

Conservation approach in the mass processes at the National Library of Poland: acquiring, disinfection, de-acidification, digitizing of the collections

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Abstract:

The paper presents activities and procedures developed in the Institute for Conservation of Library Collections (unified conservation departments and the bookbinding division of the National Library of Poland) in the following fields:

- *ongoing mass de-acidification program as the base for the mass conservation concept*
- *considering the disinfection treatment a conservation and mass conservation process*
- *evaluation of the microbiological condition and disinfection as the element of acquiring of the new collections; example: a new procedure for the employees travelling for acquiring of the new collections*
- *Themersons' case: dividing of the collection based on the different type of the media and technology of the individual objects as well as their conservation needs*
- *conservation activities planned for the digitizing project Patrimonium - developing of conservation standards for digitizing hardware, infrastructure for digitizing, work-flow, conservation duties and posts, conservation and renovation training for not-conservators*
- *conservation and preservation based evaluation of storage rooms and departments handling the different classes of objects – developing of the procedures for storage, access, exposition, digitizing*
- *mass cleaning of the early prints – the applying of the Depulvera system*

The Institute for Conservation of Library Collections emerged as a fusion of the following departments: Conservation, Mass Conservation, Laboratory and the Special Bookbinding. It brings an opportunity of creating conservation and preservation standards, task groups of different specialization within a single unit in the structure of the National Library. The Institute is also responsible for publishing of the “Conservation Notebook” - the only one periodical in Poland focused exclusively on the conservation and preservation of the paper objects and collections.

Training programs (preservation, microbiological controls, identification and preservation of photographic collections) create opportunity for the employees of the smaller libraries and archives to learn about the procedures and concepts executed in the central library of the state.

The Institute cooperates also with the Faculty for Conservation and Restoration of the Works of Arts of the Academy of Fine Arts in Warsaw and many other institutions as: libraries, archives, museums.

Keywords: mass de-acidification, conservation, disinfection, digitizing, moulds

“The mass” in conservation

After ten years of work for the library as a conservator or rather preservation officer (that description is rather not used in Poland) the term “mass” is obvious for me. On the other hand it is something that so far is not widely represented during the education of conservators in Poland. With sometimes amazing skills while working on single objects and performing “neurosurgery” repairs conservator may be stunned by endless shelves of library objects. There are two great challenges for a conservator when facing the mass: developing mass conservation procedures and applying conservation approach to non-conservation processes, especially the mass ones. The Institute for Conservation of Library Collections of the National Library of Poland emerged in 2015 as a fusion of the following departments: Conservation (over 80 years of tradition), Mass Conservation, Laboratory and the Special Bookbinding with they own variants of mass procedures. There are 47 people working in the Institute, including qualified conservator of paper objects, chemists, biologists, historian, bookbinders.

From mass deacidification to mass conservation

The final results of research project Acid Paper (2000-2008) were following: evaluation of acidity of 19th and 20th century paper in Polish libraries and archives, decision on mass deacidification, introduction of Neschen C-900 units and Bookkeeper systems. Bookkeeper system does not require additional treatment or conservator’s supervision, but its effectiveness is monitored by determination the alkali reserve in the test papers (2034 samples in 2015 for Bookkeeper and 108 for C-900). An automatic titration sampler is used every day for control of the Bookkeeper process (about 100 000 of de-acidified volumes in 2015). The C-900 can be described as semi-mass conservation system but preparation of objects and treatment after deacidification takes its time. In the first year of its activity cardboards for drying of treated objects were introduced as well as huge dryer for cardboards (the original concept of the constructors was that sheets leave the C-900 completely dry and rippled; that results in greater volume and is not acceptable, therefore the temperature in the dryer of C-900 is set to leave the sheets humid and ready for flattening). The average performance of C-900 deacidification is an equivalent of approx. 400 000 A4 sheets per year (~1500 per day). In 2015 about 48000 of this A4 had to be repaired (before or after deacidification, mostly with Filmoplast) or required additional conservation treatment. Total number of sheets with additional conservation is falling (from peak in 2010 - ~197000) since we try to reduce additional work by mass deacidification.

