



# info

No. 4

ibg-Talk



Heat treatment is a very critical part of the production process. A lot of process parameters must be kept at a constant level over long time periods and external influences have to be excluded. Regular cost and time consuming material analyses in laboratories are necessary in order to verify the quality of the heat treatment process.

These high costs are considerably reduced by using ibg test systems and furthermore the test result is available immediately. Many hours or days waiting for the results from the laboratory belong to the past.

This issue mainly deals with this topic. On the following pages, I would like to give you some information on manual and automatic test systems to verify correct heat treatment.

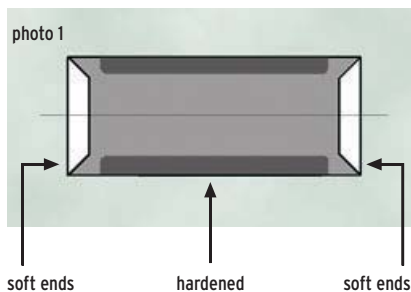
*Yours  
Herbert Baumgartner*

## Automatic structure test of rollers for correct hardness, case depth and hardness runout

High-quality bearing components require complex heat treatments during the production process. This example concerns needle bearing pins which have to be tested for correct surface hardness, case depth and - in this case very important - the correct hardness position (refer to photo 1). Each roller has to be tested as only 100 % testing guarantees that only good parts are processed.

A French bearing component manufacturer

needs less than 1 second and depending on the test result, the good parts are carefully forwarded on a conveyor belt for packaging. Photo 2 shows the overall view of the test system. Bad parts fall into a lockable container. The cycle time is approx. 1 second per part. Different part lengths and diameters may be tested on this system by using exchange parts, the changeover time is less than 15 minutes.



uses the Preventive Multi-Frequency Technology. A 2-channel instrument **eddyliner®P2** with encircling coils verifies both ends of the rollers. The coils are customised to part length and diameter. The rollers are fed to the automatic test system via a tube into the test coil head, the test itself



photo 2

# Standard- and Customised coils for all applications

Testing the structure of components for correct heat treatment with the Preventive Multi-Frequency Technology by ibg is usually carried out with encircling coils. These coils

are available from 5 mm up to 300 mm diameter and our experience shows that 90 % of all applications can successfully be tested with the standard encircling coils. Typical applications are for example testing for correct hardness, case depth, material mix, alloy, crystalline structure - to mention only a few.

There are sometimes, however, applications which require special

types of coil or probe, designed only for those applications. ibg's coil manufacturing department designs and builds suitable coils for these special applications.

One example is the use of rectangular coils to test bearing rings. The rings in such a coil achieve optimum penetration

by the magnetic field. Testing of con rods is also an application for rectangular coils.



The ability to accurately determine the position of the hardened zone, e.g. after induction hardening is important for many manufacturers. For this application, shielded coils may be sensibly used. The magnetic field is shielded so that only the critical zone is tested. Outside influences are nearly excluded. Differences in position of the hardened zone of 0.5 mm, depending on part geometry are reliably recognised.

ID test coils are available to test boreholes and inner diameters. Typical applications here are tripods or CV joints.

## Customers report

### 3R Technics GmbH Zürich

#### A Spin-off enterprise of the "federal Institute of Technology"

Imagine a production machine which monitors the material entering the process, calculates the optimum process parameters and adjusts itself, without any human operator - Zukunftsmusik/pie in the sky?

NO! The future has already started - at 3R Technics.

In cooperation with Spühl in St. Gallen, Switzerland, they developed an online-process control for a Bonell spring



photo 1



photo

part 2<sup>nd</sup> example:

coiling machine. The heart of this process control is the ibg instrument **eddyliner<sup>®</sup>P** as data provider, as well as a data processing tool. The wire to be processed is passed continuously through an encircling coil before it comes to the coiling machine. Testing with 8 test frequencies is carried out in defined short intervals and the received voltage vector coordinates at the **eddyliner<sup>®</sup>P** are forwarded in real time to the 3R Technics evaluation tool. The corresponding setting parameters e.g. deflector and bender of the coiling machine are extracted via a mathematical model, compared with the optimum settings and if needed re-adjusted. One hundred springs per minute are produced, the capacity of the re-adjusting, however, is up to 300 springs/minute. This minimises expensive machine downtime and rejects.

