Experiments with Art Clay Silver 950 and EZ960

Art Clay Silver 950 and EZ960 are new clays which combine the strength of Sterling with an open shelf, no carbon firing method. I'm testing both of these new clays against regular Art Clay Silver so I have something I really know well to compare them with.

EZ960 Packaging

On opening the EZ960 package, I was really impressed with the presentation. The clay is in a little purple resealable plastic bag and the firing schedule is on a rigid card, like a business card, so nice and robust. On the back of the card is further information about firing CZs and hallmarking.

I've been opening and closing this package for days and storing the excess clay in the purple bag, no clingfilm and just a bit of a spritz of water in the bag at the end of the day, then pop that into the resealable outer packaging. The clay has stayed in perfect condition. Brilliant packaging.

Working in the Wet Stage

Both clays are lovely and moist out of the package and roll out easily on an oiled surface. They are slightly darker than regular ACS and the EZ960 has a slightly yellow colour. The ACS950 is greyer.

They also both take texture well. One thing I did find was that the EZ960 sticks more readily to paper based textures, like the tear away texture, than ACS950. I oiled the face of the clay before using the tear away texture but found that the EZ960 didn't release and had to be peeled off the texture. There was no bad sticking though and the texture was good. In contrast, the ACS950 released cleanly with no sticking at all.

Cutting out shapes with cutters, craft knives, straight blades and pin tools all worked as normal silver clay.

Working time seems to be a little longer for both brands than regular ACS but the normal rules of being prepared before opening the package and not leaving the clay lying around uncovered are still good to follow.

Rehydrating both clays as you work was just as easy as with other silver clays and they soaked up water well.

Working in the Dry Stage

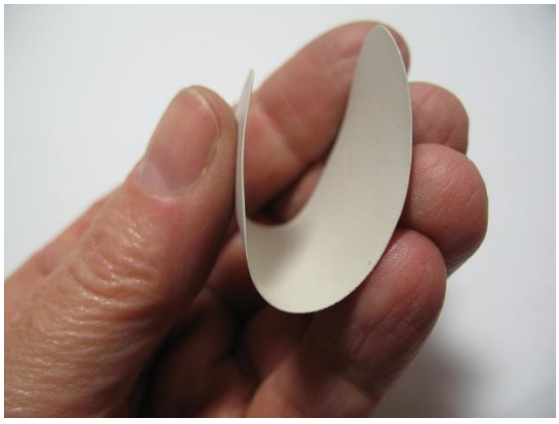
This was where I saw major differences between ACS950 and regular fine silver ACS. In the dry stage, the ACS950 has a good amount of flexibility which makes it

really good for carving, punching with a paper punch, putting through a cutting machine or using with fancy scissors. The thinner the dry piece, the more flex was possible.

On the downside, this flexibility can make it a little harder to sand in the normal way. Regular ACS is rigid when dry and tends to be brittle. ACS950 has this flexibility which means it needs to be held more firmly when refining edges to avoid bending it until it snaps. Thicker pieces – five cards (1.25mm) plus have less flexibility but as this clay makes a stronger end product, I was often working thinner than I would with regular ACS.

Dry Stage Flexibility Tests

I know that tests have been done on the EZ960 with the Silhouette machine so that's flexible enough to go through the Sil so I only tested ACS950 for flexibility. I love using punches with Sterling Flex 960 (half PMC Sterling, half PMC Flex) so I wanted to see if the ACS950 could replace this. And it can.



The piece I'm bending is 1 card/0.25mm thick, dry ACS950, air dried, not heat dried.

The punched Christmas tree is with a piece of ACS950 I squished to around 1mm thick to rehydrate from bone dry. It's been heated to dry it. It punched out perfectly. PMC Flex is a bit more brittle when it's been heat dried and I've had some problems with punches using heat dried Flex, so this is a bit of a bonus for ACS950.

To see how the one card thick piece stands up to the Silhouette cutting machine, I did a quick experiment. It worked perfectly and cut cleanly so this clay can also be used with the cutting machine.