The most common method of quick repairs is the Filmoplast R and a heater, but for objects of special collections starch paste and Japanese paper is a must. In extreme cases (contemporary newspapers for example) full laminating with Filmaoplast is the only solution. The Bookkeeper technology can be also applied with airbrush page by page and is used with water vulnerable objects. Folders with not bounded cards can be treated in 2 horizontal reactors. There are 11 conservators and restorers working in Mass Conservation of Sheets (C-900) unit and 6 restorers in Mass Conservation of Books (Bokkeeper) units. In 10 years we moved from pure mass deacidification to mass conservation and found the balance between “mass” and “conservation” that could be moved as needed: from removing staples before deacidification and quick repair with Filmoplast after to full conservation treatment only with deacidification with mass methods. The mass conservators acquire experience quickly as they work with many objects and face wide range of damage cases. Moreover, 19th and 20th century acid paper is usually very fragile and requires much more attention than pre-machine one. New technologies of print (especially ink printers) or older repairs (e.g. with adhesive tape) bring challenges unusual in traditional conservation of paper (early prints, manuscripts, prints, drawings etc.).

This unique experience is very important for preservation of collections that are legacy of famous people. The National Library acquired the archive of Stefan and Franciszka Themerson, Polish artists. The most typical problem for this kind of collections is storage. While librarians and historians usually want to keep the whole collection in one place, conservators would rather see different storage rooms with proper conditions for objects made in different technologies. For example: according to ISO-11799 paper should be kept (for “optimum preservation”) at RH up to

45% (items in regular use 50%), while optimum for parchment and leather is 50-60%. That leads to conclusion that it is impossible to keep in optimal condition a leather bounded print on paper.

Another problem with Themersons' works is already mentioned adhesive tape. The conservator must make decision whether it was used as element of the work of art or was just a later repair and can be replaced with something less damaging the paper support. Clothes, hats, cameras, electronic devices, audio-visual tapes, watches, medals and many others can be also found in legacies. They require special conditions and in this cases we look for advice from our colleagues in museums.

Table 1. Number of sheets de-acidified with C-900 technology in years 2015 – 2015 (objects of the National Library and from other institutions)

year	number of sheets, various size	number of sheets, A4 size
2005	161 484	172 147,3
2006	305 461	352 584,8
2007	265 856	494 962,8
2008	310 268	476 708,3
end of Acid Paper program		
2009	106 667	248 647,54
2010	85 208	178 905,7
2011	83 328	140 172,15
2012	82 115	201 385,81
2013	137 192	313 913,52
2014	135 631	410 901,92
2015	166 248	425 455,24
TOTAL	1 839 458	3 415 785,08

Table 2. Volumes de-acidified with Bokkeeper technology in years 2015 – 2015 (objects of the National Library and from other institutions)

year	number of volumes	mass of objects
2007	47 999	16 711,81
2008	74 773	34 862,4
2009	77 805	43 563,81
2010	60 919	25 255,5
2011	77 485	27 188,06
2012	73 057	25 914,3
2013	78 798	26 941,15
2014	104 486	31242,1
2015	104 284	21 870,2
TOTAL	699 606	253 549,33

Microbiological control of objects

Starting in 1989 we have moved from the sedimentation method of air sampling (each storage room at least once in two years) and disinfection with para-chloro-meta-cresol in methanol solution to impact sampling (MAS-100*Eco*, all storage rooms within 7months) and disinfection with ethylene oxide (1 to 9 mixture with carbon dioxide).

The sampling of objects is still made with the “classical” impress with sterile filtration paper, but we also introduced dry swab and ATP tests. These are not mass activities, but can be used to evaluate the condition of a single object or storage room. Microbiological evaluation of whole collection is more problematic and we apply procedure used in Acid Paper program. The program used Stanford method i.e. we choose 384 random objects for the survey. If we assume, that (almost) every object on a shelf has contact with two neighbouring objects the, result of 1/3 suspected or sampled with growth of moulds on Petri dishes objects means, that every object in the collection is suspected/infected or has a direct contact with such an objects. The individual objects “sampled” positive (and we know already from experiments that impress sampling collects 1/1000 of the fungal material present on paper surface while dry swab sampling between 1/10 and 1/1000) may be disinfected and sampled again or declared “stable” (unless relative humidity of the air does not reach 65% and water activity in paper or other porous material of the support does not reach 0,65) [Sedlbauer].

