ME 490: Senior Design I

Library and Web Research

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How Library and Web Research Can Help

- **ME-490 – Senior Design I**

    - Detailed design <u>proposal</u> writing phase

    - Things might be a little unclear; some teams are working on projects with history to build on (e.g., mini-baja, SAE), or with company projects where objectives might be a clearer, or advisors might be in touch with experts

- **ME-491 – Senior Design II**

    - Project design work, followed by <u>interim</u> written design <u>report</u>

- **ME-492 – Senior Design III**

    - <u>Final design report and presentation</u> (Senior Design Day!)

- Lots of <u>communication (written and verbal)</u> expected in the sequence

How Library and Web Research Can Help

- **Information and literature on effective proposals and proposal writing**

  - For example: Title searches ("proposals" and "proposal writing") in the <u>Books24x7</u> and <u>McGraw-Hill AccessEngineering</u> e-book databases

  - Lots of free guidance on the web from engineering programs. For example: "Writing Guidelines for Engineer and Science Students," including guidance on proposal writing at <u>http://www.writing.engr.psu.edu/workbooks/proposals.html</u>

- **Information and literature on effective project management techniques**

  - Remember that the "human" aspects of the senior design sequence can be as important or even more important than the technical aspects (e.g., planning, scheduling, organizing, goal-setting, communicating, working effectively with other people)

- **Information and literature on effective product development techniques**

  - Design analysis and evaluation techniques (e.g., in order to assess costs, feasibility, life expectancy, environmental impact, marketability, customer requirements, alternative uses, manufacturability, optimization potential, life-cycle analysis, block diagrams, process maps)

How Library and Web Research Can Help

• Technical Presentation Workbook: Winning Strategies for Effective Public Speaking (ASME E-Books)

• Professional Writing Skills: Five Simple Steps to Write Anything to Anyone (Books24x7)

• Get a Grip on Your Grammar: 250 Writing and Editing Reminders for the Curious or Confused (Books24x7)

• Accidental Genius: Using Writing to Generate Your Best Ideas, Insight, and Content (Books24x7)

• Big Fish Experience: Create Memorable Presentations That Reel In Your Audience (McGraw-Hill AccessEngineering)

• Writing is a key skill desired by employers in today's Learning Economy (the other skills are data analytics, cultural competency, and solving complex problems in diverse groups) – José Antonio Bowen

• Information and literature on effective presentations and writing

• The design work, the engineering work, the senior design team work are what are important in the sequence – but don't neglect the importance of communication (writing and presenting)

• Brilliant ideas that are poorly communicated are less likely to have an impact

• A former student of mine in MG-631, an engineering executive with a large company, told me that "the ideas that drive the direction of our company come from our most effective writers"

• Writing can also help you to clarify your ideas

• Excellent books on effective writing and effective presentations are available in print in the library as well as in most of the e-book databases

How Library and Web Research Can Help

- **Information and literature on effective presentations and writing**

  - My experience with engineers and writing – I avoid stereotypes

  - Engineers are not bad writers

  - Engineers have typically learned grammar and writing – just like everyone else

  - I've worked with lots of engineers who are excellent writers

  - Much depends on the writing project

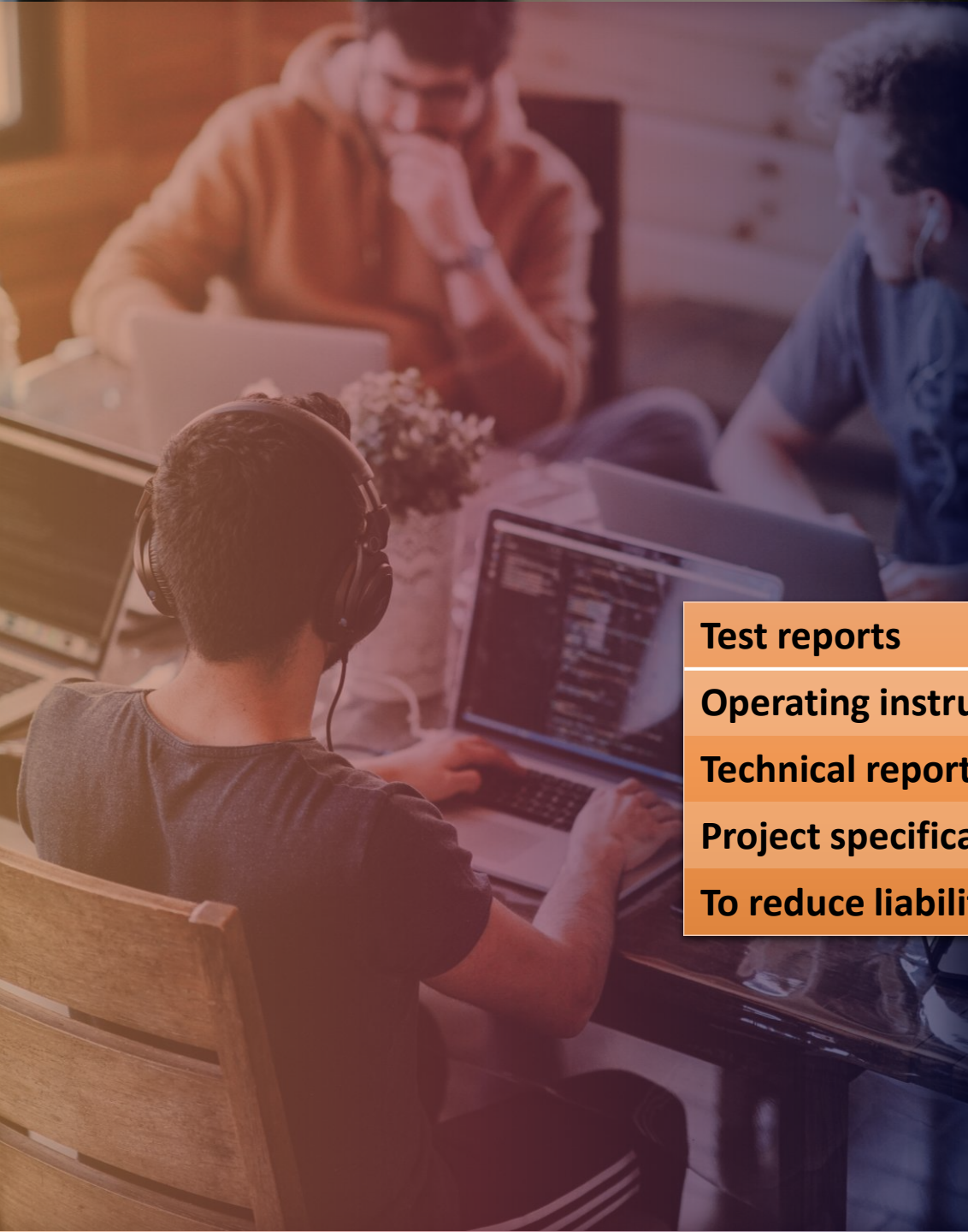 - Much depends on one's writing experience

How Library and Web Research Can Help

- **Information and literature on effective presentations and writing**

    - I've found that a lot of engineers – just like a lot of people – don't like to write

    - In engineering, we have a quantitative focus

    - In engineering, we often don't have opportunities to practice writing – and practice is required because writing is a craft

    - Many of us receive unhelpful feedback in writing: "Write clearly" is not helpful without explanations and examples specifically with respect to your writing

    - Writing is taught from a Humanities perspective with advice that doesn't always make sense for engineering

        - "Don't use the passive voice"

How Library and Web Research Can Help

- **Information and literature on effective presentations and writing**

    - Engineers tend to focus on objects, things, structures, processes, numbers, quantities, and data

        - Moreover, those objects, things, structures, processes, numbers, and data are actually what are important!

        - As a result, it makes sense to use the passive voice!

    - ACTIVE: "The technician tested the oil in compliance with the ASTM standard, D7603-13" (what's important is that the oil was tested correctly using the appropriate ASTM standard – the fact that a technician tested it is not important – thus, the passive voice is appropriate because it emphasizes the testing of the oil).

    - PASSIVE: "The oil was tested in compliance with ASTM standard D7603-13."

How Library and Web Research Can Help

- **Information and literature on effective presentations and writing**

  - As a working engineer, it's very likely that you'll have to write about and communicate effectively with others about objects, things, structures, processes, numbers, and data

  - Specialized documents and writing are often required

Test reports	**Procedures**	**Design standards**
Operating instructions	**Proposals**	**Test plans**
Technical reports	**Design documents**	**Documentation**
Project specifications	**Standards development**	**Recommendations**
To reduce liability		

  - As you work on your senior design project reports, use the opportunity to continue to improve your professional writing and presentation skills

How Library and Web Research Can Help

- **"It is well established … that information gathering is a critical step in the engineering design process."**

    - R.E.H. Wertz and colleagues, Purdue University, "Do Students Gather Information to Inform Design Decisions? Assessment with an Authentic Design Task in First-Year Engineering," American Society of Engineering Education (ASEE), 2011

- **"[W]ork by Atman and her colleagues evaluate and compare the design processes of first-year students, fourth-year students, and expert practitioners, and produce strong evidence of a relationship between information gathering skills and design quality."**

    - Wertz et al., 2011, citing:

    - Atman et al., 1999, "A Comparison of Freshman and Senior Engineering Design Processes," *Design Studies, 20*, 131-152.

    - Atman et al., 2005, "A Comparison of Freshman and Senior Engineering Design Processes: An In-Depth Follow-Up Study," *Design Studies, 26*, 325-357.

    - Atman et al., 2007, "Engineering Design Processes: A Comparison of Students and Expert Practitioners," *Journal of Engineering Education, 96*, 359-379.

    - Bursic, K.M., & Atman, C.J., 1997, "Information Gathering: A Critical Step for Quality in the Design Process," *Quality Management Journal, 4*, 60-75.

How Library and Web Research Can Help

• Literature (e.g., books, articles, documents, web sites) can be particularly important in the Introduction, Background and other sections of an ME-490 project proposal, as well as subsequently in the ME-491 interim report, and the ME-492 final report

- Clearly explain the <u>purpose</u> of the project
    - The purpose typically is to address a <u>problem</u> or <u>opportunity</u>
    - <u>Explain</u> the problem/opportunity
- Clearly explain why the purpose/problem/opportunity is <u>significant</u> and <u>important</u>
- Clearly explain the project <u>objectives</u> – what, specifically, are you trying to achieve?
- Clearly explain the <u>scope</u> and any <u>limitations</u> associated with project

How Library and Web Research Can Help

• Literature (e.g., books, articles, documents, web sites) can be particularly important in the Introduction, Background and other sections of an ME-490 project proposal, as well as subsequently in the ME-491 interim report, and the ME-492 final report

- Provide the information necessary to understand the project and its purpose. For example:

  - historical context

  - definitions of important concepts and terms

  - governing equations

  - relevant or helpful data and statistics

  - relevant or helpful properties data

  - relevant standards and codes

  - regulatory (i.e., legal) issues

  - life cycle and environmental issues

  - specifications

  - societal impacts (e.g., Who benefits? Why?)

How Library and Web Research Can Help

• Literature (e.g., books, articles, documents, web sites) can be particularly important in the Introduction, Background and other sections of an ME-490 project proposal, as well as subsequently in the ME-491 interim report, and the ME-492 final report

- Document/reference:

    (1) direct quotations;

    (2) all visual items from other sources;

    (3) quantifiable data that you don't develop or derive;

    (4) paraphrases;

    (5) other people's ideas;

    (6) most historical statements;

    (7) facts not widely known

How Library and Web Research Can Help

• **Literature (e.g., books, articles, documents, web sites) in technical design projects is also associated with a number of other purposes**

- To identify <u>solutions</u>

- To identify <u>approaches</u> to developing solutions

- To explain the <u>state of the art</u> with respect to a technical issue or problem: Who else has done what?

- To clarify <u>"knowledge gaps"</u> and to explain how your project or solution addresses something not previously addressed or attempted

- To develop a <u>business case</u> – lots of good technical ideas never get launched, because there is insufficient support for a business case (i.e., economic feasibility, manufacturing feasibility, etc.)

