

Analyze That episode transcript

Recycling Revolution: Handheld XRF Analyzers in Scrap Recycling

This transcript has been lightly edited for clarity, readability, and length. The content reflects the original discussion and technical intent of the speakers.

John: Hi everybody, I'm John Ferguson, product manager with Thermo Fisher Scientific, focusing specifically on Niton handheld XRF analyzers. Today I'm joined with my friend Kyle Schneider from Premier Analytical Solutions, an authorized Thermo Fisher representative for the Niton analyzers. So, this is the next episode in a series we're doing called Analyze That, specifically looking into the value of handheld XRF analyzers.

And Kyle's here today because he's an expert in scrap recycling. And we really want to focus on the impact that handheld XRF analyzers have on scrap recycling. So, Kyle, thanks for joining. How are you, sir?

Kyle: Yeah, good to see you, John.

John: Likewise, likewise. Yeah, I'm here in snowy Massachusetts. I think you guys got some weather down there in Texas, but you're hanging on all right.

Kyle: Yeah, we survived. Yeah, we're not used to the cold weather like that very often, but we came through this pretty unscathed.

John: Yeah, that's what I like to hear. Yeah, I would like to say we're more use to it in Massachusetts, but yeah, two feet of snow with the, I don't know if I'll ever get used to that all in that short period of time. Yeah, awesome. So, thanks, Kyle. Glad to hear everything's going well down there, and thanks again for joining us. So, I've mentioned the topic of discussion today is handheld XRF analyzers, specifically for scrap recycling.

John: A few things I want get into before we get into questions.

I want to make sure we're talking, what are the advantages? What are the applications specifically within scrap recycling, metal sorting, quality control? Hopefully we can touch on some of the key benefits that the users of the analyzers experience. And then hopefully some specific use cases and testimonials that you've encountered with customers using the analyzers. So, sound good to you?

Kyle: Sounds good.

John: All right, so let's hop right into it. First question. What are the biggest challenges scrap recyclers face when they're sorting and identifying scrap metal?

Kyle: You know, some of the biggest challenges are obviously speed and accuracy. You know, it's usually a pretty dirty environment. There's lots of stuff moving around, trucks, tractors, all kinds of things going on. And, you know, at the end of the day, they're trying to get as accurate as possible, as fast as possible. So, you know, there are lots of different alloys, lots of different metals. There's, you know, depending on the type of yard, where it's located, there could be just a, you know, a bevy of different alloys. They're trying to get through it as accurately and quickly as possible. So, you know, I think that's kind of right where Niton Handheld XRF Analyzer fits in. Always kind of been the go-to ever since they came out. That was really one of the first applications to really gravitate and grab the handheld XRF technology.

John: That's awesome. It's a great answer. And I like that you touch upon the variety of operations, right, within scrap recycling. It's not cookie cutter. Every operation is the same. You're to have different materials, different sides of operations. But you hit them on, the importance of speed, accuracy, robustness, rugged analyzers. Yeah, think those needs kind of persist across the varying operations within

Kyle: Yeah, it's absolutely one of the one of the more, I guess, dirty, rough environments that we have. So, so obviously being rugged and durable something important as well to you.

John: Yeah, I love that. Yeah, we like the nice bright colors on our Niton handheld XRF analyzers for that exact reason, right? We're in these dirty environments, so that's what we like to be. Yeah. All right, so cool. Thank you, kind of given the high level of the challenges, the pain points that these operations are focusing. So, let's take it maybe one step further. Can you describe how exactly a handheld XRF analyzer is going to fit into those daily operations at the scrapyards or a recycling facility?

Kyle: Yeah, absolutely. So, you know, lot of the larger mills, really big scrap yards that they'll implement, you know, some laboratory equipment. Yes, LECOs. And that's all good and well, but a lot of times they'll need, you know, again, the quickness of the not only the sorting, but the identifying the materials, especially if it's like shavings or turnings or anything like that, they're going to melt it down to a button. And they need some pretty quick analysis, whether they're going to be, you know, shipping off material or they're going to be offloading material that's arrived. So, a lot of the scrapyards, again, it's just a very fast and furious pace. There's lots of trucks that are waiting on scales to whether they're leaving offloading. So that's really the biggest thing is, you know, a handheld XRF is paramount for this type of measurement. You know, it's portable, it's quick, it's accurate. In most cases, it's the perfect solution for that type of

need in that application. So yeah, really, it's again, kind of back to the speed and accuracy.

John: Yeah, I love it.