Table 3. Microbiological sampling of objects in 2015. Session of sampling is a single session of sampling (with impress) and reading out the results on Petri dishes (growth – no growth). A single object is a single case. The case is closed when there is no need for further sampling or disinfection

no.	Unit of the Library	total sessions of sampling	cases started	cases closed	objects not disinfected	objects disinfected once	objects disinfected more than once
1.	Manuscripts	75	20	25	19	5	1
2.	Early prints	47	47	47	47	2	0
3.	Cartography	124	77	62	45	16	1
4.	Iconography	40	40	40	40	0	0
5.	Polona (digital library)	3	3	3	3	0	0
6.	exchangeables	17	6	17	10	7	0
7.	Special reading room	10	10	10	10	0	0
	Total	316	203	204	174	30	2

Table 4. Microbiological sampling of air in 2015.

session location	sessions of samples	samples
storage rooms	81	978
other rooms	23	78
TOTAL (rooms)	104	1056
control – outdoor air.	239	1434

The ethylene oxide disinfection at the National Library is performed in a custom built chamber (Suphatec, Catalunya, Spain). The systems comes from medical sterilizing technology but has one fundamental difference: in medicine sterilizing procedure has the following sequence: washing, drying, sterilizing and in conservation the process starts with microbiological sampling or sterilizing to increase the safety of conservator, storage and working rooms and other objects. The chamber has a working volume of about 0,7 cubic metre (horizontal cuboid, 0,65 by 0,65 by 1,95m). The full cycles

takes 48 hours and the top concentration is 522 mg of ethylene oxide per litre. The details and performance (16 years now) of the system was described in my St. Poelten paper [Zerek, 2014a]. The disinfection with ethylene oxide is a mass process, on average one batch is about 350 of volumes that may be packed in steel cases or even regular office boxes (as long as they are not airtight sealed). On average there are 60 to 70 batches (cycles of disinfection per year). The most important point is that disinfection is a conservation process, so decision on it (and on the applied method) is a conservator's one. Therefore while working for other institutions we disinfect closed chests, cases, boxes and so on without analysing their contents – it is responsibility and decision of conservator in charge from other institutions. The complete concept of the microbiological control of the library collections is described in my book from 2014 [Zerek, 2014b].

Digitizing

The conservators usually consider the digitizing second most dangerous for objects process next to access by readers. Light, machines, pressure of time and people usually not trained for contact with fragile objects can be lethal to them. All equipment used for digitizing has to be approved for conservators, and definitely before and not after buying. The safest method is photography with professional camera and lighting, but also the slowest one (definitely not a mass one). The best way to reduce the negative impact of light is using flash-lamps without UV and IR emission. All valuable objects of special collections are evaluated by conservators and written recommendations including precautions, suggested type of digitizing device and handling guidelines are given. In many cases conservators stand for hours turning pages of most valuable objects while the photographer is doing his/her job. For the upcoming program Patrimonium (digitizing of hundreds of thousands of objects) a series of trainings is prepared to teach non-conservators the correct approach to an object. Each digitizing device receives a sheet of conservation characteristics that describes its possible application, including required space, furniture and other infrastructure. Especially large format scanners need extra space for proper handling of maps, posters, documents of social life. The first step in Patrimonium will be evaluation (by conservators) of the condition of the object, especially damage and mechanical properties of the support material and construction. When needed - objects will receive conservation treatment but not the full one, just to secure them for the digitizing process. The deacidification will not be included during Patrimonium. After evaluation objects will be directed to proper scanners (or camera) with trained and assigned staff.

