

Hidden informations in old books -

made visible with invisible light ! by Stefan Steib – Hartblei Febr.2010

Digitizing precious historical books from libraries rises highest conservatory demands, because the task to protect the books during photography against unnecessary stress, requires technical equipment of highest standards.

So newest procedures and technologies are tested and used at Munich Center of Digitalisation (MDZ) of Bavarian State Library Munich www.bsb-muenchen.de to achieve cost efficiency and find new methods and knowledge. E.G. in 2007 for the first time in the world BSB used the newly developed scanrobots of Treventus to digitize prints of the 16th century. Beside the robots the scanning center uses over 15 different scanners, including thermographic systems, 3D scanners, special target holding devices for up to DIN A0 sized linescanners with several hundred MB of resolution. Color- and Workflowmanagement are essential for the handling of these produced amounts of data.

Until December 2009 the Munich Digitizing Center did produce and archive (Long term archiving) over 180 Terabyte of Data in 29 Million files in cooperation with the Leibnitz Rechenzentrum (Munich's University and scientific IT Provider)



Fig 1 Treventus Scanrobots on location

The MDZ, with his largest scanning center of any german library, is piloting various research projects, e.g. with Support by the Deutsche Forschungsgemeinschaft (DFG) or the European community, with innovative Technologies at digitization. In context of a test BSB has now tried the new Hartblei Cam imaging system with Carl Zeiss ZF Infrared-lenses.

High resolution BW , Infrared and UV imaging system

Using the new Achromatic Plus MF Back on the new Hartblei Cam www.hartblei.de with the Carl Zeiss ZF IR lenses it is possible now to produce filesizes up to 39 Mpixels (7216 x 5412 pixel). The used Kodak BW chip with a size of 49,1x36,8mm is completely uncoated/blank and without UV/IR cut filter.

Results are extremely detailed images, either with classic BW (using a bluegreen IR/UV cut filter) or Ultraviolet (UV-A) or Infrared (up to 1150nm). The specially adapted flashlight of Hensel www.hensel.de using uncovered bulbs emits a broader spectral range. This is filtered in a way similar to a „policeradar flash“, emitting only a dark reddish flash, which does only minimal harm to the examined goods. The sample bookcover with a several mm thick mix of materials is transilluminated easily, the used I differing greylevels, thus uncovering hidden details.

Whats spezial about this system ?

The used Hartblei Cam ist the only MF camera worldwide which uses an electronically managed 35mm bajonett mount supporting all canon EF lenses. This takes nearly an unlimited number of spezial lenses starting at 35mm up

to MF - like the here used Zeiss ZF-IR lenses with nikon mount. These Zeiss Industrial lenses have an image circle which supports a much larger format, is transmitting all spectral areas, starting at UV-A around 250nm up to near IR up to 1150nm. At the same time they achieve best sharpness and evenness of the image. Additionally many other lenses like the Zeiss MF Hasselblad optics eg. The Zeiss UV Sonnar, Zeiss Luminars, Biogons and more are fitting. The electronic shutter with 30sec. down to 1/4000 sec, B and the according longest exposure time of the back with 1 hour, enable spectacular results with highest resolution. Simple electronic operation, vibrationfree shutter release and the precise slider achieve currently unheard results for reproduction, forensics, material expertises, processcontrol, in short universal usage for all institutions, Libraries, Museums, science, research and studies.

The System is still in a very competitive pricerange (about 50-60.000 € according to the features of the camera+back, Hartblei delivers complete systems for this - complete with repro stands etc.pp)

