TECHNISCHE UNIVERSITÄT DARMSTADT

Institute of Electrical Energy Conversion

Pro-seminar ETiT
Scientific literature survey and analysis

Quelle: *Faulhaber, Deutschland*

Quelle: *Siemens AG, Deutschland*

Winter term 2020/21

Prof. Dr.-Ing. habil. Dr. h. c. Andreas Binder

Contents

The Greek alphabet:

$A\ \alpha$	Alpha	$B\ \beta$	Beta	$\Gamma\ \gamma$	Gamma	$\Delta\ \delta$	Delta
$E\ \varepsilon$	Epsilon	$Z\ \zeta$	Zeta	$H\ \eta$	Eta	$\Theta\ \vartheta$	Theta
$I\ \iota$	Jota	$K\ \kappa$	Kappa	$\Lambda\ \lambda$	Lambda	$M\ \mu$	My (mue)
$N\ \nu$	Ny (nue)	$\Xi\ \xi$	Xi	$O\ o$	Omikron	$\Pi\ \pi$	Pi
$P\ \rho$	Rho	$\Sigma\ \sigma$	Sigma	$T\ \tau$	Tau	$Y\ \upsilon$	Ypsilon
$\Phi\ \varphi$	Phi	$X\ \chi$	Chi	$\Psi\ \psi$	Psi	$\Omega\ \omega$	Omega

1. Procedure for a literature seminar

Step1. **Introduction**
In the first plenary meeting the students get information about the structure of a scientific publication. They get a hand-out, how a paper has to be written. The students get an overview on existing conferences and journals, dealing with electrical energy conversion. The students get an overview on available scientific libraries and online databases with scientific publications. Each researcher at the Institute EW offers two scientific topics for the literature survey. This limits the number of students, who can be tutored per semester. One of the topics at least has to deal with the PhD project of the researcher. The students select one topic per student for the literature survey. If students can not decide, there will be a selection of the topic by the tutoring professor. The students commit themselves to do the literature seminar at the Institute EW via a list of participants with signatures.

Step 2. **Literature survey**
Students select the available scientific literature related to the chosen topic via a) internet search, b) by library search and c) by other means of data mining. The students make as a first part of their written report a list of found scientific literature with a correct citation of title, author and publishing details according to the distributed hand-out. For each of these found literature items a short characterisation such as theoretical or experimental work, main focus of the paper, etc. in a few sentences shall be given. This written report will be presented in a secondary plenary meeting. Based on this first part of the written report, one scientific paper per student, related to his/her specific topic, is chosen for a further detailed analysis. This selection is done by the tutoring researcher, based on the interest and the ability of the student, and has to be confirmed by the professor. For the sake of equality between the work load of different students, the final decision of the selected paper lies with the tutoring professor.

Step 3. **Analysis and report on a selected scientific paper**
The student analyzes the chosen scientific text by
a) studying the text itself and by
b) studying the necessary pre-conditional literature, on which the work is based. In case of theoretical derivations, which very often in scientific papers are presented in a very short form, the student tries to complete or amend the derivations, so that they are easily understood. Parallel work of the same author or of other authors, which is cited in the paper and which is necessary to understand the paper content, shall be introduced by the student in the second part of the written report. The analysis of the paper shall be done in this second part of the written report. This second part shall give a presentation of the technical contents of the paper in the students´ own words. This report can be done in English or German language.

Step 4. **Delivery of the written report**
In the third plenary session of the pro-seminar, the students present their written reports to the tutoring researchers and to the professor. The researchers and the professor give a feedback on the report and suggest, if necessary, improvements. In the plenary session basic rules on the final oral presentation are given to the students, mainly preparatory rules for overhead slides and advices for good rules of speakers. Then the students prepare the final version of the written report and prepare their oral presentations.

Step 5. **Final oral presentation**
In the fourth and final plenary meeting of these pro-seminar the students deliver their final version (e.g. an improved) written report, which contains in the first part the complete list of

the literature' survey, in the second part the written analysis of the paper and in addition a paper copy of the investigated scientific paper. The oral presentation per student on the investigated scientific paper shall be 15 minutes in English or German language with multimedia support. After the presentation, a 15 minutes discussion and feedback concerning the quality of the oral presentation and on the presented understanding of the scientific content of the paper is given by the professor and the researchers of the institute. The other participating students are invited to express their feeling on the oral presentation as a personal feed-back to their colleague. This feed-back is regarded as a private confidential message within the pro-seminar.

Steps 6. **Marks**

The maximum possible number of gained points for the pro-seminar is 100. For the 1st part of the written report, the literature survey, regarding completeness, quality of citation, quality of abstracts, keeping the time schedule, 35 points at maximum are given. For the 2nd part of the written report, the paper analysis of the scientific paper, regarding profoundness of analysis, quality of written report, degree of understanding, enrichment of the report by exploitation of accompanying cited literature, another 40 points at maximum are given. For the oral presentation at maximum 25 points are given.

Gained points	51-55	56-60	61-65	66-70	71-75	76-80	81-85	86-90	91-100
Mark	4	3.7	3.3	2.7	2.3	2.0	1.7	1.3	1.0

2. Typical available literature on electrical machines, drives and traction

In the following, some selected scientific journals and conferences are given as an example. There exist a lot more, which you shall find out by advice or own recherché to use it for your own literature survey. The Conference papers are usually enclosed in the Proceedings of Scientific Conferences, which very often nowadays are only CD-ROM, such as the

- Proceedings of the International Conference on Electric Machines (ICEM)
- Proceedings of the European Power Electronics & Application Conference (EPE)

Be aware that older journals, that are not published any longer, may contain very valuable basic information such as ETZ-Archiv, VDE-Verlag, Offenbach, Germany. Others just changed their names e.g.
AIEE into IEEE or
IEE into IET or
Archiv für Elektrotechnik into Electrical Engineering. So a good literature research is also a dedective´s work, which is not finished just by down-loading some on-line papers.

a) Selection of Conferences on Electrical machines, Drives, Power Conversion, Electromagnetics:

Conferences		Turnus	Last	Next
MAGNETICS	The World's Premier Forum on Magnetic Applications, Technologies & Materials	annual	Chicago 2009	Orlando 2010
IECON	Annual conference of the IEEE Industrial Electronics Society	annual	Orlando 2008	Porto 2009
ECCE	IEEE Energy Conversion Congress and Exposition	annual	-	San Jose 2009
EPE	European Conference on Power Electronics and Applications	Bi-annual	Aalborg 2007	Barcelona 2009
PCIM	Power Conversion Intelligent Motion	annual	Nuremberg 2009	Nuremberg 2010
IEMDC	International Electrical Machines and Drives Conference	Bi-annual	Miami 2009	To be planned
IAS	IEEE Industry Applications Society Annual Meeting	annual	Edmonton 2008	Houston 2009
MAGLEV	International Conference on Magnetically Levitated Systems and Linear Drives	Bi-annual	San Diego 2008	To be planned
ETG-Tagungen	Energietechnische Gesellschaft im VDE Tagungen	annual	Elektrische Antriebstechnik Seminar Aschaffenburg 2009	ETG Kongress 2009, Düsseldorf
LDIA	Linear Drives for Industry Applications	Bi-annual	Lille 2007	Incheon 2009
Compumag	Conference on the Computation of Electromagnetic Fields	Bi-annual	Aachen 2007	Florianopolis 2009

ICEM	International Conference on Electrical Machines	Bi-annual	Vilamoura 2008	Rome 2010
SPEEDAM	International Symposium on Power Electronics, Electrical Drives, Automation and Motion	Bi-annual	Ischia 2008	Pisa 2010
IGTE	International IGTE Symposium	Bi-annual	Graz 2008	Graz 2010
ELECTROMOTION	Symposium on Advanced Electromechanical Motion Systems	Bi-annual	Lille 2009	Istanbul 2011
ISEF	International Symposium on Electromagnetic Fields	Bi-annual	Prague 2007	Arras 2009
EEMODS	Energy Efficiency in Motor Driven Systems	Bi-annual	Beijing 2007	Nantes 2009
SDEMPED	Symposium on Diagnostics for Electric Machines, Power Electronics and Drives	Bi-annual	Cracow 2007	Cargese 2009
CEM	IET Computational Electromagnetics	Bi-annual	Brighton 2008	To be planned
PEDS	International conference on power electronics and drive systems	Bi-annual	Bangkok 2007	Taipei 2009
CEFC	IEEE Conference on Electromagnetic Field Computation	Bi-annual	Athena 2008	Chicago 2010

b) Selection of some Scientific Journals:

IEEE Transactions on Industrial Electronics IEEE Industry Applications IEEE Magnetics IEEE Power Electronics	http://ieeexplore.ieee.org/ http://elib.tu-darmstadt.de/ieee/Xplore/dynhome.jsp (via the TU Darmstadt web)
Electrical Engineering	http://www.springerlink.de (“Archif fuer Elektrotechnik”)
Elektrische Bahnen	http://eb-info.eu/
European Transactions on Electrical Power (ETEP)	http://www3.interscience.wiley.com/journal/106562716/home
IET Electric Power Applications IET Power Electronics	http://ieeexplore.ieee.org/ http://www.ietdl.org/IET-EPA http://www.ietdl.org/IET-PEL

c) Selection of some scientific libraries:

TU Darmstadt FB 18 Institut für Elektrische Energiewandlung Bibliothek (no public use)	Landgraf-Georg-Str. 4, S3|10-327
TU Darmstadt FB 18 Zentrale Bibliothek (Nachrichtentechnik)	Merckstr. 25
Universitäts- und Landesbibliothek Darmstadt	Schloss Darmstadt http://elib.tu-darmstadt.de/lhb/
Online Fernleihe	http://www.portal.hebis.de/servlet/Top/searchadvanced

3. How to write a scientific paper

3.1 Preliminary information

This document is based on the following resources:

- http://ieee-tbme.univ-rennes1.fr/lapinpaper.html
- http://bioweb.wku.edu/courses/Biol398/Paper/paperText.html

and was written by TECHNISCHE UNIVERSITÄT WIEN, Institut für Computergraphik und Algorithmen, Arbeitsbereich Computergraphik. It is a first attempt to summarize the most important aspects of writing a scientific paper in the field of computer graphics. Papers in other fields are usually similar but differ in detail (see links above). If you have any suggestions for improvements, something is unclear or could be formulated in a better way, or have general remarks please report them to the tutor.

