Technical References:
How to Find Them, Read Them, and Use Them

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Mechanical and Aerospace Engineering Department
Naval Postgraduate School
2 February, 2012
An afternoon in the library can save you a month in the laboratory...
(author unknown)

• There is an INCREDIBLE amount of technical information already out there...examples just from Web of Science database
  – 23,000 journals
  – 23 million patents from 40 patent-issuing authorities
  – 110,000 conference proceedings
  – 700 million cited references

• Not spending time in the library can result in
  – Reinventing the wheel
  – Designing experiments or simulations that will not work
  – Not being able to compare your data with other recognized studies

• You want to build on what others have already done
Technical References: What are they?

- Technical Journals-serial publication of scientific or engineering articles
- Conference Proceedings-publication of papers or presentations from a technical conference
- Books or monographs-technical information in great depth about a given subject
- Patents-descriptions of technical ideas, processes, compositions, or systems that are legally protected
- Engineering Handbooks or Databases-compilations of technical data; e.g. material melting points, elastic constants, vapor pressures, steam tables, etc.
- Technical Reports-stand alone reports summarizing a technical study
- URL’s-information found on the internet—use very carefully and sparingly
Technical References: What are they?

- **Technical Journals**
  - core source of technical information for thesis or dissertation work
  - Peer reviewed and fully archived (quality *should* be high, can be traced back easily)
  - Studies upon which you can base your work and compare your results

- **Conference Proceedings**
  - For some technical areas, core source of technical information for research
  - Some reviewed, some not
  - Quality more variable than journal articles, traceability can be more difficult
  - Generally shorter than journal articles, but can very current

- **Books or monographs**-technical information in great depth about a given subject
  - Can be very useful for going into details and derivations that will not be contained in journal articles or conference papers
  - You do not want to rely too heavily on just one—they are not a replacement for journal articles or conference papers

- **Patents**
  - More important for technological development work
  - Details highly variable (often intentionally general and/or vague)
  - Still important for answering the question of “Has somebody tried this before...?”

- **Engineering Handbooks or Databases**
  - Worth their weight in gold!—where you find many of the numbers that you need for calculations
  - Most of very high quality (but not all)
  - Reference librarian can be very helpful in finding and accessing these resources

- **Technical Reports**-stand alone reports summarizing a technical study
  - Can be very important for more DoD-applied research.
  - Great deal of good research at national laboratories and corporations is published this way—you won’t find it on Web of Science
  - May or may not be technically reviewed

- **URL’s**-information found on the internet—OK for a quick estimate or a starting place—don’t want to end here...
Journal Articles and Conference Papers: Where do I find them?

Introducing a new, easier way to access NPS Scholarship Online...

Calhoun is the new Institutional Archive for NPS, built to provide a permanent, secure online home for NPS-authored content such as Technical Reports, Theses, Dissertations and campus publications.

Calhoun is:
- searchable and browsable
- easy to access
- OAI-PMH compliant

Calhoun is set for launch to the campus on February 6, 2012. Watch this space!
Journal Articles and Conference Papers: Where do I find them?

**Article Databases**

To access NPS-only library resources, please either use the CISCO VPN or have your library account information available so that you will be able to log into the library's proxy server when prompted to do so. **Please Note:** Accessing NPSBart is not the same as using the NPS VPN so if you are using it, you will be prompted to log in with your Library Username and PIN to access the commercial resources paid for by the Library.

For further information, please see our Remote Access page.