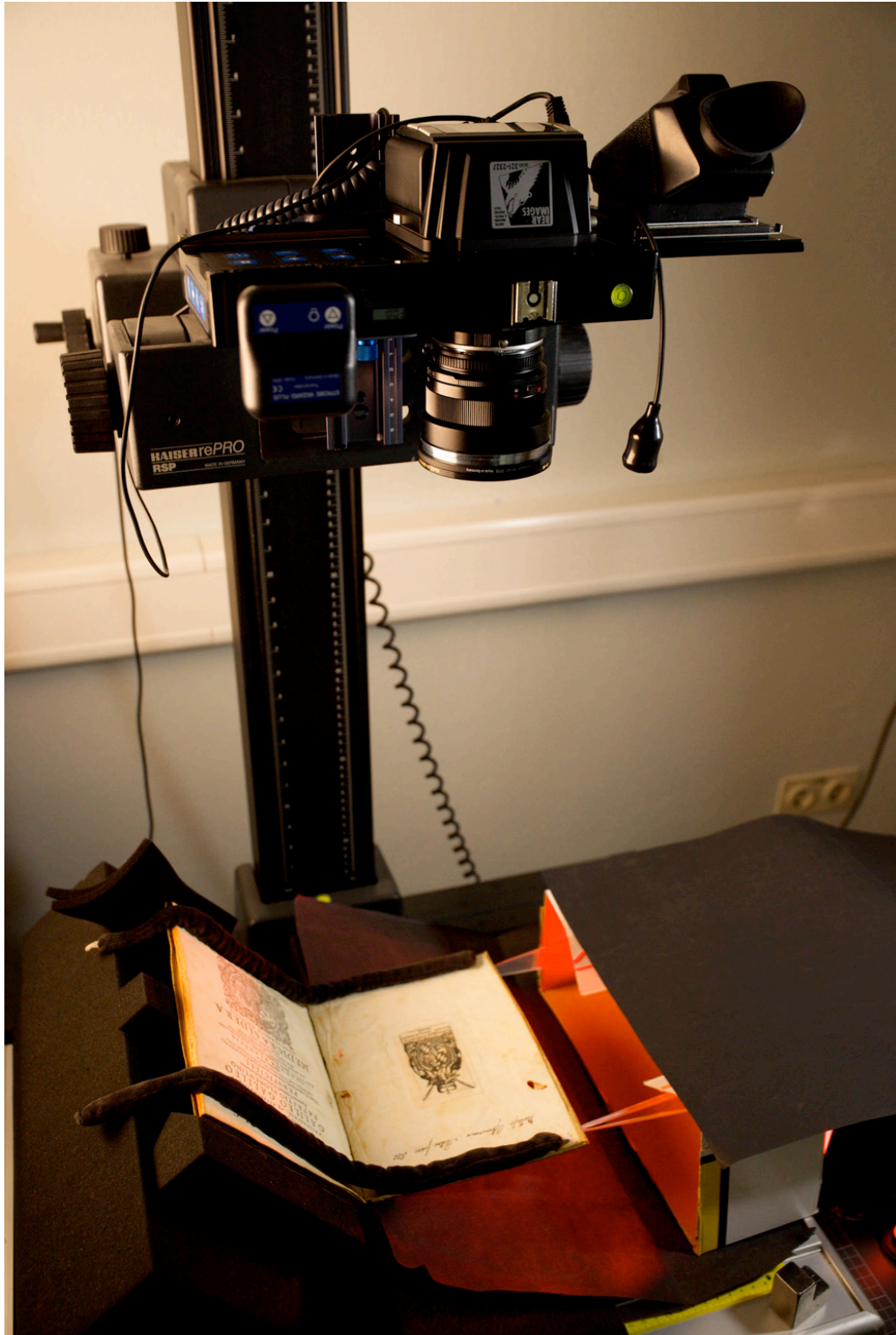


Fig.2: Bookcover, with Planar T* 1,4/85 ZF IR, 820nm IR Pass Filter with darkred „IR flash“ used shot through

Fast and efficient Workflow !

A specialty is the excellent detail resolved by the Hartblei system, which enables exact survey on the used subjects. Photos are taken normally, there are no significant differences against normal reproductions of books. Changing the bluegreen BW filter to a black IR-Pass Filter (from 820nm and up) or to a black UV -Pass (from 400nm down) gives easy access for universal usage. With Capture One Pro 5.0x Software which reads the resulting Raw Tiff files of the Achromatic plus back www.achromaticplus.com you can open, work on and store the images perfectly.



Abb. 3: First edition of Galileo Galilei's Main Publication *Sidereus Nuncius* (Message of new Stars), published in Venice 1610. Front Bookcover, with Planar T* 1,4/85 ZF IR, Flash -left with normal Light, right luminated with IR. Both done with light going through the cover, whereas left "Normal" exposure was made with a bluegreen IR and UV Cut filter at 1500 ws and aperture 4 (a setup you would normally never use- just to proof the principle of the IR shot). Although the right version used only about 100 ws with a dark red flash with 820nm IR pass and Aperture 16 details are much more visible and the objects stress at imaging is by a factor of 9 Apertures less !

