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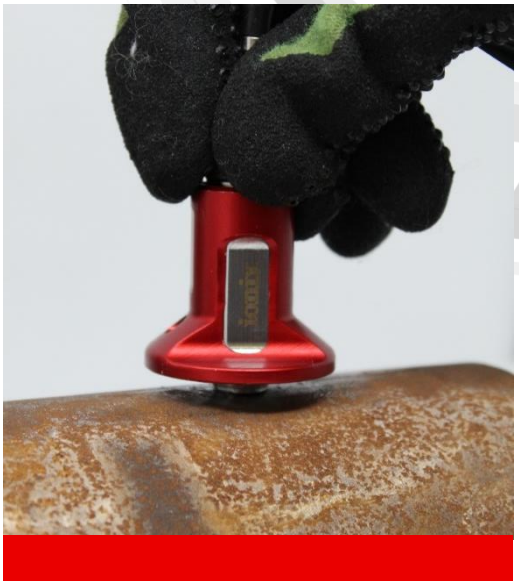
Re-surfacing your worn dual element transducer

Extending the lifetime of your transducers to maintain productivity and measurement accuracy

Overview

The Ionix HS582i dual element transducer is suitable for testing on several different materials, surfaces and applications. The front face has an 2X increased wear resistance compared to standard probes to maximise lifetime. During extended use the front face may wear. The face of the transducer is vital to the accuracy of measurement and when worn will reduce its coupling efficiency. Up to 1.5 mm of wear can be re-surfaced to renew the device and extend its life.



The need for probe re-surfacing

The front face of the transducer is durable and resilient to wear. However as with conventional ultrasonic transducers, continued use on rough/uneven surfaces will lead the face to lose its polished and flat finish. As the surface wears it will be more difficult to get an accurate measurement, reducing overall sensitivity of the device as the couplant struggles to fill these new 'gaps', creating pockets that the signal cannot pass through. To allow optimum sound energy to be emitted from the transducer into the test piece, the couplant layer needs to be as thin as possible and equal along the diameter of tip. If the transducer face has become worn, you may also find inaccuracies when calibrating the device using your thickness gauge, which is a clear indicator that it requires resurfacing.

Maximising your usage before re-surfacing

The Ionix HS582i transducer has a 2X increased wear resistance compared to conventional transducers maximising usage before resurfacing. The transducer front face can become unavoidably worn through use but there are several simple ways to reduce the frequency of resurfacing. By considering the following steps when in-use you may find the transducers factory finish can be maintained for a longer period of time.

1. **The 2 P's, Proper preparation.**

   The key to success is always in the preparation. The test surface can be severely corroded, with large undulations running along the duration of the desired measurement location. Due to the nature of the

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transducer face material, it is more likely to wear on this type of uneven surface when measurements are being taken, leading to the issues highlighted previously.

Ensure that loose scale, corrosion, pitting, paint or other coatings are removed to ensure a direct sound path. It is recommended to prepare a metal surface to achieve SA 2.5 'near white metal finish' (ISO 8501) or to an ideal surface roughness of R_a = 0.8 µm. Lesser surface quality will achieve coupling but with a lower amplitude which may impact the accuracy of your measurements.

2. **Efficient Measurements**

Often surface roughness is unavoidable, with measurements required quickly and on the same point, meaning preparation of the surface is not possible. Where this occurs, it is important that the appropriate couplant is used for the application, and that there is sufficient couplant between the tip of the transducer and the test piece. By choosing the correct couplant for the application you are more likely to get a successful measurement first time, allowing you to minimise the duration/frequency that the transducer and test piece are in contact. By failing to take a measurement the first time, repeated unnecessary contact will be required with the test piece that will begin to wear the front face of the device. Ionix provides couplants for use over a wide range of high and low temperatures. Please contact Ionix for more information.

3. **Scanning Measurements**

The HS582i is the perfect tool for taking measurements along the length of a test piece due to the hard-wearing front face. However, this does not mean that the front face will not wear in practice when dragged along an uneven surface. By following the previous steps, the wear should be minimised, but another method can be to reduce the force exerted onto the transducer during each pass. If the couplant layer is kept consistent very little force is required to ensure a clear signal on your thickness gauge or flaw detector.

