

Digital Pathology Solutions



THE DIGITAL PATHOLOGY COMPANY

STAYING AHEAD IN DIGITAL PATHOLOGY

Digital pathology holds the potential to impact therapeutic strategies for patients. With more information being revealed from tissue samples in a quantitative and documented environment, it may enable physicians and pathologists to create dedicated and personalized treatment regimens which will ultimately affect the survival rates of patients and their quality of life.

3DHISTECH's system and software line-up supports faster diagnosis, which could lead to easier healing by defining the future of pathology diagnostics. As one of the pioneers in this field, 3DHISTECH develops and manufactures high-speed digital slide scanners that create high-quality brightfield and fluorescence digital slides, digital histology software and tissue microarray machinery – supporting not only routine pathology but also medical and pharmaceutical research as well as medical education.

3DHISTECH is a Budapest-based company that has managed to build an international success story

The company began developing and producing whole-slide imaging systems and digital pathology solutions years before digital pathology had achieved widespread acceptance and adoption. Its world-class knowledge base and range of award-winning products have affirmed its status as industry leader. The company has earned considerable professional recognition globally, and it is an important innovator in the history of Hungarian research and clinical medicine. 3DHISTECH is not only one of the most influential players among the leading companies the field of digital microscopy, it is also a driving force in digitizing the whole pathological process.

COMPANY MILESTONES AND ACHIEVEMENTS



MISSION & AWARDS

OUR MISSION

3DHISTECH is dedicated to providing clinical pathologists, researchers and universities with digital pathology solutions to facilitate quick and accurate diagnostics, supporting medical discoveries and fostering education.

Shaping the future of digital pathology and setting the pace of progress in routine diagnostics worldwide, 3DHISTECH...

- is the sole innovator of the world's fastest digital slide scanners with award-winning image quality*
- provides the most effective quantitative digital pathology solutions with comprehensive image analysis modules that gives you state-of-the-art evaluation methods
- saves you time and cost by delivering the most automated and sophisticated, high-throughput tissue microarrayers for the construction of TMAs**
- releases you from the dark room to enjoy the most advanced fluorescence 3D histology reconstruction in daylight by using whole slide 3D confocal microscopy***

What we are most proud of

- 3DHISTECH's development efforts were rewarded with the Hungarian Innovation Grand Prize in 2004
- 3DHISTECH achieved the prestigious 1st place for "Best Image Quality at 40x" at the
 "1st International Digital Scanner Contest (ISC)" in Berlin, in 2010
- The company's founder, Dr. Béla Molnár was nominated for the esteemed
 "European Inventor Award" in 2011 as the result of inventing the digital slide scanning system
- 3DHISTECH won 5 awards in 2012 at the prominent "2nd International Digital Scanner Contest (ISC)" in Berlin
- Also in 2012, 3DHISTECH was proudly awarded the "Exemplary Exporter Innovation Special Award" by the National Investment and Trade Agency (HITA)
- In 2013, the Digital Slide Scanner product line and the Pannoramic Viewer Software both developed and manufactured by 3DHISTECH achieved the prominent patent of Medical Device Class II from Health Canada
- Also in 2013, 3DHISTECH was awarded for the second time by the National Investment and Trade Agency (HITA) in the category of "Best Innovation Exporter"



^{*1}st place for "Best Image Quality at 40x" at the "1st International Digital Scanner Contest (ISC)" in Berlin, in 2010

^{*5} awards received at the "2nd International Digital Scanner Contest (ISC)" in Berlin, in 2012

[&]quot;TMA Grand Master is the world's highest-capacity tissue microarrayer with 72 blocks

^{***} The world's highest confocal scanning speed achieved at 1 minute/cm²/layer/channel

WORKFLOW

3DHISTECH offers a solution for each step of the routine pathology workflow



COMPLETE LABORATORY WORKFLOW

Track & Sign™ Laboratory Information System

- Designed with the special needs of an anatomical pathology laboratory in mind
- Enhances your lab's productivity by supporting an optimized workflow
- Highly scalable: meets the needs of large and small pathology labs
- Professional barcode-based sample tracking
- Fully integrated communication with
 CaseCenter[™] for automatic digital slide scanning
- Increased device connectivity (to label or slide and cassette printers, MacroStation)