Rehydrating from Dry

Rehydration of bone dry clay was exactly the same as with regular ACS. I roughly chopped up some dry pieces, put them into cling film and spritzed them with water. Wrapped up and left, the clay soaked up the water and within a couple of hours, squishing through the cling film occasionally, I had smooth clay again.

Firing and Strength Tests

I wanted to test the different firing schedules for each clay to find out how this affected the strength of the fired pieces. My first test was to see what would happen if I fired both clays at a common firing schedule, one I use all the time with both PMC and ACS.

I made a strip of EZ960 and a strip of ACS950 6cm long by 5mm wide, two cards thick (0.5mm). I fired them together at 900C / 1650F for one hour. This is much less time than recommended for EZ960 and a higher temperature with no burn out phase for ACS950. The EZ960 was 5.5cm long after firing so it lost 0.5mm. The ACS950 was 51mm after firing, losing 0.9mm. Both retained the same width of 5mm, no shrinkage in the width.

I wanted to test how well they would stand up to bending after firing. This picture shows them both bent around a steel ring mandrel which they did well. But at this thin, I could also bend them both with my fingers.

Then I grabbed one end of each with pliers and tried to bend them at more acute angles. The EZ960 on the right snapped as soon as I made the first bend. I'm concluding that the EZ960 is not sintered - not surprising when it was fired at so much less time than the recommended schedule.

The ACS950 on the left stood up to this well until I tried to bend it back the other way, then it snapped. I think the ACS950 was just too thin to stand up to too much bending backwards and forwards.

For my second test, I made two strips of ACS950, 5cm long by 0.5mm wide, one was two cards thick, one was four cards thick. I fired these at the ACS950 schedule.

932F / 500C for 30 minutes and then
1598F / 870C for 60 minutes

After firing, the two cards (0.5mm) thick strips were 4.4cm long by 4mm wide and the four cards (1mm) thick strips were 4.3cm long by 4mm wide. The results were pretty similar to my earlier experiment. Gentle bending with round nosed pliers worked well with both thicknesses. But when I tried to put a right angle in them, they both snapped.

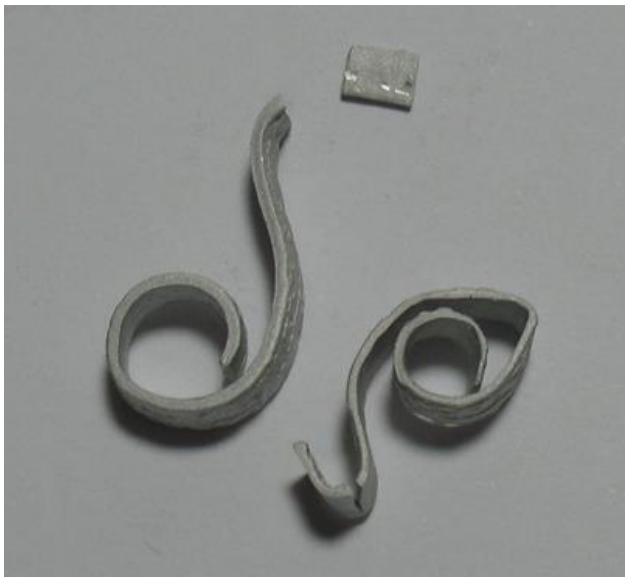
Bear in mind, I'm putting the metal under extreme pressure by trying to bend a right angle in it. I'm intentionally being heavy handed with it to test its limits. I don't think in normal practice you would want to do this for anything I can imagine but let me know if you have something in mind where this might come in useful. Gentle bending, like around a steel mandrel or even making a spiral form, works well.

Next, I tested two more strips the same size and thicknesses but fired them full ramp to 1598F/870C for an hour. After firing, the two cards (0.5mm) thick strips were 4.4cm long by 4mm wide and the four cards (1mm) thick strips were 4.3cm long by 4mm wide, so the shrinkage was the same for both firing schedules.

I did the same bend testing and found no difference in the results, gentle bending was fine, extreme angles broke. I conclude from this that for simple flat

things, there is no benefit in doing the first phase for binder burn out, you can go straight to the second phase temperature and hold for an hour. Later in this document there are tests for lentil beads but thicker or more complex forms still need further testing to see if skipping the binder burn out stage is safe.