- To <u>validate assumptions</u> and to verify the <u>credibility of information</u>
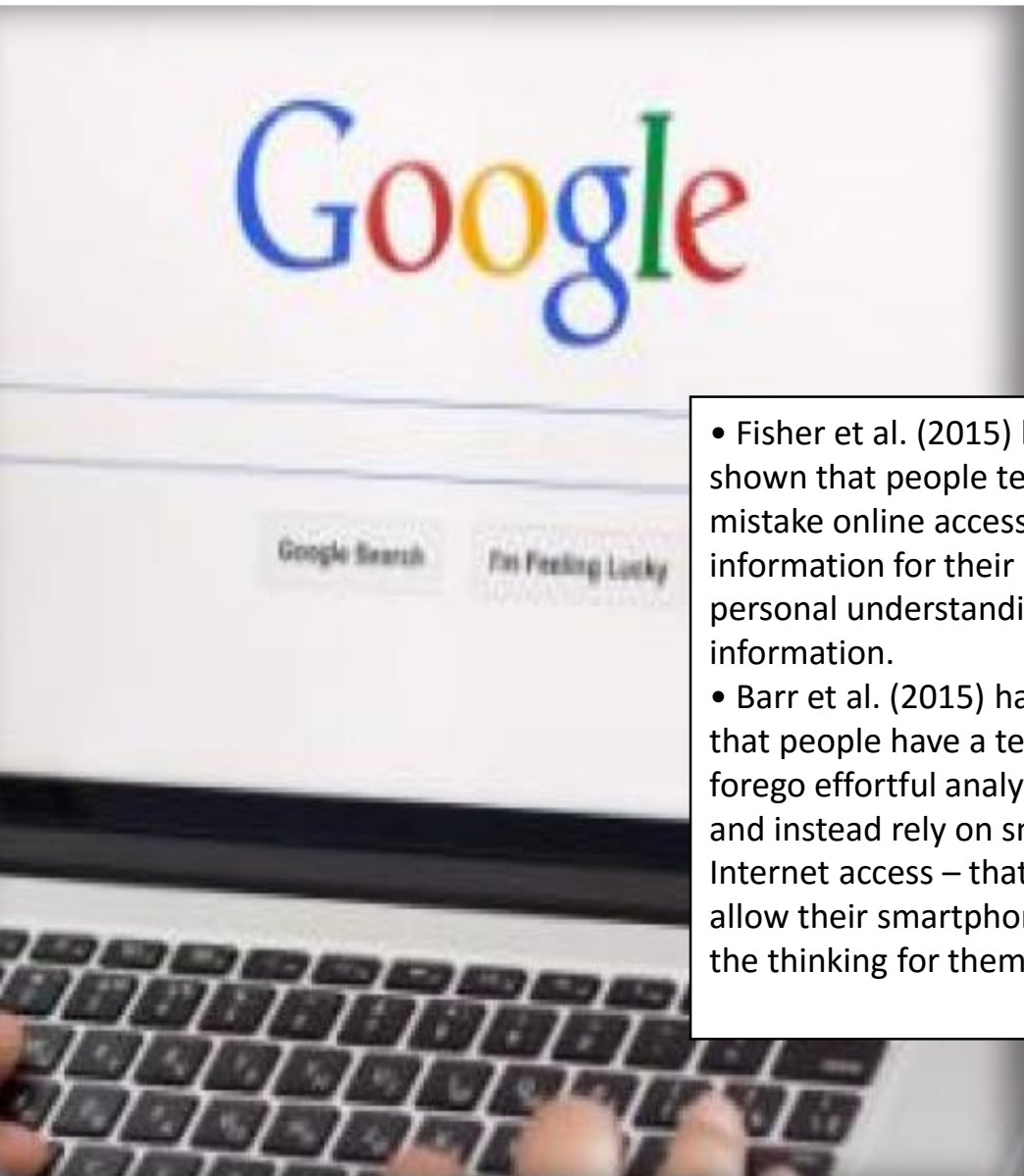
Why Not Just Use Google?

• Fisher et al. (2015) have shown that people tend to mistake online access to information for their own personal understanding of the information.

• Barr et al. (2015) have found that people have a tendency to forego effortful analytic thinking and instead rely on smartphone Internet access – that is, "they allow their smartphones to do the thinking for them."

• Citing their own research and a significant body of research on how people search Google, Wertz et al. (2011) observe the following:

   • We are inundated with information, only some of which is credible and relevant

   • With so much information, we tend to skim text – we "word-spot" and browse – we tend not to read closely and carefully, which is required for critical analysis

   • We tend to be technological literate -- we use our phones just fine to locate information -- and as a result, we tend to have "over confidence" in our "own ability to seek and evaluate information" online

   • That is, we tend to think that we're pretty good at online searching

   • When we do online searching, we do it quickly by using simple keyword searches (typically, no more than two words) or natural language searches, and we tend to end the search process quickly because we can seemingly find enough relevant information quickly

   • Our primary research tool tends to be Google

Why Not Just Use Google?

• Citing their own research and a significant body of research on how people search Google, Wertz et al. (2011) observe the following:

> • Effective online searchers develop <u>lists of keywords and related terms</u> for searching

> • Effective online searchers tend to use the <u>citation network</u> (e.g., references, citation tracking)

> • Effective online searchers tend to perform <u>multiple search queries</u> in <u>multiple online tools</u> and services when performing <u>comprehensive</u> searching

Why Not Just Use Google?

• Citing their own research and a significant body of research on how people search Google, Wertz et al. (2011) observe the following:

> • Effective online searchers understand the available tools and initially focus on specific online tools for specific types of information requests (e.g., to search for metallurgical data, begin with the ASM Handbooks Online – don't know where to look first? Ask a librarian)

> • Effective online searchers read and study their results, and then tend to reformulate and refine search queries based on those results to leverage new search strategies

> • Effective online searchers tend to use more complex search queries, strategies, techniques, and advanced features (e.g., exact-match searching, Boolean logic, use of metadata, limiting filters)

Why Not Just Use Google?

• Citing their own research and a significant body of research on how people search Google, Wertz et al. (2011) observe the following:

- • Natural Language Search: **effects of lack of sleep on college students**

- • Simple Keyword Search: **sleep college students**

- • Complex Search: **("sleep deprivation" OR lack AROUND(2)sleep) AND effect* AND ("college student*" OR "university student*")**

- • Effective online searchers frequently move beyond the first page of results

  - • Because of the way Google's ranking algorithm (Page Rank) works, when most simple keyword search queries are employed, newer documents tend to appear after the first page of results

Why Not Just Use Google?

- Consider the following example:

- You want to find literature on the forces (e.g., moon's gravity, solar pressure, sun's gravity, etc.) that affected the orbit of the rogue satellite Galaxy 15 in April 2010

- In Google Scholar, you do a simple keyword search: **Galaxy 15 satellite**

- Currently, "about 137,000 results" are obtained

- In fact, an excellent master's degree thesis precisely on the topic of the forces that affected Galaxy 15 in its rogue orbit was completed by David Schafer in 2017 in the MSOE Master of Science in Engineering (MSE) program. Main advisor: Dr. Jill Seubert, an interplanetary navigator at NASA's Jet Propulsion Laboratory (JPL) and acknowledged expert on Galaxy 15

- The citation (not a full-text link, even though the full text is available on the MSOE library site at http://milwaukee.sdp.sirsi.net/client/en_US/search/asset/261) appears on page 74!

Why Not Just Use Google?
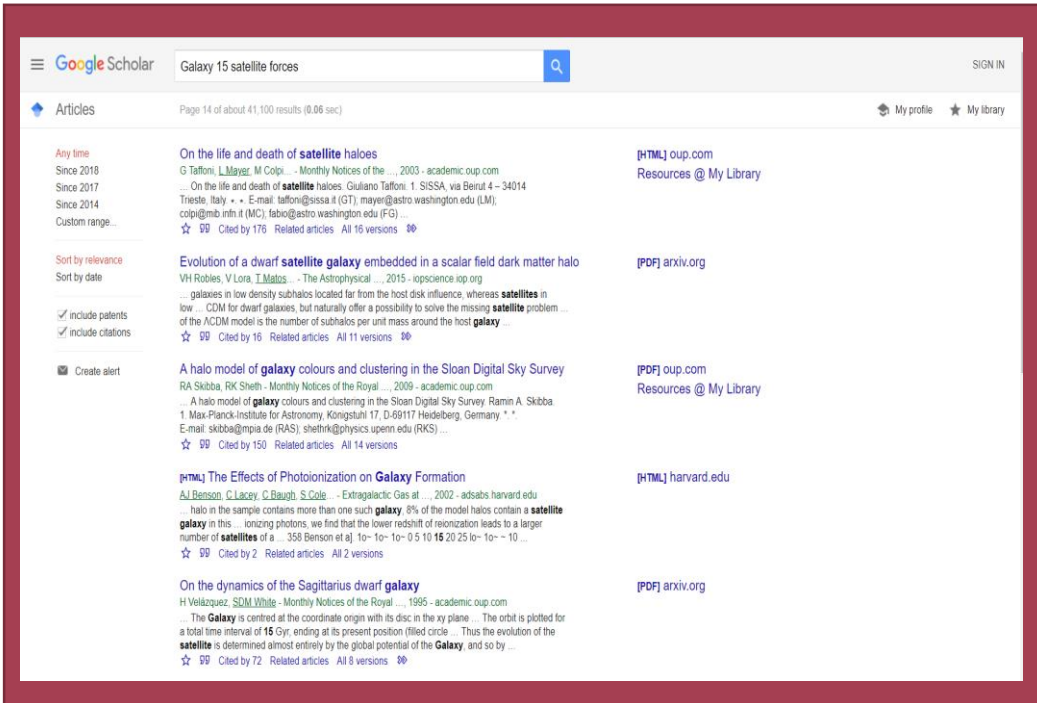
• We can improve these results a little by adding another keyword term to our search query: **Galaxy 15 satellite forces**

• Currently, "about 43,700 results" are obtained

• This time, David Schafer's thesis – which addresses the topic exactly – appears on page 18

• However, David's thesis appears <u>after</u> results that don't appear to be relevant, such as "A Sixty-Year Timeline of the Air Force Maui Optical and Supercomputing Site," which appears on page 13, and which does not mention Galaxy 15
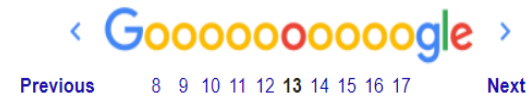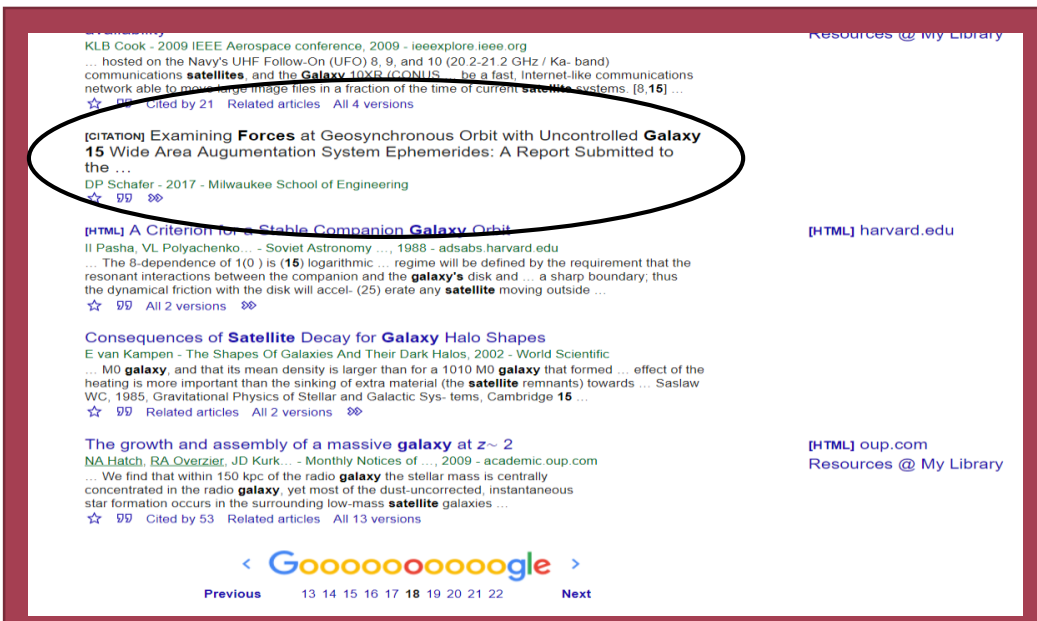
Why Not Just Use Google?

