Grinding Burn Detection with Preventive Multi-Filter Technology by ibg

During the grinding process, sometimes random or periodic damage to the surface occurs due to machining with irregular cutting geometry. Such spot like, up to large size, thermal damage is usually called “grinding burn” and ranges from surface oxidation up to serious structure changes that later on can cause a failure of the part. Traditional methods for grinding burn detection like nital etching or Barkhausen Noise are cost intensive and can be inefficient.

Now, the Preventive Multi-Filter Technology (PMFT) provides a method that is vastly superior to conventional grinding burn detection methods for rotationally symmetrical parts. PMFT grinder burn detection is easily automated, so that test parts can be scanned at production speed to attain 100 % non-destructive grinding burn testing.

The decision good / bad is made by the instruments eddyliner®C resp. eddyvisor®C. Chemical Barkhausen evaluations are not needed.

For more than 30 years now, ibg has been developing and producing eddy current test instruments and turnkey test systems for testing components. We have earned a reputation for excellence during that time.

Our instruments and systems are specifically designed to meet requirements encountered in the shop floor component production environment, which means testing must be fast, repeatable, easily implemented and easily operated - four features not easy to combine. ibg has supplied many successful and proven in practice solutions.

Now, thanks to the new Preventive Multi-Filter Technology (PMFT) developed by ibg, it is possible to strike out in a new direction regarding grinding burn detection. Traditional methods for grinding burn detection are very cost intensive and are subject to serious short comings with regard to automation. Whereas PMFT offers completely new possibilities with regard to implementation in automated in-line testing, because part handling for grinder burn detection is affected in exactly the same way as traditional eddy current crack detection.

Find out more about that topic on the next pages. Our sales partners and our offices are glad to assist you.
Grinding burn with PMFT: Test sequence

Detection of surface defects using eddy current requires a relative movement between probe and test part, i.e. either the test part rotates or the probe rotates (refer to the sketches) - the same is applied for grinding burn detection with PMFT.

In calibration mode of the Preventive Multi-Filter Technology (PMFT), the surface magnetic features (i.e., noise) are simultaneously recorded with 30 different band pass filter settings of the “good” parts and 30 corresponding tolerance zones are generated. In test mode, the signals from the surface are compared with the generated tolerance zones (i.e., noise from good parts) and test parts with discrepancy are sorted out. Contrary to the traditional eddy current test method where always one setting only is used for testing (i.e. one filter setting, one gain, one phase angle as well as one crack threshold per channel), PMFT queries simultaneously 30 tolerance zones generated as polar fields. Testing for grinding burn, cracks and pores is thus feasible.
Grinding burn with PMFT: Applications

Example 1:
Grinding burn test on rollers (cylindrical rollers, spherical rollers, tapered rollers)

Depending on customer requirements, concepts with rotating heads (eddyscan®H) as well as concepts with standard sensors may be realized. Rotating heads are preferably used for high-speed testing of cylindrical rollers and depending on diameter and length of test part up to 10 parts per second are managed. Different machine designs enable testing of a diameter range of 1.5 - 63 mm.

Options like automatic master part run, testing of both front faces, marking station etc. according to customer specification can be realized.

Larger or non-cylindrical rollers (tapered or spherical rollers), however, are individually clamped, rotated and scanned with a standard probe. Feeding and discharging of the test parts is affected by gripper systems, conveyor belt or robots.

The ibg-technology fulfils the requirements of the new DIN-EN 12080 “Railway applications - axle boxes - rolling bearings” which defines the quality requirements of all railway axle boxes and roller bearings and which among others includes the crack and grinding burn detection.

*ibg offers customized solutions as per customer’s request.*

Example 2:

Grinding burn test on steel ball races of nuts and rods

The risk of grinding burn on ground steel ball races is extremely high. Due to the huge production quantities of such ball race modules (e.g. newly developed EPS Electronic Power Steering in the automotive segment), it is very important that the testing procedure can properly be integrated into the automated production process. ibg offers suitable solutions for this critical requirement.