Resurfacing

When the factory finish of the front face has degraded, it can be resurfaced to renew the transducers full functionality, but only up to the wear marker on the device.

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Step 1: Inspection of the transducer

First remove any accessories/cables that are being used with the HS582i. Inspect the tip of the transducer, checking for any degradation to the front face and, if previously resurfaced, the distance remaining to the wear marker. Using alcohol-based cleaning solvent (such as Iso-propyl alcohol) and a lint-free cloth, wipe the tip surface to remove any built up couplant residue or other contaminants. If the underlying surface is clearly worn, then move onto the next step. If there is no wear, please refer to device troubleshooting.

Check the wear on the front face

Step 2: Re-surfacing the face of the HS582i

It is important that the abrasive selected for resurfacing the HS582i is appropriate to avoid causing further damage to the transducer face.

Silicon Carbide (SiC) paper is well suited for this preparation as it is abrasive to both the surrounding steel tip casing and front face.

The abrasive grades below are the ideal Grit to provide a flawless finish to the transducer:

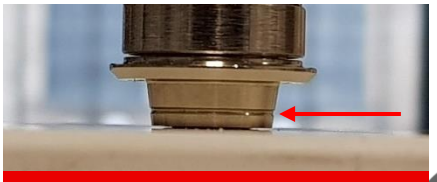
- **600 GRIT (30 µm)**
- **1200 GRIT (15 µm)**

If these specific grades are not available, similar will suffice, however take care to not go below 320 GRIT (larger than 45 µm) as there is a risk of removing too much material and creating larger grooves on the polymer that will require additional resurfacing to remove.

Secure the transducer on a hard, flat surface

1. Begin with the most abrasive grit paper (600 if following the above) and place it onto a hard, flat surface, securing it where possible with grips to stop it moving around when polishing the device.

2. Take the transducer (bare, with no cables/accessories) and position face down onto the surface of the silicon carbide. It is important that the transducer front face is always kept perpendicular to the paper and that no 'tilting' of the transducer occurs. Use the wear line of the device, marked in the Figure, as



Wear line depicted by arrow

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a reference to which the front face should always remain parallel.

3. Gripping the transducer, apply a light but firm force against the surface of the abrasive paper whilst moving the device in a circular motion. For increased stability hold as close to the bottom of the transducer as possible. Continue this method for a maximum of 5 times/circles, before rotating the transducer in your hand and repeating. Ideally try to keep rotating the transducer in your hand whilst also moving the device against the abrasive paper in a circular motion. This will reduce the chances of the transducer front face not staying parallel to the wear marker.

Move in a circular manner, rotating your grip

4. The duration of time on this grit silicon carbide depends entirely on the severity of damage to the face of the probe. A good indicator is that you should see no grooves or damage to the front face, with a 'brushed' finish on the steel tip casing. A good test for flatness is to place the probe onto a hard surface and attempt to 'rock' the device. You should find it naturally wants to sit flat against the surface, if it does not do this, repeat step 3, taking extra care to keep it flat.

5. After removing the wear from the front face, take the 1200 Grit abrasive (or similar grade) and repeat the same method as stated in step 3. You should find that both the front face and the steel tip casing will have a mirror finish once complete. Again, to test, place the HS582i against a flat surface as per step 4, repeating the polishing of the device where necessary. The Figure shows a resurfaced transducer.

6. Using alcohol based cleaning solvent (such as Iso-propyl alcohol) and a lint-free cloth, wipe the surface to remove any built up or residue from polishing.


The face should be flat and free of marking

Step 3: Testing your HS582i

Your HS582i should now look as new, however the true test is through its use.

Connect the device to your chosen thickness gauge, calibrating as per your testing procedure. Using a clean and calibrated test block, the transducer should easily couple with minimal couplant/force and show the correct

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thickness on your gauge. If this does not happen then inspect the resurfaced transducer thoroughly, ensuring all connectors are securely plugged in. Step 2 & 3 can be repeated where necessary but take care to not remove excessive material, paying close attention to the wear line on the device.

Ionix can provide a service for further evaluation/resurfacing.

Ionix accepts no responsibility for devices that have been resurfaced improperly. All the steps mentioned are simply a guide to the correct way to resurface your device.