I tested the EZ960 to see how that stands up to this extreme bending. These strips were the same size as the ACS950, 5cm long by 0.5mm wide, one was two cards thick (0.5mm), one was four (1mm) cards thick. These were fired at 1725F / 941C for 15 minutes which is the hottest, shortest schedule recommended. The results of the bend test were surprising. The four cards (1mm) thick strip would only take quite a wide bend without breaking, it was quite brittle. The two cards (0.5mm) strip was more flexible before breaking as you can see in the picture. It's possible that this clay needs a longer, cooler firing to attain full strength for this type of bending and once again I'll say this is extreme testing I'm doing, really putting the fired products under considerable strain.



My next test was a longer, cooler firing for the EZ960. These strips were the same size as the previous test strips, 5cm long by 0.5mm wide, one was two cards thick (0.5mm), one was four cards thick (1mm). These were fired at 1650F / 899C for four hours.

After firing, they had both shrunk by the same rate and measured 4.5cm long by 4mm wide. The bend test showed that this longer schedule makes for a stronger result. I could bend both of them in much tighter spirals.

They both still broke when bending a tight angle into them but the two card thick sample split rather than breaking off like the thicker sample.

I put all the previous samples I'd done the bend testing on, both EZ960 and ACS950, into the kiln during this firing. The firing temperature is compatible with both brands. This test showed that the additional firing with a long soak made the earlier samples much stronger. I could bend very tight curves into these samples.

Torch Firing

I did a quick experiment to see if torch firing ACS950 would work. One of my testing colleagues, Joy Funnell, torch fired a piece for eight minutes and found it worked OK. I tested two roughly squished pieces which were around 1cm in diameter and 1.5mm thick. One was fired for three minutes and one for five minutes. The firing process was as normal; burn out the binder – which burns with a blue/green flame – and then bring it up to the peach pink colour and time. Both were quenched in water to cool.

In the image on the right, the piece on the left was fired for three minutes. It came out a darker grey colour than kiln fired pieces and was strong enough for me to try and bend in my fingers without breaking. I then tried to break it with two sets of pliers and this broke it.

The piece on the right was fired for five minutes. The end product was a lighter grey colour and was also too strong to bend in my fingers. It took more force with the pliers to break it too.

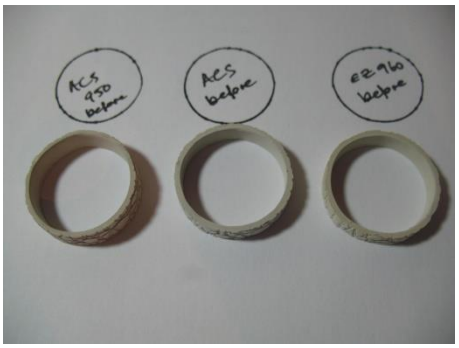
These pieces were both pretty thick which helped to make them too strong to bend in my fingers. Thinner pieces would probably break more readily due to not sintering but more experimentation is needed to prove this.

Conclusions - I think it's OK to torch fire to burn out the binder and then kiln fire but to ensure a fully sintered end product, kiln firing is preferable. If you were transporting a piece, you could probably get away with a three minute torch firing to make it stronger than an unfired piece and then kiln fire later. I wouldn't quench in water in this case!

Rings

Rings are particularly tricky as the shrinkage has to be calculated quite precisely to ensure they fit after firing. Making rings in all three clays seemed to be a good way to test the relative shrinkage of each clay.

I made three rings, five cards thick and around 5mm wide. All the rings were made at US size 12, UK size Y.



I've made a record of the inside sizes of each so I can see what the shrinkage will be after firing.

Here they are side-by-side- ACS950 / ACS / EZ960.

Not sure if you can see the slight differences in colour but to the naked eye, there is a very slight difference in each. The ACS (middle) is whiter than the other two. The EZ960 on the right is slightly more yellow than the ACS950 on the left.

This picture shows them stacked on top of each other - they are all exactly the same size after drying.

I fired the ACS950 and ACS rings on the same schedule - the one for ACS950.

