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How to Write and Publish Technical Papers

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Introduction

This presentation covers the following topics:

1. Why do you want to publish a technical paper?
2. The advantages and disadvantages of publication.
3. The 8 key requirements
4. What must be in a paper for it to be published.
5. The Peer Review process.
6. How do you select which is the right publication?
7. The rewards of publication.

Why do you want to publish a technical paper?

- It is required as part of a qualification
- It is required by your institution (Research assessment)
- It will help your career
- You want to be famous

Why do you want to publish a technical paper?

- **You wish to pass on knowledge to others**

Key Requirement # 1

The advantages of publication.

- **Spreads the knowledge to others**
 - Helps others working in the field
 - May impact on your company, industry, country, humankind
- **Tells the world what you have done**
 - Adds to your Professional Reputation
 - Affects how your colleagues see you and your Institution treats you
 - May lead to other things – National and International recognition

The disadvantages of publication.

- **Spreads the knowledge to others**
 - Helps others working in the field
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- **Tells the world what you have done**
 - Adds to your Professional Reputation
 - Affects how your colleagues see you and your Institution treats you
 - May lead to other things – National and International recognition

What must be in a paper for it to be published.

- **Spreads the knowledge to others**
 - A technical paper must be understandable to others in the field. – If other people cannot understand it, it is of no interest
 - The work must be repeatable – enough information should be given to allow others to replicate the results or find the information
 - The relationship of the work to what is already known must be clearly stated
 - What is new information must be identified

What must be in a paper for it to be published.

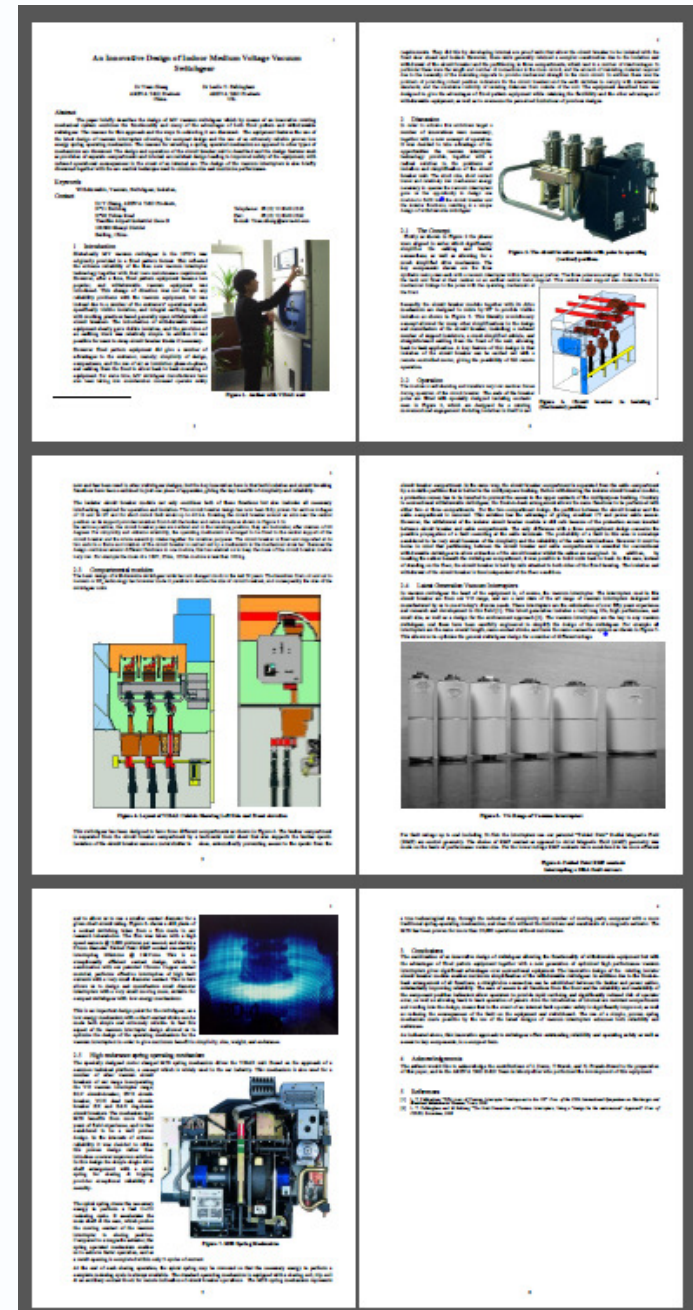
- **Spreads the knowledge to others**
 - Understandable
 - Repeatable
 - Relationship to existing knowledge
 - Identify what is new