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**DATABASES A-Z**

<table>
<thead>
<tr>
<th>SELECTED</th>
<th>BY TOPIC</th>
</tr>
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<tbody>
<tr>
<td>ACM Digital Library</td>
<td>Astronautics &amp; Space Systems</td>
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<tr>
<td>Credo Reference</td>
<td>Computer Science</td>
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<td>DTIC Online</td>
<td>eBooks</td>
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<td>EBSCO</td>
<td>Engineering</td>
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<td>Engineering Village 2</td>
<td>International &amp; Area Studies</td>
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<tr>
<td>Homeland Security Digital Library</td>
<td>Management &amp; Economics</td>
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<tr>
<td>IEEE Xplore</td>
<td>Mathematics</td>
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<td>InsideDefense</td>
<td>Meteorology &amp; Oceanography</td>
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<td>Jane's</td>
<td>Military Science</td>
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<td>JSTOR</td>
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<td>Operations Research</td>
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<td>Political Science</td>
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<td>ProQuest</td>
<td>Sciences (General)</td>
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<td>SPIE Digital Library</td>
<td>Service Portals</td>
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<td>Torpedo Ultra</td>
<td>Social Sciences</td>
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<tr>
<td><strong>Web of Knowledge</strong></td>
<td>Systems Engineering</td>
</tr>
<tr>
<td>WorldCat</td>
<td>Transportation &amp; Logistics</td>
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</table>

**LEGEND**

- NPS - NPS Domain Only
- PW - Password Required
- - Database Information

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RemoteWorks, citation management software (access from campus, VPN, or with group code)

Alumni access to a select set of licensed resources is provided upon registration. Learn more at our Alumni Resource Page.
Journal Articles and Conference Papers: Where do I find them?
Kinds of searches:

• Topic—good place to start
• Author—have to know who you are looking for...
• Cited Reference—looking for other information related to a reference you already have
Journal Articles and Conference Papers: Using (WOK)→Topic Search Strategy 1

Type in key words into topic space:
• To combine items, you can use the AND operator or simply leave a blank
• * is the wild card→crack or cracks or cracking, etc.
• Don’t start too general...”aluminum” or “fluid” or “composite”—you’ll get the whole house
• Don’t start too specific...”aluminum AND 5083 AND fatigue AND corrosion”—you’ll get the gasket of the stopper of the kitchen sink
You can typically handle 50-100 items in a results list...more than that and you will glaze over before making it to the end!
• Start pretty general
• Refine at multiple levels by adding more specific, topic search terms, e.g. “5083” is a particular kind of aluminum alloy
Use a refining process:

- Refine further by looking for items related to welding
- We went from 10,000 to 34 references...I can work with that!
<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Date</th>
<th>Source</th>
<th>Times Cited</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAILURE INVESTIGATION OF A 500 GALLON LIQUID NITROGEN STORAGE TANK</td>
<td>Wilkowski Gery; Shim Do-Jun; Brust Burt; et al.</td>
<td>JUL 18-22, 2010</td>
<td>ASME Pressure Vessels and Piping Division K-PVP Conference Location: Bellevue, WA</td>
<td>0</td>
</tr>
<tr>
<td>Fatigue crack propagation behavior of friction stir welded 5083-H32 Al alloy</td>
<td>Hong Seongjin; Kim Sangshik; Lee Chang Gil; et al.</td>
<td>DEC 2007</td>
<td>JOURNAL OF MATERIALS SCIENCE Volume: 42 Issue: 23 Pages: 9888-9893 DOI: 10.1007/s10853-007-1630-x</td>
<td>2</td>
</tr>
</tbody>
</table>

Key information:
- Title
- Authors
- Date
- Source
- Times cited—can be a good indication of impact of a particular article
Key information:

- Read/Scan the abstract—do you actually want this article?
- Times cited—can be a good indication of impact of a particular article
- Cited References—what are the papers that this paper used?
- You can also “mark” this paper so that you can download your list of references
- There are links to Endnote Web, Endnote, and RefWorks as well
- How do you get this paper? Click on “Get It!”
Key information:

- **Good News**—the library has this article, click on Go to get it...
- **Holding Information**—if the library doesn’t have an immediate link to an electronic subscription, you can check for hardcopy holding and *sometimes* you may even find an electronic resource as well.
- **ILL**—Clicking GO here will allow you to request the reference in case we don’t currently have it.
Key information:

• Use your library account log in to go to ILL (don’t have an account—go to the library!)
• The article will be delivered to you electronically through your e-mail
• ILL also helps a lot with books we do not have
Federal Laboratory Technical Reports: Where do I find them?

