



# info

No. 3

ibg-Talk



The third "ibg info" mainly deals with the topic Crack Detection with Eddy Current. This method to test components for surface-open defects can be characterised with five key words: fast - reliable - automated - reproducible - residue-free. Thus traditional methods depending on the human eye become less and less important.

ibg is your contact when automatic crack testing on components like ball studs, brake disks, hubs, bearings and many other safety-critical components is concerned. Applying the latest innovations and developments enables us now to also find sub-surface defects or scan geometries which have not been typical for eddy current testing up to now.

Please have a look at the next few pages where we explain some applications in detail.

*Yours  
Herbert Baumgartner*

## Crack detection system for testing gear switch forks

Crack detection with eddy current on components was - up to now - limited to rotation-symmetrical parts due to the necessary relative motion between crack detection probe and test part. This relative motion in automated systems is only easy to design and to realise for rotation-symmetrical parts. Either the test part or the test probe rotates.

These pre-conditions are completely different for crack testing on gear switch forks. The cast parts must be tested for cracks at the area of highest stress. The area to be tested is marked in photo 1. The customer's requirements were automation of crack detection in order to replace the labour-expensive and insecure magnetic particle inspection. ibg complied with these requirements and developed an automatic test system with a new test concept.

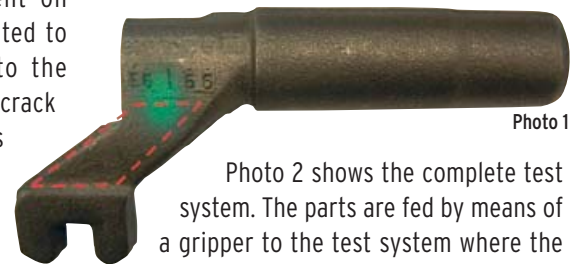


Photo 1

Photo 2 shows the complete test system. The parts are fed by means of a gripper to the test station where the part is positioned in the test station. Here, the zone to be tested is scanned with a contacting test probe. A ceramic layer protects the probe from wear. Photo 3 shows the clamped part in the test position. During testing the probe transmits the test signals to the **eddydetector**<sup>®</sup> instrument which was calibrated with a defined artificial crack. After the test, each part is paint-marked depending on the test result and discharged either to the OK or NOK chutes. The cycle time of the test system is 8 seconds per part. To guarantee a consistent and faultless test a master part is fed into the system at programmable time intervals.



Photo 2



Photo 3

# Automatic crack test on lorry axle components

ibg designed and manufactured an automatic crack detection system for an American truck trailer supplier. Test parts are cold-extruded hollow shafts which serve as the bearing seat in the trailer axle.



of the system is 54 seconds  $\rightarrow$  27 seconds for one part.

The test system can be extended by one further station for structure test. Here, parts could be checked for correct hardness at different locations or for material mix. The picture left shows the system with separate switch cabinet and operating panel. The test parts in test position during crack test can be seen in the picture below.

One of several advantages of such an automatic test system is the fact that the test result does not depend on the human eye but is always reproducible by the electronic test instrument.

The relatively high weight of approx. 10 kg per part as well as the geometry of the parts required some special design work.

A gantry robot places the test parts in pairs, horizontally onto an indexing table. The indexing table forwards the parts to the crack test station. During testing, already tested parts are taken by the robot and sorted to either the OK or NOK chute depending on the sorting decision.

The parts are rotated and a crack detection probe scans the entire outer surface of the hollow shaft for cracks. Both longitudinal and circumferential cracks are reliably detected. The **eddydector**<sup>®</sup> is used as crack detection instrument. The cycle time



## Customers rep

### Härterei Gerster AG, Egerkingen, Schweiz

Since 1950, Härterei Gerster in Switzerland has been an approved specialist for technical heat treatment. With comprehensive capabilities and high performance objectives Gerster are able to offer competent advice, and individual heat treatment solutions for very small parts for clocks and watches, safety-critical parts for the automobile industry and large work-pieces of national and international customers.