The Paper Format

- **Technical papers normally have a similar structure:**
 - Synopsis
 - Introduction
 - discussion
 - Conclusions
 - References
 - Author biography

The Paper Format

- **Technical papers are short – usually around six to eight pages long – however the actual text can be as little as two or three pages.**



The Paper Format

- **This is because the Title, Synopsis and Introduction sections can take up the first page, and the Conclusions, Acknowledgements, References, and Bio's of authors can take up the last page. Add a few photos and graphs and the text is actually quite small.**

The Paper Format

Arc control systems for AMF high voltage vacuum interrupters - modeling the contact gap

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Abstract- At present there is a clear trend for vacuum circuit breakers to move up in voltage class from distribution voltages to transmission and sub-transmission voltages.

Developing new vacuum interrupters for these voltages poses a number of challenges, not least the requirement to interrupt large short circuit currents at high voltages. This requires the development of new arc control systems which are effective at the large contact gaps necessary for these high voltages and also have relatively low resistance when closed. The paper forms part of a study examining the design challenges in extending the operation of existing geometries to higher voltages suitable for the larger contact gaps necessary for systems up to 245kV, and in particular investigates the effect of large contact gaps on the magnetic field which is used to control the arc. This paper concentrates on the Axial Magnetic Field (AMF) type of arc control systems. The alternative Radial Magnetic Field (RMF) type of arc control for this application will be the subject of a future paper.

INTRODUCTION

A. Overview of the Problem

The vast majority of Vacuum Interrupters today are used at Medium Voltage levels up to 40.5kV, although significant numbers have been used at higher voltages such as 72.5/84kV and more recently in the 132/145kV range [1]. Many of these higher voltage circuit breakers use a single vacuum interrupter to perform the switching operation and also to provide the full isolation for BIL. But as the voltage to be interrupted increases, it becomes necessary to increase the open gap between the contacts to provide sufficient insulation, and this in turn brings its own problems. The present AMF contact designs work by using the large magnetic fields generated by the short circuit currents to control the arc between the contacts and prevent it constricting which would lead to overheating of the contact surfaces and a dielectric failure of the gap which would cause a failure to interrupt [2] [3]. However, the contact designs use special geometries which are behind each contact surface in order to generate these fields [4]. For small contact gaps these "coils" generate magnetic fields which work together to give a significant axial magnetic field in order to prevent arc constriction. As the contact

gaps become larger there are three critical points as shown in Figure 1

Firstly when the contacts are touching the magnetic field generated from the coils on each contact work together to give a maximum magnetic field at the contact surface (Position 0).

Then as the contacts move apart there is a point (Position 1) where the magnetic field from contact A no longer adds significantly to the magnetic field on contact face B, and vice versa.

Finally there must come a point where the fields from the two contacts no longer significantly interact within the gap (Position 2), and in fact for larger gaps than this a zone of low magnetic field between the contacts will form.

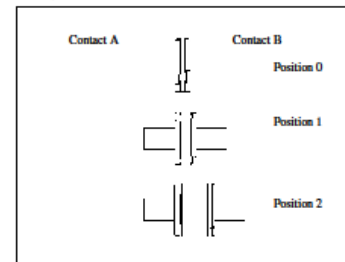


Fig. 1. The critical positions of the contact gap

Previous researchers have shown that it is necessary to have a significant axial magnetic field in order to prevent constriction of the arc [5]. A number of researchers have investigated longer gaps for high voltage interrupters [6]. Our interest is the shape of the magnetic field developed between the contacts with contact gap, and how this interacts with the arc.