• **The bottom line on Google versus library databases**

• Because most publishers now make their publication metadata available to Google, and because of technical innovations over the last 10 years, Google (including Google Scholar and Google Books) is the best online discovery tool available

• Research consistently demonstrates that Google can identify far more information and far more literature than any one or group of library databases (Brophy & Bawden, 2005; Cole et al., 2018)

• Google's discovery power does not equal full text access

• Google's discovery capability is not without issues

> • Although personalized searching can make online searching easier, it also can skew results

> • Numerous metadata issues
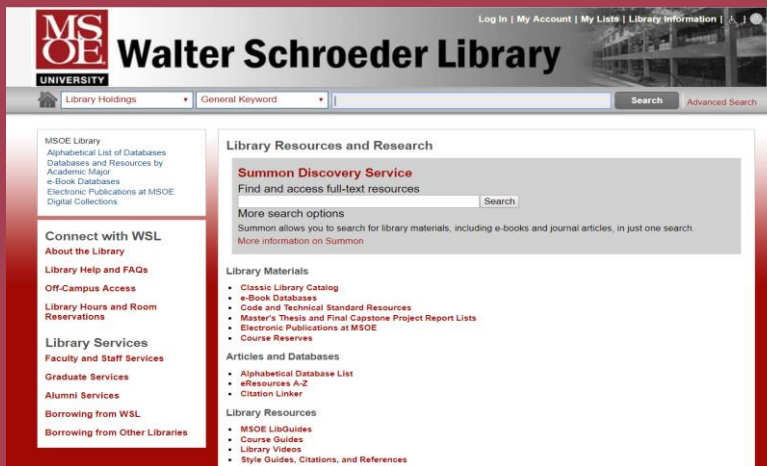
Why Not Just Use Google?

This document was actually published in 1997, but it features a metadata publication date of 1725.

• **The bottom line on Google versus library databases**

• One example of a Google "metadata issue" can be observed in a search of the keyword "Internet" in Google Scholar

• The word "Internet" – referring to a global system of interconnected networks – was first used approximately in 1985

• When the word "Internet" is searched in Google Scholar, with results restricted to documents that were produced or published between 1700 and 1800, Google retrieves more than 1,200 documents – which does not make sense if the word was only first used in about 1985!

• An analysis of the results indicates that most of the documents feature metadata (i.e., data about data) indicating publication dates between 1700 and 1800, even though they were actually published much later

• The metadata errors can occur for a number of reasons, including problems with Google's indexing, and problems with metadata supplied by publishers

Why Not Just Use Google?

- **The bottom line on Google versus library databases**

- Head-to-head comparisons of Google versus library databases by researchers consistently demonstrate that the concentration of high quality source results is much higher in library database searches than it is in Google searches (Brophy & Bawden, 2005; Georges, 2015). Library databases are curated – Google isn't.

- Academic libraries today focus on providing access to the full text of documents – these documents typically can be discovered with Google, but for a variety of reasons (e.g., copyright, intellectual property law, technical reasons), the full text often cannot be accessed with Google searching

- Unlike Google, library databases do not attempt to index all of the online text in existence; instead, databases have editorial standards, and as such, focus on specific types of literature, resulting in smaller and more manageable pools of documents

- Library databases typically offer more advanced features and operators than Google – especially controlled vocabulary, which does not exist in Google

Why Not Just Use Google?
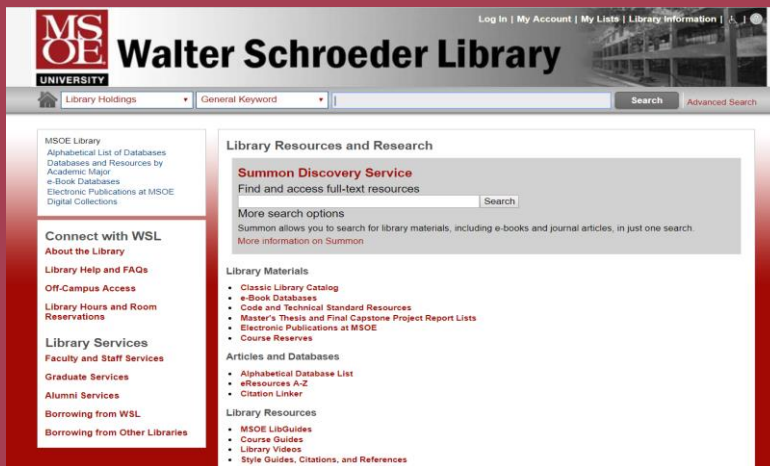
Advanced Search Operators in Google Scholar

OPERATOR	DEFINITION
AROUND:	AROUND: -- which needs to be written in ALL CAPs – is a proximity locator. For example, Einstein AROUND(2) relativity locates text in which "Einstein" and "relativity" are within two words of each other.
intext:	This operator limits query results to include a specific word in the body of an article.
site:	This operator limits search results to results retrieved from a specified site.
related:	This operator works in the same way as the "Related Articles" feature below each result on the Results page of a Google Scholar search.
intitle:	This operator limits results to documents with the specified word or words in the titles of those documents.
allintitle:	Similar to "intitle:," except that all words specified will be in the title with no synonyms.
Minus sign [or hyphen]: (-)	Use a minus sign before a word to exclude it from the search results.
Underscore: _	Connect two words with an underscore to retrieve results in which the words exist as one word or where they exist with an underscore between them.
OR	Retrieve results with one or both words that are specified. If both words are entered without OR, Google Scholar automatically searches for results without both words.
author:	Retrieve results with a specified author's name.
Asterisk: *	The asterisk is a wildcard that substitutes for one or more letters.
Quotation marks: " "	Exact-match searching

• **The bottom line on Google versus library databases**

• Use <u>both</u> Google and library databases in comprehensive literature searching

• For academic-related research, use <u>Google Scholar</u> (https://scholar.google.com) and <u>Google Books</u> (https://books.google.com)

• For Google Scholar searches, to limit results, use more keywords, as well as advanced search operators

• In addition to Google, use specialized and focused search engines, which provide discoverability and – sometimes – full-text access to specialized literature, including technical reports, patents, standards, etc.

• Begin library database searching by using the Summon Discovery Service, which is a customized search engine that indexes the library's full-text databases

• In the library databases, use effective search strategies and techniques (previously reviewed)

It's usually a good idea to take a moment to evaluate the technical data that you might locate in a Google search. For example, where do the data come from? Who produces the site that features the data, and how does the site ensure that the data are credible?

Consider, especially, data supplied by companies and data in review sites.

Why Not Just Use Google?

• **The bottom line on Google versus library databases**

• Google and other search engines can be helpful for the following kinds of documents that frequently need to be used in ME Senior Design projects

  • Material Safety Data sheets

  • Product documentation and data

  • Company and government technical reports

  • Technical reports and data produced by relevant organizations and professional associations and societies

  • Information and data on company websites

  • Review sites

Why Not Just Use Google?

Consider the following chart.

• **The bottom line on Google versus library databases**

• The chart shows the torque produced by a hydraulic motor with respect to RPM. The chart appears in a technical report that discusses the hydraulic motor; the report was published by the manufacturer of the motor, Company X. An assessment of the torque produced by a motor is important in considering the motor's overall efficiency. One needs to examine the chart carefully in order to understand that information is missing: Actual output torque is not provided for the $0 – 10$ RPM range. In fact, personnel at Company X do not have a good understanding of the motor's efficiency (including torque output) in low-RPM conditions, so the chart simply omits information in the low-RPM range.

Examples of Specialized Search Engines

• Google Scholar -- http://scholar.google.com

• Google Books -- http://books.google.com

• Microsoft Academic -- https://academic.microsoft.com/
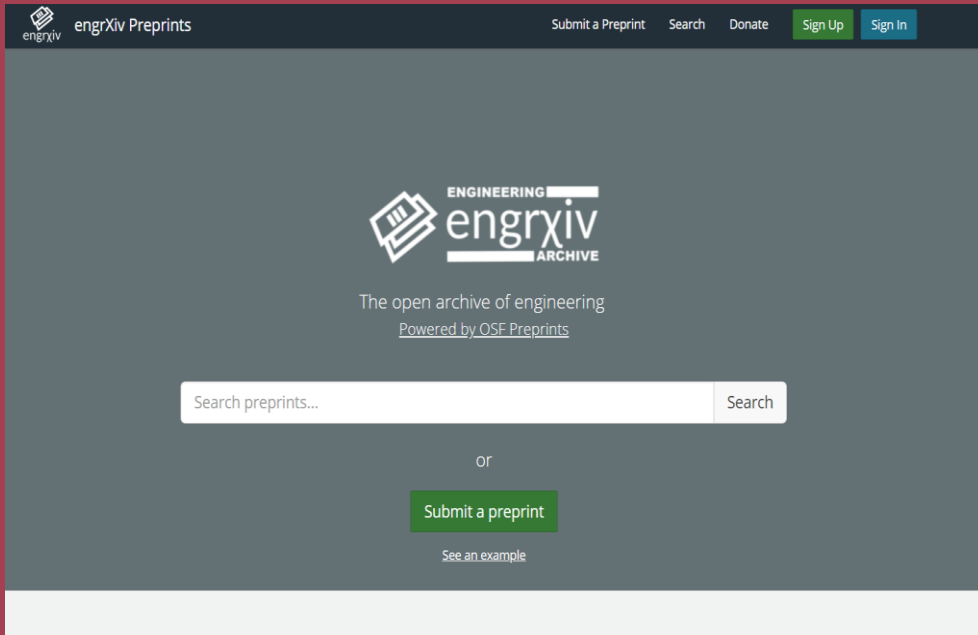
• Science. gov -- http://www.science.gov/

• ScienceResearch.com -- http://www.scienceresearch.com/scienceresearch/

• National Technical Information Service (NTIS) -- http://www.ntis.gov/ [now fee-based]

 • MetaLib -- http://metalib.gpo.gov [the best meta-search]

• The Engineering Toolbox -- http://www.engineeringtoolbox.com/

• Engineering engrXiv Archive (preprints and working papers) -- https://engrxiv.org/

• ResearchGate -- https://www.researchgate.net/

• Free web databases associated with organizations (e.g., Society of Automotive Engineers (SAE) at http://www.sae.org/search/)

Library Database Research

- Mechanical Engineering online research guide

  - https://libguides.msoe.edu/me/guide

  - Regularly updated

  - Brief descriptions of and links to the essential resources, tools, and services

Library Database Research

- Library database currently provides full-text access to

  - ~ 400,000+ e-books

  - ~ 120,000+ e-journals

  - Although most of these resources are discoverable via Google, the full text is not available for free on the Internet

  - You can use the eResources A-Z tool to search for the titles of e-journals and e-books

  - eResources A-Z provides a direct link to the resource in the database where it is hosted

Library Database Research

- Begin your library database research by using the <u>Summon Discovery Service</u>

