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DIGITALIZATION OF TESLA'S ARCHIVES
Archival protection, microfilming and digitalisation of Tesla' inheritance

We describe the activities that we in Nikola Tesla Museum have done so far in microfilming and digitizing the Museum holdings. The chosen operation mode was the so called hybrid microfilming, with the simultaneous data base development

Key words: protection of archival material, Nikola Tesla's inheritance, microfilming, digitalization, data base.

The archival science was once defined as an auxiliary socio-historical science, which it is, in one of its aspects, in the part which deals with studying and advancing methodology of expert work in archival profession. The attitude of archivists towards their profession originated from this narrow, old-fashioned and outdated definition, as well as the attitude of wide social community which knows nothing about an archivist and its role in contemporary society.

The necessity of overcoming this lagging behind the world wide trend and joining the information network was imposed upon the archival departments by the development of modern technologies, the Internet as the most important, and the growing need for quick and efficient communication. Besides, the International organisation for standardization defines[1] the archival science as the branch of Information theory applied to organizing, administrating and working in holdings and archives, and that definition also suggests the modern approach to this job. In that sense, in Nikola Tesla Museum a detailed job of archival preparation, microfilming and digitalization of archival material is in progress.

Tesla's inheritance, from the archival point of view, is complex, having variety of subject matters, as well as types and physical characteristics of the archival material itself. The holdings contain graphic material such as manuscripts, texts, plans, drawings, diazo copies, photo copies and mixed material. Beside graphic material, it also contains half tone material: negatives, positives and retouched material. All of this material is two sided. As far as the physical characteristics of the archival material carrying information are concerned, we can say that we have paper and cardboard of different texture, waxed canvas, glass and metal. Generally speaking, the process of digitisation od the museum holdings should go through the following steps:

1 Archival preparation, 2. Microfilming, 3. Digitalization

[1] ISO 5217; 2001 (E), Information and documetacion-Vocabulari, 15. October 2001, 1.2.09., 11

When the digitalization is done, the potential user can inspect the material directly in the Museum, which is something we would like to avoid for reasons of preventive protection, than he can inspect the material on the microreader in the museum or he can search the data base on the WEB, which would be desirable, and that is also something that we have set as our goal.

As a part of archival preparation, the material was classified in seven groups, systematizing within inventory units, establishing of chronological order, foliation, partial signing, and making inner leaves for each archival box, i.e. safe-keeping unit.
Classifying material is a slow process, which requires good concentration, memorising, and, as is the case with Tesla archive, the knowledge of at least English language. The material was grouped according to topics and then chronologically. After that, each leaf is assigned with the corresponding number in the box and with the partial signing. Thus prepared box is ready to get its inner leaf which aside from general information about holdings, group, the total number of leaves and chronological borders, also contains detailed list of material, as well as the remarks concerning conservation and restoration of endangered documents.

The complete procedure will be illustrated by an example---Tesla's correspondence. As a software tool we have choosen the Access data base from the MS Office suite. It is widwspread and easy to use package that enables creating tables, forms, reports and search queries.

There are two basic types of tables in the data base. Ordinary, or so called flat and relational. The difference between them is in a way of organizing data. In a flat base, all information is in one table, while in relational base data are stored in a number of interconnected tables. Ordinary bases are easy to create and maintain and they are simple solutions to a simple problems, while relational ones are powerful solution to more serious demands.

Due to the need for processing Tesla archive, which contains an enormous number of data, interactive Access data base called Catalogue of Correspondents has been created. The base consists of six tables: correspondents, inner lists, stickers, correspondents' letters, and noun and subject entries. These tables are not linked, but are in the same base for easier manipulation. For that reason we will discuss only the table Correspondents which contains about 11400 records. Tabular presentation of the base resembles work sheet.