PANNORAMIC® 1000 digital slide scanner

- Capacity: up 1000 slides
- Throughput: up to 2000 slides/day*
- Flexibility: arbitrary-order scanning, single and double-width slide handling
- Flash scanning technology
- Automatic loading

*20x objective/40x optical equivalent magnification, 0.24 μm/pixel, 7500 μm focus point distance, 15x15 mm average sample size, two sets of prefilled magazines, single layer local scanning

CaseCenter[™] server-based digital slide storage solution

- Multiple user levels for accessing information
- Teleconsultation support
- Optional integration with existing medical information systems



CaseViewer™ slide viewing software

- Features for routine and research diagnostics
- MultiView: A maximum of nine slides of a single case with different stainings can be viewed simultaneously
- Supports SlideDriver for microscope-like navigation on digital slides
- Predefined, fixed-size annotations for 20x or 40x fields of view
- Z-Stack 3D for the investigation of histological structures in real 3D (for brightfield, fluorescence and confocal slides)
- DICOM compatible



INTRAOPERATIVE CONSULTATION

Pathologists can give a reliable diagnosis when microscopic images are coupled with macroscopic ones. In the era of the digitalization of pathology, it is now possible to access micro and macro images from one place, quickly and comfortably.

MacroStation

The MacroStation is a grossing table with an image recording system, designed for use with digital slides. The MacroStation not only records images and helps you mark the specimen but can also be connected to CaseCenter TM so all your case data can be stored there. The easy-to-use MacroStation offers a manual and economical solution to acquire pathological gross macro images.

- Lightweight design
- Built-in light source and zoom functions to ensure high quality gross images
- Acid-proof stainless steel cover for easy cleaning design
- Images can be uploaded to CaseCenter[™] and can be used as regular whole-slide images: they can be annotated, shared or even discussed via teleconsultation

PANNORAMIC® Desk II DW

PANNORAMIC® Desk is an entry-level slide scanner for research, education and clinical routine diagnosis, a simple and easy-to-use tool for teleconsultation and frozen section scanning.

- Capacity: 1 slide
- Single and double-width glass slide scanning
- Brightfield
- Live-view
- Compact design small footprint

CaseCenter™

CaseCenter $^{\text{TM}}$ is a powerful, server-based slide management system with a fully featured slide database capable of storing both macroscopic images and digital slides. Thanks to its flexible structure, it can be adapted to various fields, including clinical pathology, research applications, teleconsultation and education.

- Fully featured, web-based case and slide database for the pathology workflow
- Images from the MacroStation are stored within the case, along with the digital slides and other case data
- Macro images are automatically converted to digital slide and open in CaseViewer™

Combine the MacroStation with the PANNORAMIC® Desk II DW to get an easy-to-use, yet powerful solution for handling frozen sections:

- Create a frozen section slide with the MacroStation while saving the macro images to CaseCenter™
- 2. Scan the frozen section to CaseCenter™ directly with the PANNORAMIC® Desk II DW
- 3. Provide immediate access to the specimen with the help of live-view functionality of the scanner software
- 4. In a few minutes, both the digital slide and the macro images can be accessed via CaseCenter™ by anybody, anywhere

DIGITAL PATHOLOGY COCKPIT

CaseManager[™] Pathology Information System

- A software platform designed for the future of digital pathology
- Highly scalable: meets the needs of large and small institutions
- Deeply configurable with a large array of useful time-saving functionalities
- Seamlessly integrates with
 - Track & Sign™ or other LIS or HIS*
 - CaseCenter™
- Focus View: all the relevant information on a single screen to enable better informed decision making
- Helps improve the overall turnaround time of cases significantly

*In case of integration with a 3rd party LIS system, integration services with additional fees are involved.