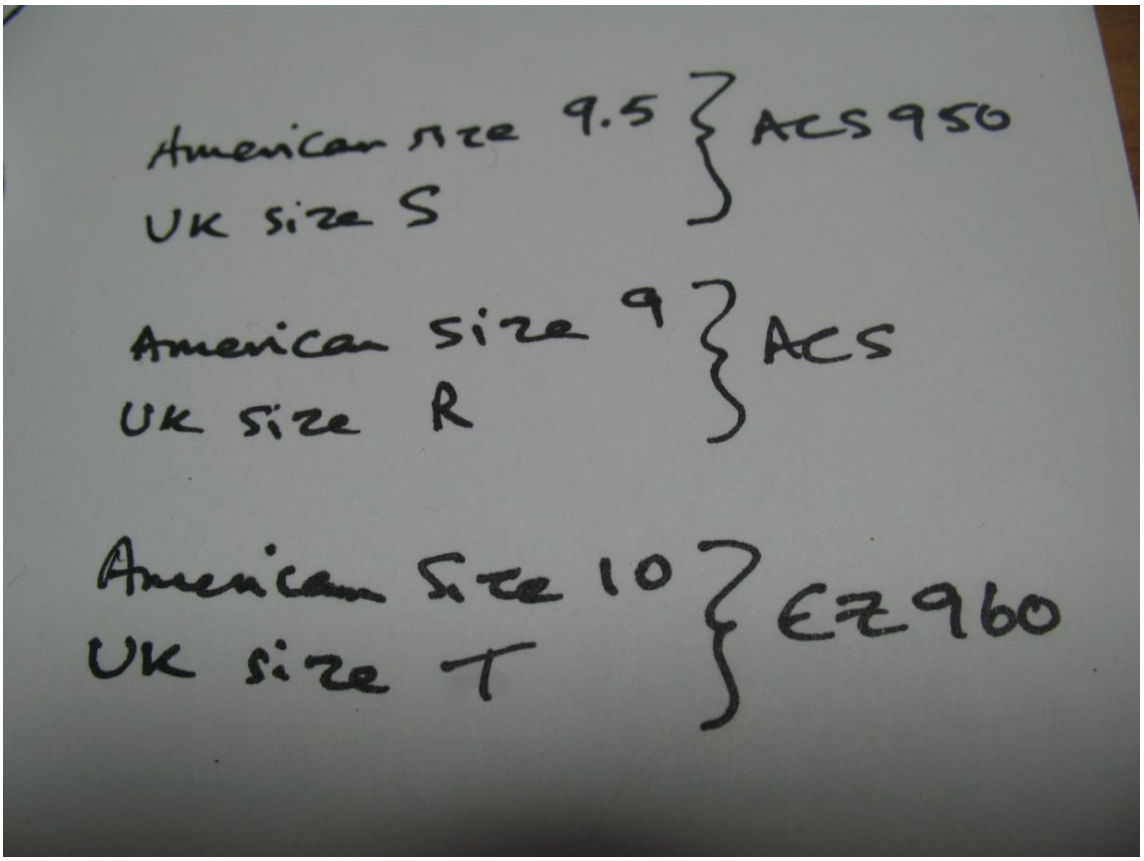
- 932F / 500C for 30 minutes and then 1598F / 870C for 60 minutes

I fired the EZ960 ring at one of the highest heat schedules recommended.

- 1700F / 927C for an hour

All were fired on a bed of fibre blanket. The EZ960 is recommended not to be fired on fibre blanket due to sticking but I didn't find this with the ring.

There was a very slight difference between them all shrinkage-wise. After firing, The ACS950 is 2.5 US sizes smaller or six UK sizes smaller. The EZ960 is two US sizes smaller or five UK sizes smaller. The ACS is as expected, three US sizes smaller or seven UK sizes smaller.



There was also some warping during firing with all of them. I hammered them all on a steel mandrel to round them again and they all stood up to this fine.

You can also see a distinct difference in the colour of the metal before polishing. The ACS in the middle is much whiter than the ACS950 on the left and the EZ960 on the right.