  - Customized MSOE library search engine

  - Simple, Google-like search interface

  - Re-indexed weekly

  - Keyword searching of virtually all library full-text databases

  - Use faceted searching to refine and to focus search results

- For comprehensive searching, search Summon **<u>and</u>** the databases
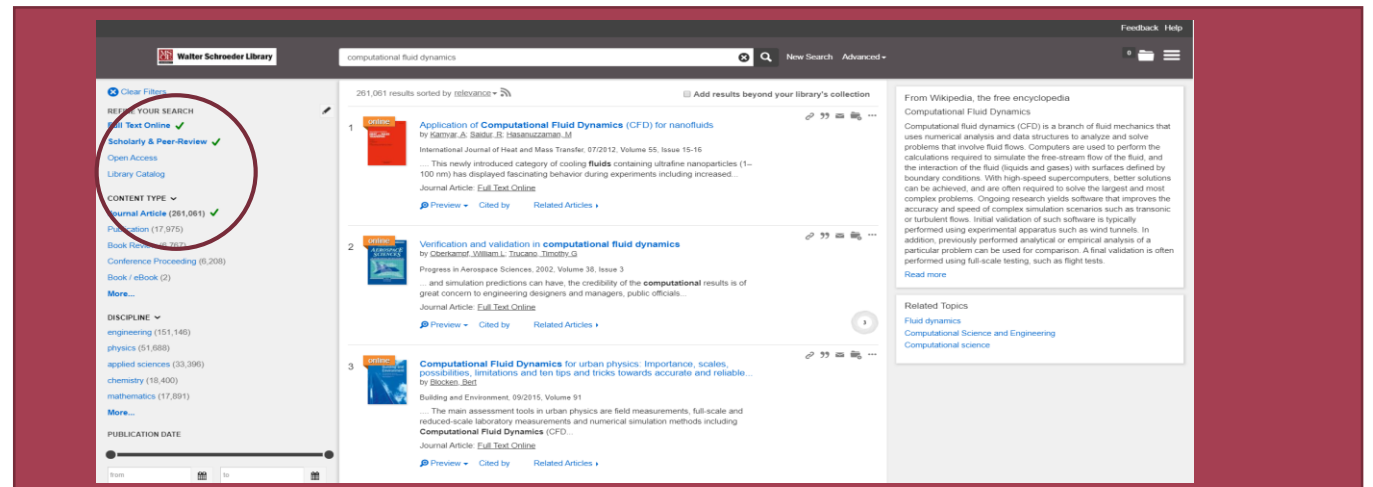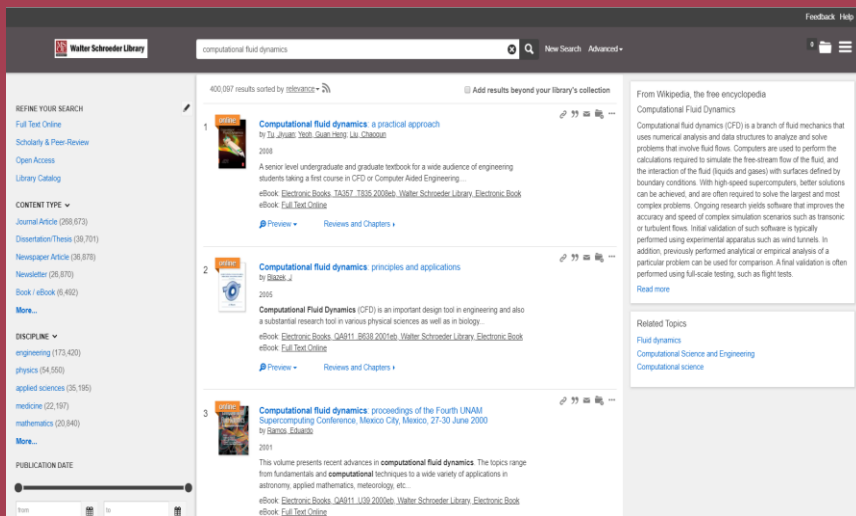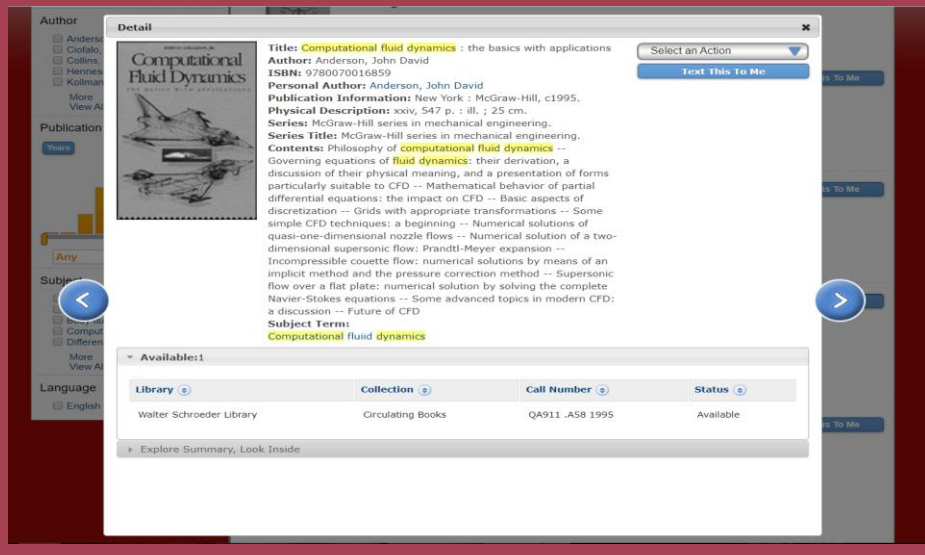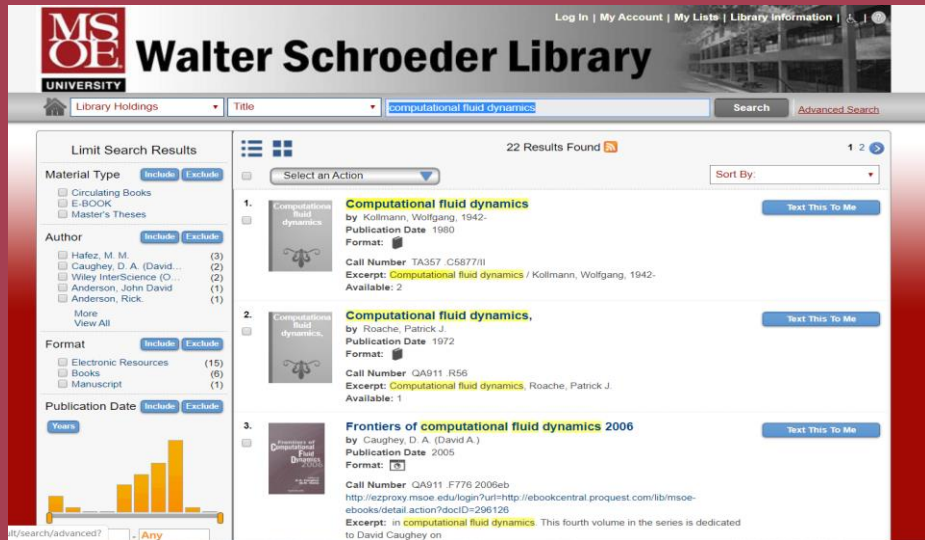
Library Database Research

• Systematically search for print books and perpetual-access e-books

> • **Library Catalog**
>
> • Print books and other items in the library (e.g., DVDs)
>
> • For books only, remember to select the **Books** filter

Keep in mind that because of copyright law, many books are not available – or not easily available – in electronic format. There are important classic technical print books in the library, and there is important technical information and data in print books that is not easily available online, or not online at all.

Library Database Research
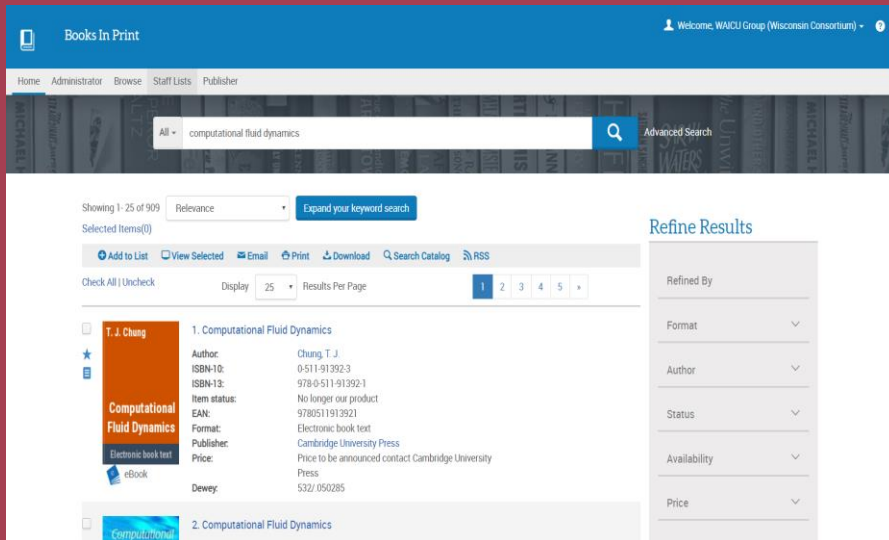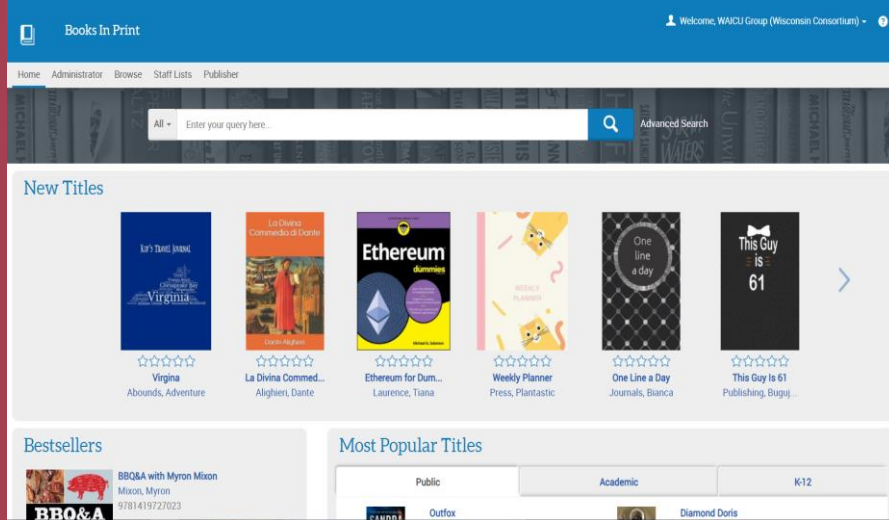
- Systematically search for print books and e-books

  - **Books in Print Database**

  - Records of print books and e-books available from more than 40,000 global publishers

  - Use a variety of keyword searches

  - Identify books currently in print or that are scheduled to be published
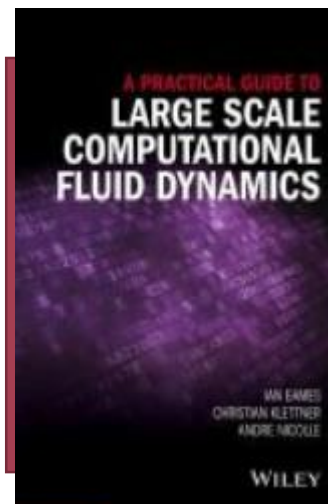
A Practical Guide to Large Scale Computational Fluid Dynamics by I. Eames, C. Klettner, and A. Nicolle
Scheduled Publication Date: 16 Apr 2021
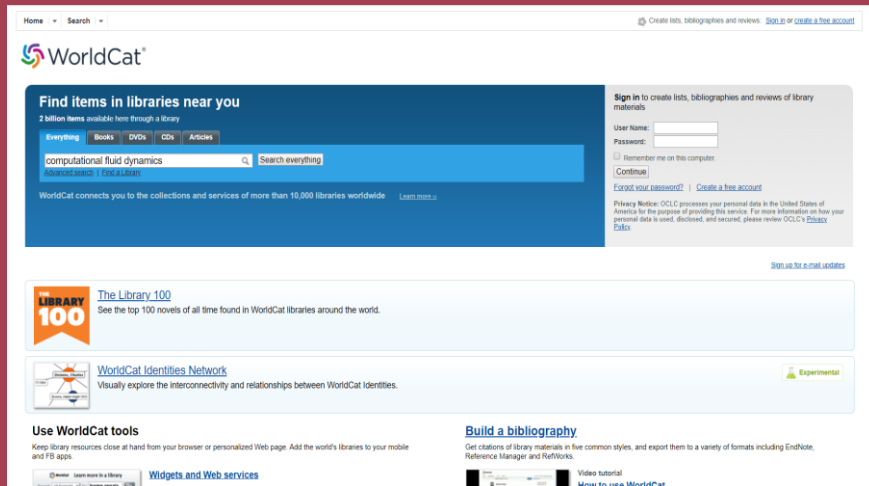
Library Database Research

• Systematically search for print books and e-books

- **WorldCat Database**

- Records of items in more than 10,000 libraries worldwide – includes library location data

