

6 common problems when **TESTING SLIP RINGS**



Slip rings need to reliably transmit data signals with accuracy and precision. Failure to do so can result in expensive and disruptive failures in wind turbines or within time-critical applications such as diagnostic medical testing or for military communications.

Manufacturers of slip rings therefore need a robust test strategy to ensure their products meet these performance demands.

We've compiled 6 key points to consider when planning this test strategy, based on our work with some of the world's largest slipring manufacturers.

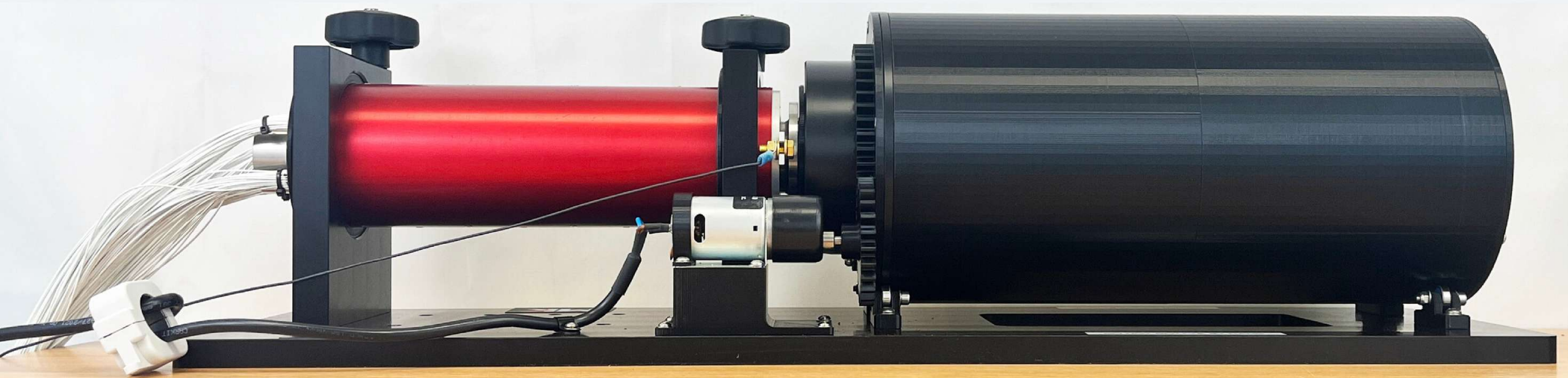


Dielectric strength

Dielectric separation between the slip ring contacts must be sufficient to avoid arcing on power circuits.

The ability of contacts to maintain voltage isolation during operation can be critical as they generate conductive wear debris during operation. Without proper insulation this debris can cause arcing and ultimate failure – yet some wear particles cannot be avoided during slip ring operation.

The fix? Use a slip ring tester to perform high potential voltage testing. This can ensure that leakage current is below a specified limit at the required test potential and time duration.



Continuity & insulation resistance

Are the power and signal paths through your slip ring assembly correctly wired, and of good quality? Are you also sure that no individual circuits are making unintentional contact? You need to perform static continuity and insulation resistance testing to find out.

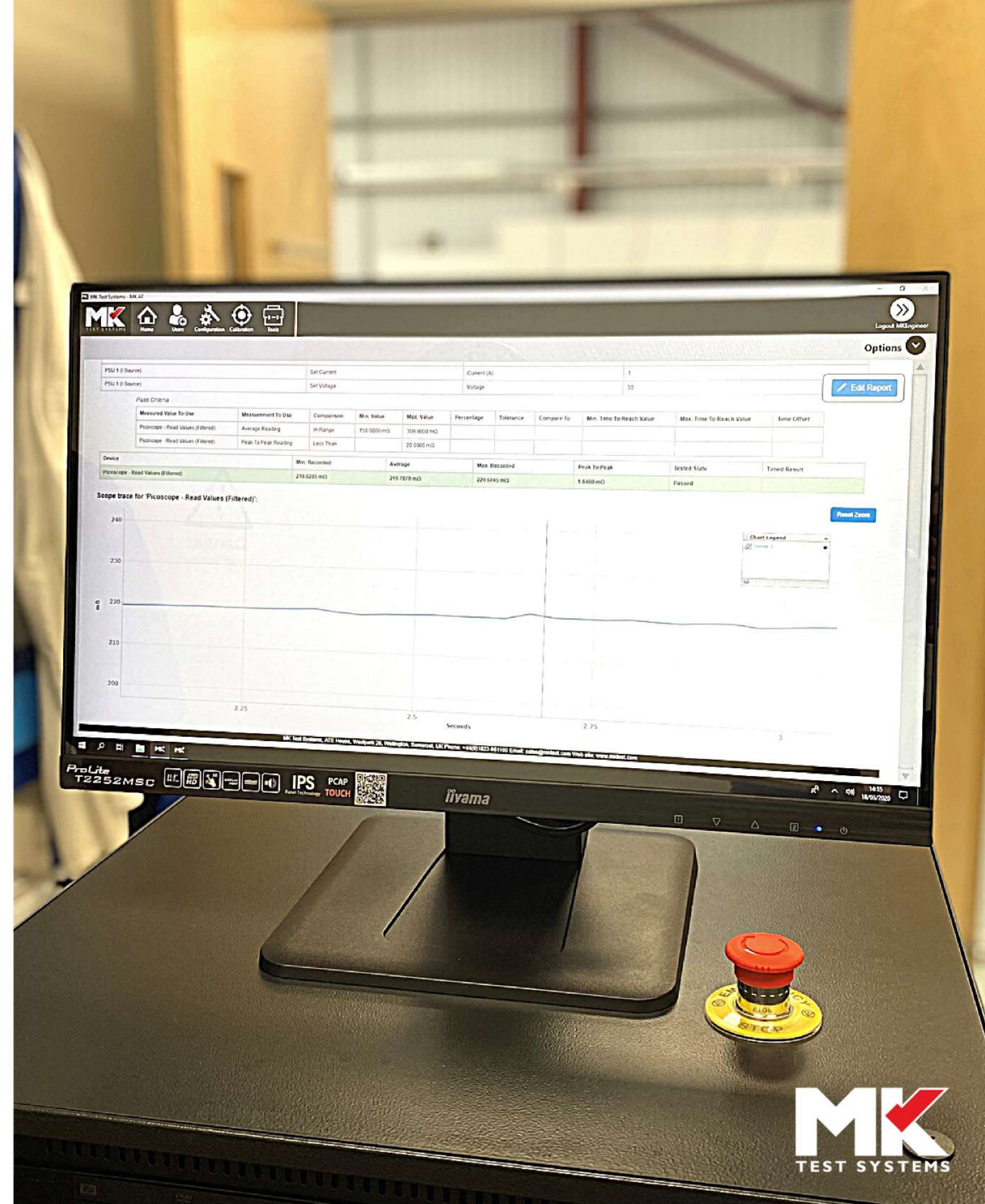
The fix? An automatic slip ring tester can help you address these issues by providing sensitive low voltage four-wire resistance circuits for the required continuity and resistance measurements, and high voltage DC insulation resistance measurements between individual slipring circuits or groups of sliprings.