Andrea N. Davis
Reference & Instruction Librarian
Dudley Knox Library, Naval Postgraduate School
411 Dyer Road, Monterey, CA 93943
andavis@nps.edu | 831.656.2809

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For a better DTIC experience, use http://multisearch.deepwebaccess.com/multisearch/
Journal Articles and Conference Papers: Where do I find them?

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andavis@nps.edu | 831.656.2809
How to read a paper...

• A typical master’s thesis has between 40-50 references...do you have 50-100 hours to spending on reading???
• There is a method (probably more than one) to “reading” a journal article
• Suggested Method
  – Start with the abstract (you probably already did this before you downloaded the article)
  – The go straight to the conclusions!
  – If interesting, then look at the data that support the conclusions
  – If still interested, then read the methods section
  – Then, and only then, should you bother with the introduction.
  – You will want to read end-to-end and study only your most important papers

Discuss your approach with your thesis advisor... they have read quite a few papers and probably have some advice on the topic.
How to read a paper…parts of the paper

• Abstract-one/two paragraph summary of the whole article
• Conclusions-AKA “the gist”
  – What did the authors find?
  – What did they think was important to know from their study?
• Results, figures, plots
  – The data behind the conclusions…it’s OK to think critically about these results—do they support the conclusions?
  – Can you mentally connect the data to the conclusions?
• Methods
  – The HOW of the paper: design for the experiment, details of the simulation, pressures and temperatures used, etc.
  – Really helpful if you are trying to do something similar
  – N.B. not everyone is good about putting all of these details in a technical paper (theses and dissertations are generally more expansive
• Discussion
  – The scientifically/technologically “meaty” portion of the paper
  – What do the results mean?
  – How do they compare with what others have found?
  – Is there a new way to think about a phenomena based on the data?
• Introduction
  – Motivation for study (often pretty skimpy in a journal article)
  – Previous work/references—really valuable! You may have missed key references in your literature search. References from papers that you read can really help
How to read a paper...Summarizing and Scoring a Paper

• You don’t have time to read a bad paper twice!
• Discipline yourself to summarize every paper you read
  – Only need 3-4 bullets
  – Write key conclusions, concerns, notes to yourself, anything that’s helpful to YOU later on...
• Score every paper
  – Use whatever scale you like (1-10, 5 stars, etc.)
  – 1-deposit in recycle bin—if you did a good search, you shouldn’t have too many of these
  – 3-looked relevant but not really related to what you are doing –OR- related but not a good paper
  – 5-Decent paper, somewhat relevant but not really core to your research
  – 7-good paper with strong relevance to what you are doing
  – 9-10 you must read and know this paper thoroughly. You will refer back to it several times during your research
• Develop a “top ten” list
  – A typical master’s thesis might have 40-50 references
  – 10 you will know really well
  – Many others are important, but not in your “top ten”
    • References required for thorough literature review
    • Paper that contains basic references for methods you are using in your research
    • Paper contains parameters that you need for your calculations
  – A “top ten” paper might
    • Be a key reference for the problem you are studying (often highly cited)
    • Describe in detail the methods that you are using
    • Be a key comparison point for your data, e.g. they studied corrosion in liquid lead, you are studying the corrosion of the same alloy in liquid bismuth
Synchrotron X-ray residual strain scanning of a friction stir weld

P J Webster\textsuperscript{1,2}, L Djapic Oösterkamp\textsuperscript{3}, P A Browne\textsuperscript{1}, D J Hughes\textsuperscript{1}, W P Kang\textsuperscript{1}, P J Withers\textsuperscript{2} and G B M Vaughan\textsuperscript{4}