3.2 General

When you get your paper(s) from your supervisor and do your literature research you will soon realize that most papers follow a similar form. This should not be seen as a restriction but as help for both the reader and the writer of the paper. The reader is usually better guided to the information he wants (e.g., to get a quick overview of the paper, read the abstract, to know the results, read the results section, simple, see?). The writer, on the other hand, knows how to structure the information so it is best communicated to the reader. We first state a few general remarks on writing a paper, also scan the above mentioned pages for more information.

- be consistent (also in tense, ...)
- use active form (simpler, easier, stronger)
- never use contractions (e.g., it's, can't, ...)
- all images, figures, tables, ... must be labelled and referenced in the text
- all images, figures, tables, ... must have a caption describing what they are there for
- no paragraph should have only one sentence
- use a spellchecker (however, do not rely on the spellchecker, it does not find every mistake and be careful with "replace all")
- the word data is plural (e.g., data are reported)
- use simple formulations and short sentences, if a sentence can be broken into two, do it.
- try to avoid abbreviations (except: i.e., e.g.), if more convenient, introduce in Introduction

A scientific paper usually is divided into several sections, and each section serves a specific purpose in the paper. Deviations to this structure are possible but should be motivated by a rather strong reason. We now describe the standard format of a scientific paper. Sections marked with * have to be included. Titles of sections can differ (but should not without good reason), the content however should be there.

3.3 * Title

The title of the paper is the most often encountered part of any paper and therefore has great importance in the success of the paper. Thousands of readers will scan the title but never read the abstract or paper itself. Abstracting and Indexing services will also utilize the title, therefore, all words in the title should be chosen with great care and their association with other words in the title carefully managed. Titles should never contain abbreviations and jargon. Indexing these word substitutions makes indexing difficult to impossible and impairs the titles credibility.

What is a good title?
The fewest possible words that adequately describe the contents of the paper.

How long should the title be?
The title should be a label and not a sentence. Consequently it does not suffer from the need to be complete and balanced, i.e., subject, verb, object arrangement, etc.

3.4 * Abstract

A well prepared abstract should enable the reader to identify the basic content of a document quickly and accurately, to determine its relevance to their interests, and thus to decide whether to read the document in its entirety. The abstract should concisely state the principal objectives and scope of the investigation where these are not obvious from the title. More importantly, it should concisely summarize the results and principal conclusions. Do not include details of the method.

The abstract must be concise, not exceeding 250 words, usually in a single paragraph. If you can convey the essential details of the paper in 100 words, do not use 200. The abstract, together with the title, must be self-contained as it is often published separately from the paper (on web pages, ...). Omit all references to the literature and to tables or figures, and omit obscure abbreviations and acronyms even though they may be defined in main body of the paper. The abstract is only text. Use the active voice when possible, but much of it may require passive constructions. Usually the abstract is written in the present tense. Maximum length should be 200-300 words.

Summarizing, the abstract should contain:

- the question(s) you investigated (or purpose), a motivation for the work (from Introduction) state the purpose very clearly in the first or second sentence.
- A short description of the method (no details), advantages over existing methods
- A brief summary of your interpretations and conclusions (from Discussion)

It should not contain:

- lengthy background information
- references to other literature
- elliptical (i.e., ending with ...) or incomplete sentences
- abbreviations or terms that may be confusing to the reader

any sort of illustration, figure, or table, or references to them.

3.5 * Keywords

The keywords should not only be taken from the title.

3.6 * Introduction

The introduction is often merged with “Related Work”. As its name implies, this section presents the background knowledge necessary for the reader to understand why the findings of the paper are an advance on the knowledge in the field. Typically, the Introduction describes first the accepted state of knowledge in a specialized field; then it focuses more specifically on a particular aspect, usually describing a finding or set of findings that led directly to the work described in the paper. In many papers, one or several major conclusions of the paper are presented at the end of this section, so that the reader knows the major answers to the questions just posed.

- State objectives clearly!
- Why is this work necessary/interesting/useful, motivation?
- What are the preliminaries/put your work in context?

Cite important literature (if you have no “Related Work” section).

3.7 Related Work

This is either included within the introduction or it is a sction on its own. Establish the context by providing a brief and balanced review of the pertinent published literature that is available on the subject. The key is to summarize (for the reader) what we knew about the specific problem before you did your studies (developed your algorithm). This is accomplished with a general review of the primary research literature (with citations) but should not include very specific, lengthy explanations. Objectively state the drawbacks of existing methods and why you have to look for other solutions.

3.8 * 2-4 main sections

Explain your Algorithm and the theory behind it, include useful figures, structure the explanation (do not jump from point to point) before starting to write, keep the thread. This is the most difficult part of the paper to give useful hints how to do it since this of course strongly dependent on what your paper is about.

3.9 * Results

The function of the Results section is to objectively present your key results in an orderly and logical sequence, using both illustrative materials (Tables and Figures) and text. Explain used data sets in Tables (timings, space requirements, ...) to compare to other methods. They should clearly describe what was found, and should not require the reader to interpret data from figures and tables. If a figure can be used to show the data, use the figure (e.g. a graph) instead of the table. Most people understand graphs more quickly than tables. Don't present the same data in several ways, choose the one best way. While tables are good for presenting some kinds of data, consider the options. Both tables and figures should be clearly labelled Figure 1 or Table 1 in order of being referred to in the text, and should include a descriptive caption so they "stand alone" without needing reference to the text of the results section.

3.10 * Conclusions (and Future Work)

In your conclusions, address the following:

- Reach conclusions about the initial objectives (therefore we call the section "Conclusions")!
- Show advantages of your method over previously published methods!
- State open problems, cases your method does not or insufficiently work!
- Identify needed next steps in research on the problem!

If the last two points make up more than one paragraph, put them in a separate section entitled "Future Work".

3.11 Acknowledgments

If you received any significant help in thinking up, designing, or carrying out the work, received materials (data sets, source code, ...) from someone, who did you a favour by supplying them or funding, you must acknowledge their assistance and the service or material provided. Do not include your dog, your friends, or wife/husband (in order of importance), or similar things.

3.12 * References

- Cite all references in the text!
- Reference order is dependent on publisher, usually it is alphabetically, sometimes in order of appearance in the text!
- Include all necessary information for others to locate the reference!
- Usually it is not a good idea to reference web pages!
- Be consistent!

required fields of most common entries (names from bibtex):

- article (an article in a journal):
  authors, title, journal, volume, number, pages, year
- inproceedings (a paper in conference proceedings):
  authors, title, booktitle, pages, year
- book (yes, a book):
  author or editor, title, publisher, year

See also: http://www.loria.fr/services/ctan/bibtx-7.html

In the following you find Sample IEEE Documentation Style for References

References to sources should be numbered sequentially by order of mention in the text, with the number placed in brackets and printed on line (not as a super- or subscript) like [1]. The list of all references used in the text should appear in numerical order of mention at the end of the document.

Books

[1] E. R. Tufte, *Visual Explanations: Images and Quantities, Evidence and Narrative.* Cheshire, CT: Graphics Press, 1996.

[2] J. H. Watt and S. A. van der Berg, *Research Methods for Communication Science.* Boston, MA: Allyn and Bacon, 1995.

[3] M. S. MacNealy, *Strategies for empirical research in writing. Boston*: Allyn & Bacon, 1999.

Articles/Chapters in Book

[4] J. W. DuBois, S. Schuetze-Coburn, S. Cumming, and D. Paolino, "Outline of discourse transcription," in *Talking Data: Transcription and Coding in Discourse Research* (J. A. Edwards and M. D. Lampert, Eds.). Hillsdale, NJ: Lawrence Erlbaum Associates, 1993, pp. 45-89.

Articles in Periodicals (journals, magazines, etc.)

[5] R. C. Carter, "Search time with a color display: Analysis of distribution functions," *Human Factors*, vol. 24, no. 3, pp. 302-304, 1982.

Papers Published in Proceedings

[6] P. Leone, D. L. Gillihan, and T. L. Rauch, "Web-based prototyping for user sessions: Medium-fidelity prototyping," in *Proc. 44th Int. Technical Communications Conf.* (Toronto, Canada, May 11-14, 1997, pp. 231-234).

Unpublished Papers

[7] K. Riley, "Language theory: Applications versus practice", presented at the Conf. of the Modern Language Association, Boston, MA, December 27-30, 1990.

Technical Reports

[8] K. Kraiger and M. S. Teachout, "Applications of generalizability theory to the Air Force job performance measurement project: A summary of research results," Human Resources Laboratory, Air Force Systems Command, Brooks Air Force Base, Texas, Tech. Rep. AFHRL-TR-90-92, July 1991.