So here are the three rings after two hours of tumble polishing. It's hard to tell them apart although the ACS one (on the right) is slightly whiter than the other two but there's not much in it.

Lentil Beads

One of the things I love to make are lentil beads. As both ACS950 and EZ960 are quite flexible in the dry stage, I wondered how this would affect the assembly stage of making a lentil.

I made these lentils with three cards thick (0.75mm) clay and domed on measuring spoons. They are 2cm in diameter. The top two are ACS950, the bottom two EZ960. They were all textured using tear away textures.

The ACS950 took on the dome easily and was less prone to popping up than I've found with regular ACS. The EZ960 was a bit more difficult to convince to stick down, more like I'm used to when making lentils.

In the dry stage, they were easy to file and both were stuck together with regular ACS syringe. They are not the neatest lentils I've ever made but I was keen to get them dry and fired asap!

The ACS950 lentil was fired open shelf, one phase, full ramp up to 1598F / 870C and held for one hour. The EZ960 was fired open shelf, full ramp to 1625F / 885C and held for four hours. Both were nestled in fibre blanket to support them. A bit of sticking to the fibre blanket was seen but this was easily brushed off under running water.

After firing, they had both shrunk to 1.5cm across but kept their integrity with no slumping or warping. I was really pleased with the way they stood up to the whole process.

More testing on larger lentils needs to be done to see if the warping seen in the rings affects larger and more complex forms. These are also quite shallow domes. Deeper domes need to be tested to see how these stand up to the firing.

Carving

I used Dockyard carving tools, files and a craft knife on this piece of four cards thick (1mm) ACS 950, heat dried. It is 5cm long.

It carves really well, no cracking or chipping and is still pretty flexible. The flexibility in the dry stage can give a bit of a false sense of security so I was quite careful when I felt it flexing, in case it broke. This is especially obvious when using files on the edges to create some edge detail. Holes can easily be drilled using a pin vice. I also made the larger hole using a Dockyard gouge.

Gold Paste

I carved another piece with the intention of adding gold paste to an element of it. It was 5cm long before firing, 4.4cm after. This was fired open shelf, no burn out phase, full ramp up to 1598F / 870C for an hour.

I then applied a single coat of gold paste directly onto the unpolished surface of the piece, down in one of the carved dips. This was brought up to a peach glow using a torch, then the torch was turned off. I burnished the gold using an agate burnisher while the piece was still hot. Quenched to cool and then steel brushed and the gold burnished again. There was no flaking of the gold; it appears to be solidly adhered.

I really liked the gold effect so I added gold to the other carved piece and then made them into earrings.

Keum Boo

Another process I wanted to test for both EZ960 and ACS950 is keum boo. This is the process for adding gold foil to the surface of the silver after it's fired.

I've made two small sample pieces, 2.2cm x 1.6cm. The one on the left is ACS950 and on the right, EZ960. These have been textured with a tear away texture which is shallow and really good for keum boo.

After firing, I added gold using the keum boo technique. This worked perfectly on both, straight onto the fired, unpolished metal. Some people had problems with this but I found it worked as I'd expect it to.

I used a hotplate to add the gold, burnishing them really well while on the highest heat. I then steel brushed them and tumbled for a couple of hours, then added Liver of Sulphur and polished the high spots.

Enamelling

I wanted to test the enamelling capabilities of EZ960 and ACS950 so I made a pair of wings using a tear away texture. The wings on the left are ACS950 and on the right are EZ960. These are around 4cm tall and three cards thick. After firing, I gave them a quick steel brush and then added enamel in a variety of colours.

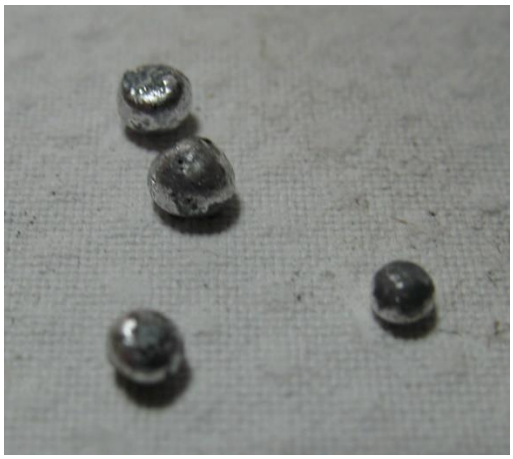
I used three types of green from a dark to a light green on the top of the wings. I then used a pink that I know normally works on fine silver on the bottoms.

