Overview of rotating systems
Reliable quality assurance for your semi-finished products

- For wire, bars, seamless tubes
- Diameters from 1.9 to 140 mm
- Robust, compact, to suit demand
To ensure the quality of semi-finished products
The eddy current method is already standard practice for non-destructive 100% testing of tubes, bars and wire. It has a high sensitivity to surface defects, can be easily integrated into the production line, works automatically and provides reproducible results and watertight documentation.
Depending on the application, different sensor systems are used. Encircling coils for testing the whole part or segmental coils for testing a single area – such as a weld – are commonplace.

The use of rotating systems specifically for longitudinal defects
For production processes in which longitudinal defects can occur, rotating systems are an industrial requirement. Rotating systems scan the specimen’s surface helically and without contact. Due to the high resolution and the orientation of the probes perpendicular to the cracks, these systems are capable of detecting long, uniform defects – unlike standard encircling coil systems. And because the probes rotate at up to 12,000 rpm, the eddy current testing can keep up with the speed of any production line.

Production speed is not an issue
This is especially true for the small RS20 rotating system which is optionally available as a four-channel model (i.e. with four probes on the probe disk). With part diameters smaller than 20 mm, material throughput speeds of up to 2880 mm/s can be achieved in wire drawing or recoiling systems – while testing the entire surface area.
In summary: Rotating systems monitor the manufacturing process (process control) and ensure product quality (quality control).

Rotating system: This is how it works!
The test specimen moves longitudinally through the rotating test probes and is helically scanned without contact. If a probe passes over a material defect, it detects a change in the induced eddy current and displays this in real-time as a defect signal. The angular position of the defect along the circumference of the test specimen is shown via a special graph.
Defect resolution
The minimum defect length (i.e. the minimum safely repeatable, detectable defect length) is a function of the rotational speed of the probe and the throughput speed of the material being tested. The minimum defect depth is 0.05 mm and depends on the sample’s surface qualities.
Conventional sensor technology
Segmental or encircling coils react in high resolution to the smallest changes in the material’s surface. Longitudinal defects are therefore often only detected at the start and end of the defect and falsely classified as less critical point defects.

PRUFTECHNIK rotating systems: 40 years of eddy current experience
- Four systems for diameters from 1.9 to 140 mm
- For use in production lines and during final inspection of tubes, bars and wire
- Specifically for the detection of longitudinal defects
- High test sensitivity
- Distance compensation between probe and eccentric/round test specimens
- Robust design for high operational reliability even in harsh environmental conditions
- Comprehensive documentation as proof of quality
- Easy to service – resilient – economical
Wire testing with the RS20 rotating system

The small RS20 rotating system is intended for conductive materials with a round, oval or egg-shaped cross-section up to 20 mm in diameter. The core element is a quick-change probe disk with 2 (optionally 4) probes orbiting the test specimen at 12,000 revolutions per minute.

Each probe disk is specific for a particular material diameter and can be very easily – together with the inlet and outlet guide sleeve – switched to another diameter using just one tool in just a few minutes.

As one of the most important modern industrial inspection methods, eddy current testing provides immediate feedback about product quality during the manufacturing process. Eddy current testing provides reliable test results and enables a timely correction of the production process before waste is produced. PRUFTECHNIK provides complete roller tables and test benches based on customer requirements for upstream inline testing – including separation and sorting systems.

System for testing drawn wire in the diameter range 1.9 to 20 mm
Primary material for tool manufacture or for small springs in mechanical engineering
Longitudinal defects 0.1 mm deep, 0.1 mm wide, 10 mm long

“0.05 mm minimum defect depth”
Wire testing with the RS35HS rotating system

Wire testing for longitudinal defects in a drawing machine
- Spring wire for the automotive sector, chassis springs
- First test station for cold material after the hot rolling mill
- Process control, e.g. to detect defective wire drawing dies or rollers

The RS35HS rotating system inspects semi-finished products up to 35 mm in diameter. With 6,000, 9,000 or 12,000 revolutions per minute available, it is ready for all known production speeds. Set-up times for the RS35HS are also incredibly fast: If the material diameter changes, the probe distance distance may be adjusted with a few grab handles – without tools or opening the device. Even the guide bushes can be changed without tools.

„The higher the rotation speed, the lower the minimum defect length“

Eddy current testing can be used at various stages of production. The continuous testing of wire during production ensures that the material is defect-free prior to further processing and contains no cracks, holes, periodic defects or any other type of material defect. Simultaneously, eddy current testing with rotating systems is used for process control and detects stress cracks from annealing, transport damage or damage caused by faulty dies.

