrap with metal recycling. Indeed, this technology provides information about the composition of scrap and the alloy grade of the analyzed piece. It identifies the alloy grade and then enable scrapyards to sort accurately the different metal they collect and then sell those sorted metal at a much higher price than they bought it for. And with this, Niton Handheld XRF will help anyone trading metals, especially with fluctuating of metal price, to ensure that they buy at the right price and not overpay to ensure the profitability of each transaction,

also by picking up elements that shouldn‘t be there, for example, contaminants such as lead or trapped elements.

John: That’s great and I think profitability being the key word there so thanks for touching upon that, maybe going a little further... Can you give an example where a Niton analyzer may help distinguish between two seemingly similar alloys which actually have a quite different value?

Mathieu: Yes, so the Niton analyzer helps to differentiate different grade of alloys, for example in stainless steel.

So the typical scrapyard will buy a mixture of stainless steel that will trade at around 20 to 30 cents per pound. And then when the mixture is sorted, the grade 304 will trade a bit more at about 30 to 40 cents per pound, while a grade 316, which is more corrosion resistant and contains high level of molybdenum and nickel would exchange at 60 to 70 cent per pound, which is a considerable amount considering the scrapyards trade tons of stainless steel per day and what can understand that the return of investment for XRF is really fast in this industry.

John: Right. And again, we talk about profitability coming back to return on investment. I think these are the key words, right?

And not just scrap recycling, but other industries that we can touch upon. Staying with scrap recycling for a second and on that topic of profitability. So, we‘ve covered how NITON analyzers can help identify materials and the impact that has.

John: We also know that time is money. So, I know that NITON analyzers have light metal quicksort capabilities. Can you go a little further and explain how this specific mode helps scrap recyclers operate with pace?

Mathieu: Yes, the handheld XRF has been very strong to sort, for example, stainless steel, as we‘ve just said.

For aluminum, it took usually a bit longer to sort aluminum grades, for example, to differentiate cast aluminum from wrought aluminum. And so recently, we have released a new approach to sort aluminum within one or two seconds, which dramatically improved the productivity for companies processing high amounts of aluminum such as aircraft dismantler or aluminum foundries.

John: That‘s great. And like I said, we could probably spend hours talking about just scrap recycling, but I do want to touch upon some of those other industries that we highlighted earlier.

Moving on to perhaps mining and geological exploration, starting from there, how have Niton analyzers been able to help users in these industries?

Mathieu: Yes, Niton analyzers are able to detect and quantify the elements in minerals. It can be used to analyze soils or outcrops in unexplored areas. And so based on those

results, it allows geologists to map an area thanks to the integrated GPS and actually discover potential new mines or new mining sites.

Mathieu: Then in the mining process, the handheld XRF also plays a role in the second step which is analyzing drilling cores to model the potential mining site and assess the economic viability of this mining site. And yes, another place where handheld XRF will play a role is in the mining process itself to locate where the higher-grade ore are located and then also to check the grade of the extracted ore.

John: Fantastic, right, And so we've covered how the Niton analyzers can help provide fast results for users in these industries. Staying with mining and geological exploration, maybe to further contrast and point to that improvement with handheld XRF, can you highlight what some of the more of the traditional alternative methods of analysis which are used in these industries and how those compare to handheld XRF?

Mathieu: Yes, definitely. So Handheld XRF helps to accelerate the exploration process because it allows to connect a much higher density of data with a better traceability with, as I mentioned, the integrated GPS that will store the GPS coordinates along the composition.

Mathieu: So in other words, more information will be available to the geologist about a deposit while cutting lab costs for assays by a factor of 10 or even 100. So overall, the benefit for those users is that the exploration process will be more efficient and it will lead to more precise and accurate resource estimation.

Mathieu: And also in the mining process itself, it allows in the extraction process to make informed decision in real time.

John: That's great. And so just adding some of these keywords you've touched upon, profitability, return on investment, efficiency, another one that you just mentioned.

So I love that. And just kind of comparing the different industries, with scrap recycling, we talked about how light metals quick sort mode helps users cut seconds off their operation? And that makes a significant impact. In this mining and geological industries, we're talking factors of months and weeks down to days. So just even more significant.

John: So I think great examples. Thanks, Mathieu. And if we're going to stay somewhat in the same industry, but maybe more tangentially related, can you explain how Niton analyzers would be used in more environmental analysis?

Mathieu: Yes, so Niton Analyzer would be used in very similar manner in environmental analysis than in mining. So, this may be a slightly different purpose, targeting more the heavy metals in soil. So, this is typically done around former industrial sites or mine.

Mathieu: This is done typically before the shaking construction projects or resigning the use of the sites. So, the Tentadic SEREF will provide data that allows environmental assessment and ensure that the quality of the soil and the level of heavy metal will fulfill compliance. And by mapping the hotspot of the pollution, it will also help to support remediation of the soil to restore the site to an economically usable state.