\textsuperscript{1}Institute for Materials Research, Division of Civil and Environmental Engineering, University of Salford, UK
\textsuperscript{2}R&D Materials Technology, Hydro Aluminium a.s., Norway
\textsuperscript{3}Manchester Materials Science Centre, University of Manchester, UK
\textsuperscript{4}ESRF, Grenoble, France

Abstract: Synchrotron X-ray strain scanning has been used to determine the residual stress distribution over the cross-sectional area of a friction stir weld across an I-section made of extruded aluminium alloy type AA 7108 in the T69 condition. Measurements were made using the 311 reflection and a wavelength of about 0.35 Å. The dominant longitudinal residual stress field is tensile within and to just outside the friction band, where the field drops steeply. Further out there are regions of balancing compression falling to near zero at the outer edges of the sample. The longitudinal residual stresses vary within the range from −60 to 140 MPa. The transverse residual stresses are generally weaker but show a more marked through-thickness variation below the friction band. The residual stress maps show detailed features which are related to the heat flow from crown to root faces and differences between the advancing and retreating sides. The results demonstrate that synchrotron strain scanning is a practicable technique for determining non-destructively internal and through-surface residual strains in light element components. The synchrotron technique complements and extends the range at present covered by neutron and X-ray diffraction methods and is capable of substantial development.

Keywords: residual stress, friction stir weld, synchrotron, X-rays, strain scanning, aluminium alloy

NOTATION:

- $d_{kl}$: lattice spacing of hkl planes
- $d_{0kl}$: unstrained lattice spacing of hkl planes
- $\Delta d_{kl}$: change in the lattice spacing of hkl planes
- $E$: Young's modulus
- $Q$: scattering vector
- $\varepsilon$: residual strain
- $\theta$: Bragg angle

residual stress distribution across a friction stir weld in an extruded aluminium alloy type AA 7108. Destructive mechanical and traditional X-ray diffraction techniques had already been tried but with very limited success.

1.1 Friction stir welding

Friction stir welding (FSW) has been developed over the last few years \cite{1, 2} and is well suited to joining aluminium alloys of low fusion weldability. In FSW, a rotating tool, with a helical shoulder, is forced...
How do I use the references once I’ve found them?

• Technical references serve three main goals in thesis/dissertation research
  – Frame and support the introduction
  – Provide details for your methods
  – Provide discussion points and comparisons for your discussion of your research results

• You are starting with a big stack of summarized and scored (>5) references

• You want to end with a visual and textual summary of the collection
  – What are the key clusters of work that you have found
  – Who are the dominant authors in the area?
  – Are there any critical references?
  – Where does your work fit into what others have done/are doing?
  – Where are the gaps in the literature?
How do I use the references once I’ve found them?:

Methods for Distilling the Results

• Put micro-summaries on power point slides
• Make a series of Venn diagrams
• Excel spreadsheet
• Write micro-summaries on post-it notes or 3x5 cards

What’s a micro-summary??
Examples...

Tran, 2006, applied laser peening to aluminum welds with fatigue
Peyre, 2001, applied laser peening to stainless steel—one of the first
Hatamleh, 2009, laser peening applied to AA2095, also FSW
Zucchi, 2001, MIG and FS welding comparison for AA5083
Searles, 2001, stress corrosion cracking in AA5083—key reference
Ogoucha, 2008, sensitization of AA5083-has thermal treatment data
Goswami, 2010, TEM study of sensitization in AA5083
Tan, 2010, thermomechanical processing to lessen SCC in AA5083
Fonda, 2009, FSW of AA5456
How do I use the references once I’ve found them?: Methods for Distilling the Results

You can use any one of a number of software products (free and commercial for storing and organizing your references...
How do I use the references once I’ve found them?:

Methods for Distilling the Results

You can use any one of a number of software products (free and commercial for storing and organizing your references...
How do I use the references once I’ve found them?: Methods for Distilling the Results