Continuous wire testing in the drawing line
Steel bar inspection with the RS65 or RS140 rotating system

The RS65 and RS140 rotating systems inspect semi-finished products up to 65 or 140 mm in diameter. They are characterized by a disaster-proof housing, massive, 3-roller centering mechanisms (with optional guide bushes) that are adjustable from the outside, a robust probe head with spring-loaded probe arms and rapid diameter adjustment. The probes are well protected and easy to change; each probe unit includes two differential probes and a lift-off probe. Different types of probes can be used depending on the specific requirements and specifications.

Offline testing is performed as a final quality control before shipment. Even material that has been sorted out as scrap during inline inspection may be subjected to more accurate classification via an offline test. The test also provides feedback to the manufacturing process – for example, an alert about a defective peeling tool. PRUFTECHNIK also supplies complete roller tables and test benches for offline tests according to customer requirements.

“Easy handling – shorter set-up times“
Combined test with RS35HS and encircling coil

- Offline bar testing
- Meets the stringent requirements of the automotive industry
- Supplementary inspection in a single pass
- Detects the smallest point defects and process-typical longitudinal defects

If you need to play it safe and detect longitudinal and point errors in equal measure, you simply cannot beat a combined inspection with a rotating system and an encircling coil. The documentation and archiving of the data plays a key role here by providing evidence for your customers. EDDYTREND PC software enables the optimal analysis of the eddy current test data:
  - online for production monitoring and possible process changes, and
  - offline for analysis of test data and creation of test reports and statistics

Furthermore, the system can be integrated into the customer’s network and database connections.

"Minimum defect depth 0.05 mm"

The best test results are obtained by the combined use of a rotating system and an encircling coil. Combined testing ensures that the material has no cracks, holes, periodic defects or material defects of any other kind – even small surface defects can result in a defective final product and a high reject rate after further processing.
Combined test with RS65 and encircling coil

Combined testing process for quality assessment of rods. With height adjustable sliding tables for the magnetization unit and rotating system and drive rollers for centering and further transport of the material. A wide range of accessories makes it possible to meet all customer requirements with standard components.

**DC demagnetization**
DC demagnetization is used to bring the pipes or rods (which were also magnetized with DC) to the lowest possible level of residual magnetism.

**AC demagnetization**
AC demagnetization is used to further reduce the residual magnetism.

PRUFTECHNIK designs and manufactures complete test lines with infeed, adjustable tables, outfeed and sorting.

„Combined testing for point and longitudinal defects“
Systems overview

Rotating systems

<table>
<thead>
<tr>
<th>Type</th>
<th>RS20</th>
<th>RS35HS</th>
<th>RS65</th>
<th>RS140</th>
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<tbody>
<tr>
<td>Diameter range [mm]</td>
<td>1,9 – 20 mm</td>
<td>2 – 35 mm</td>
<td>5 – 65 mm</td>
<td>10 – 140 mm</td>
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<tr>
<td>Speed [RPM]</td>
<td>12000</td>
<td>6000/9000/12000</td>
<td>3000/6000</td>
<td>1800 (max.)</td>
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<tr>
<td>Distance compensation</td>
<td>via testing system</td>
<td>via testing system</td>
<td>integrated</td>
<td>via testing system</td>
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<tr>
<td>No. of probes (channels)</td>
<td>2/4</td>
<td>2</td>
<td>2/4</td>
<td>8</td>
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<tr>
<td>Track width per probe [mm]</td>
<td>1,8/3,6</td>
<td>1,8/3,6</td>
<td>1,8/3,6</td>
<td>9,5</td>
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<tr>
<td>Minimum defect length [mm]</td>
<td>3,6</td>
<td>3,6</td>
<td>7,8</td>
<td>14,5</td>
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<tr>
<td>Max. prod. speed* [m/s]</td>
<td>2,88</td>
<td>2,4</td>
<td>2,4</td>
<td>2,5</td>
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<tr>
<td>Centering mechanism</td>
<td>Guide bushes</td>
<td>Guide bushes</td>
<td>3-roller centr.</td>
<td>3-roller centr.</td>
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<tr>
<td>Weight [kg]</td>
<td>40</td>
<td>77</td>
<td>320</td>
<td>650</td>
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Testing systems

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<tr>
<th>Type</th>
<th>EDDYCHEK® 605 compact</th>
<th>EDDYCHEK® 605</th>
<th>EDDYCHEK® 610</th>
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<tr>
<td>Channels</td>
<td>max. 5, modular</td>
<td>max. 5, modular</td>
<td>max. 10, modular</td>
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<tr>
<td>System design</td>
<td>Integration solution</td>
<td>All-in-one</td>
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<td>Display</td>
<td>– (via PC)</td>
<td>15”</td>
<td>15”</td>
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<tr>
<td>Operation</td>
<td>remote via PC</td>
<td>Touchscreen</td>
<td>Touchscreen</td>
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Detailed technical specifications can be found in the respective product brochures.