Accurate detection of slip ring resistive noise

Resistive noise is an inevitable part of slip ring operation. It occurs as the brushes slide over the rotating rings, and encounter continuously-changing contact resistance. This creates a corresponding varying voltage – noise – which could typically range from 0.4 to 40 millivolts on a 100 milliamp signal.

This is enough to seriously degrade signal quality on low-amplitude analogue signals. While their measurement bandwidth is typically below 10 kHz, their amplitude may be as low as a few millivolts. Conversely, the digital signals more commonly used in today's electronic systems and devices exceed 1V, so are less susceptible to resistive noise. However, as their frequencies reach gigahertz levels, they can become susceptible to crosstalk, jitter and possibly micro cuts.

The fix? Any slip ring tester you choose must be capable of measuring for resistive noise. Additionally, it must be flexible enough to operate over the voltage and frequency levels necessary to detect the various noise modes described above.





Mechanical inspection

A good-quality slip ring tester, especially if automated, will help you to efficiently identify any electrical issues. However, slip rings are electromechanical devices and continuously exposed to operational wear and tear.

The fix? No matter how well lubricated the contacts are, wear debris will always be generated; you should clean this out once or twice a year.

Also, take the opportunity to check the slip-ring contacts and ensure they are following the intended rotational paths. For some slip ring designs, checking for adequate spring pressure may be important; this will help reduce power loss and increase product life.

Excessive time spent on testing

You can test slip rings using an oscilloscope and Hipot tester. However, this makes full and effective testing extremely time consuming, while fault diagnostics becomes difficult.

The fix? You can massively improve production throughput by using an automated slip ring tester. It can measure isolation resistance between every ring at high voltages. It can also measure and report average dynamic resistance of every ring, along with its electrical noise.

Measurement values can be automatically reported and logged, while dynamic resistance and noise values are shown as traces.

"Ultimately, you can reduce manual intervention to zero, while having access to tools like variance analysis to improve product quality."



Personnel resources needed to set up and run the test system

While an automated slip ring tester will improve your productivity and insight into your products' quality, you still need to set it up initially to run the test sequences that you need.

The fix? You can simplify the burden of both time and personnel by using a tester that can be set up intuitively, with no need for programming skills. It should also be able to generate reports automatically, and offer customisation options for graphics and other functions.

Easy communication with third party environmental test systems like climate chambers or vibration beds should also be possible, freeing up personnel resources and saving time.



Final considerations when testing slip rings

Most slip ring manufacturers can expect to encounter these 6 common problems when they're testing their slip rings.

If you're looking for the best testing solution for your situation, an automatic slip ring tester is likely to top your wishlist - here are a couple of tips in what to look for from a test equipment supplier:

- Consider the supplier's credentials as well as their test machine specifications.
- How good is their support, and do they have a local presence?
- Do they offer calibration services, with repair capabilities if necessary?
- Finally, although the best systems are by definition easy to set up and to use, does the supplier offer training courses to ensure that you get the best from your equipment?





About us

MK Test Systems has been designing and manufacturing automatic electrical test equipment for 30 years. In that time, we've provided systems to customers around the world, in the following industries:

- Aerospace
- Automotive
- Defence
- Industrial, Power & Control
- Subsea
- Trains

Our range of products enable rapid, automatic testing of engines, wiring harnesses, slip rings and other vital components.

We can work with you wherever testing is undertaken, at any stage of the product lifecycle. This may be at component manufacture stage - providing quality assurance to subcontractors - at the final assembly stage, ensuring complete confidence in the final product, or for MRO and servicing once the vehicle is active.

Talk to us

Our UK head office is supported by satellite locations in the US and Hong Kong. With our large global network of reps and distributors, you can be assured of local support, sales and training.

For your local contact details, please visit our website, www.mktest.com.