John: Fantastic, right. And so, we talk about using the handheld XRF and to map out various areas and different differences in soil composition. And just to kind of bring that back to the Niton analyzers, I know that the Niton XL5 Plus has integrated GPS to help with that mapping. So, I think it's a great example.

John: Thanks, Matthew. Okay, just for the sake of time, let's change industries once more. Precious metals, as we're recording gold is on a significant rise in value and that has brought a lot of attention to the precious metals market. Can you explain why handheld XRF is so popular amongst precious metals resellers right now?

Mathieu: Yes, so... The Niton analyzer will measure the composition of not only of gold but of all types of precious metals including silver, palladium, platinum, iridium and few others that are present in all kinds of jewelry like rings, earrings, bracelets and also in other precious metal products such as dental alloys or bullions. When beside the scale it's really the indispensable tool for those who trade precious metals to set the price of the transaction and ensure that the transaction will be profitable based on the XRF results. So, we have also other ways to analyze precious metals such as acid testing which is generally not very accurate with typically an accuracy about 2 to 4 karats, which is about 8 to 10 percent in weight while XRF can measure within that accuracy that is generally of 0.2 to 0.5%. So that makes a huge difference for not overpaying gold and estimating properly the value of metals, gold and also other metals such as palladium or platinum which also are very valuable for example, in white, gold or in dental alloys.

John: That's great, right. And so, I think now we're starting to kind of piece together how these seemingly very different industries can all see the same value with handheld XRF.

So, whether you're in a scrap yard, mining exploration site or a pawn shop, handheld XRF brings back those keywords of efficiency, return on investment. and profitability. So I think you're doing a really good job of kind of tying everything together.

So, thank you for that. Sticking with precious metals for a second, you mentioned, obviously Niton analyzers can process more than just gold. There's a wide variety of materials in precious metals. We also know that with these materials being more valuable, there's a rising market for counterfeits.

Can you explain how Niton analyzers can help uncover counterfeit materials?

Mathieu: Yes, so Niton Analyzer has a... a proprietary patented technology called AuDIT. It can detect the gold plating up to 8 micrometers. To avoid people, for example, working at pawn shops to buy plated gold as solid gold and detect counterfeited gold jewelry made of, for example, plated metals such as tungsten, which have the same density than gold and that can basically fool the buyer.

John: Yeah, and that's obviously what we're trying to avoid. yeah, thanks for highlighting the patented AuDIT technology. Okay, so we've covered scrap recycling, mining, precious metals.

John: One more industry that I want to get to is manufacturing, specifically quality control. Can you highlight how Handheld XRF and specifically the Niton analyzers can help businesses with their quality control?

Mathieu: Yes, it‘s really also a great tool for this industry. So the XRF helps the deals industry to ensure compliance with specifications and standard, and also basically reduce material mix ups and resulting production errors, and also overall supporting a better traceability of the material throughout the entire supply chain. With these failures prevented also in some mission critical industries such as automotive and medical device, it becomes obvious that the value that is brought by Niton Handheld XRF to also perform diligently quality control to avoid, for example, expensive records and overall preserve what‘s more valuable for a company which is its reputation.

John: Perfect and adding on to the keywords you mentioned traceability. I think that‘s something we hadn‘t highlighted in these previous industries so I think really good job calling that out. I‘m sticking with manufacturing and some of these other industries we‘ve discussed we‘ve highlighted and Niton Handheld XRF analyzers. It‘s compared to more traditional methods used is staying within manufacturing, can you can you explain the practical benefit of a Niton Handheld XRF versus alternative methods for quality control?

Mathieu: Yes, so unlike a lab analysis, the use of handheld XRF can be done at-line in the manufacturing process and it actually has another benefit. It‘s completely non-destructive so that, for example, bulky or expensive finished products do not have to be cut, damaged and then taken to a lab for analysis.

Mathieu: a batch doesn‘t need the spec that the corrective action can be taken promptly without having to wait for the lab results. This actually can save a lot of money and avoid product losses as well as enhance overall the productivity of a business.

John: Thank you, Matthew. I think it‘s a great answer. And just looking at time, I think we‘re about ready to wrap up this episode.

So thanks again to Mathieu Bauer, our senior application scientist. A really great insight from you, Matthew. I‘m John Margeson, product manager here with Niton Handheld XRF Analyzers. If you‘re in an industry that we haven‘t discussed, or even if you are in one of the industries we did discuss today, please keep a lookout for follow-up episodes. We‘ll go a little further into some more of these applications.

And just as a reminder, Niton has recently celebrated 30 years history as a leader in the handheld XRF space. And in a larger view, Thermo Fisher has a wide range of products, not just handheld XRF, but floor standing and automated XRF products that can help with more industry than we were even able to touch upon today. We have a global distribution team ready to help you. If you have a question about a specific application and you‘re interested in handheld XRF, please reach out. You can go to thermofisher.com/niton for more information on the analyzers we discussed today. And yes, we thank you for the time and please keep a lookout for following episodes.