And you mentioned the portability too, right? That's something that I've definitely heard directly from users, right? It's making sure it's not just an instrument that's portable and a handheld, but handheld and also in a way that can be used ergonomically for hours on end.

Yeah, I think that's, that's a good kind of summary of what the sort of the controlled chaos that we often encounter at the facilities. Okay. So we've talked about sort of the, different pain points and the overall, you know, variations that we're going to see with these operations. You also touched upon like the different materials, the different metals that, you know, different scrapyards might encounter on, you know, different regions different markets cycles, times of the year, right? So can we go a little bit more into those materials? Like what types of metals and alloys specifically are we most frequently seeing analyzed with these handheld XRF analyzers?

Kyle: Yeah, Nickel is king and kind of always been king. The two topper are Nickel and Copper. I would say those are probably the two most just from a monetary standpoint.

But you know there's a bevy of all types of you know, you got the stainless is the high temp Which is like a nickel chrome cobalt alloy the red metals, which is you know, typically a copper based you know the bronzes the brasses Aluminum is actually taken off probably in the last, know handful years, maybe decade especially the focus on the six thousand and seven thousand series with a lot of the aerospace a lot of the a lot of the auto manufacturing so there's, it's ever growing. It's a challenge to try to get, know, keep up with the demand. But those are really the biggest ones. I would say it's, you know, the nickel and then again, the high temp and nickel chrome cobalt. And then now recently the aluminums. That's really coming into play a lot for a lot of the scrap and recyclers. So where before red metals, Aluminums, were kind of all just thrown in one pile, but now it's becoming a request from a lot of the mills, a lot of the larger facilities saying, hey, if you can sort them out properly for us, we can pay a premium for you because it's going to make their jobs a lot easier once everything arrives there at the mill.

John: That's a great answer. I really like that kind of setting the stage of what's traditionally been sort of the most common, right? Nickle is King. I definitely hear that. Then on the more recent trend, I think that's fascinating as well. So you mentioned the aluminum is being more popular, more and more common. I understand aluminum, it's a lighter element. Can you kind of jump into what differences that makes being, you know, aluminum being a later element as compared to some of the others that maybe are more commonly, you know, historically seen in scrap recycling.

Kyle: Yeah, so the light elements, especially the 6000 series, it's got, you there's traditional, you know, your heavy elements, you know, your nickels, your chromes, your irons, your cobalts, et cetera. The lighter elements, which is just a, it's just on the periodic table, it's just a lighter signal coming back to the analyzer itself. So primarily it's aluminum, silicon, magnesium are the elements you're trying to analyze there. And up until the recent, you know, silicon drift detector or SDD for short.

It was a challenge to accurately measure those. It's just kind of like everything else. As technology is getting better, the SDD detectors are getting more and more sensitive in a good way, lower detection limits. That's really increasing the capability of a lot of these scrapyards. And then there's also some features out there on an analyzer specifically that we have. It's called the light metal quick sort, which allows you to access those light elements first. So typically, five seconds or less you can accurately or positively sort out, you know, lot of the materials that are in the aluminum family very quickly. Traditionally you'd have to wait a little bit longer to get to those elements. It's a pretty good feature. There's been a lot of talk about it and, you know, customers are liking that feature right now.

John: Yeah, thanks for that. Thanks for the secondary in-depth explanation there. I really appreciate it. You brought it back to speed too, right? That's kind where we started saying, hey, that's the name of the game for scrap recycling. So now focus on aluminum in the speed of sorting and identifying aluminum, I think really connects. So, let's kind of stay on that thought, right? So maybe a novice or someone who's newer to the space, you're in a scrap yard, you see all these materials.

A lot of them look very similar, right? To the naked eye. But we understand that these materials, just because they look similar, they are not similar in their core build. And that similar materials may actually have really different values, right? And think that's the ROI is something that our users are very interested in. So, can you also expand on how XRF really helps distinguish between these similar look materials? Like stay in the steel grades or some higher temp alloys. And then what does that distinguishing do in terms of return on investment for scrap recyclers.

Kyle: Yeah, absolutely. So again, to your point, you walk into a scrap yard, it can be fairly daunting, especially if you're, you know, you kind of a startup or a mom and pop, you're just really trying to get into it because there's, there's, there's an ever need of, of, know, places to sort out the metal. So just kind of looking at a pile, a lot of the stuff to your point looks very, very similar. So obviously the copper alloys look, are going to have a certain look to them.

