

Empirical study: Comparison of coating thickness testing methods

Bachelor thesis successfully completed with 1.0

Thomas Krause, student of medical engineering in the department of electrical engineering and OptiSense work-study student, has completed his bachelor thesis with the top grade summa cum laude (with highest praise).

Prof. Dr. Marion Gebhard and Prof. Dr. Thomas Hilbel, both from the Westphalian University of Applied Sciences, as well as OptiSense managing director Georg Nelke had supervised the student Thomas Krause during the extensive empirical project, which deals with the "Validation of a photothermal layer thickness determination in medical technology".



Thomas Krause (left), student of medical engineering in the department of electrical engineering presents his successful bachelor thesis to Thorsten Merfeld, head of technical support and former working student at OptiSense.

In his work, the OptiSense work-study student focuses on the quality and safety testing of medical instruments using the example of surgical tweezers. Numerous requirements are placed on the coating of these instruments: It must be elastic, have good adhesion, be free of cavities and be dirt-repellent. Last but not least, the electrical insulation function must be reliably guaranteed over the entire service life of the tweezers. These requirements can only be met with a precisely measured coating thickness. The smallest errors in the tweezers coating process can have serious consequences for the patient and the surgeon.

To this end, Thomas Krause compared two coating thickness testing methods in his work: the contact eddy current technique and the non-contact photothermal method.



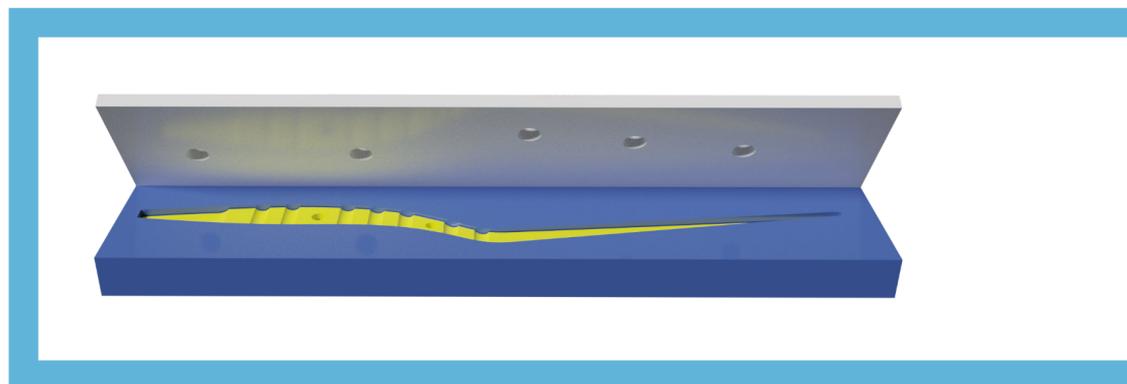
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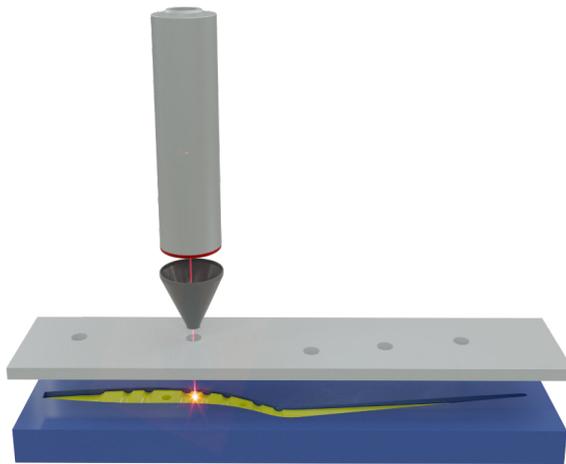
Through numerous empirical measurements, the medical technology student simultaneously worked out the optimization potential that a change in the testing methods from eddy current technology to contactless photothermal technology could bring. A large-scale series of measurements was carried out at firmly defined points on the tweezer legs, and the data from the two measurement methods were statistically evaluated and compared.

Krause describes in his conclusion: "The evaluation of the recorded data showed that the photothermal method is clearly superior to the eddy current technique in this medical application. In addition, the comparison of measuring devices showed that the OptiSense

For data acquisition, the tweezers are placed in a template provided for this purpose. The measuring positions are based on the geometry of the tweezers.



measuring device unmistakably delivers more stable and reliable measured values. A major reason for this is that photothermal technology deals better with the influencing factor of roughness. The measurement of coating thickness via non-contact averaging is less prone to error. This advantage also makes the method more flexible to use, for example for an automated application."



Each tweezer limb must be measured at the six points indicated by the holes, three on each side.

The structure of the work, as well as the accuracy of the results, were rated equally positively by the university and OptiSense. And the successful implementation was rewarded: OptiSense managing director Dr. Jens Heymans surprised the student with the participation in a subject-specific advanced training course on test equipment capability (MSA) & test process suitability and also announced to use the results of the final thesis as didactic basis for customer and employee trainings.

By the way: OptiSense offers students a variety of opportunities to gain valuable practical experience and to get to know the company better. Exciting topics in optical metrology for industrial and medical applications as well as the intensive, professional support of the specialists await those willing to do research. Many of the former students are now working at OptiSense. Detailed information is available at www.optisense.com.

CONTACT