In order to investigate this we plan to take a two step approach. The first step is to model the magnetic fields generated by a typical AMF contact geometry, using a five dimensional mathematical model (x space, y space, z space, time & motion) and to establish at what point the magnetic fields from the two contacts cease to interact significantly at the contact surfaces, and also cease to interact significantly at all. The second step is

The Peer Review process

■ Peer Review

This a process of reviewing the paper by a number of experts in the field. They will assess the paper based on their own knowledge and experience for the following;

- Understandable
- Repeatable
- Relationship to existing knowledge
- Identifies what is new
- Is intellectually honest

The Peer Review process

■ Peer Review Requirements

■ Understandable

- Has the author presented the work and its context clearly and unambiguously?
- This does not mean is the English perfect! It just means that the paper must be readable and understood by others. Papers are not rejected for bad English. Papers are rejected for being badly written so that they cannot be understood, sometimes these are ones written by native speakers of the language!
- Data and graphs must be clearly labelled and understandable. They must also be referred to from the text and be relevant to the paper.

Key Requirement # 2

The Peer Review process

■ Peer Review Requirements

■ Repeatable

- Has the author supplied enough information so that another worker in the field could closely repeat or confirm the work?
- This is important so that the work can be verified by others. To say that you have found a way to convert lead into gold is not enough, you must give enough instructions so that others can also do it!
- You must pay attention to the equipment or methodologies used, and specify carefully. This may have a significant effect on the results.

Key Requirement # 3

The Peer Review process

■ **Peer Review Requirements**

■ **Relationship to existing knowledge**

- Has the author clearly explained what is already known and how this work fits into this existing knowledge?
- This is a weakness of many papers. It is very rare that papers are published on a completely new subject. The paper must put the work into context and the author must refer to previous work, reference it, and show an understanding of it. Failure to do this adequately is often a reason for rejection

Key Requirement # 4

The Peer Review process

■ Peer Review Requirements

■ Identifies what is new

- Has the author clearly shown what part of the paper is their work and what is new, and what is based on the work of others?
- This is the heart of the paper and is often ignored. What is new? We know that much of the paper will show what the author or others did previously, and also how this work was carried out. It is important to state exactly what is actually new, why you think it is new, and what you think it means. This is the role of the Discussion.
- If there is nothing new then it is not worth publishing.
 - Note, a review paper or Meta analysis does give something new as the analysis of the work in the field is itself new, but this must be demonstrated.

Key Requirement # 5

The Peer Review process

■ Peer Review Requirements

■ Is intellectually honest

There are two types of intellectual dishonesty in Publications;

- **Plagiarism**: The adoption or reproduction of ideas or words or statements of another person or which has been previously published without due acknowledgment.
- **Fabrication**: The falsification of data, information, or citations in the publication.

Key Requirement # 6

Sources: adapted from Wikipedia article on Peer Review

The Peer Review process

■ Peer Review Requirements

■ Is intellectually honest

- **Plagiarism**: The adoption or reproduction of ideas or words or statements of another person or which has been previously published without due acknowledgment.
 - If you use someone else's work you must clearly acknowledge it and identify it
 - If you are a co-author of a paper you must have contributed significantly to the paper or the work in the paper.
 - If you repeat text from your own previously published work you must also acknowledge and reference it. Self plagiarism is not allowed.

Sources: adapted from Wikipedia article on Peer Review

The Peer Review process

■ Peer Review Requirements

■ Is intellectually honest

- **Fabrication**: The falsification of data, information, or citations in the publication.
 - Report the results accurately with no editing.
 - If there are unexpected or anomalous results report them. If you have no idea why they occurred say so.
 - Do not select references which solely support your views – if there is an opposing theory or viewpoint you should, as a minimum, say this and not give the impression that the one presented is the only view.
 - Falsification of data is the fastest way to destroy your reputation. There may be a temptation to « massage » the results to prove your point or theory, but remember that once published the paper will always be there to haunt you for the rest of your life and beyond.