Most of the aluminum's are going to have a look to them, but to be able to tell the difference between a nickel alloy, even an iron-based alloy that's been cleaned, it doesn't have any oxidation on it. In order to sort those out, know, the more nickel that's in the material, the more money it's going to return on your purchase. So being able to positively identify that accurately and also in a quick timeframe, it's very, very beneficial to sort those out. So, you've got all the different grades of stainless. You got the 300s,

the 400s, some of the duplexes that are some of the newer alloys that are starting to see in the petrochemical space. And then you've got the high temp alloy stuff that's really, really high in nickel. It's got cobalt and chrome in there and sometimes those can be hard to sort out, but having a good, long-standing robust application and algorithm to be able to positively identify and sort them out is going to bring a much better return and more confidence for the folks that are out there sorting. Just having a good, accurate, trustworthy analyzer is going to be the key.

John: Yeah, I love it, right? It's the confidence, it's the trust, yes, because we mentioned the speed, and so you're doing however many hundreds, thousands of samples a day. You want to have people to trust those results consistently, I think is so key. And you mentioned that also, I want to circle back to you, right? So, we talked about how just because materials look the same to the naked eye doesn't mean they actually are and doesn't mean they have the same value. You also mentioned, like, you know, oxidation, right. And maybe rusted materials. My understanding is, you know, sometimes there's some sample prep that is needed before a scan is done. Can you kind of talk about what that sample prep may look like when it's needed, when it's not needed?

Kyle: Yeah, absolutely.

So, a lot of times, especially in the scrap environment, the material may be clean when it arrives, but you know, you've got a tractor side by side trucks driving it out. It's going to definitely build up some build up some, you know, I guess dirt, per se. So, you always want to remove that just a good clean rag is kind of a quick one on that one. That's going to be good for all your, you know, your iron based, nickel-based alloys because those are pretty lenient on the sample prep side of it. Obviously, you want to remove any paint, any coating, anything like that. If you have any piping or anything like that, that you may have any, I guess, curiosity that it may be welded or an overlay or a spray. It's always a good idea to shoot the end of that pipe.

The two metals that are almost paramount that you want to sample prep on are the aluminum alloys and the copper-based alloys. So, aluminum specifically, because silica is part of the makeup of a lot of the alloys, especially the 6000 series. So, you want to make sure that you're getting an actual or an accurate measurement on that specific element. Silicon is basically in sand. So, if you're getting dirt, that's going to be piled on top of that material.

It's always a good idea to use a grinder more than just wiping it off. You're going to want to make sure you're prepping on that to get your accurate measurement to be able to sort like specifically, know, a 6061 versus a 6063. You know, the main element that sort those two is silica is one of them, obviously aluminum, but magnesium and silica are the two main drivers to sort those two. In order to get an accurate measurement, you're going to want to sample prep on those. removing any oxidation, anything like that on there. It's pretty paramount for the aluminum alloys.

John: Yeah, I appreciate calling out the aluminum as well, right? Because we just mentioned how important aluminum is and how that importance is growing, right? So that need and sort of the attention to detail in the sample prep, think is important to call out. And I just want to be clear, this is like a, a technology specific, right? That's any handheld XRF analyzer. That's best practice. yeah, I think that's not always understood. And I think it's worth noting. So, thanks for kind of touching upon.

Kyle: Yeah, lot of these, again, it's a surface measurement. you're not, you know, you're not burning down into the material. Like even, even some of the, some of the old LIBS out there as you can burn through it, but it's, we've done a lot of testing internally and it's just, it's not, especially on the aluminum, you're going to want to make sure to remove any of that surface contaminant to get good and accurate readings.

John: That's fantastic. And again, right, that's, that's, that's a sort of a sample prep that I don't think is always well understood, but I appreciate kind of going into it. and to take it one step further, right? So, we've talked about, you know, the variations in scrap recycling operations, sort of the general value of the technology. Can you go a little bit more into say, you know, we've talked about the ROI, the return on investment that a scrap recycler may see when using handheld XRF analyzers.

Can you kind of detail exactly how they're realizing and maximizing that return on investment?

Kyle: Yep, so a lot of times you know you've got a guy out in the yard. They're like hey, this guy's been doing it for 20 years. You know he's as good as gold. They've had gone back to the old, you know spark tester where you know they grind on it looking at the sparks the way it goes. But that's those guys are few and far between now so. Even customers that were hesitant in the past that were, know, we don't want to invest in in an XRF. You know I've had one case in point. There was one customer that I talked to at one of the scrap and recycling shows years back. He had purchased a truckload of what he had intended was 316. It was kind of a trustworthy customer he bought it from. Said, yeah, we'll buy it. Typically, 316 is about a 10 to 14 % nickel. So, you're paying per pound of it, 10 to 14%. Soon as the truck arrived, he had just recently purchased an XRF about six months before.