Each record contains nine fields and ID2, surname and a name of a correspondent, the year of correspondence, number of a box which contains that particular file, foliation, company name, language, number of a microfilm roll and comment. The number of fields is not limited and it depends on actual needs. Picture 2 shows the result of filtration upon a given parameter. In this case it is the number of a box, 85. During filtration we got 141 records out of 11400, which represent correspondents' files in box 85 with all corresponding fields. Filtration can be done for any given parameter.

This table can be shown as a form or an application, in so called form view. In contrast to the table in which more records can be followed simultaneously, in form view only one record can be seen on the screen. To see the next one, one should use navigation commands.

[2] ID is a unique identification number of a recording in a table, which is automatically assigned

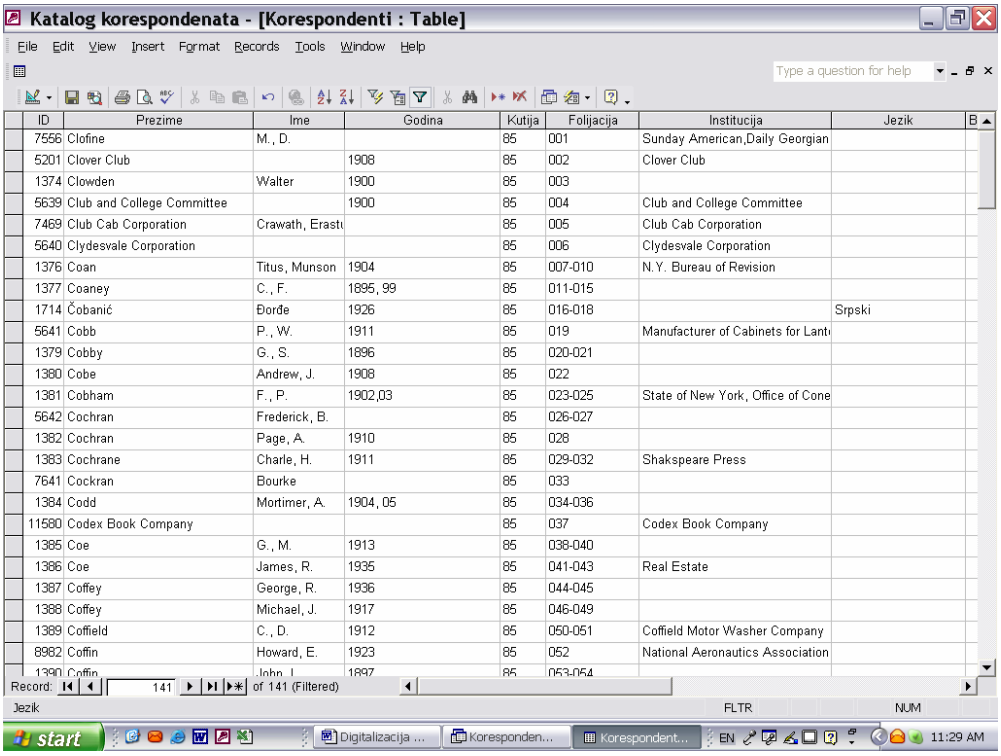


Figure 1. Window for tabular representation
of the base Correspondents

It is possible to transform forms into so called reports and to create search queries. Printing reports adaptable in forms and contents, which create the corresponding paper documentation, is extremely important. Paper documentation, still valid by law, makes the file of the archive holdings. The reports can be edited in word format and simply printed. When we talk about a form in the base Correspondents, appropriate report would be equivalent to a card used in libraries and archives. Search queries, as a response to our request, are it themselves a base which exists only in the moment of search.

Classifying includes arranging material in the box with correspondence according to correspondents, and chronologically systemizing material concerning each correspondent. Upon finalizing this phase of work, the partial creating of an inner list begins, in which the names of correspondents are entered into the base Correspondents together with other data. Then the filtration of the base is done, according to the number of the box thanks to which out of more thousands correspondents in the base, you get tabular presentation of only those records, correspondents, which are present in that box (Fig. 1). After that, filtrated data are alphabetized, because 99% of Tesla's correspondence is in English. That alphabetical order is established in the box itself. Filtrated data are then transferred to the table of Inner list, in the field Contents, and the following fields are filled out: Holdings, Group, Inventory Unit, Inventory Number, Correspondents from – to, Number of Full Leaves, Number of Empty Leaves, Total Number of Leaves and Age Span. Material in that box is then returned so that it could be given foliation and partial signing. At this phase, enough information is gathered for completing the inner list, i.e.

inventory of other material in the box and comments which are mostly concerned with conservation (Fig 2). When the inner list is created, the box is ready for microfilming (Fig. 3).