- Use a variety of keyword searches

- Filter by **print book** or **eBook**
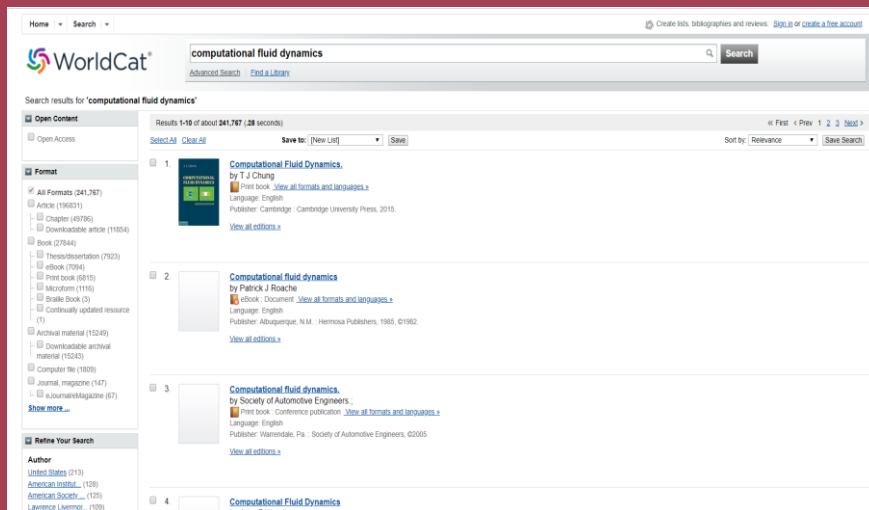
Computational Fluid Dynamics
T.J. Chung
Cambridge Cambridge Univ. Press 2003

Available at MSOE, as well as Marian University, Marquette University, Carthage College, and UW-Madison
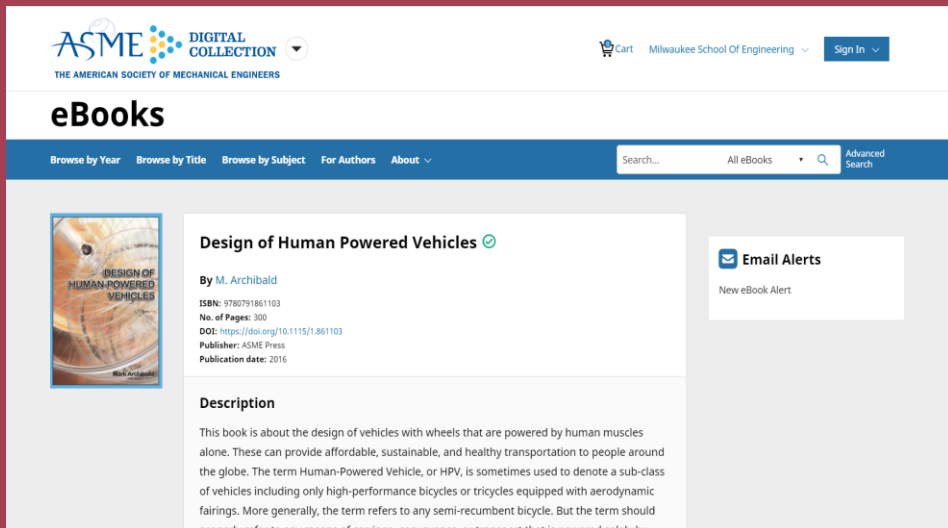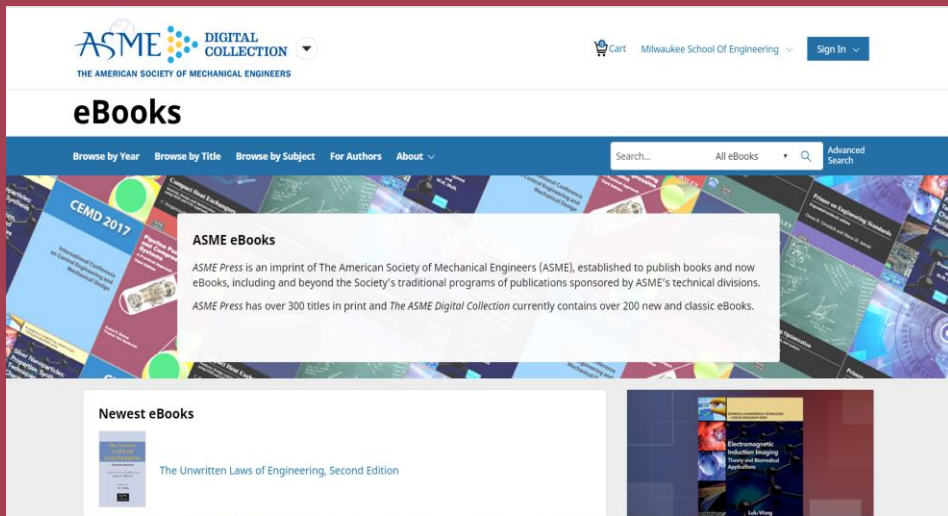
Library Database Research – E-Books

• **ASME E-Books**

> • This database provides access to new and classic titles published by the American Society of Mechanical Engineers (ASME)
>
> • Currently provides full-text access to more than 200 e-books
>
> • Subject coverage includes design, manufacturing, renewable energy, robotics, bioengineering, pressure vessels and piping, and other engineering topics

Library Database Research – E-Books

- **ASM Handbooks Online**

  - This database provides full text access to the latest edition of the American Society for Materials (ASM) Handbook, which is a multi-volume publication.

  - Also included is access to the Engineered Materials Handbook and the ASM Metals Handbook.

  - The "Bible" of metals and materials research

  - Authoritative properties data

  - Current edition; older editions are in print in the library's Reference collection
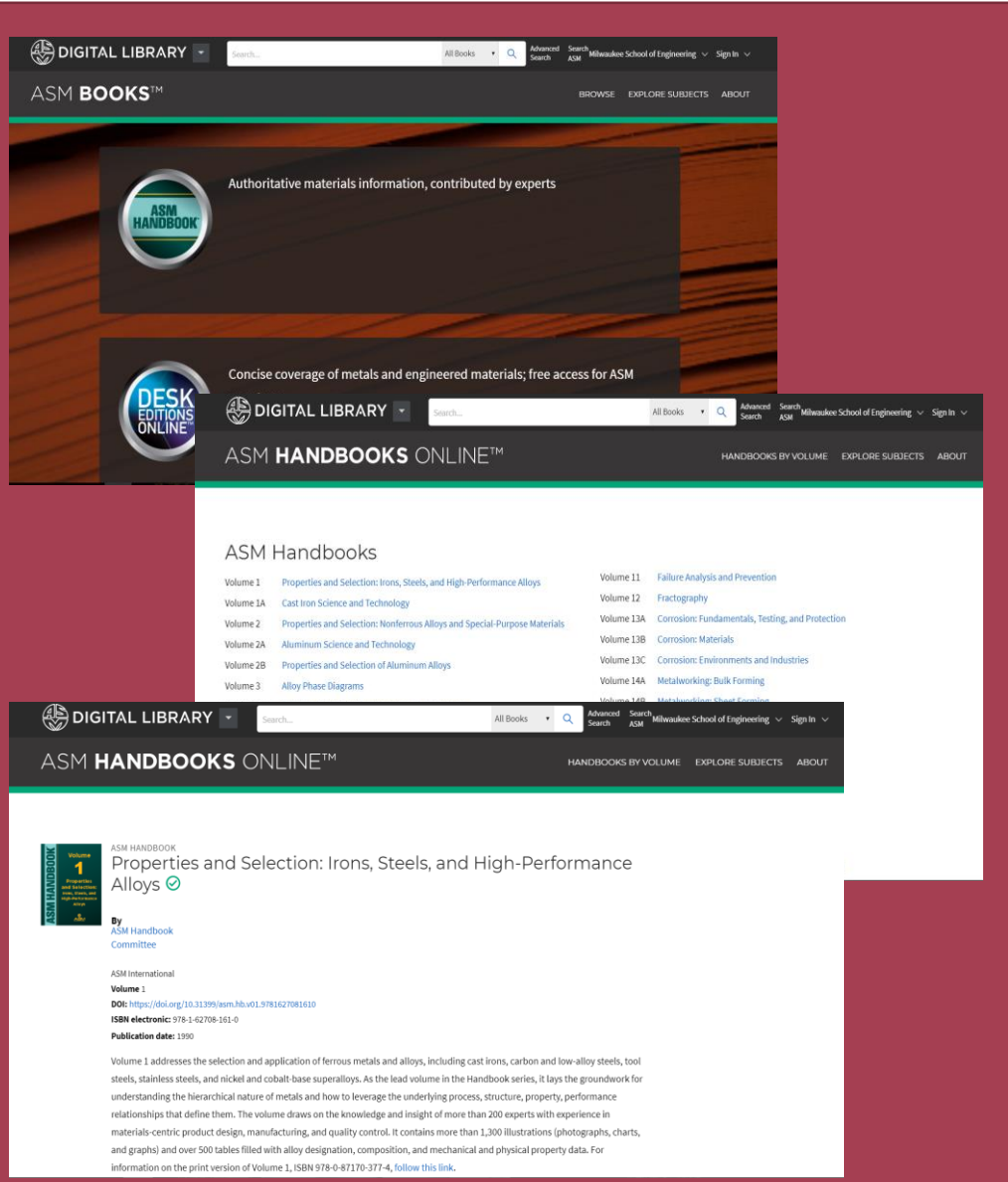
Library Database Research – E-Books

- ## EBSCO E-Books

  - More than 190,000 e-books

  - Multidisciplinary subject coverage

  - Includes coverage of engineering disciplines

  - Books can be read online or downloaded for short-term loan

Library Database Research — E-Books

- **Knovel E-Books**

  - More than 2,300 e-books covering bioengineering, civil engineering, general engineering, and mechanical engineering