Education and publication

The conservators of the Institute teach staff of the Library and other institutions: conservators, librarians, archivists. The list of (usually two days long) trainings includes: Preventive conservation, Identification and preservation of photographic objects, Microbiological control of the library collections. There usually four trainings for our own personnel per year and another four for guests. Learning procedures developed in the National Library increases safety of collections in other institutions and increases awareness of correct prevention. People trained in the National Library are familiar with our procedures and it is easier for them to co-operate with the greatest library in Poland. This education is also an element of preservation of all library collections in Poland, since trainees will know at least one thing for sure – in case of any disasters, conservation or preservation problems - contact the Institute at National Library. It is very important while almost every two years appears a new method or systems for disinfection and the advertisement of the dealers rarely includes the complete data on effect of the method on the material of the collections. In the last ten years there were: MISYA microwave system that (at least in Poland) was presented as effective against moulds, adapted medical hydrogen peroxide plasma sterilization, anoxia, essential oils, UV sterilizers for books. Last year we have tested the effectiveness of BIO-MASTER (Korean, based on essential oils), the results (or rather lack of them) will be published this year. The scientist work on new methods including electron beam and silver on nanoparticles (in the second case results are very promising, but it is still semi-mass technology).

Almost every year a new volume of "Conservation Notebook" ("Notes konserwatorski") is published. It contains usually twelve original papers (about half of them are case studies of conservation of single objects or collections, the other ones cover research and new methods) and information on events, conferences. In the near future we plan to publish it open and in English,

including older volumes. It is important since we can assume that “Notebook” has about 400 readers in Poland – about 150 active conservators of books and works of art on paper plus chemists, physicists, biologists and other people active in the field of preservation of the national heritage.

Mass cleaning

Over 30 000 volumes of manuscripts and 170 000 volumes of early prints are stored in the Krasieński Palace, about 5km from the main a building. The 17th century Palace was heavily damaged and burnt during World War II, rebuilt in years 1948-1961 and became one of the buildings of the National Library. The Palace does not have any active climate control and since 1965 is on the list of the national monuments of heritage. Therefore any modification of construction and infrastructure requires permission Bureau for Conservation of the Monuments. In this situation a relocation of collections of manuscripts and early prints to the main storage building is considered. Since these collections have their “history” of numerous relocations and storage in not appropriate conditions they should be cleaned before entering the new and clean storage rooms; preventive disinfection of such large number of objects is not possible. We assume that top ratio will be on average 500 volumes per day (about 1 cubic metre) including: removing from shelves, checking on the list, vacuum cleaning, packing into steel chests, transporting to the main building, unpacking, checking the list again, placing upon shelves in the new storage rooms. We decided to buy the Depulvera cleaning system produced by Oracle and in tests we have reached performance of about 300 volumes per hour. The most time consuming part of the process is removing books from shelves by the staff of the Early Prints Department. The preparation of about 700-800 volumes batch on library carts takes up to three days depending on the size of volumes. At the beginning the Depulvera was operated by conservators trained by dealer, then after preparing the conservation characteristics of the unit with some restrictions (like it is not suitable for soft and thin or malformed covers) a team of one conservator and one restorer will be used. (In Poland any employee of conservation unit in governmental sector with master (or higher) degree works on post of “conservator”, that includes chemist, biologists etc.; everybody without master degree is “restorer”).

Final remarks

Usually a conservator is perceived as Cerberus who is always against: the exposition or access is to long, the furniture is not correct, the climate conditions are wrong, the light is too strong, the materials do not follow the standards, the producer of the material or device did not provided the full documentation, please don't touch, please don't eat, please don't use that camera, use only pencils. It comes from the nature of the work known as a traditional conservation, when total time spent on a single object may reach hundreds of hours. The mass production of paper and invention of mass printing created mass problems and need of creating of mass conservation to solve them. In Poland it emerged from mass deacidification in the water based Neschen C-900 system. The experience acquired while working with this system can be easily transferred to other mass processes including those not performed by conservators or even restorers, but the basic principles remain the same as in classical conservation – *primum non nocere*. The greatest advantage of qualified the conservator is a set of rules and ethics that are brought to her/him during study and practice with experienced conservators. The technology may change (the latest projects include cellulose produced by bacteria, enzymes and graphene) but it is a good sense of the conservator that will evaluate new method, technology, process or work-flow with a little help of few simple questions:

- *how it will affect the object (now and in hundred years)?*
- *is it reversible?*
- *is it removable?*
- *do we really need it and what for?*

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