<table>
<thead>
<tr>
<th>Author</th>
<th>Title</th>
<th>Rating</th>
<th>Key point Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hwang</td>
<td>SCC Corrosion Eval 2008</td>
<td>4</td>
<td>- Not just on ODS, but also F/M steels (T 91 and T92 alloys, Ni alloys and ODS) ODS – MA956; SCPWR another possible use of ODS;</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>- Good description of SCC test (SSRT w/u-bend) but not done on ODS; done on F/M steels; results not clear for ODS; discussion of oxide layer thickness</td>
</tr>
<tr>
<td>Kimura</td>
<td>Recent Progress 2007</td>
<td>5</td>
<td>- Materials: F82H and JLF-1; SCC of ODS discussed but not clear; SSRT test discussed; concluded SCC less than for ASS;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Conclusion: Couple RAF w/ODS steel; rad dmg is f(x) steel choice</td>
</tr>
<tr>
<td>Hoseman</td>
<td>Corrosion ODS Pb-Bi 2008</td>
<td>4</td>
<td>Corrosion of Alloys (PM2000, MA956, 12YWT, 14YWT, MA957) in LBE by measuring oxide layers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Depends on Al content;</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- Depends on grain size;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- PM2000 appears to be best (thin oxide layer with no selective oxidation)</td>
</tr>
<tr>
<td>Takaya</td>
<td>Corrosion Resistance Al alloy 2010</td>
<td>2</td>
<td>- Measuring oxide layer thickness to determine corrosion impact</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Measure impact of adding Al to ODS</td>
</tr>
<tr>
<td>Takaya</td>
<td>Corrosion Behavior Al alloy 2009</td>
<td>3</td>
<td>- This is the predecesor to the other Takaya article</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Same approach, exposed in LBE, measure oxide layer</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Conclusion: Cr content and Al content important not just Cr</td>
</tr>
<tr>
<td>Isselin</td>
<td>Effect Al on Corrosion ODS 2010</td>
<td>2</td>
<td>- Uses Nitric acid, similar to decladding in fuel reprocessing</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- Process: measure current density vs. potential to measure corrosion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- 2 ODS steels compared to Inconel, Hasteloy, 315 SS</td>
</tr>
<tr>
<td>Narita</td>
<td>Water Corrosion Resistance ODS 2007</td>
<td>3</td>
<td>- 2 ODS Steels (9Cr 12Cr) compared to ASS and MSS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Process: measure weight loss to estimate corrosion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Conclusion: resistance not just due to Cr</td>
</tr>
<tr>
<td>Roy</td>
<td>EAC Structural Materials</td>
<td>4</td>
<td>- Conclusion: expressed as % of YS; effect of temp; effect of notch; effect of pH</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Alloys: HT9, EP823, 422</td>
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<td></td>
<td></td>
<td></td>
<td>- Constant load test and SSR test</td>
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<tr>
<td></td>
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<td></td>
<td>- Good process</td>
</tr>
<tr>
<td>Miwa</td>
<td>SCC F82H</td>
<td>3</td>
<td>- Conclusion: Predict when each type of SCC occurs</td>
</tr>
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<td></td>
<td></td>
<td>- SSRT testing; Variables: heat treat, CW, radiation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Look for SCC in water w/DO</td>
</tr>
</tbody>
</table>

Excel spread sheet courtesy CDR B.W. Baker
Dissertation Concept:
Characterization and analysis of environmentally assisted corrosion of ODS steel for reactor applications
How do I use the references once I’ve found them?: Writing a literature summary...

• At this point you should have
  – Reviewed, summarized, and scored papers
  – Coherent “clusters of knowledge”

• The task now is to
  – Organize the clusters of knowledge into a meaningful flow
  – Remove clusters that are not fully relevant from your summary
  – Write the clusters of knowledge into individual or series of paragraphs
  – Integrate into one, flowing literature summary
  – You should reference as you go along, but don’t worry too much about the formatting at this point (Brewer, JMR, 2010) will do fine

• At the end of this process, you will have a basic working draft for most of the introduction to your thesis!