NanoZoomer Application Note #1

...and it scans and scans...

Long-term experience with Hamamatsu's NanoZoomer 2.0-HT at Erasmus MC Tissue bank, Rotterdam

The advantage of virtual microscopy is that virtual slides are, in contrast to their glass counterparts, easily accessible from remote locations when stored on an image server. Like glass slides under a microscope they can be viewed with different magnifications, pathologists can navigate through the tissue and add annotations to mark important areas. In contrast to images taken with a standard camera mounted on a microscope a virtual slide enables the pathologist to review the whole tissue and not only the small section imaged by the camera. This is particularly important for second opinion revisions. Furthermore virtual slides don't fade with time, like their glass counterparts do. Fluorescence labelled tissues are especially prone to bleaching, making it very difficult to review the original slides after weeks or even days after preparation.

Dr. Peter Riegman, Head of the Erasmus MC Tissue Bank, was one of the first NanoZoomer customers worldwide. Actually the 3rd ever built NanoZoomer was delivered in 2005 to the Erasmus Institute and has been used there ever since.

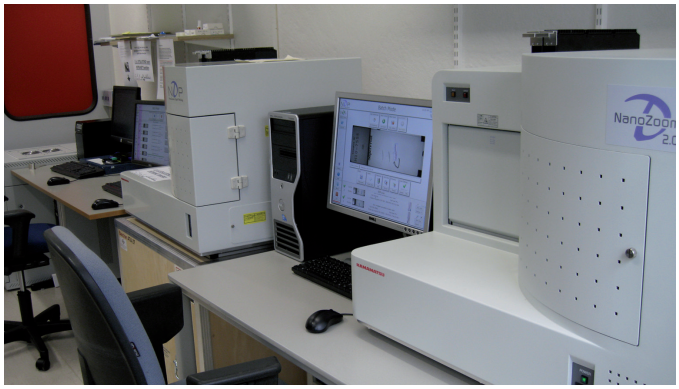
"Our initial idea was to establish a Tissue Micro Array platform. Slides are scanned and afterwards they can be analysed by dedicated software and algorithms" Dr. Riegman tells us. "But of course our hope was that it could be used for pathology purposes, too."

"It turns out that he was correct: the TMA platform was started only two years ago. The NanoZoomer is used basically for three application fields", explains Dr. Bas de Jong, Assistant Manager of the Erasmus MC Tissue Bank. Namely for

- research (imaging facility for internal and external scientists, digital analysis),
- diagnostics (virtual revision slides for second opinion, internal and for other hospitals, case studies) and
- students education.

It runs nearly full time (i.e. 24 h, 7 days/week) with a throughput of ca. 700 slides/week. In the past three years no slides have been broken by the scanner. In the very beginning it sometimes happened that slides were not handled correctly, owing mostly to a cover slip or label sticker being placed askew. But thanks to regular feedback from Dr. Riegman and his colleagues, Hamamatsu have continued to improve both the software and hardware, making the NanoZoomer the most reliable system on the market.

Dr. Bas de Jong estimates that the only maintenance needed in the past 5 years have been to exchange the light bulb in the NanoZoomer, which was



done by himself and his co-workers, without need to call a service visit from a Hamamatsu support engineer.

The NanoZoomer is designed to scan slides automatically, including tissue recognition, definition of the proper scan area and scanning itself. This automatic mode works even with slides marked with felt tip notes.

Yet in the experience of Dr. de Jong and Dr. Riegman, felt tip pens exhibit similar contrast as stained tissue in the black and white macro image, consequently the scan area sometimes is defined too large, leading to longer than necessary scanning times and larger file size. For this reason they scan 99% of their slides in semi-automatic mode. This mode allows the operator to review the scan area and focus before scanning. The NanoZoomer is also capable of setting different scan properties for different slides. This functionality enables the operator to scan very diverse slides in batches rather than individually.

Dr. Bas de Jong

Dr. Peter Riegman

A short time ago Dr. Riegman and Dr. de Jong decided to upgrade the old scanner to version 2.0 to achieve higher throughput. But as the demand for virtual slides for research applications had increased so much, that even the upgraded scanner is used to capacity, a second scanner was purchased. "This scanner is connected to an image server and used for diagnostics, scanning ca. 50 slides per day. These slides are directly stored on the server, making network bandwidth a crucial factor for scanning speed" states Dr. de Jong. In his opinion the greatest challenge of using two of the fastest scanners on the market is storage capacity for handling the large amounts of image data.

Erasmus MC
Universitair Medisch Centrum Rotterdam

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Hamamatsu Photonics Deutschland GmbH
Phone: +49 (0)8152 375-0 · Fax: +49 (0) 8152 2658
www.nanozoomer.com · E-mail: info@hamamatsu.de