CaseCenter™ server-based digital slide storage solution

- Multiple user levels for accessing information
- Teleconsultation support
- Optional integration with existing medical information systems

High-resolution monitor for case access, slide viewing and diagnostics

- 30" Barco Coronis Fusion 4MP medical display
- Built-in calibration ensures optimum image quality and consistency
- Luminance uniformity technology for uniform brightness levels across the entire screen
- Extended dynamic range for a wide color spectrum with optimum accuracy
- Backlight Output Stabilization for continuous LCD backlight stability and long-term image consistency

SlideDriver™ for easy navigation

- Microscope-like navigation on digital slides
- Useable with CaseViewer™

InstantViewer™ for flexible slide viewing

- Platform-independent, browser-based slide viewing application
- Supports Windows10, MacOSX, iOS, LINUX and Android

QuantCenter™ for digital image analysis

- Trainable image analysis platform
- Dedicated IHC quantification modules for cancer diagnosis
- Several modules with CE IVD approval

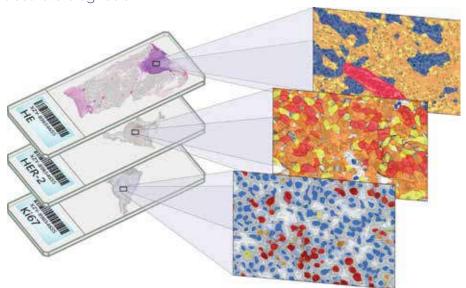




QUANTCENTER**

QuantCenterTM from 3DHISTECH is a multiple-module image analysis platform designed for whole-slide quantification in histopathology and molecular pathology. Pathologists can tailor QuantCenterTM to their needs, connecting different image analysis applications to easily define custom image analysis scenarios. In histopathology a tissue classification module can be applied to identify the cancer region as the first step, then IHC stains can be analyzed with a specific cell-based quantification module.

Thanks to its wide range of linkable modules, QuantCenter TM delivers objective quantitative analysis of digital slides quickly, freeing up valuable time for pathologists to do truly value-added work and contributing to faster and more accurate diagnosis.

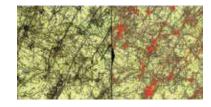


Histopathology

Tissue Classification

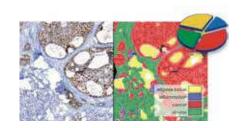
HistoQuant

Image segmentation module which identifies stained tissue elements based on color and intensity features. This is an adequate solution for double stain quantification or multiplex fluorescent analysis.



PatternQuant

Trainable pattern recognition module for tissue classification, tissue pre-segmentation and identification of different tissue structures. Different tissue elements can be detected based on their morphological and color features using an artificial intelligence algorithm based on machine learning.



QUANTCENTER**

IHC Quantification

NuclearQuant

A robust cell nuclei marker detection and quantification module. An accurate solution for the evaluation of predictive and prognostic markers like estrogen, progesterone, Ki67, P53, etc. in histopathological diagnostics.

IVD approval for the analysis of Estrogen- and Progesterone-stained breast samples.



MembraneQuant

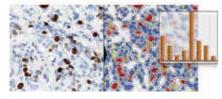
A cell membrane marker detection and cell scoring application. The application classifies the detected cells based on their membrane stain intensity.

IVD approval for quantification of Her2 expression in breast tissue samples.



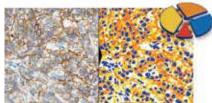
CellQuant

A cell detection application adequate for cell nuclei, cytoplasmic and membrane marker quantification on IHC stained samples.



DensitoQuant

An easy-to-use, fast and accurate, stain-intensity-based IHC quantification tool.

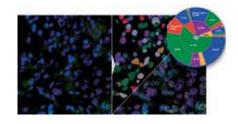


Molecular Pathology

FISHQuant

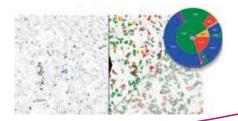
A FISH evaluation application dedicated to cytological and histological FISH assays, including, but not limited to solid tumor diseases and hematological tumors.

IVD approved solution.

