Quality Assurance & Process Control for Blu-ray Discs (ROM, R, RE)

Blu-ray Competence

Ready for Blu-ray: In-Line Scanner ISM.blue+ and the Off-Line System PROmeteus MT-200.blue

Competence for the New Media Generation

Dr. Schenk, known as the inspection pioneer for the optical media industry, continues to set standards also for the generation III of high definition formats. Blu-ray disc replicators and manufacturers rely on the quality assurance and process control systems that have „precision in focus".

The perfect synergy between technical innovation, more than 3 decades of experience in optical design, close relation and collaboration with major developers of the new media format as well as a solid and growing organization builds the basis for Dr. Schenk's Blu-ray competence and business success.

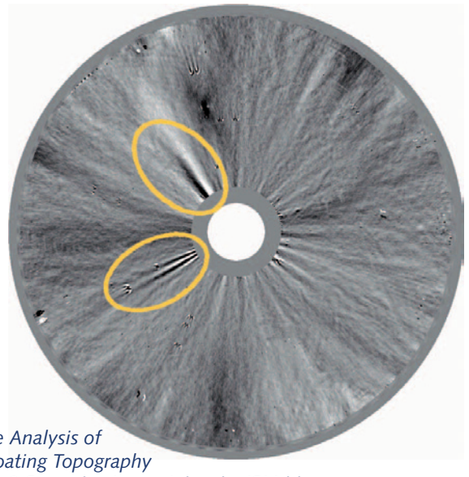
Instead of just an upgrade of a standard DVD scanner, a completely new optical set-up, including high-speed electronics, has been developed to fulfill the special needs of BD inspection. The unique optical design of the In-Line scanner ISM.blue+ and the Off-Line system PROmeteus MT-200.blue enables a reliable inspection and process control that meet the strict quality standards of Blu-ray disc production at an optimized yield.

INSPECTION & MEASUREMENT SOLUTIONS FOR BLU-RAY MEDIA

The high definition disc format Blu-ray (BD) is based on blue laser technology which enables an increased recording density. The production of Blu-ray discs (ROM, R, RE) involves spin coating of cover and space layer. Especially these two processes are still new to the industry and challenging as they are very vulnerable to layer thickness variations on the one side and new types of defects on the other. Such defects and layer irregularities could cause the pick-up head to loose its focus or track and the disc becomes unplayable.

100 PERCENT OF THE DISC AREA VISUALIZED

Dr. Schenk's Blu-ray inspection and test systems measure the thickness of the space, cover and hardcoating layers on 4-8 radii. This radial thickness profile supports the process control throughout the production and builds the basis for immediate action to adjust the system and regain operating stability. Discs that do not meet the strict geometrical and physical requirements are detected and rejected from further production steps.



In-line Analysis of the Coating Topography within 2 Seconds - Image taken by ISM.blue+

At the same time a parallel inspection set-up checks the entire disc area for the even more concerning local thickness variations and deformations that occur between the measured radii, like e.g. burst bubbles. Common scanners that now test on 20-30 radii to cover a slightly bigger disc area, would still not reliably detect these. For this reason Dr. Schenk has decided against a pure increase of radii number.

The ISM.blue+ In-Line scanner and the Off-Line system PROmeteus MT-200. blue therefore perform a thickness analysis to create a coating topography on 2048 radii covering the entire disc (see grey scale image above). Only by this combination of two optical camera an improved process and quality control becomes possible and no local, topographical defect goes undetected.