Sources: adapted from Wikipedia article on Peer Review

How do you select which is the right publication?

- **Types of Publication.**
 - **There are four main types of publication;**
 - **In-house publications**
 - **Conference Papers**
 - **Non reviewed journals**
 - **Peer reviewed journals**

How do you select which is the right publication?

- **Types of Publication.**

- **In-house publication**

These are effectively press releases and are not academically rated.

However, the internet is pervasive and be aware that these publications may well be read and cited by others, so care must be taken to maintain your credibility and integrity. If they are clearly wrong or badly written it will reflect upon you.

How do you select which is the right publication?

- **Types of Publication.**

- **Conference papers.**

These are often not peer-reviewed, but are widely seen as substantive technical papers and should be treated by the author as though they are peer reviewed.

They will be cited and will reflect upon your reputation.

How do you select which is the right publication?

- **Types of Publication.**

- **Non reviewed journals**

These are technical journals which normally do not have a formal peer review process. However instead the papers are reviewed normally by the editors. Again these should be treated exactly the same as for peer reviewed journals.

Peer review is a modern trend and in the past century many influential journals used editor review only, and some researchers believe that this is not in principle inferior to the peer review method. For example Einstein's 1905 papers on Physics and Relativity was reviewed only by the journal editors – Max Planck and Wilhelm Wein, (who were both Nobel Laureats).

How do you select which is the right publication?

- **Types of Publication.**

- **Peer reviewed journals**

These are technical journals which follow the peer review process, such as IEEE Proceedings. Peer review has grown in popularity in recent years to try to give more academic credibility to the publication of technical papers.

A major reason for the increase in popularity being the preference for peer reviewed publications in the rating of research prowess by academic institutions, and the resultant huge increase in the numbers of papers submitted for publication.

How do you select which is the right publication?

■ **Choosing which Publication.**

- The choice of publication should be driven by Key Requirement #1. The wish to add to human knowledge. In this case it means that you should publish where the work will do the most good. Normally this is in a specialist conference or a publication dealing with work in your field.
- Many papers are rejected due to being proposed for the wrong publication. The rule is very simple. Will the people who read this journal be expecting this type of paper, and its subject, and will they be interested in it? If the answer to any of these questions is no, then it is the wrong publication.

Key Requirement # 7

How do you select which is the right publication?

- **Follow the publication rules.**
 - All publications have rules for submission, they are mainly similar, but each has its own variants. Normally there is a template which must be used, and there is a written procedure.
 - You must read this carefully and then do exactly what it says. Many authors do not do this, and as a result, many authors' papers are rejected.

Key Requirement # 8

How do you select which is the right publication?

- **The process.**

- Normally the paper will be submitted online. It will be read by the Editor and then a number of reviewers will be selected to look at it in detail. The editor will select the reviewers based on the subject of the paper and the fields in which they are specialists.
- The Reviewers will read the paper and submit comments, both to the editor and to the authors. They will choose one of four options.
 - **Publish as is**
 - **Resubmit after minor rewrite**
 - **Resubmit after major rewrite**
 - **Reject**

How do you select which is the right publication?

- **The process.**

In each case the reviewers will state what is wrong, why, and what needs to be done. But although they will make suggestions they will not rewrite the paper for you.

- **Publish as is**

- It is rare that this is the first response, normally papers require some work and at least one resubmission.

- **Resubmit after minor rewrite**

- This is the most common result. The paper is judged to be appropriate, interesting, and professional. It needs some corrections or adjustment but is essentially good.

How do you select which is the right publication?

- **The process.**

- **Resubmit after major rewrite**

- This is where the paper has major flaws but is still thought to contain worthwhile information. Normally the problem is that Key Requirements 3, 4, or 5 have not been met. Repeatability, relationship to previous work, and clearly identifying what is new, are common areas of weakness in submitted papers.