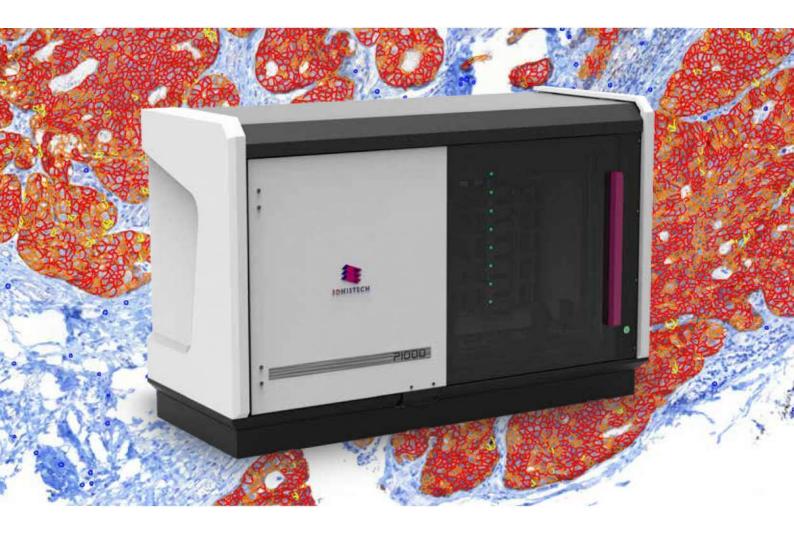


CISHQuant

This module is suitable for examining gene amplification, deletion and chromosome aberration on CISH stained samples.



PANNORAMIC® 1000: THE ULTIMATE HIGH-THROUGHPUT SOLUTION FOR LARGE-VOLUME WHOLE-SLIDE SCANNING



- Unprecedented capacity: up to 1000 slides
- Unparalleled speed: up to 2000 slides/day*
- Innovative hardware design
- Efficient slide logistics

 * 20x objective/40x optical equivalent magnification, 0.24 μ m/pixel, 7500 μ m focus point distance, 15x15 mm average sample size, two sets of prefilled magazines, single layer local scanning

The PANNORAMIC® 1000 has obtained market access clearance as an In Vitro Diagnostic (IVD) device in the European Union (EEA). The product has not been approved or cleared as a medical device by the U.S. Food and Drug Administration – for research use only.

PANNORAMIC® 1000: DESIGNED FOR HIGH THROUGHPUT

Highest capacity

- Largest capacity whole slide scanner on the market: 1000 standard slides (or 800 standard slides+40 double width slides)
- Fully automatic loading and scanning

Shortest scanning time

- Fastest whole slide scanner on the market: up to 2000 slides per day*

*20x objective/40x optical equivalent magnification, 0.24 µm/pixel, 7500 µm focus point distance, 15x15 mm average sample size, two sets of prefilled magazines, single layer local scanning

Innovative hardware design

- Antivibration granite base for maximum stability and image quality
- Dual slide stage
- Robust construction for heavy duty use
- Easy-maintenance robotized loading

Most efficient slide logistics

- Double-width slide (mega slide) support
- Mixed (single and double width) batch scanning
- Emergency magazine handling
- Magazine panels supporting slide magazines from a range of stainer devices (up to 5 per device) default magazine is Sakura
- Rapid loading
- Flexible slide processing, scanning in arbitrary order
- Parallel operation: slide loading and preview in parallel with scanning
- Batch preview function
- Temporary scanning profile option

High-resolution imaging

- Two separate objectives exchangeable automatically during scanning
- Water immersion (optional coming soon)
- Oil immersion (optional coming soon)
- Multilayer (Z-stack) scanning (optional)
- Extended Focus scanning (optional)
- Multiple scanning profiles, auto selection
- 1D and 2D barcode reading and parsing
- Multiple image compression
- Multiple color profile and schemes
- Multiple image compensation
- Automated tissue detection and automated coverslip detection

Advanced operational information management with scanning history

New, flexible, touch-ready, easy-to-use software user interface

Integrated slide server with expandable storage

DIGITAL PATHOLOGY AT ITS BEST WITH PANNORAMIC® 250 FLASH III AND PANNORAMIC® SCAN II



PANNORAMIC® 250 FLASH III

For great image quality with the fastest brightfield & fluorescence scanning in one