Photo 1 shows the eddylinerP with encircling coil incl. wire. Photo 2 shows the coiling machine with test coil (red). Similar process controls may be used in other machines which process metallic material such as straightening, heat treatment and forming machines.



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# Enormous cost reduction in heat treatment monitoring

The heat treatment of safety-critical components is a complex process. Many parameters influence the result of the heat treatment process. Cost and time consuming material analyses are necessary in order to monitor the treated components. These analyses are carried out destructively and incur delay in a laboratory. This causes high costs and with continuous production result in a lot of rejects.

The use of inline non-destructive test methods which give instant results, and do not influence the test part, can save up to 80 % of the costs of destructive material analysis according to the experience of our customers.

Photo 1 shows a test table for structure test on drive shafts. The shafts (photo 2) are tested at two locations for correct hardness, case depth and hardness position. A similar test table is used for controlling the tempering process of gears (photo 2). The gears are positioned in the test coil. The test itself is activated by pressing a button or automatically. The test instrument indicates OK or NOK.

The investment in this system paid for itself within a few months as the tremendous costs for the destructive test were dramatically reduced.

Please contact ibg and we may calculate your cost reduction potential together.



photo 1



photo 2

ibg - extra info

## ibg-webpage as well in Spanish

Due to the increasing demand from Spain and Mexico for our products our webpage is now also available in Spanish. As the number of hits continues to increase so our internet presentation becomes more and more an important marketing tool. Please visit us at [www.ibgndt.de](http://www.ibgndt.de) or [www.ibgndt.co.uk](http://www.ibgndt.co.uk) or [www.ibgfrance.fr](http://www.ibgfrance.fr) in German, English, French and Spanish.



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## Inline Test on Piston Pins

Automobile manufacturers require a 100 % test of heat treatment for certain components. A typical test part which has to be verified is the piston pin. The cylindrical geometry makes this application quite simple. The test part slides down a chute, two friction wheels controls the feed rate to the test coil. The test is affected by the **eddyort**<sup>®</sup> instrument, the single-frequency instrument by ibg. Parts which are not heat-treated are reliably sorted,



and exit to a lockable box. The good parts continue to the next process. The cycle time is approx. 1 second per part. By using change parts the system is able to test piston pins of different length and diameter. The changeover time is less than 20 minutes

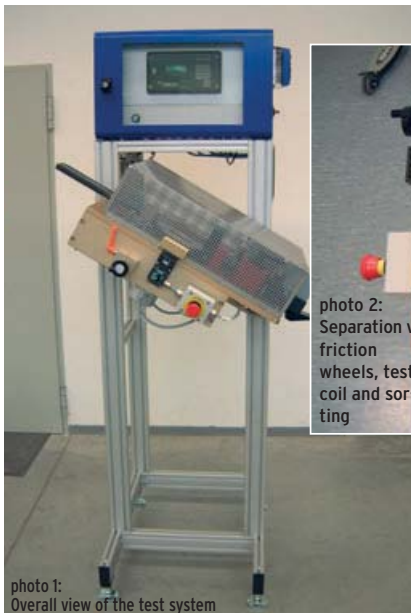


photo 1:  
Overall view of the test system

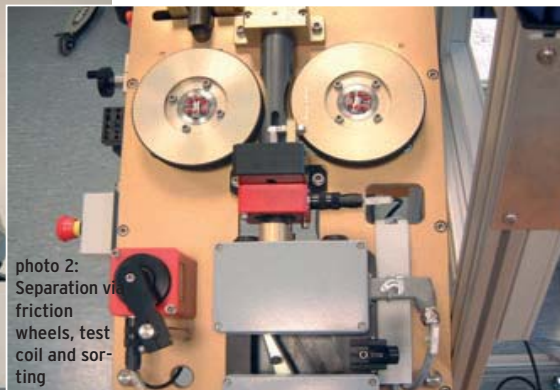


photo 2:  
Separation via friction wheels, test coil and sorting

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