

Application note N39d

Non-destructive testing of wind-turbine blade edges using the direct imaging, non-ionizing NIDIT method



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Introduction

One of the most powerful methods of non-destructive testing is X-ray through transmission. Especially attractive are its direct imaging, the high spatial resolution, and its capability for tomography. However, X-rays are ionizing and therefore harmful. Considerable and expensive safety measures are necessary and thus limit its application in practice.

In case that the devices under test (DUT) are made from insulating (dielectric) material and if the high spatial resolution is not necessary, the direct imaging testing with low-power microwaves (NIDIT – Non-Ionizing Direct Imaging Testing) offers itself as an alternative method. Microwaves are non-ionizing and therefore harmless. Please note: The use of mobile phones is only possible because the used microwaves are harmless.

In the following, as an example the non-destructive testing of edges of wind-turbine blades using the NIDIT procedure is described.

Test method

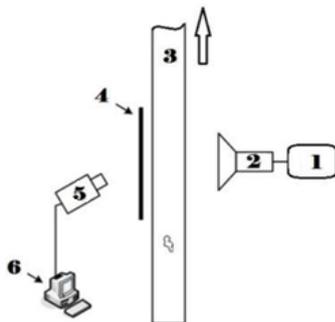


Figure 1: Basics of a NIDIT test setup

Fig. 1 shows the basics of a NIDIT test setup. A microwave source 1 (e. g. 24 GHz) and an antenna 2 widespread irradiate the DUT 3. On its backside there is a microwave absorbing foil 4. The microwave radiation, which is homogeneously incident on the front side, inside the DUT is affected by defects and thus is inhomogeneously incident on the microwave absorbing foil. So the foil, according to the defects gets a heat distribution, which is detected by a heat camera 5 and displayed by a computer 6. The heat distribution corresponds to the defect distribution inside the DUT.

Test device

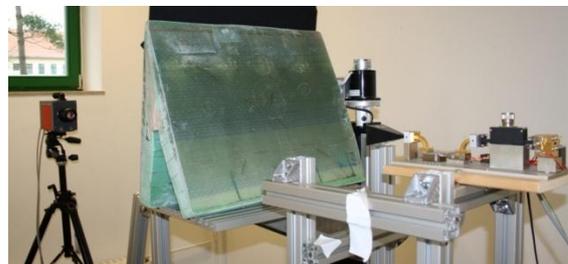


Figure 2: Trailing edge of a wind turbine with artificial bonding being tested with NIDIT

Fig. 2 shows a section of the trailing edge of a wind turbine with artificial distribution of the adhesive in a NIDIT test setup. The aim is to show the distribution of the adhesive which in practical cases is covered and cannot be seen visually. The sample is moved horizontally between the fixed test setup. In the test region the DUT is about 200 mm thick. Fig 3. shows a typical still picture of the video of the hole test. The video can be downloaded using the link at fig. 4.

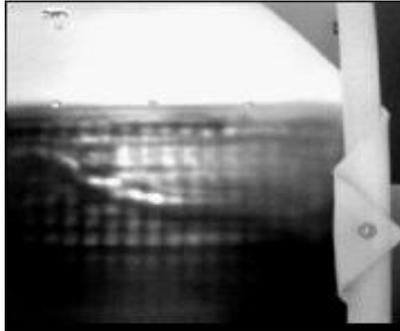


Figure 3: Still picture of video showing NIDIT test of wind-turbine blade

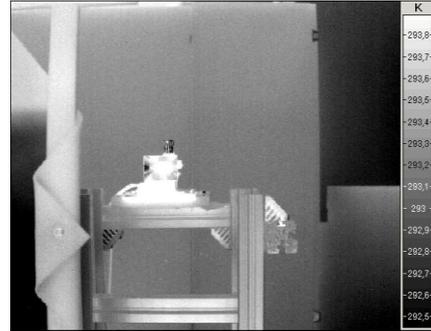


Figure 4: Link for video: http://fitm.de/wp-content/uploads/2017/10/P05_x264.mp4

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