  - Books can be downloaded in chapter installments as PDF documents

  - This e-book service provides additional useful tools

    - Material Property Search

    - Interactive Equation Solver

    - Unit Converter
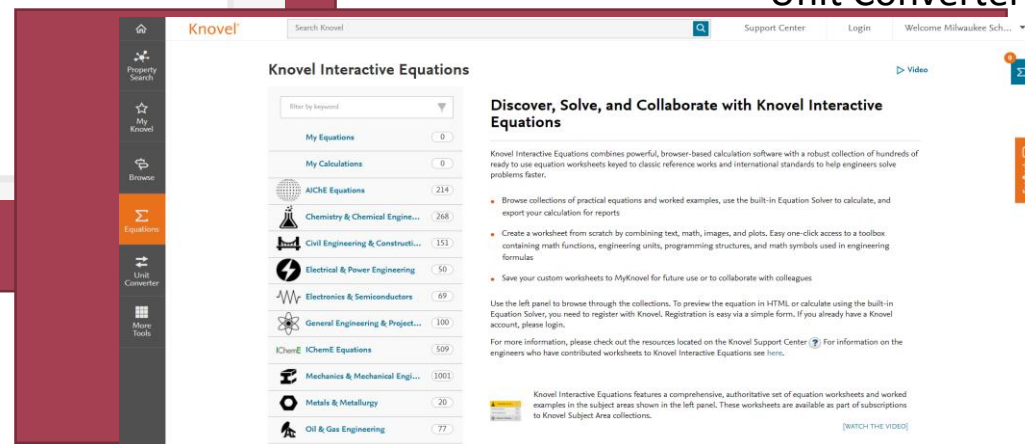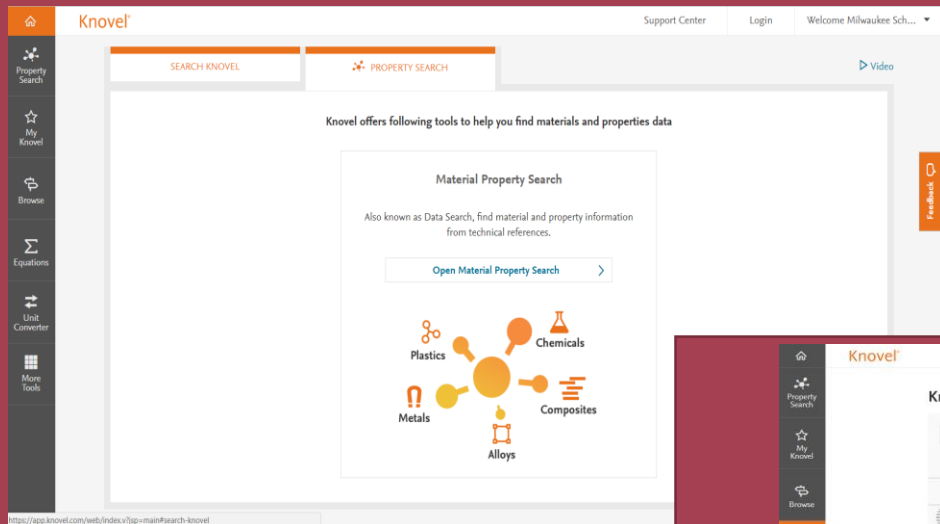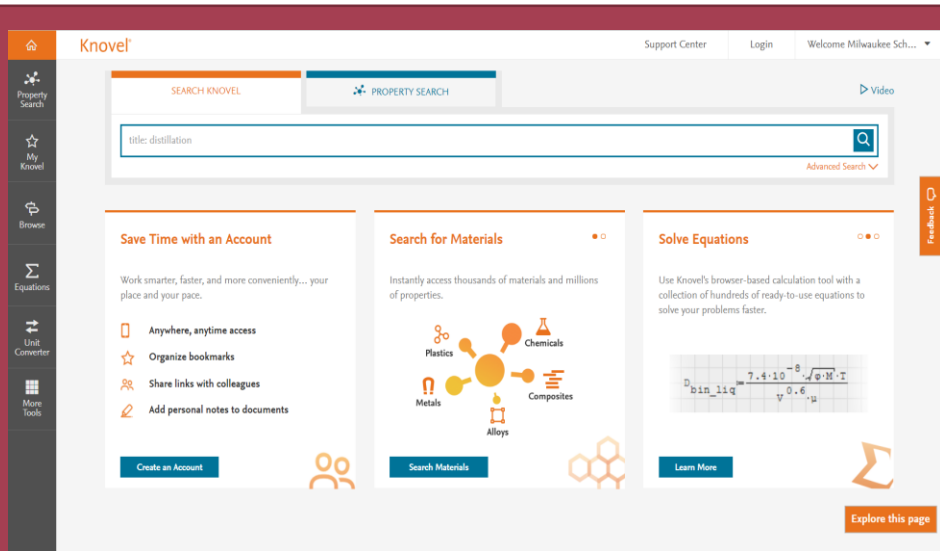
Library Database Research – E-Books
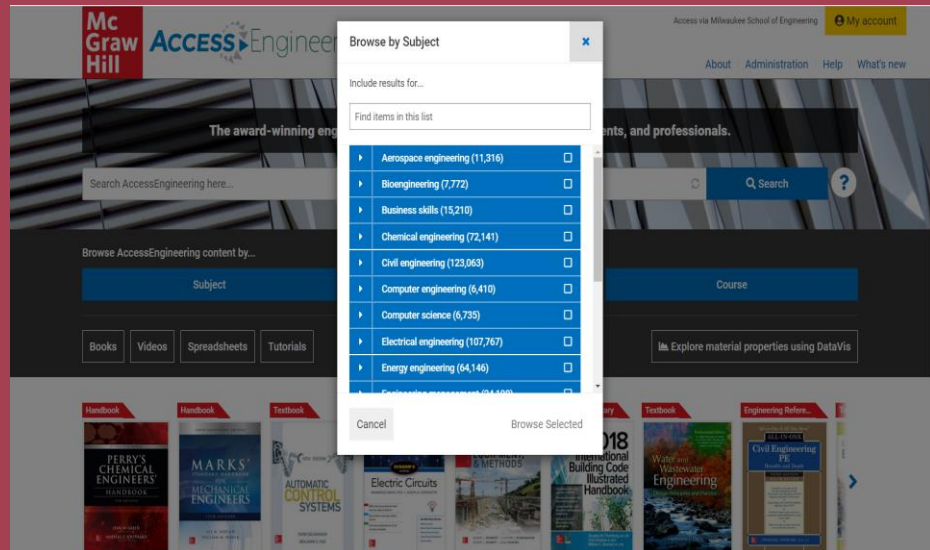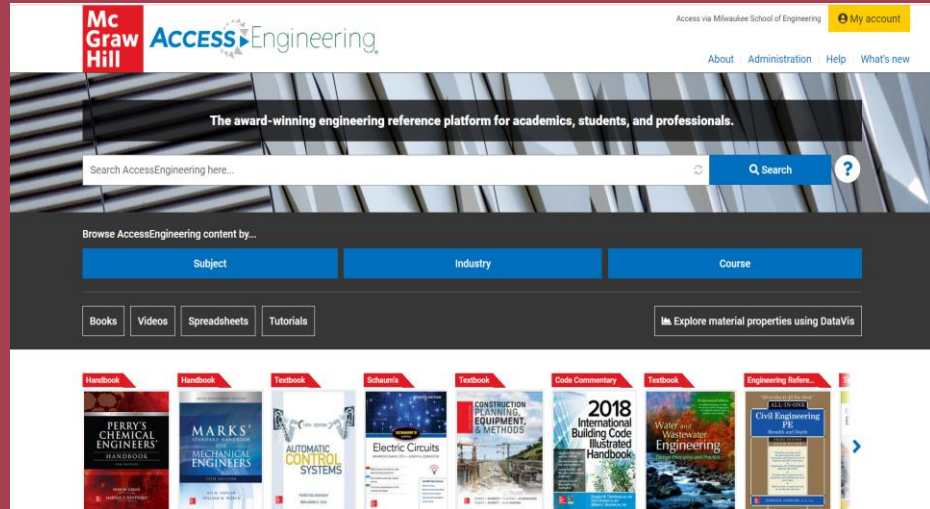
• **McGraw-Hill EngineeringAccess E-Books**

> • More than 740 e-books covering bioengineering, business skills, chemical engineering, civil engineering, communications, electrical engineering, energy/petroleum engineering, industrial engineering, materials engineering, mechanical engineering, operations management

> • Books can be read online or create and sign into your personal account and print sections

Library Database Research — E-Books

- **McGraw-Hill EngineeringAccess E-Books**

  - Features include

    - Spreadsheet calculators

    - DataVis Materials property search

    - Online video tutorials
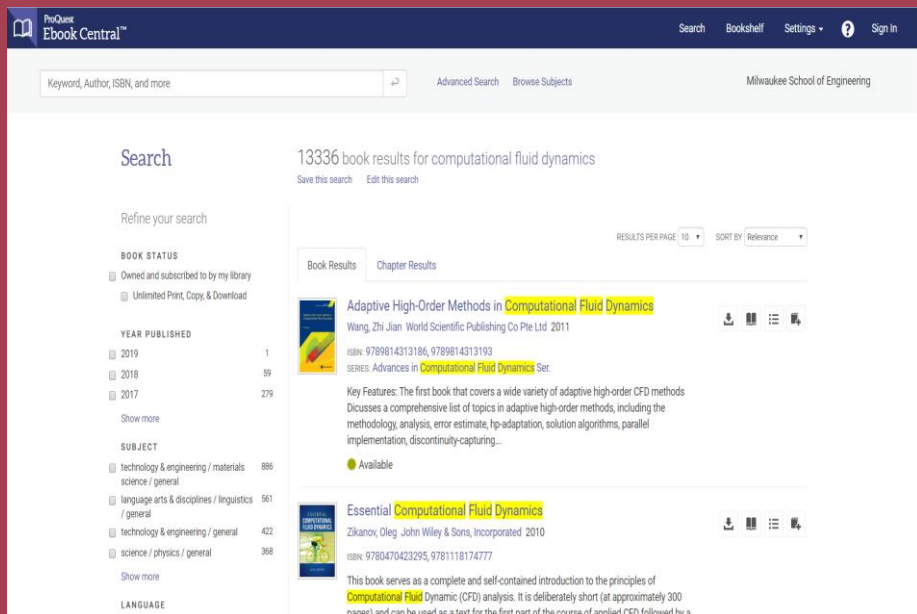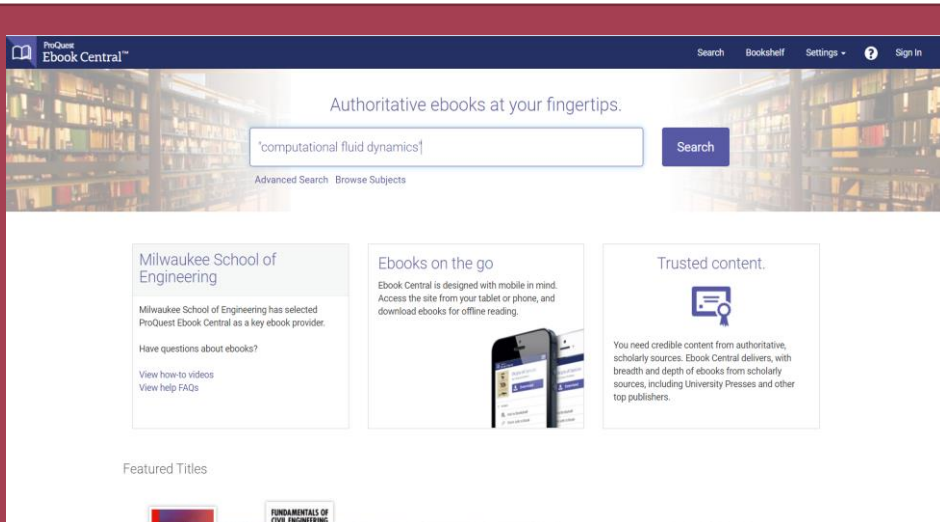
Library Database Research – E-Books

• **Proquest E-Book Central**

• This database provides full-text access to more than 162,000 books, many published by university presses, covering a large range of subject areas, including engineering

• Read books online, or download a limit number of chapters, or create an account and download a book for a short-term loan
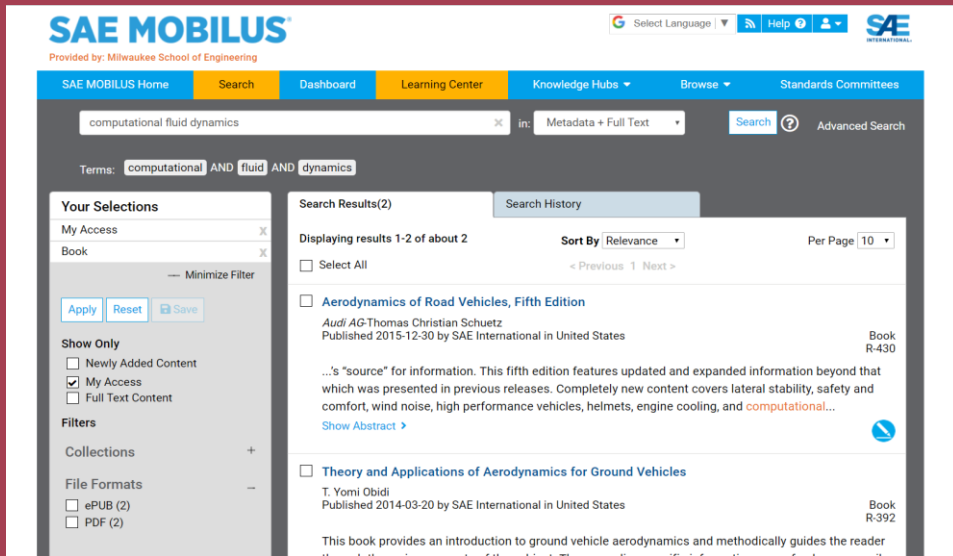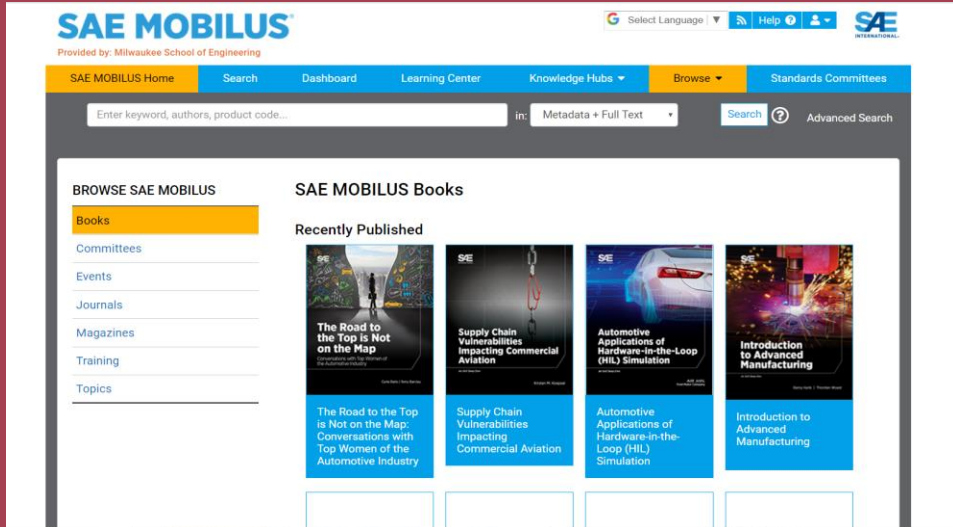
Library Database Research — E-Books