Was able to shoot the material, the entire load actually showed up as Nickel 200, verified it, grinded it down, shot the ends of it, making sure it wasn't a thermal spray or an overlay. He positively identified it as Nickel 200, which is a 99 plus percent nickel. So his profit went absolutely through the roof. And he likes to tell that story, said, look, you know, I paid off my XRF and literally one load. So that was a pretty fun story that I like to share pretty often. He jokes about it every time we see him. Pretty good story on how successful they can be.

John: That's awesome. I don't think we can guarantee that for every single experience. The first load you use the analyzer on, but it kind of shows you all it takes is one positive

use case like that, and again, it goes back to point of what we think we have, what we see in front of us is not always what is there. Using these tools to kind of get that next level analysis.

Kyle: Yeah, it's actually a double-sided coin. I had one customer, a fairly large customer, really, really heavy copper buyer. They ended up buying a few trucks full of what's considered Copper No. 1, which is pure copper. you know, basically 99 plus percent copper, they're using it, you know, in really critical connectivity applications. They basically ordered a bunch of trucks of it, get it on site. They have quite a few of handhelds on site.

Once the units arrived, or once the trucks arrived, they went out and started sorting all the material, shooting it, got it all sorted out, cleaned up. You know, months later it was shipped off to the mill. The mill came back to them, providing them with a pretty hefty, I want to say it was like a 30 % downgrade, because they ended up finding out that that copper was not pure copper. It was not copper one. There was actually a, there's a type of copper out there that has a specific element. It's only half a percent and it's a pretty small amount. But unfortunately, they did not have the appropriate analyzer in their hands that they were able to detect that particular element.

So just that downgrade alone, them having the right analyzer in their hands would have helped save that. So, they ended up coming to me asking what a solution would be for that. We were able to provide that, get the correct analyzer in their hands. Now going forward, still doing a lot of copper one in their business, but they can verify that, is it really copper one or is it this specific grain of copper that has a need out there. So now they're even sorting to a deeper depth.

But again, it kind of goes back to having the right analyzer. Now it's not always the most expensive. It's just talking to your rep, making sure that you got the right analyzer in your hand. That's the key. So if you're going to invest in one multiple, I like I said, these guys have five or six of them on their site. So it's very important to make sure you got the right analyzer.

John: Yeah, I really like that example, right? Because one you mentioned two sides of the same coin, right? So, the first sample that customer, he's constantly joking about that story. Assuming the second one maybe isn't joking about it as often. But right, the key word there is verification.

Kyle: Yes.

John: Yeah, you want you want to know what you have want to know what that what that material actually is scrap recycling. A lot of material can come from a lot of sources, so really hard to track that back. Yeah, that's fantastic examples. Appreciate that Kyle. So just kind of looking at time. This has been great. I want to close up maybe with a final question of. What advice would you give to an operation scrap recycler yard who's?

who's just starting to implement handheld XRF technology, what do they need to know first, getting their hands on these tools?

Kyle: Yeah, I mean, I'll say first thing is, you know, try to get an expert out there. Don't just don't just get online and start searching for, know, the cheapest analyzer you have out there. I mean, we get it, you know, startups, you know, that the capital may not be there, but know, it's free to get one of us like myself or somebody else out there. Like get an expert out there, you know, really walk through, talk about your applications, talk about your needs, finding out exactly what you need. I mean, there's a lot of options in handheld XRF out there. I mean, there's.

There are pre-owned options that will, particularly that we can sell through the factory, new ones. Also getting into the local round tables, the ISRI shows, the remote round tables come into, those types of things, or even some of the large conventions, kind of talking to your peers and finding out really what's making them successful.

There's a lot of us scattered throughout the countries, throughout the world. So if you have any questions, just reach out to us. mean, Thermo's got a pretty large web, so we're here to help you in any way we can.

John: Yeah, that's great. So earlier you mentioned, hey, just simply buying the most expensive analyzer may not be the best fit. And simply buying the cheapest analyzer may not be the best fit. Yeah.

I think that's really good advice. Find out what tool you need for your operation, what your applications are. I think that's just really well said. And hopefully, I think.

Very often, Kyle will be the expert I would refer you to. So, clearly know your stuff.

Again, thank you so much for joining me today. I'm John Ferguson, Product Manager for Thermo Fisher Scientific, joined by Kyle Schneider with Premier Analytical Solutions.

If you want more information, please reach out. You can find us at thermofisher.com/scrap.

So again, thanks everybody and stay tuned for more episodes of the series.