PANNORAMIC® SCAN II

With 150-slide capacity and continous loading for larger labs

AWARD-WINNING IMAGE QUALITY WITH PANNORAMIC® MIDI II AND PANNORAMIC® DESK II DW



PANNORAMIC® MIDI II

With fully automatic slide loading for up to 9-channel fluorescence scanning

PANNORAMIC® DESK

An affordable slide scanner for education, research and clinical routine diagnosis

PANNORAMIC® SCANNER RANGE

The PANNORAMIC® family is the most comprehensive product range on the digital slide scanner market. From affordable single-slide to high-speed 1000-slide capacity, from high-quality brightfield to versatile brightfield and fluorescence scanning in the same device, for normal or double-width slides, PANNORAMIC® scanners offer a scanning solution tailored to any need - contributing to faster and more precise diagnosis, more accurate research results and more efficient medical education.

PANNORAMIC® 1000

Thanks to its unprecedented capacity and unparalleledspeed, PANNORAMIC® 1000 offers automated, "walk away" slide scanning for a whole day's scanning needs, speeding up the workflow and freeing up valuable lab resources for other important tasks.

- Capacity: up to 1000 slides
- Speed: up to 2000 slides/day*
- Flexibility: arbitrary-order scanning, single and double-width slide scanning
- Flash scanning technology
- Automatic loading

^{*20}x objective/40x optical equivalent magnification, 0.24 µm/pixel, 7500 µm focus point distance, 15x15 mm average sample size, two sets of prefilled magazines, single layer local scanning



PANNORAMIC® 250 Flash III

Thanks to its award-winning Flash scanning technology, PANNORAMIC® 250 offers a versatile, high-quality and high-speed scanning solution to high-volume scanning tasks.

- Capacity: 250 slides
- Speed: up to 54 slides/hour
- Brightfield and up to 9-channel fluorescent scanning
- Automatic loading
- Automatic switching between brightfield and fluorescent scanning based on profile content

PANNORAMIC® Scan II

PANNORAMIC® Scan is a high-capacity, all-round slide scanner.

- Capacity: 150 slides
- Brightfield and up to 9-channel fluorescent scanning
- Automatic loading
- Automatic switching between brightfield and fluorescent scanning based on profile content



PANNORAMIC® Midi II

 $\label{lem:pannormal} PANNORAMIC^{@}\ Midi\ is\ an\ award-winning\ digital\ slide\ scanner\ with\ an\ affordable\ fluorescent\ scanning\ option\ for\ low-volume\ scanning.$

- Capacity: 12 slides
- Brightfield and up to 9-channel fluorescent scanning
- Automatic loading
- Compact design small footprint
- Automatic switching between brightfield and fluorescent scanning based on profile content



PANNORAMIC® Desk II DW

PANNORAMIC® Desk is an entry-level slide scanner for research, education and clinical routine diagnosis, a simple and easy-to-use tool for teleconsultation and frozen section scanning.

- Capacity: 1 slide
- Single and double-width glass slide scanning
- Brightfield
- Compact design small footprint













