

## Analyze That episode transcript

### Beyond the Shine: Handheld XRF Analyzers in Gold Analysis

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**John:** Hello, welcome. My name is John Margeson, product manager for Niton handheld XRF analyzers here with Thermo Scientific, covering the value and importance of handheld XRF analyzers.

Episode one covered the underlying science of handheld XRF. So, if you're interested in that topic, please go back and listen to episode one. But the remaining episodes of this series are going to jump into the specific value of handheld XRF within various industries.

Today's focus is on the value of handheld XRF for precious metals analysis. And joining us to discuss that value is our North American sales director, Pete Anzalone. Welcome, Pete.

**Pete:** Thanks for having me.

**John:** So, Pete, with no further ado, let's hop into it. Talking precious metals analysis with handheld XRF—I guess the first question I want to cover: handheld XRF, there's a wide variety of industries and applications for precious metals. What type of industries or professions, what type of users are actually using handheld XRF for precious metals?

**Pete:** Of course, John. So, at the moment, we're extremely busy, and the driving factor for that, and those particular industries, are the buyers and sellers of gold. Anyone that's dealing with any precious metals can see that the gold prices have spiked, and that's led to an uptick in demand for our XRF analyzers.

So, the industries that we're typically serving are the jewelry manufacturers, buyers, and sellers of gold—typically pawn shops that you see up and down the high street—and of course, manufacturing, gold buyers, and estate management also. So, if you're in the position where you have a bereavement in the family, analyzers are used for assessing the total value of that particular estate from a precious metal standpoint.

**John:** Fantastic. So, I think the keyword there is gold. We're talking precious metals, but gold is a huge driver of this market. At the time of recording, gold is experiencing record-high prices. So that is definitely a factor in the increased demand we're seeing.

Let's stay on gold for a second. How accurate are Niton handheld XRF analyzers when identifying gold purity?

**Pete:** Extremely accurate. If you look at the three different methods of measuring gold, John, you've got the acid testing, and then you've got the X-ray fluorescence, which gives you a quantitative composition of the material non-destructively. And then you've got the ultrasonic, which is measuring the density throughout the material.

So, of those three main elements, the most accurate by far is X-ray fluorescence, because that gets you down to the percentage of the gold for that composition. And with gold price as of today at \$4,000 an ounce, those points of a percent really do make a difference when you're buying and selling gold.

**John:** Really well put. Yeah, and I appreciate you comparing to the alternative methods, because I think folks in the industry are probably well versed with those methods and maybe not all are experienced with handheld XRF.

So going a little further, we're talking about gold. I know the Niton analyzers—we have a specific feature for gold plating. Can you tell me more about the AuDIT technology and what that is doing for identifying gold plating?

**Pete:** Yeah, absolutely. Our analyzers have an algorithm that is measuring best-case standards. For instance, 14 karat is 58.3% gold. Depending on the blend of gold that you would like—like a rose gold would have more copper in it, a white gold would have more nickel in it, and vice versa—but in essence, you're measuring the 58.3% of gold for determining 14 karat.

And just as a back-of-the-envelope calculation, you simply divide 14 by 24—24 being 99.9%—to determine the amount of percentage of gold that's required to meet that karat value. You want to get to that level of detail to ensure that you're buying and trading the gold to the exact level.

And this industry is based on trust. If you look at how things are transacted, there's a buying and selling process that you deal with certain individuals and the public. And that's where it gets a little bit challenging, where the public comes in. They perceive the item to be 18 karat, which represents 72% gold. And you can instantly show them on the screen via the Niton Connect that it's indeed 10% or 14%, and value the item appropriately.

**John:** Fantastic, and I know we've tested this. My wedding ring, tested in the Niton DXL, came back as 14 karat as advertised. My watch came back as gold plated, also as advertised. There's situations where gold plating is completely normal and expected, but there's also—I've encountered examples where items are not as advertised.

Can you give me, and I know Pete, you've seen this, can you give me some examples of maybe a counterfeit that has been uncovered using a Niton XRF analyzer?

**Pete:** Yep, unfortunately, as my grandmother said to me when I was very young, you know, not all that glitters is gold, John. And I had no idea at that young age it would be so relevant now in the latter part of my adult career. But it very much is.