So informations and details covered, glued over or between or even IN pages (watersigns) can be made visible, a method which will spare the conservating or researching restaurator a lot of work and costs, at best showing all necessary informations to decide if a work is necessary or how to achieve best results.

As a sample for the Hartblei Cam we used also pages from a Richard Wagner notes book. These had been partly glued over with paper and edited. The goal was to support the scientific research for Music history science to verify the development of versions for his opera. As there are hundreds of pages existing with similar characteristics, you can simply imagine how many time, work and money can be saved by the usage of IR on the Hartbleicam.

With highly sophisticated Image analysis tools made by Carl Zeiss Microimaging special informations can be resolved from the different layers and tones of the image. This uses wavelet analysis, special tone/gradation analysis and other scientific methods. The software can also produce multichannel Images, which e.g. may contain one IR, the other the UV and the another the BW informations shot with the visible spectrum.

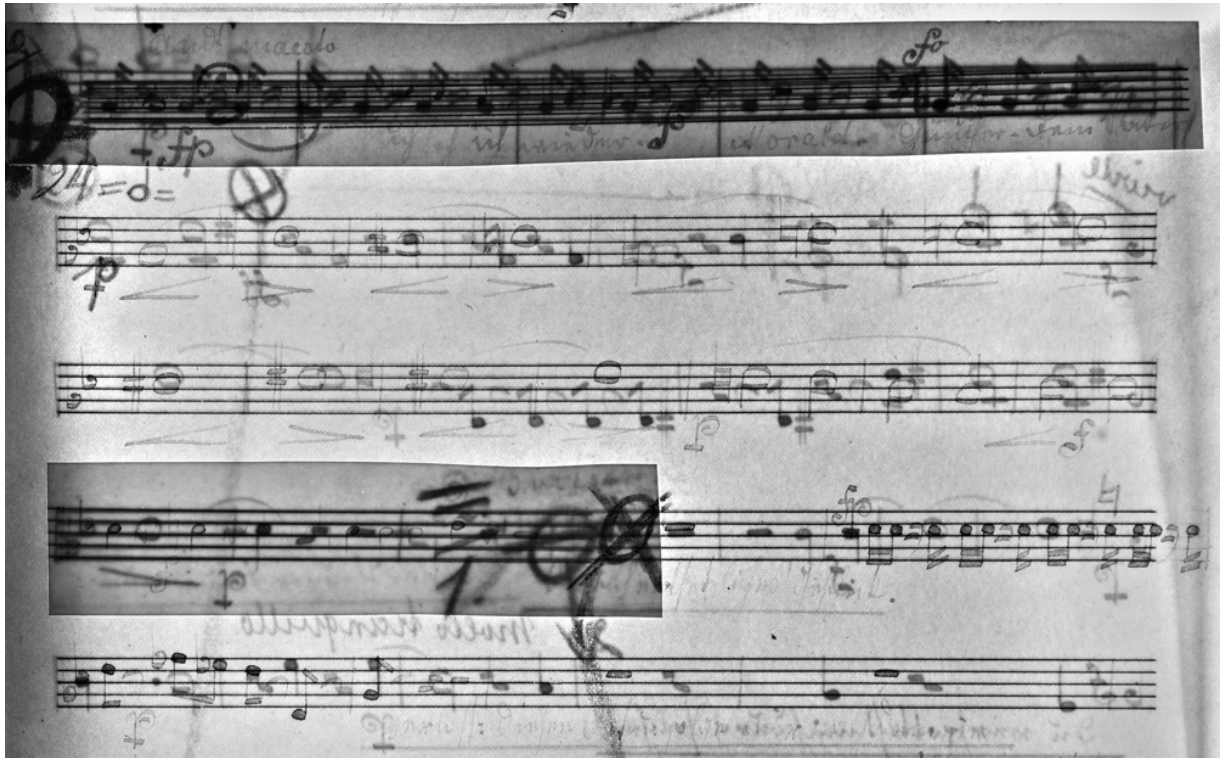


Fig. 4 : Wagner, Richard / Levi, Hermann: Die Feen romantische Oper in drei Acten von Richard Wagner - Cutout - you can exactly see the layers of glued on top corrections.