	PANNORAMIC® DESK II DW	PANNORAMIC® MIDI II	PANNORAMIC® SCAN II	PANNORAMIC® 250 Flash III	PANNORAMIC®
Slide loading capacity	1	12	150	250	up to 1000
Double width slide compatible	Yes	_	_	_	Yes
Objective type	20x (NA 0.8) or 40x (NA 0.95)	20x (NA 0.8) and 40x (NA 0.95)		20x (NA 0.8) and 40x (NA 0.95)	
Brightfield scanning technology	5 MP camera with RGB illumination (3-chip equivalent)	5 MP OR 4.2 MP camera with RGB illumination (3-chip equivalent)		12 MP camera with Xenon Flash illumination	
Optical magnification	58×	52x and 110x / 31x and 62x		41x/82x	41x/82x
Pixel resolution (µm/pixel)	0.172	0.172 and 0.087 / 0.325 and 0.162		0.242 / 0.121	0.242 / 0.121
Highest brightfield scanning speed*	6 min 30 sec	3 min 23 sec	2 min 30 sec	35 sec (20x) / 1 min 35 sec (40x)	32 sec (20x) / 1 min 15 sec (40x)
Average BF file size (native resolution)	2.6 GB (20x) / 7.9 GB (40x)	2.6 GB (20x) / 7.9 GB (40x)	1.2 GB (20x) / 3.7 GB (40x)	1.25 GB (20x) / 4.5 GB (40x)	1.25 GB (20x) / 4.5 GB (40x)
Highest throughput/hour	_	15	20	up to 54	up to 100
Fluorescence scanning technology	_	5 MP 12 bit OR 4.2 MP 16 bit camera with wideband/6 channel LED		Additional 4.2 MP 16 bit camera with 6 channel LED	-
Highest fluorescence scanning speed**	-	6 min @ 31x 22 min @ 62x	6 min @ 31x 31 min @ 62x	5 min @ 31x 15 min @ 62x	-
Dimensions (W x D x H, cm)	38 × 31 × 25	70 × 50 × 50	74 × 53 × 45	68 x 69 x 55	154 × 100 × 91
Weight (kg)	12	23	26	46	270

 $^{^*}$ 15x15 mm area, 7500 μm focus point distance, local scanning, single layer, JPEG compression, MRXS file format * 10x10 mm area, 3 filters, 20 ms exposure

RESEARCH PATHOLOGY

WHOLE-SLIDE CONFOCAL MICROSCOPY: PANNORAMIC® CONFOCAL

Research laboratories require maximum image quality (with low bleaching and phototoxicity) at a considerable scanning speed. While competitive technologies have not been able to deliver this, PANNORAMIC® Confocal from 3DHISTECH offers fast and high-quality confocal scanning at low running costs for molecular pathology applications by combining confocal imaging with award-winning whole-slide scanning technology - contributing to increased productivity for research laboratories.



Brightfield Immunofluorescence Multiplex IHC

Whole cell FISH

3D reconstruction

RESEARCH PATHOLOGY

WHOLE-SLIDE CONFOCAL MICROSCOPY: PANNORAMIC® CONFOCAL

Confocal scanning for research pathology applications in unprecedented image quality and unparalleled speed

Innovative imaging technology

- Innovative structured illumination confocal imaging to overcome the limitations of spinning pinhole-disc techniques delivering the highest light efficiency with minimal bleaching and fast scanning
- Colocalized fluorescent and brightfield imaging
- SW DDIC (Digital Differential Interference Contrast) for low contrast brightfield visualization

Unique speed-up technologies

- Darkfield and fluorescent preview
- Lumencor LED light engine for highest possible illumination power
- Scientific SCMOS camera: high sensitivity with low noise for short exposure times
- Automated water immersion system for high NA objective

Anti-bleaching solutions

- Structured illumination for collecting every usable light from the sample
- High brightness confocal mode for weak signals
- Hardware light triggering to avoid unnecessary sample illumination
- Reducible light intensity for sensitive samples

Advanced image logistics

- Motorized objective changer
- 1D and 2D barcode reading
- Multiple export options (ROI, grayscale/color, multichannel)
- Lossless image export to 3D applications

Low operating costs thanks to high LED lifetime

CONFOCAL - PRODUCT AND TECHNOLOGY COMPARISON

	LASER SCANNING CONFOCAL	SPINNING DISC	PANNORAMIC® CONFOCAL
Scanning Speed	Slow, 2-3 sec / image	Very fast, up to 100 fps for live cell imaging (weak noisy signal)	Optimized for best signal/speed ratio
Bleaching and Phototoxicity	High, 1 point illumination	Low	Lowest
Flexibility	6 min 30 sec	3 min 23 sec	2 min 30 sec
Magnification	5x, 10x, 20x, 40x, 63x, 100x	5x, 10x, 20x, 40x, 63x, 100x	Specified by display size, resolution equals to 63x
Light source	Laser, expensive	Laser, expensive	Solid state LED lightsource lifetime >20000 hours
Light efficiency	99% incoming light,	70% incoming light	50% incoming light
Light emelency	2-4% emitted light	4-5% emitted light	99% emitted light
Pinhole flexibility	Continuously adjustable	No, fixed pinhole (50µm)	3 different grids, for 20x, 40x and 63x objectives
Flexibility	Every microscopic option is available	Similar to a microscope High framerate for live imaging	Colocalized BF, FL and CF imaging