- **Society of Automotive Engineers (SAE) E-Books**

  - The SAE eBooks Database provides full-text access to 230 books published by the Society of Automotive Engineers (SAE) from 1990 through 2018

  - The SAE publishes authoritative and scholarly literature in Aerospace, Commercial Vehicle, and Automotive areas

  - To search for books, on the SAE e-book site, execute a keyword search, and then apply the **My Access** and **Book** filters
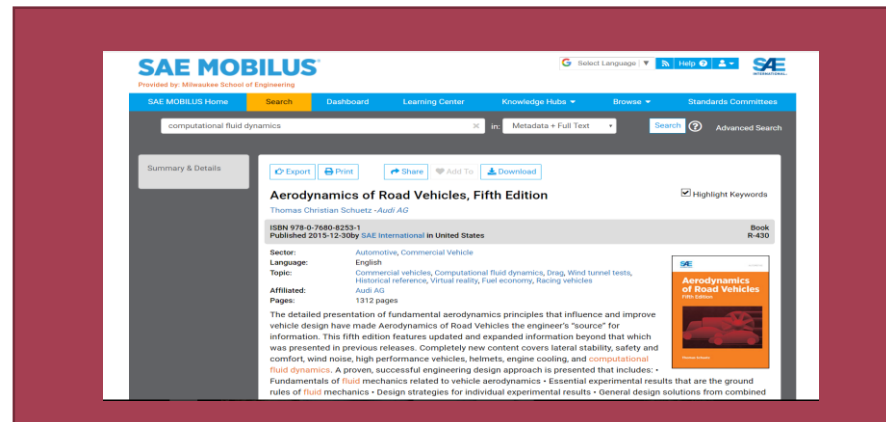
  - Download the books as PDF files

Library Database Research – Journal/Serial Literature
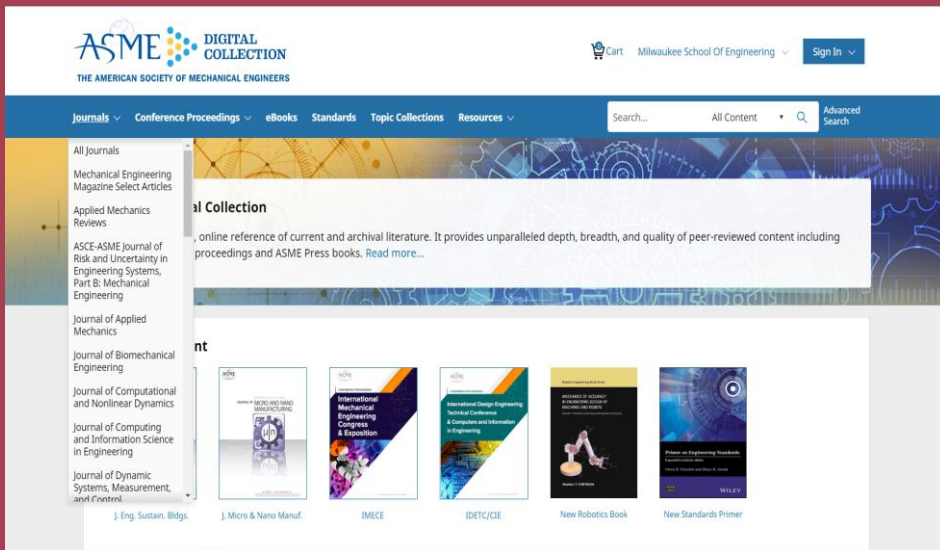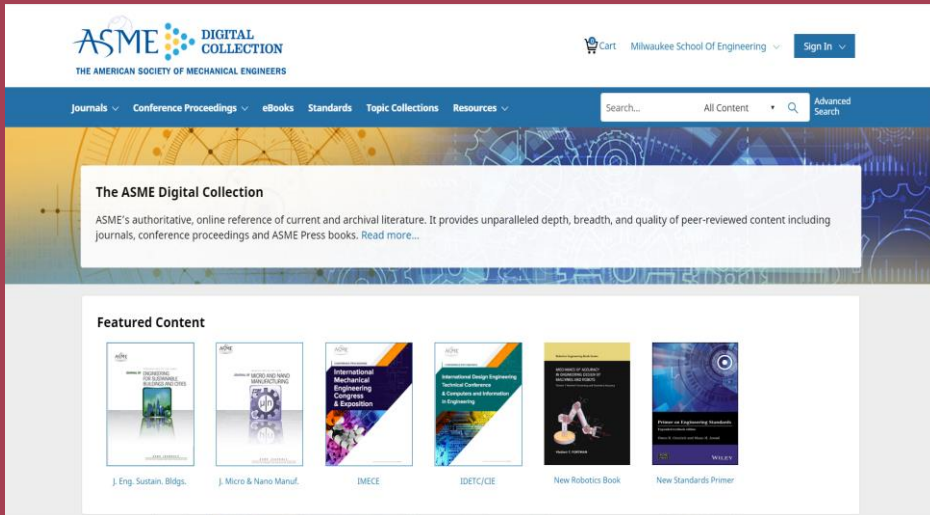
- **ASME Digital Collection**

  - Search the transaction journals, e-books and conference proceedings published by the American Society of Mechanical Engineers (ASME)

  - Full-text is available for the transaction journals (2000-)

  - The ASME journals are scholarly, peer-reviewed, and authoritative
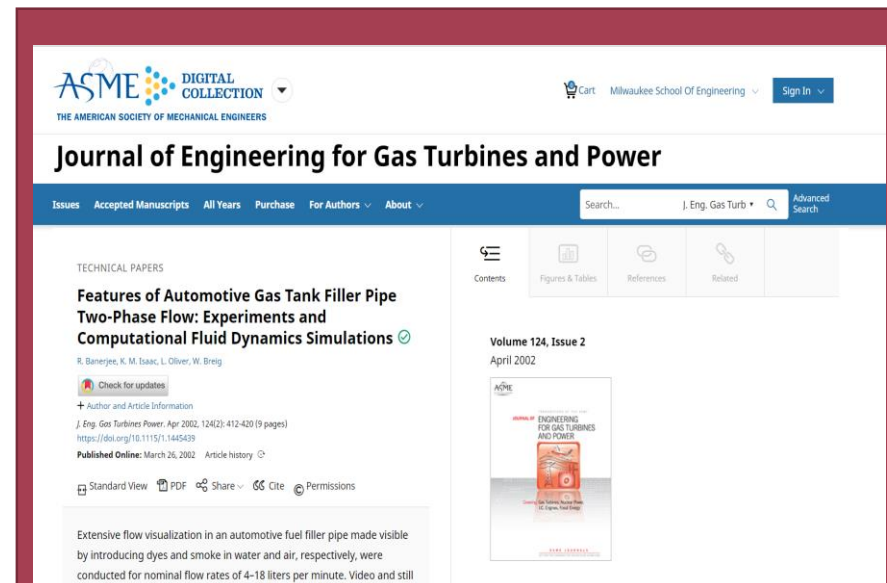
  - Download the articles as PDF files

Library Database Research – Journal/Serial Literature
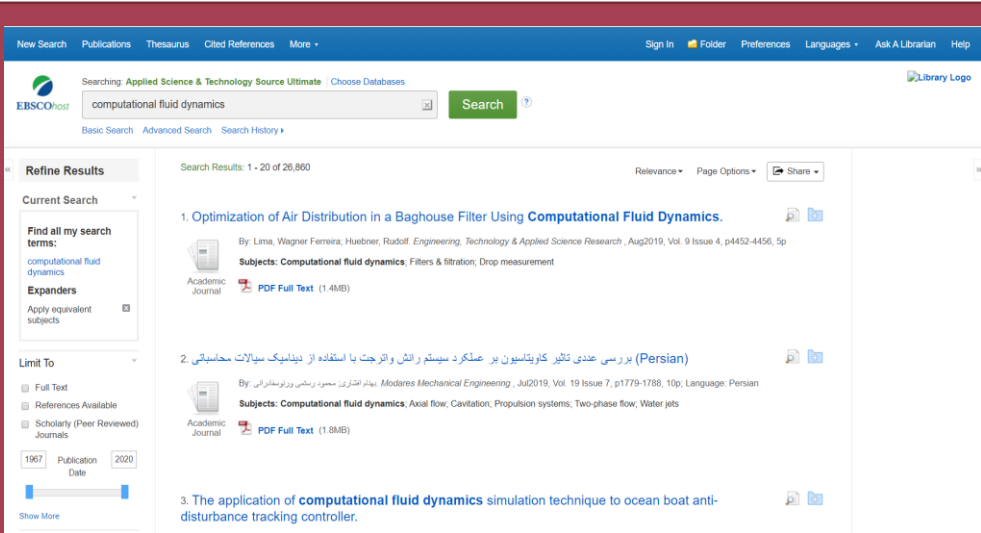
• Applied Science and Technology Ultimate

> • EBSCOhost database that provides full-text access to more than 2,100 journals and trade publications covering a wide range of STEM topics including artificial intelligence, applied mathematics, plastics, hydroponics, computer science, chemical engineering, energy resources and robotics, as well as the business and social implications of new technologies.

> • Use the online **Thesaurus** to identify potentially useful controlled vocabulary for searching
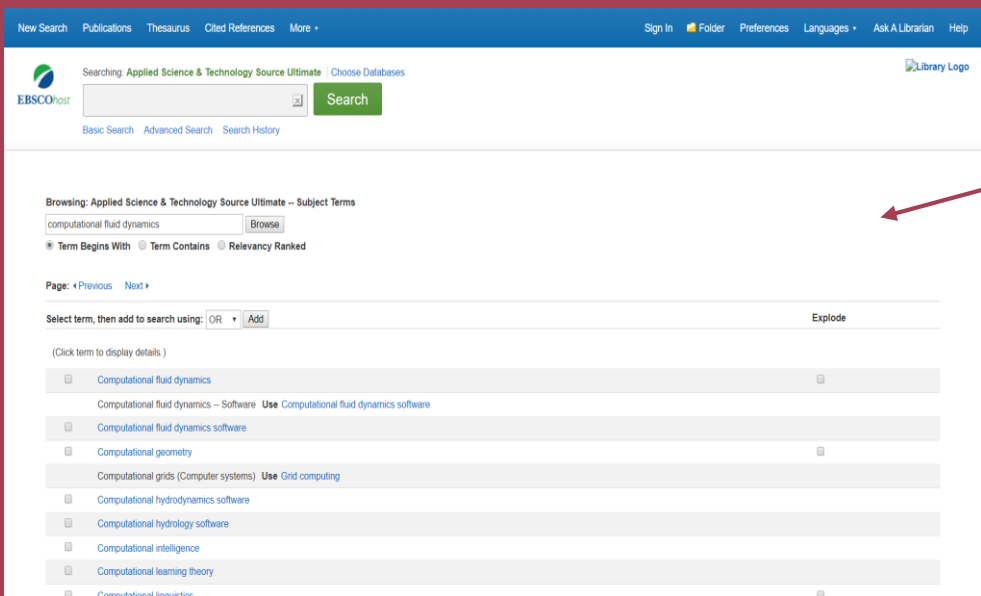
Library Database Research – Journal/Serial Literature

- **Applied Science and Technology Ultimate**

- Library databases often (but not always) feature the use of controlled vocabulary. Controlled vocabulary is metadata that database producers use to tag documents so that they are more easily found. Controlled vocabulary does not exist in Google.

- For example, if you do a **[A]** basic keyword search on **computational fluid dynamics** in Applied Science, you currently retrieve more than **26,800** documents. If you execute **[B]** an exact-match search ("computational fluid dynamics" in quotation marks), you retrieve fewer results (over **20,500**). If execute **[C]** an exact-match **subject** search (or controlled vocabulary search) on "computational fluid dynamics," you reduce the number of results to just over **10,000**. And if you conduct **[D]** both an exact-match subject and title search on "computational fluid dynamics," you retrieve just under **1,100** results.

- Use controlled vocabulary searching whenever possible!