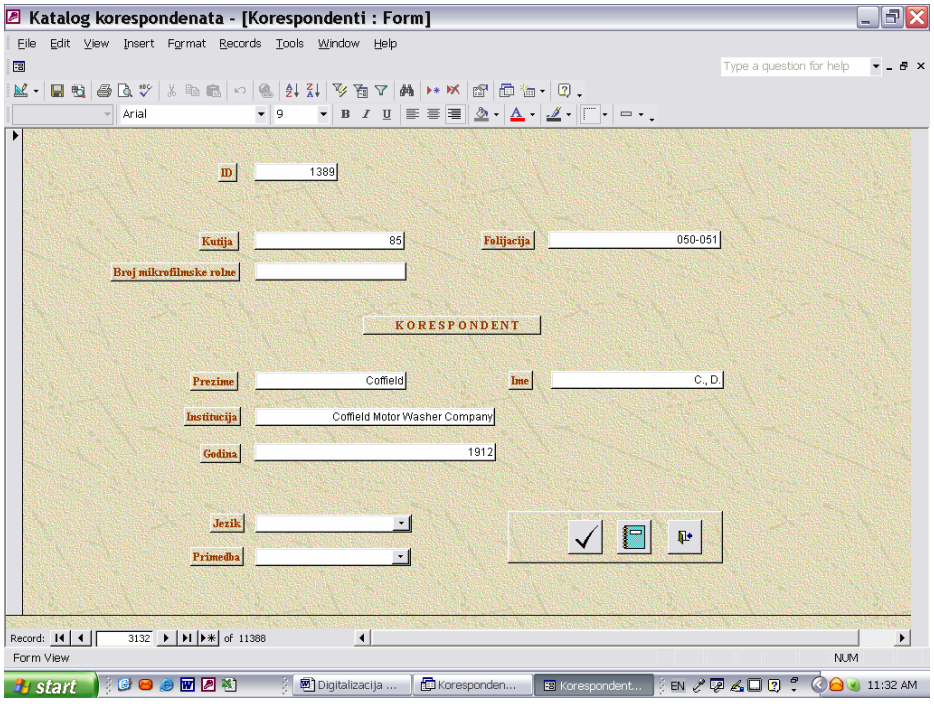


Figure 2. Window for representing base Correspondents as a form

Microfilming (Fig. 4) of the material is done at the Museum (using rather old equipement). Standards for microfilming were applied in order to make the process valid. It is possible to take 600 shots a day. The work pace depends on the material itself, its format and its physical state. As far as a format is concerned, correspondence is undiversified, and it is also in a very good state. However, the group of financial documents was totally different in both respects. That group contained cheques, cheque books, invoices, forms, receipts, reminders, bills and so on. Material in that group, as far as format and type of information carrier are concerned, was heterogeneous, one part of it is in a very bad physical state, so the process of microfilming required more time.

Keeping and processing the documentation as an integral part of microfilming means marking the number of the archival box that is being photographed, then index marks, both sides of the document (A, B). Comments made during photographing are also noted down into the diary of microfilming. That comment can refer to a missed number during foliation. It is marked on a microfilm by an appropriate graphic symbol. A log book is kept about the files that have to be photographed some place else due to a large format or some other reason. A File on photographed documents is also kept, as well as a resume of a diary of photographing. That file contains the number of a photographed document and pages, the number of microfilm rolls and short comments.