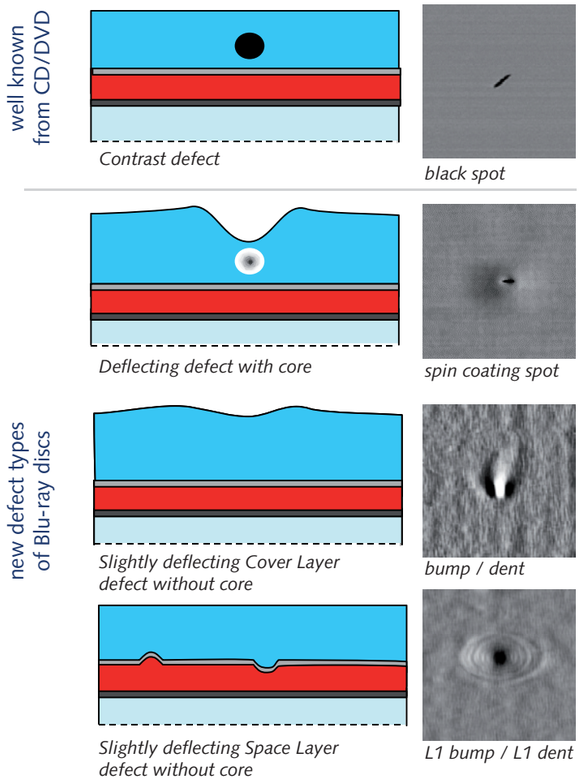
NEW PROCESSES CAUSE NEW DEFECT TYPES

A big challenge during the Blu-ray disc replication process are the new local defect classes that can occur in cover and space layer during the spin-coating process. Double layer Blu-ray discs are in addition subject to new defects during the embossing of the information layer. Dr. Schenk has classified these (for examples see image to the right) and developed innovative ways for an even more reliable replication process analysis.

Defects, which occur during the hard coating or spin coating process of the Blu-ray disc's cover layer mostly appear with an additional deflecting part (e.g. bubbles with deformations and spin coating or hard coating spots). The optical behavior of these defects can be purely deflecting. Even when the core size of a defect might still be within the specified limit, its associated, mainly much larger deflecting part can cause the pick-up head to loose its track.

Dr. Schenk's Blu-ray disc scanners therefore inspect on two complementing optical channels for a correct discrimination between contrast and deflecting defects. A 0° high contrast camera being vertically aligned and extremely sensitive to absorbing defects determines the real core size of a defect. A unique 30° near dark-field camera is used in parallel for the accurate inspection of deflecting defects.

With this set-up an accurate classification and evaluation of defects becomes possible and will lead to higher yield as incorrect disc rejection can be minimized.



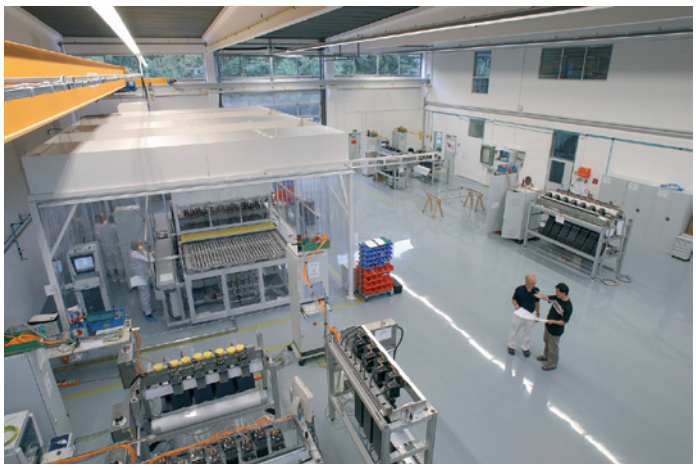
Basic Blu-ray defect types

IN-LINE SCANNER ISM.blue+ KEY FEATURES AT A GLANCE

- Absolutely stable systems based on embedded LINUX™
- Easy integration into replication and manufacturing lines
- 100 per cent coating topography within split seconds
- Advanced defect classification specific to Blu-ray discs
- Precise identification of core and deflecting size of a defect
- Userfriendly and industry suitable vizualisation software ISM.viz
- High speed data processing

PROmeteus MT-200.blue - OFF-LINE SOLUTION WITH FOCUS ON PHYSICAL PROPERTIES MEASUREMENT

- Industry and research standard for an easy comparison of test results
- Blu-ray discs analysis with blue-laser according to BD specifications
- Stable operation based on embedded LINUX™
- Unreached spot accuracy for most precise layer thickness measurement, crucial especially at Blu-ray layer edges
- Very high scanning frequency to guarantee superior spatial resolution
- User interface according to SEMI standard
- Fully network-compatible with customer data bases
- Tests blue and red formats in only one system



Dr. Schenk's modern production site

Dr. Schenk GmbH, established in 1985, is an innovative high-tech company based in Munich, Germany. For the third decade now, the range of products and services offered by Dr. Schenk comprises comprehensive solutions for automated quality assurance and production process monitoring to the optical media, flat glass, film and foil, converting, paper, solar and semiconductor industries. In these areas Dr. Schenk continues to set new standards for the inspection of surfaces through the utilization of the latest technical advances in optics and electronics.

The company's primary objective is to achieve complete satisfaction of our customers on a long-term basis. This vision is realized by a perfect synergy between innovative solutions and practical ideas. Global sales and service facilities ensure local support, technical service, training and consulting at any phase of a project. From modular standard units to complex and highly customized systems – Dr. Schenk's high performance test and inspection products have precision in focus!

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