- **Reject**

- Often this is because of Key Requirement 7 or 8, – it is not the correct place for publication, or did not comply with the rules. But it may also be because of Key Requirement 5, or 6. There is nothing new, or the paper does not clearly meet the ethical standards required – if there is doubt it will not be published.

The rewards of publication

Jan Hendrik Schön

Born 1970.

Ph.D. 1997

Schön rose to prominence since 2000 in the fields of condensed matter and nanotechnology. He obtained his Ph.D. at the University of Konstanz, Germany, in 1997 and then joined the prestigious Bell Labs as a researcher. His revolutionary work on the organic transistor had potential to change the world of electronics, and was featured in a large number of his peer reviewed papers.

As a result of this published work Schön received the prestigious Braunschweig Prize and the Otto Klung Weberbank Prize in 2001, and the Outstanding Young Investigator Award of the MRS (Materials Research Society) in 2002.

Clearly, this is what we think of when we talk of reputation and the role of the researcher in adding to human knowledge. This is a man who actually changed the world early in his career, and had a very bright future ahead of him.



Sources Wikipedia and the BBC website. Photo from: Bing Search,
http://2.bp.blogspot.com/_JUw2aRvPUwc/Sq4wVaycPul/AAAAAAAAAEgY/5H3So_jOVF8/s400/Jan+Hendrik+Schon+photo+4.gif

The rewards of publication

Jan Hendrik Schön

Born 1970.

Ph.D. 1997

2001 Braunschweig and the Otto Klung Prizes

2002 Outstanding Young Investigator Award of MRS



In 2002 and 2003, 21 of his peer reviewed papers were withdrawn due to proven scientific fraud.

In 2002 he was dismissed and left Bell Labs in disgrace.

In 2004 his Ph.D. was removed for “dishonourable conduct”

Although his coauthors were exonerated of fraud, their reputations were damaged simply by being coauthors of papers which were later proven to be fraudulent. If you are a coauthor you share responsibility for the paper.

Clearly this is not what we think of when we talk of reputation and the role of the researcher. This is a man who actually changed the world – but not as he would have liked. His main effect is the reviewers and research institutes are now much more aware of intellectual fraud, and if in doubt will not publish.

The rewards of publication

Sir Cyril Ludovic Bart 1883-1971

Honoured during his lifetime for his outstanding work on inherited intelligence. This was used by many countries to introduce selective streaming in education. After his death new evidence has been found, and it is now believed that he had falsified his research data to support his theory.

Cold fusion: 1989

Despite being announced in 1989 no researcher has been able to actually reproduce the experimental results reported. There is no question of fraud, but the work is effectively disgraced, as are the researchers Fleischmann and Pons.

Sources Internet, Wikipedia and the BBC website.

The rewards of publication

Karl Thodore zu Guttenberg (Baron)

Senior German politician

Member of parliament 2002 -2011

Minister of Defence 2009-2011

Youngest ever post war Minister of Defence

Regarded as a future Chancellor of Germany

Political career ended in March 2011.



Sources Internet, Wikipedia and the BBC website.

The rewards of publication

"Baron zu Googleberg"

Minister for Cut and Paste.

Ph D thesis Granted by University of Beyrouth in 2006

PhD revoked by the university in February 2011 for « severe errors in workmanship »

An investigation by Bayreuth University found that he had "grossly violated standard research practices and in so doing deliberately deceived".



Sources Internet, Wikipedia and the BBC website.

Conclusions

- **Be careful when publishing technical papers. It is your reputation and your career which is at stake. Once something is published you cannot change it.**
- **Remember the eight Key Requirements. If you follow them, publication is quite simple.**
- **Apply the highest standards of writing and integrity to all of your publications whether peer reviewed or not. You will be judged on all of them.**
- **Don't worry if the paper is rejected at first with advice to resubmit. This is normal, and actually not a criticism of you or your work.**
- **Good luck with your publication. If they are done well, publications will help others, enhance your career, and are something you can be proud of.**

Questions?