Electronic sources

Give the author, title, type of medium (enclosed in brackets [ ]), volume, issue number (in parentheses ( )), page number (if given), and the year and month of publication (in parentheses ( )). Then give the full Internet address or the name of the online service provider prefaced by "Available:"

Article in an Electronic Journal

[9] D. Blankenhorn, "Newsproducts: Panasonic debuts first rewritable optical disk recorder," *Newsbytes*, [Online] Vol. 7, Jan. 1990. Available: Knowledge Index File: Newbytes (NEWS 1) Item: 08931265

Other online documents

[10] T. Land, "Web extension to American Psychological Association style (WEAPAS)," [Online document], 1996 Mar. 31 (Rev. 1.2.4.), [cited 1996 Sep. 14], Available: http://www.nyu.edu/pages/psychology/WEAPAS/

[11] P. Curtis, "Mudding: Social phenomena in text-based virtual realities," [Online document], Aug. 1992, [1996 Aug 30], Available FTP: parcftp.xerox.com/pub/MOO/papers/DIAC921992

[12] T. Adamowski, "Writer's resource," in *IEEE PCS Online Discussion Forum,* 14 Dec 1999. [Online]. Available WWW: http://ieeepcs.org/wwwboard/.

3.13 Appendix

Sometimes interesting, but not necessary information about a paper (e.g., a rather lengthy proof) is included within an appendix. Usually, it is not necessary.

Further very detailed, classical literature of how to write a technical report is given at the German books:

[1] W. Lanze, *Das technische Manuskript – Ein Handbuch mit ausführlichen Anleitungen für Autoren und Bearbeiter.* Vulkan-Verlag, Dr. W. Classen, Haus der Technik, Essen, 2. Auflage 1970.

[2] H. E. Marks, *Der technische Bericht.* VDI-Taschenbücher T26, VDI-Verlag GmbH, Düsseldorf, 1971.

4. Example: Guideline for a scientific paper as demanded by the IEEE, USA

Preparation of Papers for IEEE TRANSACTIONS and JOURNALS (March 2004)

First A. Author, Second B. Author, Jr., and Third C. Author, *Member, IEEE*

***Abstract*—These instructions give you guidelines for preparing papers for IEEE TRANSACTIONS and JOURNALS. Use this document as a template if you are using Microsoft *Word* 6.0 or later. Otherwise, use this document as an instruction set. The electronic file of your paper will be formatted further at IEEE. Define all symbols used in the abstract. Do not cite references in the abstract. Do not delete the blank line immediately above the abstract; it sets the footnote at the bottom of this column.**

***Index Terms*—About four key words or phrases in alphabetical order, separated by commas. For a list of suggested keywords, send a blank e-mail to keywords@ieee.org or visit the IEEE web site at http://www.ieee.org/organizations/pubs/ani_prod/keywrd98.txt**

I. INTRODUCTION

THIS document is a template for Microsoft *Word* versions 6.0 or later. If you are reading a paper version of this document, please download the electronic file, TRANS-JOUR.DOC, from http://www.ieee.org/organizations/pubs/transactions/stylesheets.htm so you can use it to prepare your manuscript. If you would prefer to use LATEX, download IEEE's LATEX style and sample files from the same Web page. Use these LATEX files for formatting, but please follow the instructions in TRANS-JOUR.DOC or TRANS-JOUR.PDF.

If your paper is intended for a *conference,* please contact your conference editor concerning acceptable word processor formats for your particular conference.

Manuscript received October 9, 2001. (Write the date on which you submitted your paper for review.) This work was supported in part by the U.S. Department of Commerce under Grant BS123456 (sponsor and financial support acknowledgment goes here). Paper titles should be written in uppercase and lowercase letters, not all uppercase. Avoid writing long formulas with subscripts in the title; short formulas that identify the elements are fine (e.g., "Nd–Fe–B"). Do not write "(Invited)" in the title. Full names of authors are preferred in the author field, but are not required. Put a space between authors' initials.

F. A. Author is with the National Institute of Standards and Technology, Boulder, CO 80305 USA (corresponding author to provide phone: 303-555-5555; fax: 303-555-5555; e-mail: author@ boulder.nist.gov).

S. B. Author, Jr., was with Rice University, Houston, TX 77005 USA. He is now with the Department of Physics, Colorado State University, Fort Collins, CO 80523 USA (e-mail: author@lamar. colostate.edu).

T. C. Author is with the Electrical Engineering Department, University of Colorado, Boulder, CO 80309 USA, on leave from the National Research Institute for Metals, Tsukuba, Japan (e-mail: author@nrim.go.jp).

When you open TRANS-JOUR.DOC, select "Page Layout" from the "View" menu in the menu bar (View | Page Layout), which allows you to see the footnotes. Then type over sections of TRANS-JOUR.DOC or cut and paste from another document and then use markup styles. The pull-down style menu is at the left of the Formatting Toolbar at the top of your *Word* window (for example, the style at this point in the document is "Text"). Highlight a section that you want to designate with a certain style, then select the appropriate name on the style menu. The style will adjust your fonts and line spacing. **Do not change the font sizes or line spacing to squeeze more text into a limited number of pages.** Use italics for emphasis; do not underline.

To insert images in *Word,* position the cursor at the insertion point and either use Insert | Picture | From File or copy the image to the Windows clipboard and then Edit | Paste Special | Picture (with "Float over text" unchecked).

IEEE will do the final formatting of your paper. If your paper is intended for a conference, please observe the conference page limits.

II. PROCEDURE FOR PAPER SUBMISSION

A. Review Stage

Please check with your editor on whether to submit your manuscript by hard copy or electronically for review. If hard copy, submit photocopies such that only one column appears per page. This will give your referees plenty of room to write comments. Send the number of copies specified by your editor (typically four). If submitted electronically, find out if your editor prefers submissions on disk or as e-mail attachments.

If you want to submit your file with one column electronically, please do the following:

--First, click on the View menu and choose Print Layout.

--Second, place your cursor in the first paragraph. Go to the Format menu, choose Columns, choose one column Layout, and choose "apply to whole document" from the dropdown menu.

--Third, click and drag the right margin bar to just over 4 inches in width.

The graphics will stay in the "second" column, but you can drag them to the first column. Make the graphic wider to push out any text that may try to fill in next to the graphic.

B. Final Stage

When you submit your final version, after your paper has been accepted, print it in two-column format, including figures and tables. Send three prints of the paper; two will go to IEEE and one will be retained by the Editor-in-Chief or conference publications chair.

You must also send your final manuscript on a disk, which IEEE will use to prepare your paper for publication. Write the authors' names on the disk label. If you are using a Macintosh, please save your file on a PC formatted disk, if possible. You may use *Zip* or CD-ROM disks for large files, or compress files using *Compress, Pkzip, Stuffit,* or *Gzip.*

Also send a sheet of paper with complete contact information for all authors. Include full mailing addresses, telephone numbers, fax numbers, and e-mail addresses. This information will be used to send each author a complimentary copy of the journal in which the paper appears. In addition, designate one author as the "corresponding author." This is the author to whom proofs of the paper will be sent. Proofs are sent to the corresponding author only.

C. Figures

All tables and figures will be processed as images. **However, IEEE cannot extract the tables and figures embedded in your document.** (The figures and tables you insert in your document are only to help you gauge the size of your paper, for the convenience of the referees, and to make it easy for you to distribute preprints.) Therefore, **submit, on separate sheets of paper, enlarged versions of the tables and figures that appear in your document.** These are the images IEEE will scan and publish with your paper.

D. Electronic Image Files (Optional)

You will have the greatest control over the appearance of your figures if you are able to prepare electronic image files. If you do not have the required computer skills, just submit paper prints as described above and skip this section.

1) Easiest Way: If you have a scanner, the best and quickest way to prepare noncolor figure files is to print your tables and figures on paper exactly as you want them to appear, scan them, and then save them to a file in PostScript (PS) or Encapsulated PostScript (EPS) formats. Use a separate file for each image. File names should be of the form "fig1.ps" or "fig2.eps."

2) Slightly Harder Way: Using a scanner as above, save the images in TIFF format. High-contrast line figures and tables should be prepared with 600 dpi resolution and saved with no compression, 1 bit per pixel (monochrome), with file names of the form "fig3.tif" or "table1.tif." To obtain a 3.45-in figure (one-column width) at 600 dpi, the figure requires a horizontal size of 2070 pixels. Typical file sizes will be on the order of 0.5 MB.

Photographs and grayscale figures should be prepared with 220 dpi resolution and saved with no compression, 8 bits per pixel (grayscale). To obtain a 3.45-in figure (one-column width) at 220 dpi, the figure should have a horizontal size of 759 pixels.

Color figures should be prepared with 400 dpi resolution and saved with no compression, 8 bits per pixel (palette or 256 color). To obtain a 3.45-in figure (one column width) at 400 dpi, the figure should have a horizontal size of 1380 pixels.

For more information on TIFF files, please go to http://www.ieee.org/organizations/pubs/transactions/information.htm and click on the link "Guidelines for Author Supplied Electronic Text and Graphics."

3) Somewhat Harder Way: If you do not have a scanner, you may create noncolor PostScript figures by "printing" them to files. First, download a PostScript printer driver from http://www.adobe.com/support/downloads/pdrvwin.htm (for Windows) or from http://www.adobe.com/support/downloads/pdrvmac.htm (for Macintosh) and install the "Generic PostScript Printer" definition. In *Word,* paste your figure into a new document. Print to a file using the PostScript printer driver. File names should be of the form "fig5.ps." Use Adobe Type 1 fonts when creating your figures, if possible.

4) Other Ways: Experienced computer users can convert figures and tables from their original format to TIFF. Some useful image converters are Adobe *Photoshop,* Corel *Draw,* and Microsoft *Photo Editor,* an application that is part of Microsoft *Office 97* and *Office 2000* (look for C:\Program Files\Common Files \Microsoft Shared\ PhotoEd\ PHOTOED.EXE. (You may have to custom-install *Photo Editor* from your original *Office* disk.)