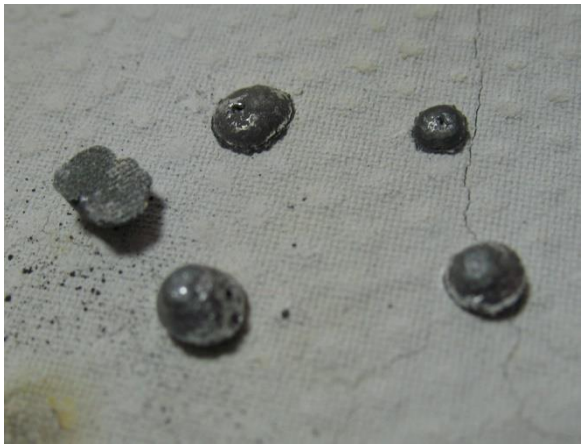
These were torch fired. The greens worked fine on both brands but the pink really didn't.

Conclusions – if you are going to enamel on the ACS950 or EZ960, test samples need to be made to find out what works straight onto the metal and what would need a flux. To be safe, treat as if you are enamelling on Sterling silver.

Balling Up

As I had some little bits of both fired brands from the breakages in the strength testing, I melted them with a torch to see if they would make good embellishment. Fine silver clay scraps make lovely balls when melted with a torch. Unfortunately, I can't say the same for these two brands.





The balls on the left are ACS950. They rounded a bit but were flat on the bottom and as you'd expect with a mixed metal clay, the balls were a bit pock-marked. The EZ960 on the right melted into blobs more than balls. And they're pretty ugly! Fine if you are going for an organic kind of look though! Both would require pickling if you wanted something silver, not oxidised. I think I'll be sticking to the fine silver for ball embellishments in future. Good experiment though!

Overall Comparisons

There are some subtle handling differences and they look quite different in colour. The EZ960 is slightly stickier but that normally means it has a slightly longer working time as it starts out more moist. I haven't noticed this being very significant though. I found that paper based textures – like the tear away textures – tend to stick more readily to the EZ960 than the ACS950. Not badly but still the releasing isn't as clean.

They both make a strong end product. But the caveat here is the firing schedule used for the EZ960. A longer, cooler firing tended to result in a stronger end product than the shorter, hotter firing.

They are also both quite flexible in the dry stage. This is a distinct bonus when using paper punches or the Silhouette cutting machine and very thin pieces can be cut with scissors. This would make bezels a breeze to create using the clay although you'd need to calculate shrinkage carefully.

There was little difference in the shrinkage of both clays in my tests.

The main difference is the firing. They are both open shelf. The ACS950 is recommended to be fired in two phases with a 30 minute binder burn out phase followed by a top temperature of 1598F / 870C, hold for an hour. I've found that a single firing of 1598F / 870C, hold for an hour, works fine for flat things and small

lentils so the burn out phase isn't necessary. For more complex forms, I'd probably do the binder burn out or add 30 minutes to the overall firing time. This isn't a problem for me as I normally fire at 1650F / 900C for two hours anyway. Because the firing time and temperature are compatible with ACS and PMC, I can co-fire these all together in one kiln load which works for me as I use all the varieties of silver clay.

EZ960 has a range of firing temperatures from 1600F / 871C hold eight hours to 1725F / 941C for 15 minutes. In my strength testing, I found that the EZ960 was less strong when fired at the high 15 minute firing than when fired at 1650F / 899C for four hours.

Personally I'm more drawn to the ACS950 because of the firing schedule being compatible with other silver clays. Even though I could fire my other clays (PMC and ACS) in with EZ960 on the 1650F / 899C for four hours schedule, a four hour firing is much less attractive than a one to 1.5 hour firing which I'm used to.