And unfortunately, where there's money to be made, unscrupulous people will go to extreme lengths to counterfeit the gold and its perceived value, even going as far as stamping the gold 18 karat when indeed it's only nine or 10 karat. So you can trust, but verify. We're eliminating the guesswork with handheld XRF. If an item comes across your desk, you need to be able to say, I'm going to trust and verify, and the XRF removes any guesswork or second guessing.

At trade shows, you hold your breath when someone gives you a diamond ring and you hope it's authentic, and not one to be disappointing. But an individual came to a JCK jewelry show, which is the largest jewelry show we attend every year, where there's over \$7 billion of gold exchanged during these events. Chains, jewelry manufacturers buy hundreds of feet of chain and they make them into 22-inch or 10-inch or 16-inch necklaces.

Well, two brothers came to the booth with a bag of bracelets. One brother said, 'My younger brother purchased this bag of bracelets and we do not believe that this is accurate.' The color was questionable, but within seconds we took one piece of the bracelet, put it in the DXL2 800 Niton XRF analyzer, closed the lid—which is a closed-beam lid, so you're keeping your eye on the sample the whole time—and straight away it was a non-standard karat, which gives you an indication further investigation is required.

So, at that point, the best thing to do is hit the item in two or three places to verify that you're seeing consistent irregularities. And we pushed it back to him, and I was later told that it was the value of \$15,000 of bracelets that his younger brother purchased from somebody off the street.

So, the only way you could authenticate further is that you actually cut the bracelet in half, which the gentleman did back in his room—not too sure how he did that. But he came back to the booth. We were able to go into the segment of the bracelet, and there was no gold present. So unfortunately, in this instance, that investment was sunk and the counterfeit wasn't caught at the point of purchasing. So, the justification to trust but verify is no more evident than in that case.

**John:** Yeah, and I imagine, with gold prices hitting record highs, you can also imagine instances of counterfeit jewelry being at record levels, just because the motivation is that much higher. So, I think it's a really good example. Thanks, Pete.

I like the instant results, I think, as such a key takeaway. We talked about the other typical methods that may involve sending out samples to a third-party lab, versus when you have an XRF Analyzer, you get those results so instantaneously.

I guess sticking on that, we talked about the aspects of handheld XRF for precious metals analysis that people love. Let's talk about what are some of the common

questions or concerns that folks have when they're new to the technology. Are they curious how safe the technology is? Can you elaborate on the safety of handheld XRF?

**Pete:** Yes, this is important. In essence, Thermo Scientific is a laboratory manufacturer, and we have scientific instrumentation for industrial applications. So, every aspect of our instrumentation needs to follow health and safety requirements.

It's an X-ray, which is exciting the atoms, and you need to be able to ensure that you have the appropriate training to use the instrument correctly. It wouldn't harm you initially. However, there are emitting X-rays, and if it was done consistently, it's equivalent to going to your dentist where you'll have an X-ray at that point. That is emitting X-rays, and you need to take necessary precautions.

The beauty of the two technologies we have: one is the benchtop DXL 800, which is a closed-beam system. It has a glass front and glass rear, and the item of jewelry is always visible to the client. But not only that, when you close the lid, it's a closed-beam system. So the safety in that aspect is far greater than a handheld portable, for obvious reasons.

The handheld has the same technology, but because of its versatility, it can be used incorrectly. Yes, there's absolutely some health and safety rules required, but not to the extent that you need to be concerned as with a class three laser, which would be instantly detrimental to your physical being.

**John:** That's really well put, Pete. And yeah, we just recently celebrated 30 years of Niton. So, the technology itself is tried and tested at this point. So really great explanation.

So, we've talked about operator safety, which I think obviously should be the first concern. But let's talk about the safety and the condition of the samples we're testing. So handheld XRF—we label it as a non-destructive technology. Can you elaborate on what sort of impact, if any, our testing has on, say, a piece of jewelry that someone's interested in testing?

**Pete:** Yes, the last thing you want to do when you're valuing somebody's priceless jewelry or grandmother's jewelry is harm the item. And the testing is absolutely non-destructive. It emits an X-ray which excites the atoms, and from that comes a spectrum. And those elements are going through a detector, a CPU board, which is identifying the library of the periodic table that you see. And from that, it determines the composition is 14 karat.

And if you've got different characteristics in there, this item is not reading the composition that you're looking for. This technology is used for many applications across the industries, from oil and gas, where they're authenticating the materials used for high-velocity oil refining, down to precious metals and scrap recycling, where the first entry level for scrap recycling is identifying ferrous and non-ferrous. Ferrous being low-value iron and non-ferrous being the stainless steels. And our analyzer does this very quickly, very efficiently, and more importantly, non-destructively.