Here is a way to make TIFF image files of tables. First, create your table in *Word.* Use horizontal lines but no vertical lines. Hide gridlines (Table | Hide Gridlines). Spell check the table to remove any red underlines that indicate spelling errors. Adjust magnification (View | Zoom) such that you can view the entire table *at maximum area* when you select View | Full Screen. Move the cursor so that it is out of the way. Press "Print Screen" on your keyboard; this copies the screen image to the Windows clipboard. Open Microsoft *Photo Editor* and click Edit | Paste as New Image. Crop the table image (click Select button; select the part you want, then Image | Crop). Adjust the properties of the image (File | Properties) to monochrome (1 bit) and 600 pixels per inch. Resize the image (Image | Resize) to a width of 3.45 inches. Save the file (File | Save As) in TIFF with no compression (click "More" button).

Most graphing programs allow you to save graphs in TIFF; however, you often have no control over compression or number of bits per pixel. You should open these image files in a program such as Microsoft *Photo Editor* and re-save them using no compression, either 1 or 8 bits, and either 600 or 220 dpi resolution (File | Properties; Image | Resize). See Section II-D2 for an explanation of number of bits and resolution. If your graphing program cannot export to TIFF, you can use the same technique described for tables in the previous paragraph.

A way to convert a figure from Windows Metafile (WMF) to TIFF is to paste it into Microsoft *PowerPoint,* save it in JPG format, open it with Microsoft *Photo Editor* or similar converter, and re-save it as TIFF.

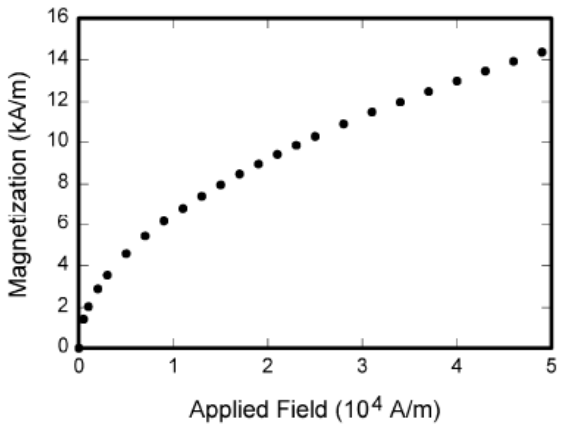

Fig. 1. Magnetization as a function of applied field. Note that "Fig." is abbreviated. There is a period after the figure number, followed by two spaces. It is good practice to explain the significance of the figure in the caption.

Microsoft *Excel* allows you to save spreadsheet charts in Graphics Interchange Format (GIF). To get good resolution, make the *Excel* charts *very* large. Then use the "Save as HTML" feature (see http://support.microsoft.com/support/kb/articles/q158/0/79.asp). You can then convert from GIF to TIFF using Microsoft *Photo Editor,* for example.

No matter how you convert your images, it is a good idea to print the TIFF files to make sure nothing was lost in the conversion.

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III. MATH

If you are using *Word,* use either the Microsoft Equation Editor or the *MathType* add-on (http://www.mathtype.com) for equations in your paper (Insert | Object | Create New | Microsoft Equation *or* MathType Equation). "Float over text" should *not* be selected.

IV. UNITS

Use either SI (MKS) or CGS as primary units. (SI units are strongly encouraged.) English units may be used as secondary units (in parentheses). **This applies to papers in data storage.** For example, write "15 Gb/cm^2 (100 Gb/in^2)." An exception is when English units are used as identifiers in trade, such as "3½ in disk drive." Avoid combining SI and CGS units, such as current in amperes and magnetic field in oersteds. This often leads to confusion because equations do not balance dimensionally. If you must use mixed units, clearly state the units for each quantity in an equation.

The SI unit for magnetic field strength H is A/m. However, if you wish to use units of T, either refer to magnetic flux density B or magnetic field strength symbolized as $\mu_0 H$. Use the center dot to separate compound units, e.g., "A·m^2."

TABLE I
UNITS FOR MAGNETIC PROPERTIES

Symbol	Quantity	Conversion from Gaussian and CGS EMU to SI [a]
Φ	magnetic flux	1 Mx → 10^{-8} Wb = 10^{-8} V·s
B	magnetic flux density, magnetic induction	1 G → 10^{-4} T = 10^{-4} Wb/m^2
H	magnetic field strength	1 Oe → $10^3/(4\pi)$ A/m
m	magnetic moment	1 erg/G = 1 emu → 10^{-3} A·m^2 = 10^{-3} J/T
M	magnetization	1 erg/(G·cm^3) = 1 emu/cm^3 → 10^3 A/m
$4\pi M$	magnetization	1 G → $10^3/(4\pi)$ A/m
σ	specific magnetization	1 erg/(G·g) = 1 emu/g → 1 A·m^2/kg
j	magnetic dipole moment	1 erg/G = 1 emu → $4\pi \times 10^{-10}$ Wb·m
J	magnetic polarization	1 erg/(G·cm^3) = 1 emu/cm^3 → $4\pi \times 10^{-4}$ T
χ, κ	susceptibility	1 → 4π
χ_ρ	mass susceptibility	1 cm^3/g → $4\pi \times 10^{-3}$ m^3/kg
μ	permeability	1 → $4\pi \times 10^{-7}$ H/m = $4\pi \times 10^{-7}$ Wb/(A·m)
μ_r	relative permeability	$\mu \rightarrow \mu_r$
w, W	energy density	1 erg/cm^3 → 10^{-1} J/m^3
N, D	demagnetizing factor	1 → 1/(4π)

No vertical lines in table. Statements that serve as captions for the entire table do not need footnote letters.

[a]Gaussian units are the same as cgs emu for magnetostatics; Mx = maxwell, G = gauss, Oe = oersted; Wb = weber, V = volt, s = second, T = tesla, m = meter, A = ampere, J = joule, kg = kilogram, H = henry.

V. HELPFUL HINTS

A. Figures and Tables

Because IEEE will do the final formatting of your paper, you do not need to position figures and tables at the top and bottom of each column. In fact, all figures, figure captions, and tables can be at the end of the paper. Large figures and tables may span both columns. Place figure captions below the figures; place table titles above the tables. If your figure has two parts, include the labels "(a)" and "(b)" as part of the artwork. Please verify that the figures and tables you mention in the text actually exist. **Please do not include captions as part of the figures. Do not put captions in "text boxes" linked to the figures. Do not put borders around the outside of your figures.** Use the abbreviation "Fig." even at the beginning of a sentence. Do not abbreviate "Table." Tables are numbered with Roman numerals.

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Figure axis labels are often a source of confusion. Use words rather than symbols. As an example, write the quantity "Magnetization," or "Magnetization *M*," not just "*M*." Put units in parentheses. Do not label axes only with units. As in Fig. 1, for example, write "Magnetization (A/m)" or "Magnetization ($A \cdot m^{-1}$)," not just "A/m." Do not label axes with a ratio of quantities and units. For example, write "Temperature (K)," not "Temperature/K."

Multipliers can be especially confusing. Write "Magnetization (kA/m)" or "Magnetization (10^3 A/m)." Do not write "Magnetization (A/m) × 1000" because the reader would not know whether the top axis label in Fig. 1 meant 16000 A/m or 0.016 A/m. Figure labels should be legible, approximately 8 to 12 point type.

B. References

Number citations consecutively in square brackets [1]. The sentence punctuation follows the brackets [2]. Multiple references [2], [3] are each numbered with separate brackets [1]–[3]. When citing a section in a book, please give the relevant page numbers [2]. In sentences, refer simply to the reference number, as in [3]. Do not use "Ref. [3]" or "reference [3]" except at the beginning of a sentence: "Reference [3] shows ... ." Unfortunately the IEEE document translator cannot handle automatic endnotes in *Word*; therefore, type the reference list at the end of the paper using the "References" style.

Number footnotes separately in superscripts (Insert | Footnote).[1] Place the actual footnote at the bottom of the column in which it is cited; do not put footnotes in the reference list (endnotes). Use letters for table footnotes (see Table I).

Please note that the references at the end of this document are in the preferred referencing style. Give all authors' names; do not use "*et al.*" unless there are six authors or more. Use a space after authors' initials. Papers that have not been published should be cited as "unpublished" [4]. Papers that have been submitted for publication should be cited as "submitted for publication" [5]. Papers that have been accepted for publication, but not yet specified for an issue should be cited as "to be published" [6]. Please give affiliations and addresses for private communications [7].

Capitalize only the first word in a paper title, except for proper nouns and element symbols. For papers published in translation journals, please give the English citation first, followed by the original foreign-language citation [8].

C. Abbreviations and Acronyms

Define abbreviations and acronyms the first time they are used in the text, even after they have already been defined in the abstract. Abbreviations such as IEEE, SI, ac, and dc do not have to be defined. Abbreviations that incorporate periods should not have spaces: write "C.N.R.S.," not "C. N. R. S." Do not use abbreviations in the title unless they are unavoidable (for example, "IEEE" in the title of this article).

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Number equations consecutively with equation numbers in parentheses flush with the right margin, as in (1). First use the equation editor to create the equation. Then select the "Equation" markup style. Press the tab key and write the equation number in parentheses. To make your equations more compact, you may use the solidus (/), the exp function, or appropriate exponents. Use parentheses to avoid ambiguities in denominators. Punctuate equations when they are part of a sentence, as in

$$\int_0^{r_2} F(r,\varphi)\, dr\, d\varphi = [\sigma r_2 / (2\mu_0)] \cdot \int_0^{\infty} \exp(-\lambda\,|z_j - z_i|)\, \lambda^{-1} J_1(\lambda r_2)\, J_0(\lambda r_i)\, d\lambda \,. \quad (1)$$

Be sure that the symbols in your equation have been defined before the equation appears or immediately following. Italicize symbols (*T* might refer to temperature, but T is the unit tesla). Refer to "(1)," not "Eq. (1)" or "equation (1)," except at the beginning of a sentence: "Equation (1) is ... ."