RESEARCH PATHOLOGY

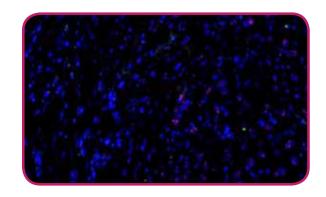
DIGITAL FLUORESCENCE AND FISH SCAN

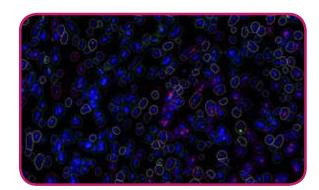
Fluorescence whole-slide imaging requires a greater degree of flexibility compared to brightfield scanning. Only area scanning used in PANNORAMIC® digital slide scanners is able to fulfill these requirements. For instance, you can always have a live view to make sure the scanned image is good quality.

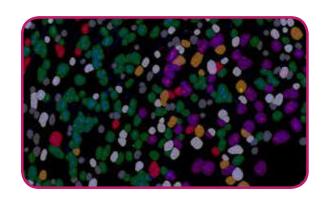
The fluorescence scanning technology used in all FL-capable PANNORAMIC® digital slide scanners is continuously improved and remains unsurpassed. With up to 16-bit image depth, extended focus and Z-stack, it is not surprising the PANNORAMIC® is the No. 1 choice for quality-conscious customers.

Key Features

- Fastest fluorescence scanner
- High quality (16-bit) fluorescence scanning with Z-stack for the most detailed imaging
- Whole-slide scanning with extended focus scan mode for the perfect final image in compact
- More than 10 fluorescence channels for scanning
- Fluorescence background image compensation for the clearest and most precise picture, even in separate Z layers
- Sharpening option for a more luminous image







TISSUE MICROARRAYERS

HIGH-SPEED, FULLY AUTOMATED TMA SOLUTIONS FOR ALL NEEDS

The tissue microarray (TMA) technique can be used as a valuable, high-throughput tool for diagnostic and research purposes. By being able to place up to several hundred different samples into one paraffin block, TMA saves time and costs of tissue preparation, slide preparation and staining.

Thanks to their fully automated operation, TMA solutions from 3DHISTECH speed up the laboratory workflow, resulting in cost savings and reduced workload for pharmaceutical companies, research centers, biobanks or routine pathology labs of all sizes.

TMA Master II

- 5-block capacity
- Fast operation: 200-250 cores/hour
- Small footprint

TMA Grand Master

- High capacity: 72 blocks (12 recipient and 60 donor blocks)
- Fast operation: 250-280 cores/hour
- Simultaneous loading, imaging, drilling and punching

Key Features

- Fully automated operation
- Multiple core diameter options 0.6, 1, 1.5 and 2 mm
- More than 500 samples in one block
- Sample extractions in PCR tubes









Recipient Block Donor Block



Sectioning & Staining

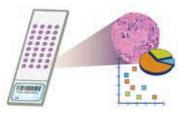


Image Analysis

Mark the relevant area with CaseViewer software.

Find the same area by using TMA Control software.

the selected tissue core(s). All the histochemical and molecular detection techniques are working with TMA sections too.

Scan your stained TMA slide. Find the TMA spots and score them with TMA Module and QuantCenter software.

TMA Control software

- Recipient Block layout designer
- Ability to import Donor Block ID and additional sample data from Excel
- Barcode-based donor block identification
- Automated Digital Slide search and overlay
- Automated saving of TMA data
- TMA Register for advanced search and export of TMA data and registration of TMA slides
- Language localization

TMA Module software

- Spot finding
- Automated data binding
- TMA spot gallery
- Manual scoring
- Quantitative immunostain intensity measurement (optional)
- TMA data export in Excel