**John:** When you talk about priceless heirlooms, even if the results are instantaneous, people want to make sure they're not damaging the piece to get those instantaneous results. And that's most certainly not a concern with the Niton analyzers.

And yeah, I think just moving on there, you touched upon earlier the two different options—the benchtop and handheld XRF options. So, with Niton, we have the Niton DXL benchtop analyzer and the XL2 800 handheld analyzer. Just for folks at home, just so they're aware, this is the same underlying technology, right? We're really talking about different form factors of the same core technology.

**Pete:** Yeah, John, you've nailed it with the comment of form factor. The technology in essence is the same. The only difference between the two is the benchtop has a camera for intricate, finite zooming into certain jewelry to define whether the platinum, palladium, or gold is in a particular ring shank, as an example. And then you've got the handheld.

So, the first question, once we've done the demonstration to a potential customer: What is your application? Is it in a safe pawn shop, jewelry store, where you have a clean environment and the item doesn't need to be moved? And more importantly, the sample that you're testing will fit into the size of the benchtop.

If your business is portable, where you need to go to estates or do valuations for large items, then the portability is important to you and you go for the handheld XRF. But that doesn't mean to say that you can't convert the handheld XRF into a benchtop. We have a test stand which inverts the handheld, and you're in essence making a closed-beam system using that test stand for that application. So, you have the best of both worlds, but it really depends on your form factor and what your typical business is on a weekly, monthly basis.

**John:** Really well put. So, it's about your specific application, what your needs are. We have options for a wide variety.

Another comment: We started talking about XRF for precious metals analysis, but so much of the conversation I've been leading is about gold, and for good reason with gold prices where they are. But when we say precious metals analysis, there is far more than just gold involved. I think you touched upon this briefly. Can you go into what other elements beyond gold are folks are interested in?

**Pete:** So, the calibration code X02 100P denotes precious metals. And that calibration encompasses 22 elements, and all of those elements are deemed precious metals. And that includes platinum, palladium, rhodium, silver, titanium—anything that is deemed of a commodity value is in the elements.

And what the analyzer will do is filter through those 22 elements, detecting very quickly the composition that it detects. And from a very complicated algorithm, it will indicate what—based on the materials that we've identified—we believe this is.

If you look at catalytic converters, precious metals are used in so many different applications: PCB board manufacturing, silvers. You've got the catalytic converters,

which has platinum, palladium, rhodium. And all those elements are enhancements of oxidization in reducing carbon. So, the catalytic converter industry wants to be able to identify these precious elements for recycling purposes. So, this analyzer is used for any commodity which is deemed as a precious metal commodity.

**John:** All right, because those are typically applications you wouldn't typically lump together. But yeah, different users benefiting from the same technology. I think that's fascinating.

Maybe sticking in that realm, talking real-world examples—we've talked about specific aspects of Niton handheld XRF. Let's take it from the perspective of a customer. Can you walk me through a real-world example of, say, a pawn shop who's using a Niton handheld XRF analyzer and how they should think about the ROI, the return on investment that they're going to receive from this technology?

**Pete:** This is the most common question I get asked at a trade show: How does this work? And the amount of individuals—and these are independent traders—that see the spike in gold and want to move in on buying and selling gold.

So this is a very transactional business. Here's an example: my wife loves me. This is a Costco one-ounce, 99.9% gold bar. And my wife purchased it for me at Christmas two years ago, because I mentioned how gold was spiking up, at \$2,000. So my wife does love me, because this is now a 200% increase in that investment.

If you read the articles with the geopolitical uncertainty, tariff prices, people are moving away from the equity market over to the solid background of comfort of gold. And that has fuelled gold prices globally.

And if you look at your drawer that you've got at home in your dresser, there's always going to be some sort of precious metal item in there—jewelry, gold that you don't wear. And these individuals are now taking that gold item and saying, how do I transact this?

And what they would do: if you look at the gold district or the diamond district in New York or in Los Angeles or Chicago, they are a tight-knit community that all work together, and they're touting, 'We buy any gold.' So what you would do is you would take your item of jewelry into that pawn shop.

What they would do is first of all measure the purity of that. And this community is embracing XRF as the gold standard, typically for Niton. We see a massive amount of chains saying, 'Have you Niton'd this item for authentication?' And that has made us the standard for these markets.