E. Other Recommendations

Use one space after periods and colons. Hyphenate complex modifiers: "zero-field-cooled magnetization." Avoid dangling participles, such as, "Using (1), the potential was calculated." [It is not clear who or what used (1).] Write instead, "The potential was calculated by using (1)," or "Using (1), we calculated the potential."

Use a zero before decimal points: "0.25," not ".25." Use "cm^3," not "cc." Indicate sample dimensions as "0.1 cm × 0.2 cm," not "0.1 × 0.2 cm^2." The abbreviation for "seconds" is "s," not "sec." Do not mix complete spellings and abbreviations of units: use "Wb/m^2" or "webers per square meter," not "webers/m^2." When expressing a range of values, write "7 to 9" or "7-9," not "7~9."

A parenthetical statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.) In American English, periods and commas are within quotation marks, like "this period." Other punctuation is "outside"! Avoid contractions; for example, write "do not" instead of "don't." The serial comma is preferred: "A, B, and C" instead of "A, B and C."

If you wish, you may write in the first person singular or plural and use the active voice ("I observed that ..." or "We

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observed that ..." instead of "It was observed that ..."). Remember to check spelling. If your native language is not English, please get a native English-speaking colleague to proofread your paper.

VI. Some Common Mistakes

The word "data" is plural, not singular. The subscript for the permeability of vacuum μ_0 is zero, not a lowercase letter "o." The term for residual magnetization is "remanence"; the adjective is "remanent"; do not write "remnance" or "remnant." Use the word "micrometer" instead of "micron." A graph within a graph is an "inset," not an "insert." The word "alternatively" is preferred to the word "alternately" (unless you really mean something that alternates). Use the word "whereas" instead of "while" (unless you are referring to simultaneous events). Do not use the word "essentially" to mean "approximately" or "effectively." Do not use the word "issue" as a euphemism for "problem." When compositions are not specified, separate chemical symbols by en-dashes; for example, "NiMn" indicates the intermetallic compound $Ni_{0.5}Mn_{0.5}$ whereas "Ni–Mn" indicates an alloy of some composition Ni_xMn_{1-x}.

Be aware of the different meanings of the homophones "affect" (usually a verb) and "effect" (usually a noun), "complement" and "compliment," "discreet" and "discrete," "principal" (e.g., "principal investigator") and "principle" (e.g., "principle of measurement"). Do not confuse "imply" and "infer."

Prefixes such as "non," "sub," "micro," "multi," and ""ultra" are not independent words; they should be joined to the words they modify, usually without a hyphen. There is no period after the "et" in the Latin abbreviation "*et al.*" (it is also italicized). The abbreviation "i.e.," means "that is," and the abbreviation "e.g.," means "for example" (these abbreviations are not italicized).

An excellent style manual and source of information for science writers is [9]. A general IEEE style guide, *Information for Authors,* is available at http://www.ieee.org/organizations/pubs/transactions/information.htm

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Authors should consider the following points:

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IX. Conclusion

A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on

the importance of the work or suggest applications and extensions.

APPENDIX

Appendixes, if needed, appear before the acknowledgment.

ACKNOWLEDGMENT

The preferred spelling of the word "acknowledgment" in American English is without an "e" after the "g." Use the singular heading even if you have many acknowledgments. Avoid expressions such as "One of us (S.B.A.) would like to thank ... ." Instead, write "F. A. Author thanks ... ." **Sponsor and financial support acknowledgments are placed in the unnumbered footnote on the first page**.

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2 Inhaltliche Hinweise

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- IEC 50
- IEC 375
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3.1 Format

Das Format ist DIN A4. Die Ränder betragen 2,0 cm für oben, 2,0 cm für links und rechts sowie 2,5 cm für unten. Es dürfen keine Seitenzahlen auf den Seiten stehen.

Als Schrift ist die Times zu verwenden. Die Schriftgrößen für die einzelnen Überschriften entnehmen Sie bitte der Musterseite (PDF) am Ende dieses Dokuments.

Sofern Sie mit WORD 98 bis WORD 2003 arbeiten, können Sie sich von der Homepage des VDE VERLAGs http://www.vde-verlag.de die entsprechenden Dateien herunterladen (MS-Word.zip) und damit Ihr Manuskript erstellen.

Diese Muster und Vorgaben beziehen sich auf unser Standardformat für Tagungsbände **21,0 x 29,7 cm** (DIN A4). Bitte vergewissern Sie sich beim Tagungs-Herausgeber, ob evtl. ein anderes Buchformat vorgesehen ist, da zum Druck keine Skalierung Ihrer Vorlagen erfolgen kann.

Im Falle eines anderen Formats als DIN A4 ändern sich die Größenvorgaben unter Punkt 2.1 dieser Schreibanleitung zum Beispiel wie im Folgenden:

- **17 x 24 cm**: Satzspiegel nur 13,2 x 20 cm
  Keine zweispaltige Gestaltung erforderlich
  Alle Maße wie Schriftgrößen und Zeilenabstände (Durchschuss) müssen in etwa 83 % der entsprechenden Maße für DIN A4 gewählt werden.
- **14,8 x 21 cm** (DIN A5): Satzspiegel nur 11,7 x 17 cm
  Keine zweispaltige Gestaltung erwünscht
  Alle Maße wie Schriftgrößen und Zeilenabstände (Durchschuss) müssen in etwa 70 % der entsprechenden Maße für DIN A4 gewählt werden.

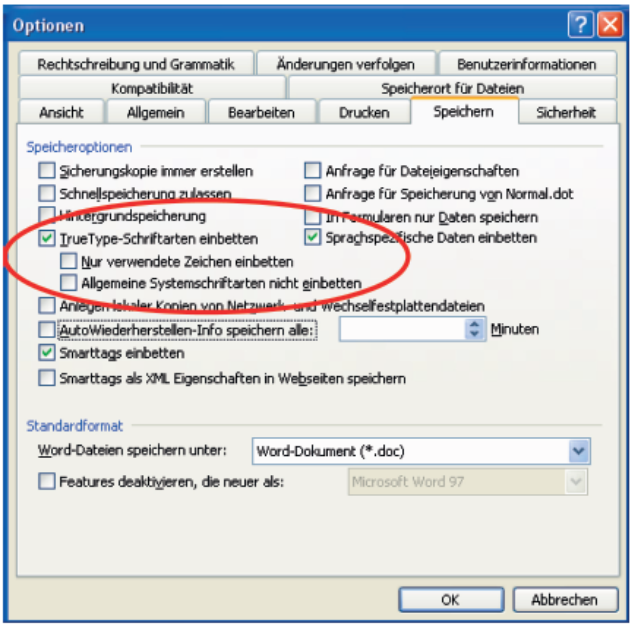
3.2 PDF-Datei

Die Datei ist als PDF mit vollständig eingebetteten Schriften abzuspeichern. Die Auflösung der Bilder sollte mindestens 200 dpi betragen. Ein zusätzlicher Papierausdruck ist für den Druck nicht erforderlich.
Wichtig: Für die Weiterverarbeitung sollte das Dokument offen **ohne jeglichen Dateischutz** sein.

3.2.1 Einbetten von Schriften in ein Dokument

Es ist unbedingt darauf zu achten, dass **alle** Schriften (**auch die Standardschriften!**) eingebettet sind. Um eine hohe Qualität zu erreichen, drucken wir die Tagungsbände direkt von den PDF-Daten. Dafür ist es erforderlich, dass alle Schriften im Dokument enthalten sind, da sonst einige Zeichen nicht richtig dargestellt werden können. Bitte beachten Sie folgende Vorgehensweise in Word:

1. Klicken Sie im Menü Extras auf Optionen und dann auf die Registerkarte Speichern.
2. Aktivieren Sie das Kontrollkästchen TrueType-Schriftarten einbetten. Deaktivieren Sie unbedingt das Feld „Allgemeine Systemschriftarten nicht einbetten“.



3. Speichern Sie das Dokument.

Beachten Sie auch, dass Vertreiber von TrueType-Schriftarten die Lizensierungsrechte für das Einbetten von Schriftarten festlegen. So können beispielsweise bestimmte Schriftarten nicht eingebettet werden, oder eingebettete Schriftarten können zwar angezeigt und gedruckt, nicht jedoch bearbeitet werden.

3.3 Rückfragen

Bei speziellen **technischen Fragen** wenden Sie sich bitte an:
VDE VERLAG GMBH, Buchverlag, Frau Amrhein
Bismarckstraße 33, 10625 Berlin
Tel.: +49 30 348001-1142
Fax: +49 30 348001-9142
E-Mail: amrhein@vde-verlag.de

6. Handbook for Speakers

The following „Handbook for Speakers“ is taken from the IET (former IEE: The Institution of Electrical Engineers), Professional Development Section, Michael Faraday House, Six Hills Way, Stevenage, Herts. SG1 2AY, United Kingdom, 1992. This Handbook offers help and guidance to those who have to read a paper at a meeting, present a contribution to a conference or colloquium, deliver a lecture or Open a discussion meeting. Much of what is said applies to any form of public speaking but the booklet is of particular relevance to technical talks.

It is a sad fact that many otherwise admirable lectures are marred by faults in their presentation. Members of an audience choose to attend a lecture because they are interested in the subject. The speaker can normally rely on their Support and tolerance if, say, a difficult demonstration fails first time. However, they will be less tolerant of sloppy presentation. The IET (former IEE) and similar professional audiences expect professionalism of presentation. A speaker who does not communicate well-either because the talk is badly structured or poorly delivered-will loose the attention of the audience and fail to make it understand the lecture. It is impossible to lay down hard and fast rules to guarantee a lucid and relaxed presentation. That is usually achieved only as the result of experience. However, this booklet gives some guidance on how to prepare and present a talk so that common pitfalls can be avoided and speakers can prepare more confidently. The booklet falls into four Parts. The first deals with planning a lecture; the second gives some advice on delivery; the third considers staging and practical arrangements; the final part gives detailed advice on the preparation of slides. A bibliography suggests further sources of information.

