No UV radiation in magnetic-powder inspection

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Abstract

A new light source for the magnetic-powder inspection increases the contrast of material defects while avoiding UV exposure to NDT personnel. Newly developed LED illumination and filters stimulate the fluorescence, leading to better inspection results and better protection to the NDT personnel.

Keywords. Magnetic-powder inspection, UV-exposure, crack detection, surface inspection

1. Introduction

The magnetic-particle inspection is a non-destructive detection method. Cracks are indicated by using the magnetic-powder or penetrate testing method. A high contrast between cracks and the undamaged surface of an object is inevitably necessary for a fault-free visual inspection.

2. Current situation with UV illumination

Traditional UV-mercury-illumination generates UV radiation. Comprehensive industrial safety measures have to be applied to ensure skin and eye protection. A fundamental problem with visually testing by UV-mercury-illumination is the use of shortwave light in the UV range. This generally results in the human eye being greatly stressed. In the case of direct contact with the shortwave radiation, the skin and other organs may also be damaged. If the intensity of the exiting UV light is increased in order to obtain a higher contrast, the risks will increase.

3. Introduction of a new illumination approach

Introducing the Autoflux®-Cracklight-System, Automation W + R GmbH offers a new approach in the field of surface inspection for the magnetic-particle detection.

Autoflux® Cracklight enables inspection without UV radiation. As a result, this system (patent pending) eliminates extensive work protection regulations and delivers improved inspection results, both factors contributing to reduced production costs.

The system consists of a combination of newly developed LED illumination and filters. The inspector merely sees the flux medium resonance, but not the light that stimulates the

fluorescence.

Our newly developed, innovative LEDs and corresponding high-tech filters replace the use of UV-mercury-illumination. Therefore, the exposure of personnel to UV radiation and additionally needed safety measures are eliminated, due to the implementation of the Autoflux®-Cracklight-System.

4. The Active Principle

While using the magnetic particle system and the flux medium, the fluorescence continually increases with rising wave length. The stimulation of the flux medium is optimized with the use of the Autoflux®–Cracklight LED-illumination.

In comparison to the traditional mercury-vapour lamp which reaches a wave length of 365 nm, the Autoflux®-Cracklight illumination achieves a higher stimulation (e.g. approx. 30 % for the colour pigments “Lumogen Yellow” a trademark of BASF AG). In addition to a more efficient stimulation, the Autoflux®-Cracklight-System also increases the visibility of defects because of the exact calibration of the transmission range of the Autoflux®-Filters.

These filters are installed on the facility of the light and are integrated into our specially designed glasses.

The inspecting personnel merely sees the flux medium resonance, but not the light that stimulates the fluorescence.

Therefore, the difference between signals and the signal-to-noise ratio are optimized, leading to better detection results.

5. Advantages of Autoflux®-Cracklight

Innovative LEDs and the appropriate high-tech filters replace the common UV-mercury-vapour lights. This system generates less heat than mercury-vapour lights and permits a fully encapsulated casing with the following advantages:

- Improved inspection by virtue of more light, better contrast, and optimized fluorescent stimulation.
- Risk-free application without UV exposure to NDT personnel
- Low power consumption and low heat radiation
- Extended lifespan and reduced chance of malfunction
- Improved occupational health and safety due to elimination of UV radiation
- Mobile application with portable battery