## Port 1<sup>st</sup> example:

Especially for the automobile industry heat-treated parts are required to be tested for correct quality (100 % test) in order to prevent reject parts being installed. For this, Härterei Gerster applies the **eddyliner<sup>®</sup>P** with multi-frequency technology. Two test systems are installed for semi-automatic testing. Vibration bowls and other feeding devices are used for automatic testing of large batches and corresponding part geometries. Härterei Gerster appreciates the flexibility of the **eddyliner<sup>®</sup>P**. To change to a different part type and recalibrate the instrument takes only some minutes, so that small batch sizes can be efficiently tested.



The photo shows an **eddyliner<sup>®</sup>P** installation at Härterei Gerster. The test parts are fed to the test coil by means of a vibration bowl. After the test, the parts are sorted into OK and NOK parts. The cycle time in this case is approx. 1 second.

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# ibg-new development

## Testing the inner surfaces of automobile components by means of ID coils

The usual procedure for eddy current structure tests is with the use of encircling coils. The test parts are positioned in the coil and the test is carried out accordingly. Applications requiring the test on the inner diameter of a component are difficult as this area cannot be reached by encircling coils. Typical examples

are bearing races in a hub or the inside of the bell of a CV joint. An encircling coil is not able to reach these zones from outside as the magnetic fields do not sufficiently penetrate the material.

In order to manage such applications with satisfactory sensitivity and reliability ibg Prüfcomputer developed Inner Diameter Coils which are tailor-made for customers' applications to directly reach the zones from inside. The photos show such ID coils for testing CV joints resp. tripods. The ID coils can be supplied from 5 mm diameter.



Photo 1:  
ID coil for CV joint test



Photo 2:  
ID coil with test part

ibg - extra info

## 200 participants at ibg-Workshops in Germany, France and USA

More than 200 interested participants were welcomed at our traditional Workshops which took place in March and April this year in Stuttgart, Wolfsburg, Besançon, Atlanta, Nashville and other venues. Our Workshops have developed into an international forum informing on component testing in general as well as special applications. Further events are scheduled for this year in Great Britain, Mexico, Brazil and France. If you are interested in please contact our representatives or ibg directly.



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## A new aerospace application for ibg - Crack detection on highly-stressed rollers

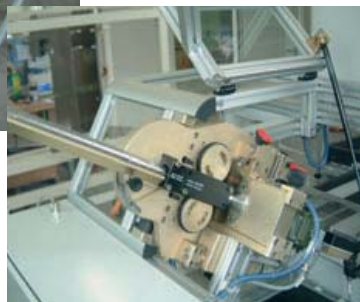
Jet engine bearings are highly-stressed and must be of the highest quality. ibg has developed an inline system for 100 % testing of these rollers, which reliably detects flaws as small as 50 microns deep and 80 microns long. The new system has been certified by a major manufacturer of commercial and military jet turbines.

rotating probe disk which can be adjusted to the different diameters of the roller parts. Friction wheels guide the test parts end to end at a constant speed through the **eddyscan**<sup>®</sup>. OK and NOK rollers are separated onto soft conveyor belts. Special provisions are made for extra gentle handling during feeding and discharge of tested parts. Change over for different roller sizes is kept to a minimum, with exchange and maintenance parts kept in drawers below the test instrument.



An interesting application for ibg, increasing our experience in bearing testing within the specialised aviation / aerospace market.

The system incorporates a 2-channel **eddydetector**<sup>®</sup> and **eddyscan**<sup>®</sup> H2/30 rotating scanner for non-contacting testing. Roller bearings with diameters of 5 - 26 mm and lengths of 5 - 32 mm can be tested. With a maximum line speed of 75 mm/sec. the system inspects up to 204 parts/minute.



Left:  
Test system for rollers

Middle:  
The test parts are fed into the **eddyscan**<sup>®</sup> H via friction wheels

The **eddydetector**<sup>®</sup> crack detection instrument uses two test channels with two probes on a

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