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ENDOSCOPE TEST SYSTEMS TO ASSURE THE OPTICAL QUALITY OF ENDOSCOPES IN CLINICAL PRACTICE

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In minimal invasive surgery, rigid endoscopes are used to view inside the body through natural or artificial made orifices. As the price of a rigid endoscope is high, they are being constantly re-used after a cleaning and steam sterilization procedure at the Department of Central Sterilization (DCS). However, due to mechanical, chemical and thermal stresses, endoscopes degrade over time. To determine whether an endoscope still provides sufficient quality, personnel of the DCS visually inspect the outside and inside of an endoscope. Because of the large diversity in endoscope types, the variation of image quality of new and used endoscopes is so large, that it is difficult to perform this manual check objectively.

In this talk we want to discuss the results of using an experimental test bench to measure the optical quality of endoscopes over the years 2007-2011. The system is based on measuring the illumination pathway using a white LED and photo cell and the viewing pathway using a LCD generated test pattern and high resolution camera. The measurements show that endoscopes roughly degrade 20% per year, but also that the variation in degradation is high and uncorrelated to the type of endoscope. Looking at the system itself, it appeared that although the system had sufficient stability over these years to allow conclusions, it has too much drawbacks to be used at the DCS, like the stability of the LCD screen, loosing track of endoscopes when they are placed in another basket and the large number of manual steps needed to perform a measurement.

For this reasons we present a new design of an endoscope measurement system, called the MDE, a Measurement Device for Endoscopes. It is based on a comparison of the endoscope image of the inside of a marker sphere with that of a new one. After a test run at the St Jansdal clinic in Harderwijk, the Netherlands, from March to December 2011, the system will be re-designed during the coming months to include endoscope labeling with a data matrix, detection of broken illumination fibers and lenses and scanning of water and dust particles. Aimed to be commercially available from the end of 2012, we hope that this system will be a valuable device for assuring the optical quality of endoscopes in clinical practice.