Further very detailed, classical literature of how to write a technical report is given in the German book:

[1] A. Alteneder, *Fachvorträge vorbereiten und durchführen.* 1. Auflage, Berlin, München; Siemens AG, 1977.

6.1. Planning

6.1.1 General notes

Printed Papers and oral presentations are very different. They rely on a different approach to language and illustrations, different methods of presenting arguments and different ways of drawing conclusions. Readers can set their own pace. They can skip backwards and forwards to clarify points and can scrutinise illustrations or diagrams at leisure and in as much detail as they wish. A speaker, however, sets the Pace and determines how long the viewer has to examine each slide. Therefore, when planning a talk, the speaker should ensure that the audience is guided and helped to understand.

6.1.2 Structure

During a lecture, listeners can only absorb a limited number of new ideas and, in general, only one at a time. It is therefore important to isolate and select those points which are relevant to the theme and present them in a way which helps the audience to grasp their significance and relation to one another. Ideally a talk should follow a straight line with as few branches as possible, proceeding, for example, in the following order:

1) Problem

2) Outline approach

3) Hoped-for solution

4) Method of attack

5) Results and applications

6) Limitations

7) Prospects of further work

When preparing a lecture it is useful to draw up a list of the points to be made. This list can be revised to make sure that the points follow a logical sequence and are in the correct order of significance. Using this framework it is helpful to deliver an impromptu lecture in private into a tape recorder. Listening to this can help to identify problems before the lecture is written down and thereby avoid wasted effort. Among points to be checked at this stage are:

(a) Total time of talk

This will depend on plans for visual aids, but should be approximately five minutes or more shorter than the target time.

(b) Relative emphasis of various topics

Check that the emphasis of the talk is appropriate-a speaker should not, for example, have to race through the last three points and the conclusion to reach the target time. Also, make sure that minor points have not been dealt with in more detail than the major theme.

(c) Topics where the explanation is inadequate or confusing

Identify any aspects which need more appropriate treatment-a clearer explanation or the use of a visual aid.

(d) Vocabulary

Make Sure that the vocabulary is well used, varied and is appropriate both to the topic and to the audience. Try to avoid meaningless buzz words such as 'situation', 'at this moment in time: etc.

6.1.3 Using visual aids

Visual aids can give greater impact to information and emphasise key points. The spoken word has limitations and a slide can often make clear in seconds what it would take minutes of hand-waving talk to explain. Numbers are often better remembered if they are displayed and relationships are better understood if they are visualised. However, it is not enough simply to display a slide and read out the contents. The lecture should incorporate an explanation or interpretation so that the purpose of the illustration can be fully understood.

(a) Slides

Slides are most useful and effective when making points such as:

- Changing mathematical relationships: Continuous line graphs, 'river' and 'area' plots show trends clearly.
- Comparisons and Proportions: bar charts show relative magnitudes and/or timing, pie charts show proportions of a total.

- Flow of events, physical relationships: Simple diagrams convey more than photographs of equipment.

- Key topics, caption slides: Short list of key thoughts and sequences of events can help the audience to keep track of complex happenings.

Slides are less satisfactory for:

- Circuit schematics: These are best avoided as are logic diagrams, software flow charts, charts of organisations, etc., unless they are very simple indeed.

- Tables and row/column charts of figures: Bar or pie charts are more effective. Avoid computer printout at all costs.

Nevertheless slides - like the speaking voice-can only make one point at a time. Visual aids will often do more harm than good if they are inappropriate, irrelevant or badly prepared. It a speaker is saying one thing and a slide appears to be saying something else, the audience will become confused, bored and inattentive.

Speakers often try to include too much material on slides so that the audience has to choose whether to puzzle out the contents or to listen to the speaker and ignore the slide. In either case the speaker communicates less effectively with the listener. Slides should be on view long enough to be assimilated but not long enough to become boring. Unfortunately, the poor quality of slides is the most common complaint voiced by conference participants and conference organising committees. Part 4 gives advice on how to prepare slides so that they can be clearly and easily understood.

(b) Transparencies

Most of what has been said about slides also applies to transparencies for overhead projectors. Transparencies are particularly useful for successive displays. One transparency can be made containing a list of points which can be kept covered until required and then revealed one at a time. This saves making a series of slides to achieve the same effect.

(c) Live experiments

Experiments can vividly confirm a speaker's point. They also provide a welcome break from being talked at and the -However, any element of risk involved should be minimised and there must be no danger of damage to the building or injury to the audience. All equipment should be well constructed and reliable and should be thoroughly checked after it has been set up. The effect of an experiment is often lost because the audience cannot see what is happening. If the event is too small to be seen from the back of the hall, a video camera and projection equipment should be used. If monitors are used, enough of them should be distributed throughout the lecture theatre to ensure that everyone can see without difficulty.

(d) Films and videos

There has been a steady increase in interest in the use of video presentations, but these are not dealt with in this booklet as they require specialist preparation. If they are used, the importance of early contact with the organisers of the event cannot be overemphasised. For example, arrangements have to be made to ensure that the correct apparatus is available, time is needed to discuss facilities with the projectionist, to decide on lighting levels, to rehearse picking up cues and clarify where to begin and end excerpts.

6.1.4 Speaking notes

When the lecture is in something like its final shape it can be written out bearing in mind that it is to be spoken and hot read. For example, a speaker naturally uses abbreviated forms of the verb-'it's' not 'it is'; 'won't' rather than 'will not: Keep sentences short as it is difficult for a listener to retain the sense of a long sentence with many sub clauses or asides. On a practical note, it is a good idea for the lecture to be typed in double spacing on stout paper. Normal upper and lower case type should be used as block capitals are difficult to read in large quantities.

Those confident enough to speak without full notes may still find it helpful to have the lecture written down, as the mind can go blank during a presentation. As an alternative, it can also be a good idea to make a set of cards containing the main points to ensure that the talk is kept to the planned sequence and nothing important is left out.

6.2 Delivery

Having planned and written out the lecture, the speaker will be well advised to rehearse its delivery in full, including all visual aids. If possible this should be before a colleague who is sufficiently senior and /or uninhibited to criticise effectively. This helps to identify potential problems so that they can be put right before the presentation. Apart from ensuring that the mechanics of the lecture are right - e.g. slides appear correctly, demonstrations work, the length is correct - it is also important to pay attention to style of delivery. Nothing is more likely to alienate an audience than the head-down reading of a script in a flat monotone. Variations of speed, tone and emphasis help to retain audience interest. The following are some faults to look out for:

1) Too rapid delivery

2) Mumbling and stumbling

3) Reading from the text with eyes down

4) Delivery faults such as 'ums' and 'ers'

5) Personal mannerisms such as hoisting trousers or fiddling with jewellery

6) Bad speech habits that can be distracting to the listener

The speaker should relax and 'stand at ease' with feet about 30cm apart-this stops trembling or swaying. As far as possible the eyes should focus on the audience rather than the script -a quick glance down will encompass a complete sentence if it is short and carefully set out. Keeping a finger alongside the part of the script that has been reached will ensure that sections are not missed out.

A normal conversational voice is less likely to drop at the end of sentences. In a small room the voice will carry well enough and sound-reinforcement systems will ensure that it carries well in a larger room-so long as the speaker does not get too close to the microphone or too far away from it. The voice should be slow, clear and authoritative, while conveying respect for the audience. To emphasise a particular point it is helpful to look an individual in the audience straight in the eye. The emphasis of this direct glance will communicate itself to everyone else-but make sure not to focus on the same person all the time. The speaker should

try not to turn away from the audience and also avoid turning frequently to look at or point to slides. If it is necessary to point to a slide, it is best to do so briefly and then turn back to the audience. It is preferable to ask a colleague seated in the front row to help, using an optical (light) pointer if possible. Similarly, it is better ii demonstrations are carried out by someone else so that the speaker does not have to try to follow the script, cue for lights, correct a misplaced item of equipment, etc., all at the same time.

If slides are marked for correct insertion and numbered in sequence, the speaker can be confident, that they will be there when the script calls for them. If anything does get out of sequence it is better to resynchronise and go on rather than go back. The audience will probably not have noticed and there will normally be a chance to clarify points in discussion after the presentation. To ask the projectionist to go back to earlier slides destroys the rapport that has been built up with the audience. The only exception is if a crucial point in the explanation would be lost by pressing on.

It is best not to drop attention to minor errors by repeated apologies. Equally, the speaker should not seek approbation by referring to the care taken in preparing a slide or experiment. It is better to ignore any interruptions; otherwise the continuity of the lecture will be destroyed.

The speaker should not try to be funny, but an amusing aside often helps to relax an audience which has been concentrating hard, and can also smooth over any hitches such as a slide appearing upside down.

6.3 Staging

When preparing a lecture it is important to be aware of the facilities available at the venue where it will be presented. Audio-visual facilities vary considerably from venue to venue and are frequently changed or updated. If the lecture includes experiments, the speaker should check that adequate supplies of all the services required-power, gas, water, etc.-are available. Safety regulations should also be checked. For example, are the right types of fire extinguishers available and correctly positioned? Is it necessary to have a fireman/first-aid-attendant present?

IET lecture theatres are particularly well equipped, but if several lectures are taking place at the same time, not all the facilities may be available in all the theatres. A separate leaflet is available, giving details of IET facilities.

If the lecture involves displays, demonstrations or experiments, the speaker should make sure that there will be access to the theatre beforehand and should arrive in good time to set them up. It is useful to carry an emergency kit such as a hammer, screwdrivers, Blue-tack, etc., just in case there are any last minute snags.