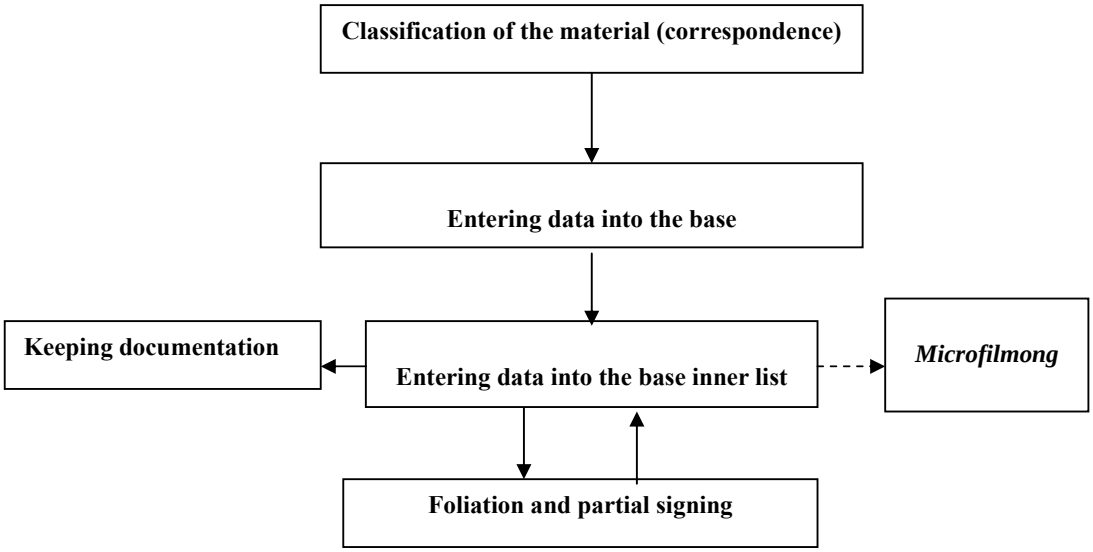
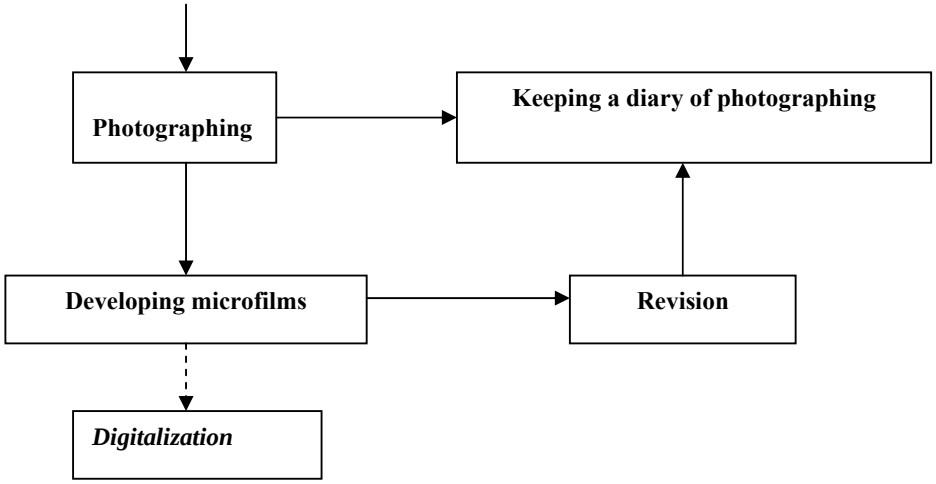


Figure 3. Archival preparation

After microfilming, the process of digitalization begins. The technique chosen for this process is so called hybrid microfilming, which means digitalization of the microfilm content, not direct digitalization of the archival document. The microfilms are scaned by a specialized scanner. Digitalized documents are entered as scans into computer data base, which contains digital record (equivalent to a card) which has to be filled in. For the time being, only LAN application is possible, and WEB application is in making. The important part of the work is regular writing of the scanned documents and of back-up base. The basic data are also entered into digital record. The type and scope of data differ depending on classification of a document. The final processing of a document in the base is something that yet has to be done.