So, if you walked into a pawn shop, you would have the Niton Analyzer authenticate the item of jewelry. And if it was 14 karat, that would represent 58.3%. They would then put it on a scale, and that would be measured against the spot value.

And what's important: the spot value of a troy ounce, which is the gold troy ounce, is 10% heavier than the typical weights and measures of the food industry. 28.3 is a standard ounce, yet 31.1 is a troy ounce. So, keep that in mind as the first wave.

The second is they wouldn't give you the spot value. They are in this business to buy and sell. So typically, a good reseller would offer you 70% of the spot value. So for instance, if it was an ounce and it was \$4,000 today, they would give you 70% of that value and obviously times it by the percentage of that item.

Any other elements are irrelevant. So, for instance, 14 karat has 58.3% gold, and 41.3% are other elements which are irrelevant. And that's based on whether you want it to be a rose gold or white gold. So, keep that in mind also that you'll only get paid...

And if you want to move forward, he or she will give you a spot value of that item. And you leave that item there, and they give you the cash, and you walk away to buy something new for yourself and repurpose that piece of jewelry. So that's a typical transaction that you would see on the high street.

**John:** Yeah, fantastic example. We talked about instant results, in this case instant results leading to instant transaction. I think everyone loves that.

A couple of points that I want to highlight. One, I love hearing Niton as a verb: 'Did you Niton this piece?' That's a great tidbit. And maybe the most important: we've talked about record gold prices, and no one can predict the future with 100% accuracy, but I'm hearing similar stories as you that there are not a lot of expectations that this gold price is going to drop anytime soon. So really a fascinating time to be in this market.

Thanks, Pete, for discussing the accuracy of XRF when it comes to gold purity. And we have the data to back up that accuracy, but from the perspective of a user, how can they verify that this technology is as accurate as we're saying it is?

**Pete:** Yes, if you ever got to a position where the customer needed greater authentication of the accuracy of the Analyzer, it's not necessary. However, in those extremes, you can invest in a certified standard. And this is a certified standard for 24 karat, 99.9%.

You would remove this from the case, and you would simply insert this standard into the analyzer—or if it's handheld, you would hit the surface—and from there you're looking for 99.9% pure gold. And once you verify that the material or the analyzer is reading against a certified standard, then those discussions are muted.

There's also the ability to do that with 14 karat. So if you had a 14 karat item perceived by the customer, and you told them it was 10 karat, unfortunately, and they pushed back, you could then take out the certified standard, show that the Analyzer is performing correctly to this, calibrated correctly to this standard, and that normally satisfies the customer with regard to the assessment or appraisal value.

**John:** Just as sort of a final closing, any more advice that you want to give someone who may be considering investing in XRF technology for precious metals analysis, specifically for the first time?

**Pete:** Yes, that's one of the challenges we've had historically before the pandemic. The gold price was \$1,000 an ounce. So, if you calculated how many ounces you would

have to transact to buy a typical handheld XRF, it was very challenging for somebody transacting \$5,000 or \$10,000 per week—transacting 10 ounces a week, for example.

Now, with \$4,000 an ounce, it literally means that the return on investment is done within five ounces, around five ounces. So, the justification for moving over to this technology has never been more pertinent to ensure that you're authenticating what you're buying and selling.

As you mentioned earlier today, we are celebrating 30 years in the industry—last year—and still going strong. These are manufactured in Tewksbury, Massachusetts. I live in Boston, Massachusetts. I've worked for Thermo Fisher Scientific for 30-plus years. And this product line I've represented for the last eight years. And it's been the most exciting period during that time to really embrace XRF technology.

We're ISO 9001. We're not going anywhere. We stand by the products and services we offer, and the passion you can see from the people building this technology and selling this technology is second to none.

At last count, back-of-the-envelope, my understanding is there's over 100,000 customers worldwide that have invested in XRF. And if you look at the precious metals embracement of the technology over the last year, you would see that investment has tripled. And we're seeing that today, and we hope this continues for the foreseeable future. So, thanks for your time, John.

**John:** Pete, thank you so much. Absolutely fantastic. Your experience truly shows. I'm really impressed to be able to cover so much information so concisely. So, thank you so much for taking this time.

And that's going to wrap it up for us, folks. So again, thank you for joining us. My name is John Margeson, product manager here with Niton XRF Analyzers. Please go to [thermofisher.com/niton](http://thermofisher.com/niton).