If only slides or transparencies are to be used, the speaker should arrive not later than half an hour before the session (not the lecture) is scheduled to start. Slides should be in the correct sequence and have a 'spot' to indicate correct insertion in the projector.

Slides should be handed to the projectionist with a copy of the notes or script, if possible. Allow time for discussion about the lighting and other aspects of the presentation. Any points where lighting needs to be reinstated- e.g. during gaps in slide sequences or during demonstrations-should be indicated. The speaker should also meet the session chairman to agree procedural matters. For instance, will there be a formal introduction? If not. The speaker

should make an introduction at the beginning of the lecture. How will discussion be handled? This is often established by tradition attaching to a particular venue, but there are two techniques for dealing with questions-either by answering them in turn or by taking all questions together and delivering a composite reply. Depending on facilities, time will also be needed to become familiar with use of the lapel microphone, to adjust sound levels to practise with the overhead projectors and find out where writing materials are located if charts or blackboards are used. The aim is to spend time beforehand making sure the lecture can proceed with minimal disturbance. The best planned lecture fails if the audience becomes irritated because mechanical details have not been sorted out in advance.

6.4 Preparing slides and transparencies

Slides add variety and impact to a talk if they are well prepared and effectively used. This part deals with their preparation and sets out guidelines for achieving an adequate standard of acceptability. Legibility is essential. The audience, including those at the back of the room, must be able to read and understand the information on the slide. The amount of detail that can be seen easily is determined by the visibility of the characters on the screen, not by their number.

Many speakers wrongly believe that more characters can be put on a transparency for an overhead projector than on a 35 mm slide because the film area is larger. The reverse is true because the optical resolution of the projection system is not as good on overhead projectors as on most 35 mm projectors.

For a typical installation of projector and screen in a room for meetings of average to large size, experience suggests that the minimum easily readable character on the screen has a height of a character should therefore be $1/30^{th}$ of the screen's vertical dimension. Assuming that the projected image reasonably fills the screen, the minimum height of character should be $1/30^{th}$ of the vertical height of the side, transparency artwork.

6.4.1 Slide size and format

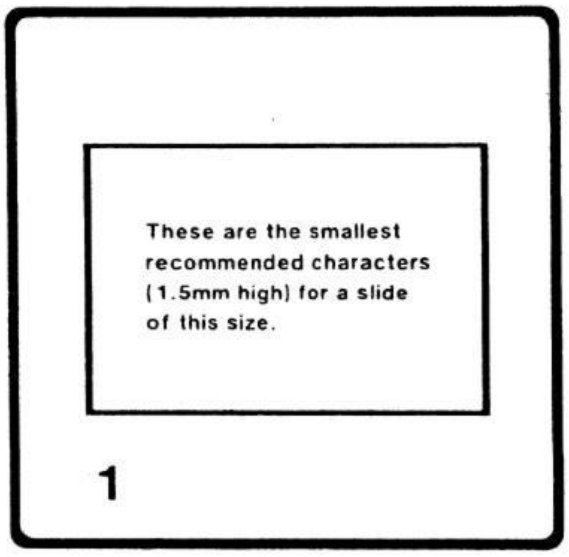


Fig. 6.4.1-1: Size of characters

For easy-to-read 'title' and 'topic' slides the character should be double the recommended size (i.e. 1/15th of the slide height). The width of major lines (most important curves on graphs, significant boxes on block diagrams) should be l/100th of the artwork height. The width of minor lines should be 1/200th of the artwork height.

For slides consisting mainly of words there should be ***a*** space above and below the lines of words equal to the height of a capital letter. Thus there should be a maximum of six or seven on a mainly-word slide. For clarity, there should be no more than four to six words on any one line.

Legend information should be restricted to the minimum. If there are more than six 'topics: divide the information into more slides. If there are more than 20 words in total remove some of them or divide among more slides.

Titles if used should be concise and the words used in them counted as part of the total word-count limit.

Abbreviations, unless well understood by the non-specialist, should be avoided unless they are frequently to be used, in which case they must be properly explained when first encountered.

Vertical lettering must be avoided.

Lettering should be lower case except where capital letters would naturally occur. Typewriter faces of normal 'typing' style (Elite, Pica, Modern, etc.) are not suitable even when enlarged. Compressed and extended versions of otherwise suitable printers' types should not be used.

Typefaces for captions and lettering should be medium-to-bold-faced upright, preferably sans serif. Helvetica, Grotesque 9 and Univers in suitable weights are very satisfactory. These are available in a variety of sizes as dry-transfer lettering sheets. They are also commonly found on computer-graphics Systems, but very thin-line versions such as those produced by pen plotters are best avoided.

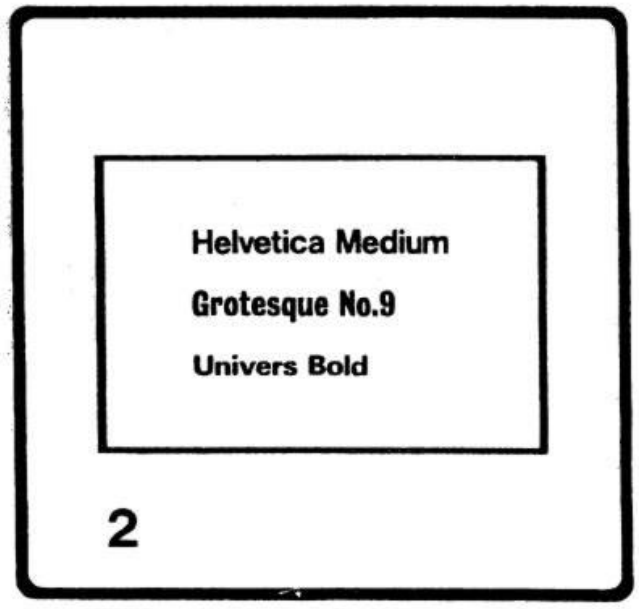


Fig. 6.4.1-2: Some suitable typefaces

6.4.2 Treatment of individual aspects

Diagrams should make maximum use of the space available. All non-essential detail must be omitted. A diagram suitable for a publication is usually too complicated and detailed to make a good slide. Captions and labels should be integral with the diagram (i.e. not shown as a separate box in the slide margin).

Tables should be avoided if possible and replaced by bar or pie charts. If unavoidable, they must be confined to at most four columns with two to four entries per column.

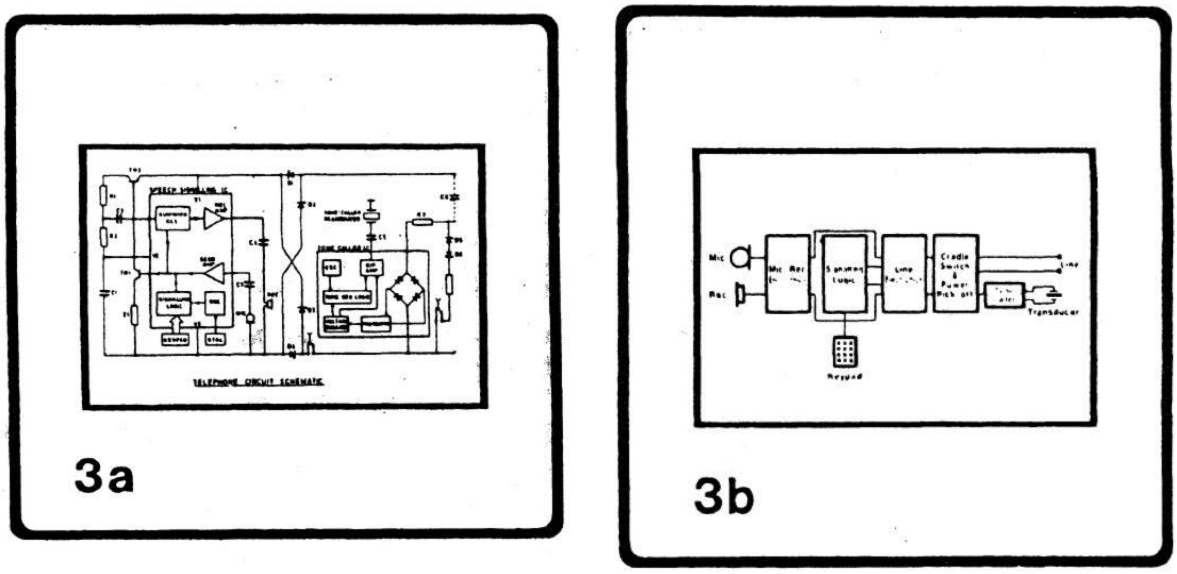


Fig. 6.4.2-1: a) The circuit diagram is totally unsuitable for use in a slide, b) Block schematic of the circuit diagram is better - but it also contains too much information and detail