Regardless of the fact that scanned documents are not always processed on the whole, the partially filled in digital regesta are created and can replace the classical means of information and enable fast and simple search by key words and creating an archival object. The accessibility of the base on the Internet is another goal that should be solved in the future. The valid Law on Cultural Properties defines digitalized archival document as a movable cultural property, so that legal provisions can be applied both to the "paper" material and its digital equivalent. This could lead to the conclusion that the part of the material that was published can be accessible on the WEB, which does not apply to the unpublished material. It is possible to put onto the on-line regime material that includes information about material contained in digital records.

Bearing in mind the pilot project of preparing, microfilming, and digitalizing of photo material which was done in 2001/2 outside the Museum, the work of preparing the material, experimental phase of establishing and managing technical-technological process of microfilming in the Museum that was done in 2002, we can say that by November 2004, 53% of the material was prepared for microfilming, 42% was microfilmed, and 20,2% was digitalized.



Figur 4. Microfilming

Conclusion. The need to overcome the defects in the work and lagging behind in the field of digitalization of the holding, resulted in the realization of preparing, microfilming and digitalization of Tesla's inheritance. Numerous problems accompanied the organization and maintenance of the work process, and those problems can be divided into several groups: people, choice of technological process, and financing.

Hybrid microfilming as a technological procedure is a good choice in those archives which already have a great number of microfilms and/or damaged archival material, because that is one possible way of protecting it from physical manipulation and the possibility of further damage. The disadvantages of these technological procedures are visible in the first place, in the part of a software which is used for scanning and which is integrated into the base. Software scanning can distinguish between black and white hues, and most often than not, that is not enough. The real situation is when the microfilm photograph is good, but its digital equivalent is bad. The solution to this situation can be in scanning the particular document on paper scanner and then entering that scan into the data base. This solution is acceptable, unless the number of these photographs is too big. If it is, than the question of profitability of the choice of microfilming can be raised, because, as we said before, microfilm scanner is a very expensive piece of equipment.

If an archive does not have a microfilm library and it is beginning to form one, it would be wise to consider the possibility of microfilming its material in some microfilming centre and digitalizing it by scanning it on paper scanner.

The next problem is data base which can be developed during the work itself. This possibility asks for excellent knowledge of the material and close collaboration between an archivist and a programmer. However, there are licensed software packages on our market, adaptable to different needs, the purchase of which can save a lot of time. Installing the programme, training the people and administrating the base are all included in the price of such a package.

The law on cultural properties, article 88. states that institutions of protection can not display movable properties which are not categorized, processed and registered into the Register of cultural properties. Caught between such strict regulations, the fact that 50 years passed since the Museum was founded, and that archival material was not categorized, completely processed and recorded into the Register of cultural properties is the real, everyday need for studying it both here and abroad. The categorization procedure is in progress.

Financing of the project is a problem that equally affects all phases of this work. The Museum is on the budget, so this project is partially financed by the City Culture Department, which is not enough. Additional financial means were received from the Ministry of Culture and different donations.

Although the problems we mentioned burden the work, the value of the current work is three fold. By preparing the material for microfilming we also prepare it for further expert analysis. By microfilming it we replace the originals thus physically protecting it. By digitalizing it, we also do the substitution, and, which is equally important, we give our response to modern challenges which the advancement of digital technologies is offering.

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ДИГИТАЛИЗАЦИЈА ТЕСЛИНИХ АРХИВА
Архивска заштита, микрофилмовање и дигитализација Теслиног наслеђа

Описујемо досадашње активности у музеју Николе Тесле на микрофилмовању идигитализацији музејских збирки. Изабрана је метода такозваног хибридног микрофилмовања уз истовремено развијање базе података.
Кључне речи: заштита архивског материјала, наслеђе Николе Тесле, микрофилмовање, дигитализација, базе података.

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