

## **Progress report on experience with use of the ScanRobot® at the Bavarian State Library**

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### **Mass digitization of German printed matter from the 16th century**

The Bavarian State Library is responsible for looking after the register of print editions published in the German-speaking region in the 16th century (VD 16). In 2006 the Bavarian State Library commenced mass digitization of the written cultural heritage that is copyright-free with the objective of providing all VD16 editions of the Bavarian State Library for research worldwide, with free access via the Internet.

### **Conservational requirements**

Besides the usual conservational requirements, such as radiation exposure, the focus was on the mechanical load imposed on the books. The central aspect of this was careful treatment of the sensitive spine structure of the aged materials by way of a restricted, narrow opening angle of the book during scanning.

### **The VD16-1 project**

In the first part of the project the digitization was performed with manual feeding on standard commercial scanners equipped with additional copy holders. The opening angle was much less than 180° for 70% of the works. Due to the limited opening angle, initially only single-sided scans (1 click = 1 image) were able to be performed. This required a separate image-taking process for all recto sides and verso sides, which clearly restricted the throughput. In a period of 24 months of the project term 4237 works were able to be digitized at three (manual) scanner workplaces with this process.

### **New approach to mass digitization with scanning robotics Print editions dating from 1518 to 1600**

In continuation of the VD16-1 project the Bavarian State Library commenced in July 2007 the digitization of print editions published in the years 1518 – 1600 (the VD16-2 project). The use of state-of-the-art scanning robotics (a total of 3 ScanRobot® devices from the company TREVENTUS were acquired for



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the VD16-2 project) promised a much quicker, high-quality and above all conservationally flawless scanning throughput. This project was supported decisively by the German Research Council.

## Why ScanRobots®?

Compliance with the strict conservational specifications in the preceding VD16-1 project showed that 70% of the books scanned in that project allowed an opening angle of only 90° or even less. A new technological approach was therefore advisable. This makes do with a continuously variable, adaptable **opening angle of only 60°** and digitizes the pages sequentially and with **high precision without any fold distortion**. The ScanRobot® from the Austrian company Treventus provides a completely new approach to this:

A prism lowers itself gently into the opened book, the opposite pages are picked up **by a gentle current** and photocopied in an upward movement; an air blast then turns the pages, whereupon the process starts back from the beginning again. Turning the pages and photocopying are therefore a single work operation on the ScanRobot®. The constant current between the paper and device even provides for **almost contact-free scanning**. This principle was awarded the European ICT Prize at the CeBIT2007 trade fair.

Treventus's ScanRobot® was adapted successively during the project on a development cooperation basis with the Bavarian State Library to the specific features of historical print editions **in consideration of the high conservational requirements** of the Institute for Book and Manuscript Restoration of the Bavarian State Library. This led to a **scanning and page-turning mechanism of the ScanRobot®** that treated the books with extreme care.

## The materials of the print editions and their suitability for the ScanRobot®

The ScanRobot® can scan almost any types of book, binding or paper (e.g. leather-covered wooden bindings, flexible parchment bindings, cardboard bindings, thick, thin or rigid paper).

The two central factors for the robot processing capability of a book are the flexibility of the paper and the structure of the spine. On the basis of the empirical experience of the Bavarian State Library the following criteria can be designated for the robot processing capability of print editions of the 16th century:

### Flexibility of the paper

Above all the anthologies that were frequent in the 16th century (bundles of documents) are a special challenge for the robot processing capability. Thus, many titles have an incorrect direction of creation or paper of unequal thickness within a single book.

Even in these cases digitization was able to be performed with the ScanRobot® within a reasonable time and with a reasonable throughput (see the formula further below), as well as more effectively and efficiently in comparison to other devices.

### Structure of the spine

The spine also influences the conservational opening angle and the page-turning behavior in the scanning process. Up to now books with a very narrow inside margin or with handwritten notes have digitizable on account of the conservational maximum opening angle of 60° or have been digitizable only with a lot of work. Through the use of the ScanRobot® documents whose binding only permits slight opening of the book, i.e. just about 60°, have now been able to be scanned for the very first time.

### Customizing the ScanRobot®

The two ScanRobot® devices used in the project were delivered in July and October 2007. On account of the very good experience with the ScanRobot® a third ScanRobot® was procured in February 2008 with the Bavarian State Library's own funds.

Through this successful development partnership a total of 15 adaptations and optimization measures have been implemented on the ScanRobot® together with the Bavarian State Library. With regard to the careful treatment of books we have been able to exert a decisive influence on the processing of relevant book collections that is gentle from the conservational viewpoint.

### Results of the VD16-2 project

Within a project term of 18 months (in addition to the 6 months of joint development and adaptation of the robots for the 16th century) **a total of 8,900 works with 1.7 million pages** were able to be digitized by the end of the project in June 2009 by means of ScanRobots and 3,057 works by means of elaborate manual feeding. The **digitization speed** has therefore been **tripled** in this project through the use of the ScanRobot®. In consideration of the very difficult material these figures therefore represent very good scanning and processing times.

### ScanRobot® for modern book collections

The ScanRobot® has also been in use since July 2009 at the Bavarian State Library for digitization projects relating to works from the 19th and 20th centuries. Provided that the books are suitable, individually measured net throughputs of 4,000 to 6,000 and more pages, which corresponds to between 20 and 30 volumes, per ScanRobot® per day are possible from this time segment.

### Summary

It has to be put on record that the current state of the art makes available sufficient options to comprehensively digitize historic collections of this type despite their specific heterogeneous materials. The integration of conservational checking routines into the digitization workflow is indispensable for this.

The question as to the achievable "**net throughput**", which is often the focal point in projects that are sponsored specifically by means of external funds, is therefore always determined in accordance with the following sophisticated parameters:

<b>Net throughput</b> = Conservational specifications + Materials of the objects + Scanning technology + Workflow + Personnel.
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