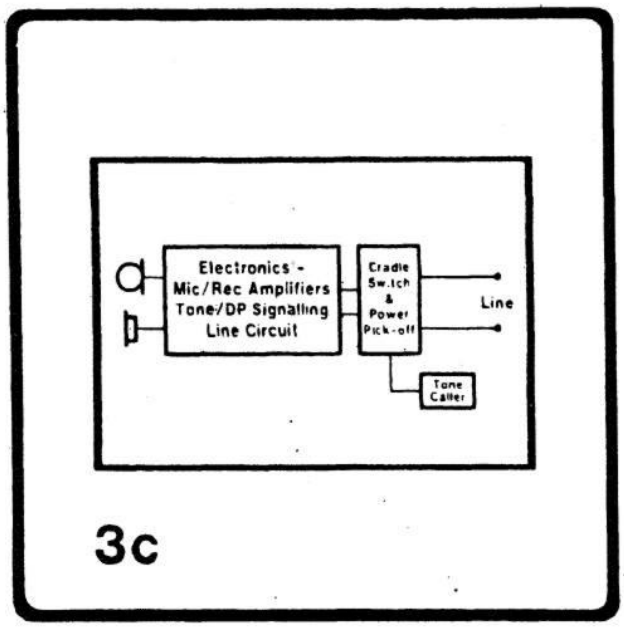


Fig. 6.4.2-2: The block schematic can be simplified

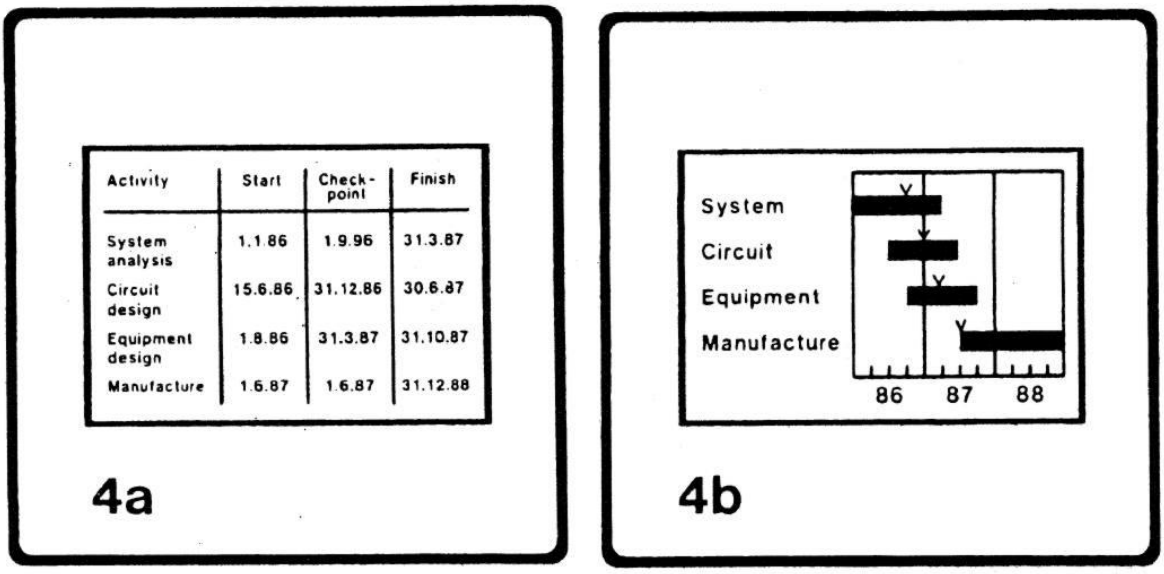


Fig. 6.4.2-3: a) Typical table, which is difficult to comprehend at a glance, b) A bar chart is better

Graphs and histograms are probably the best way of rapidly communicating a feeling for magnitudes. Their usefulness disappears if too much detail is included. Graphs should be drawn on axes with few if any scale lines, and the values along axes should use no more than the minimum recommended character sizes.

Families of curves should make full use of the area of the graph; different line thicknesses or colours should be used to emphasise significant or special cases. Cross reference to legends for identifying curves must be avoided as there is no time to cross-refer when trying to follow the lecturer's words as well. Scale changes must be avoided if possible; if they must be used, there should be an obvious discontinuity or gap in graphs or axes where the change occurs.

6.4.3 Colour

Colour finds its natural expression in photographs of views or of equipment. The somewhat limited range of tone values and accuracy in colour rendering means that great care needs, to be taken in photography if significant detail is not to be lost. Scientific accuracy rather than artistic expression should be the aim.

Colour should not be employed in slides for purely decorative purposes. Properly used, it can greatly aid comprehension; e.g. by outlining a coastline in blue to represent the sea, by colouring a significant member of a family of curves, by outlining functionally related blocks in a diagram and for indicating related connection patterns in a circuit diagram.

Many slides are nowadays prepared by some form of computer-graphics. System such systems should be used with care as many have facilities enabling highly decorative patterns and backgrounds to be created. These may be visually pleasing but they do not always add clarity to complex diagrams.

The best of the modern slide-creating systems of this type have great advantages over more conventional techniques. In particular, they provide great consistency so that it is possible to guarantee that all slides in a presentation will be equally clear and legible. However, even the most elaborate machines of this type are no substitute for simplicity of design as an aid to clarity, and although many can produce literally millions of colours, the best results are frequently obtained by the simplest approach. Care is necessary in the choice of colours.

Coloured backgrounds, especially of dark or highly saturated colours may reduce contrast. Combinations which are effective include:

1) White lettering on a blue background

2) Blue lettering on an orange background

3) Black lettering on a pink or yellow background

If several colours are required on a single slide, e.g. to distinguish connections relating to different elements, avoid colours, which can be confused by limitations of the colour process. Good colours to select part from black and white are red, green, blue and yellow. Avoid using 'mixed' colours. i. e. orange, turquoise and purple with them.

6.4.4 Assembling slides for projection

Slides can be prepared in accordance with British Standards BS 191-7. The 'additional position indicator' (spot) should be applied as follows: with the slide held so that it can be read, a light-coloured spot 4 to 6 mm in diameter should be placed in the lower left-hand Corner on the face of the slide towards the viewer. No conflicting spot should be present. (See also Armerican National Standards Institute (ANSI) PH3.43-1969 and Deutsche Industrie Normen (DIN) 108. Sheet 1/1970.

Slides should be numbered in the correct show sequence. If there are times in the sequence when no slide is being shown, this should be noted on the script or slide list handed to the projectionist. An alternative is to provide opaque slides to go in the sequence at the appropriate places, or to provide 'dummy' slides with no information but with the same background as the main slides. As many projectors cannot reverse the direction of slide sequences, it a slide is referred to more than once a copy should be inserted in the sequence each time it is needed. In this way the projectionist does not have to withdraw and re-insert the slide and there is less likely to be a mistake.

6.4.5 Preparing overhead transparencies and ppt-slides

a) Overhead transparencies

In the case of transparencies produced from artwork, the same rules apply as for slides. In the case of transparencies prepared directly for overhead projectors, It is recommended that the sizes for lettering should be not less than 16 mm high for principal text and not less than 8 mm high for minor matter.

It is possible to use a stencil or template system to add verbal information to overhead-projection (OHP) transparencies, or even to use instant lettering or machine-generated lettering if a particularly high-quality finished product is required. For most purposes, however, hand-produced lettering is quite adequate, as well as being much quicker. Typewritten material from a normal-sized typeface should never be used.

By far the quickest means of producing OHP transparencies is to prepare them by hand using suitable marker pens. Either water-soluble or permanent pens can be used, but permanent pens are strongly recommended since water-soluble material tends to smudge when touched. Medium-tipped pens are best for most OHP work and four basic colours black, red, blue and green-are usually sufficient. Avoid using yellow or orange pens, since material produced in these colours is difficult to make out, especially from the back of a room. If large areas of

colour are required, these can be added using transfer films, which should be cut to the exact shape required using a scalpel. Transparencies are normally made by writing directly on the acetate sheet, but may be prepared on opaque material and transferred to acetate by an electrostatic printing process.

b) Power Point slides (PPT)

The basic rules for preparing slides and overhead transparencies hold also true for PPT slides. Some special comments are added here specific for PPT. You find more informations, taken from the Herdt-Verlag, (in German), at the homepage

tu-darmstadt.de/hrz/verkauf/handbuch.tud .

A PPT presentation consists of several slides. You can view each slide and you can view the slide "Overview". The "Master" slide defines basics like the frame. For listing main items use in the text with "TAB" listing items such as dots. The headline should be between 40 … 44 pts. Add you name and affiliation on the first slide. For designing slides: A 1st order text should range between 22 ... 24 pts, a 2nd order text between 20 … 22 pts, a normal text should be 18 pts.. Do not use 16 pts or less. Use consistently the same colour for the headlines. And use always the same structure of headlines, 1st oder text and 2nd order text consistently.

Start the presentation with an overview. End the presentation with a conclusion. If convenient, list in between your presentation the subtitles of your presentation, when you start the corresponding subsection, so that the listeners know, where you are within your presentation. Try to design all slides in the same manner, so that the presentation looks homogeneously. As humans can catch maximum 7 items at one glance, do not give more than 7 informations on one slide. Add Figures or Pictures such as Photographs via the Graphic command import. You may also use Figures and Photographs from the internet. In any case, give a "Source address" along with the Figure and Photo directly at the slide. It may be small (14 pts, e.g. italic), because it is not of vital information during the presentation, but is necessary for documentation. Try to compress the amount of Bits per Figure in order to keep the amount of data low. But the Figures must stay clearly visible. Avoid too many animations in the presentation. You may overburden the listener. Use them only to clarify a certain message, otherwise not. Give at least 1 minute per slide for your presentation. Number all you slides and give also the total number of slides like "3/27", "4/27", … . This is done via the master slide. The PPT program allows a lot more off different features, but according to experience only a few a really needed, which – used according to the above noted rules – will help you to deliver your message.

6.4.6 Checking legibility

A quick check of how a proposed slide layout will look when projected can be made by viewing the artwork from a distance of ten times its vertical height. Under these conditions, the characters in the artwork will subtend-at an angle to the eye equivalent to that which will be experienced by a viewer seated at the back of an average sized meeting room.

A finished 35 mm slide for use at a meeting should be readable without a magnifier when viewed directly. Similarly, a 250 x 250 mm transparency should be clearly readable when viewed from a distance of 2.5m.

6.5 Bibliography

This bibliography lists some of the many publications available on aspects of public speaking. These are not the only publications available nor necessarily the best, but they are listed to give some ideas for further reading. A number of the books will be available in public libraries.

[1] Adamy, D. Preparing and Delivering Effective Technical Presentations. Artoch, 1987.

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