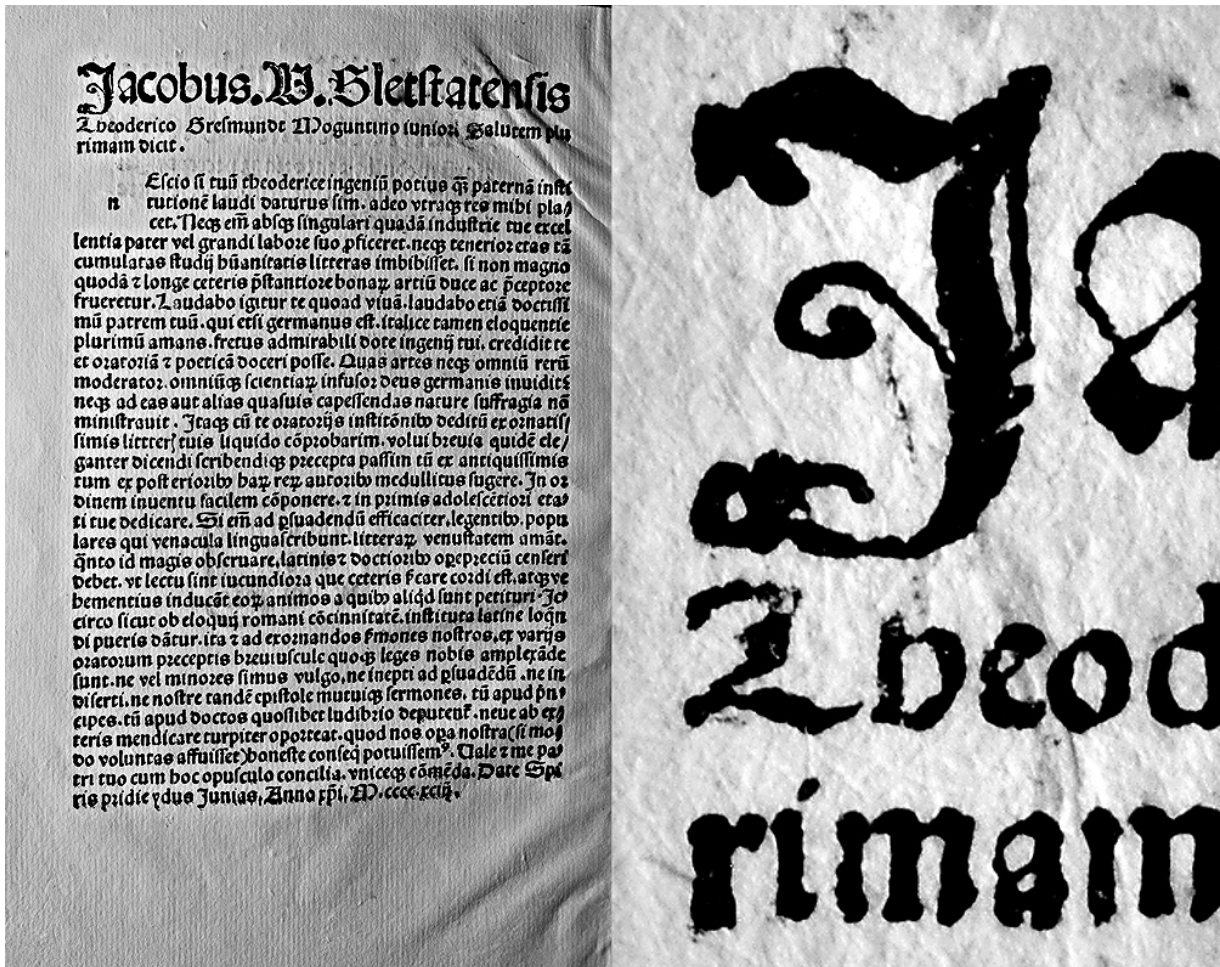


Fig.5:UV -Textreproduction with UV Pass Blackfilter UG1 for contrast improvement-extreme cutout on the right

Testimonial by the BSB Munich:

In a first valuation of the test the BSB saw promising advantages by the used system. Restorational efforts could be prevented because of the usage of the Infrared imaging technology. „We will further test this technology in cooperation with the staff and department of book and handwriting restoration of the bavarian state library“ said Dr. Markus Brantl, director of the Munich Digitizationcenter/digital library of the BSB.



Fig. 6: Dr. Markus Brantl – BSB München

Links

<http://www.zeiss.de/micro>
www.bsb-muenchen.de

www.hartblei.de
www.achromaticplus.com
www.hensel.de