Library Database Research – Journal/Serial Literature
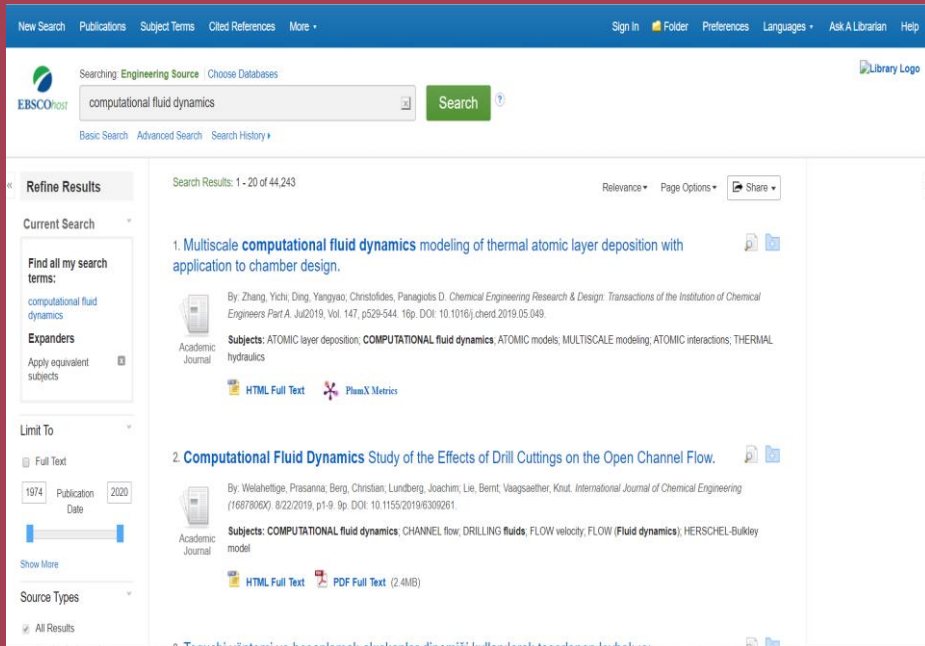
• **Engineering Source**

> • This EBSCOhost database provides indexing and full-text coverage for more than 1,600 engineering journals, magazines and trade publications.

> • Engineering-focused monographs, books, conference papers and proceedings are also included.

> • Coverage features different content than the content in Applied Science and Technology Ultimate.
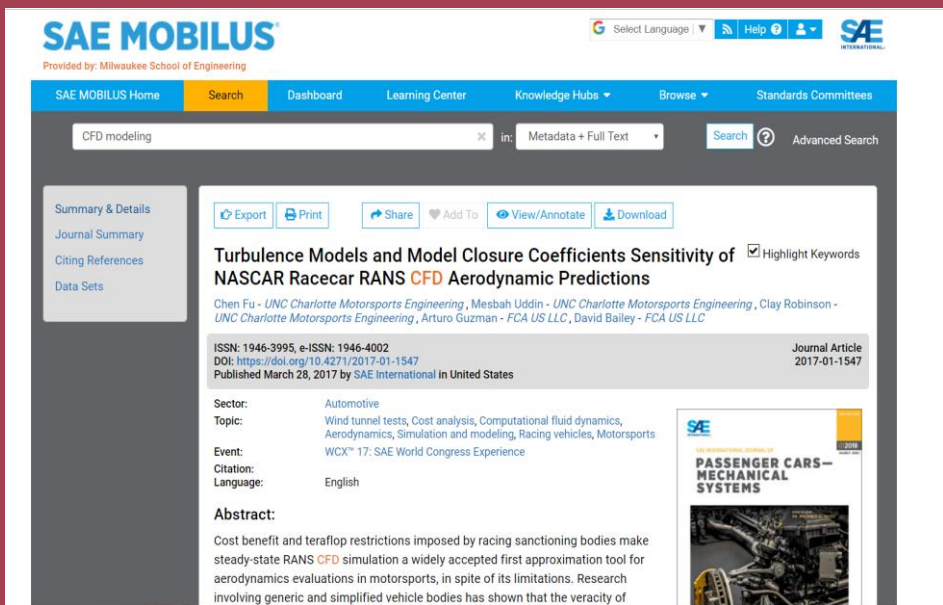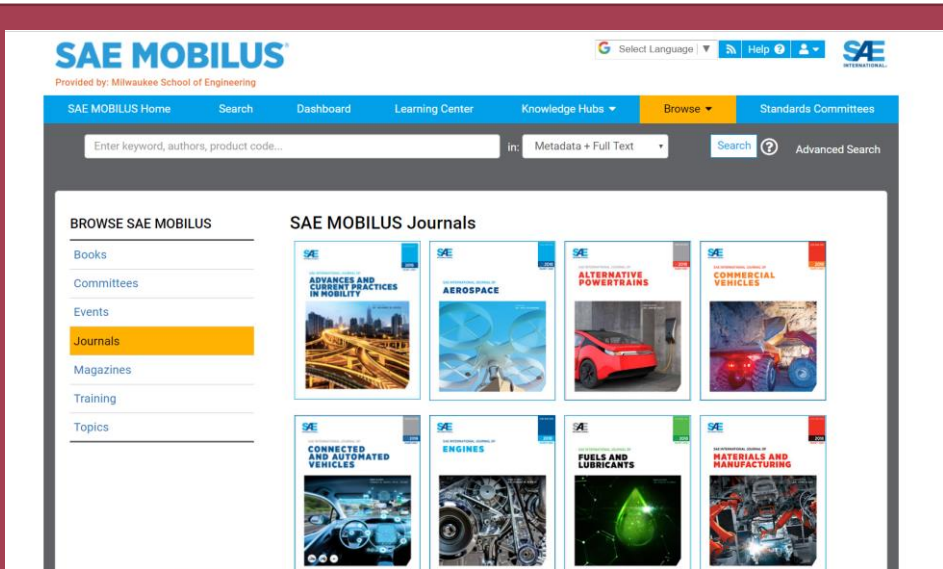
Library Database Research – Journal/Serial Literature

- **<u>Society of Automotive Engineers (SAE) International E-Journals Complete</u>**

- Full text of all issues of all scholarly, authoritative, peer reviewed journals published by the SAE (from Volume 1 to the present for each journal)

- Download articles as PDF documents; use the **Journal** filter

- Journal titles include the *SAE International Journals of*

- *Aerospace*   •*Alternative Powertrains*   • *Commercial Vehicles*

- *Engines*   • *Fuels and Lubricants*

- *Materials and Manufacturing*   • *Passenger Cars: Electronic and Electrical Systems*

- *Passenger Cars: Mechanical Systems*

- *Transportation Cybersecurity and Privacy*   • *Transportation Safety*

- *Vehicle Dynamics, Stability, and NVH*

Library Database Research – Journal/Serial Literature

- **ScienceDirect College Edition Database**

  - Full-text access to articles published in more than 3,000 scholarly, peer reviewed journals from 1995 to the present

  - Subject coverage includes the physical sciences and engineering, the life sciences, and the social sciences and the humanities

  - Download articles as PDF documents

  - Be sure to leverage the **Recommended Articles** tool for locating related articles.

Library Database Research – Journal/Serial Literature

• IEEE Xplore Database

• IEEE (Institute of Electrical and Electronics Engineers) Xplore provides web-based, full-text access to IEEE journals, transactions, and magazines, IEEE e-books, IEEE conference proceedings, IET journals, IET conference proceedings, IEEE published standards, IEEE Spectrum Magazine, and Proceedings of the IEEE published since 1988, and select content published since 1913.

• The multidisciplinary nature of much of today's engineering means that a great deal of relevant literature appears in IEEE publications with respect to mechanical engineering topics

Library Database Research – Journal/Serial Literature

- **Society of Automotive Engineers (SAE) Technical Papers**

  - Authoritative and scholarly annual technical papers published by the SAE

  - Search for technical papers at https://www.sae.org/publications

  - Select **Technical Papers** from the **Publications** option in the top menu bar

  - Execute a keyword search

Library Database Research – Journal/Serial Literature

- **<u>Society of Automotive Engineers (SAE) Technical Papers</u>**

  - Apply the **Technical Papers** filter in the left-hand faceted searching

  - The MSOE library has a complete collection of SAE technical papers on microfiche from 1984 through 2004

  - For papers published after 2004, contact the library and request a copy

    - Use an Interlibrary Loan request, or

    - Send an e-mail to library@msoe.edu
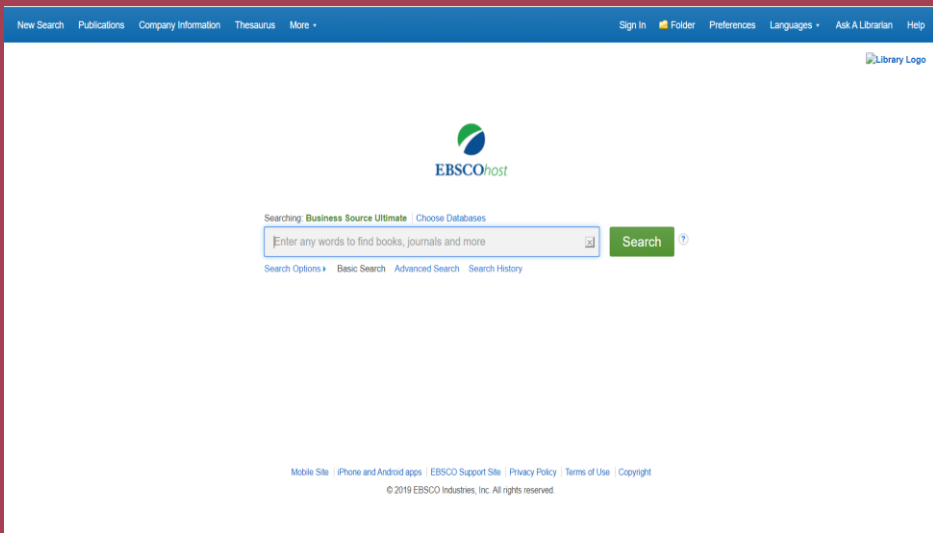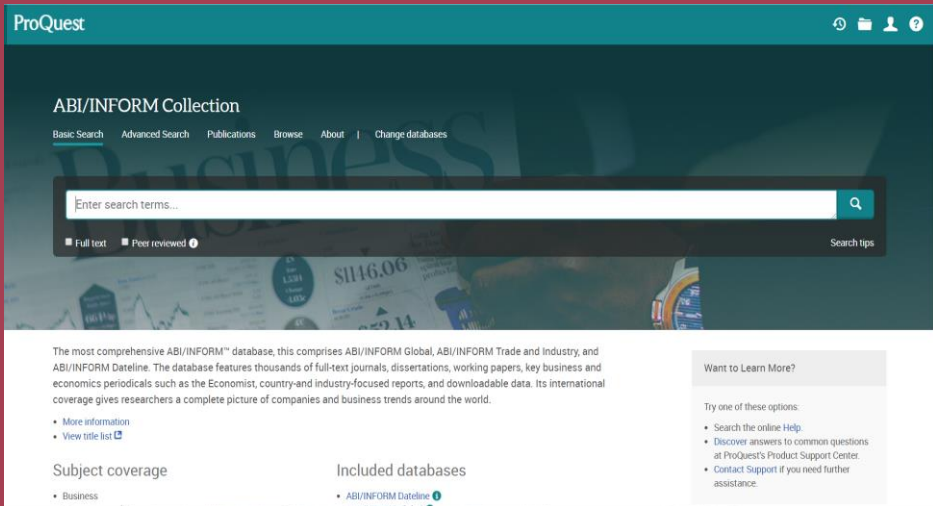
Library Database Research – Journal/Serial Literature

- <u>Additional Databases</u>

  - **ABI/Inform** – A comprehensive business database. It features access to full-text business and economics journals, dissertations, working papers and industry-focused reports. Potentially useful to help build a business case for your project.

  - **Business Source Ultimate** – A comprehensive scholarly business database providing full-text access to more 3,500 journals with subject coverage in the following areas: Accounting, Administration, Banking, Economics, Finance, Human resources, Management, and Marketing. Another potentially useful database for developing a business case for your project.

Library Database Research – Journal/Serial Literature

- <u>Additional Databases</u>

  - **IBISWorld** – The IBISWorld Database provides access to the United States' most comprehensive collection of full-text Industry Market Research and Industry Risk Ratings. In-depth reports on more than 700 U.S. industries that feature a North American Industry Classification Systems (NAICS) number, as well as several hundred additional specialized or "niche" industries in the United States.

  - **ReferenceUSA** – A U.S. business directory currently featuring records for more than 57 million businesses.

Library Database Research – Journal/Serial Literature
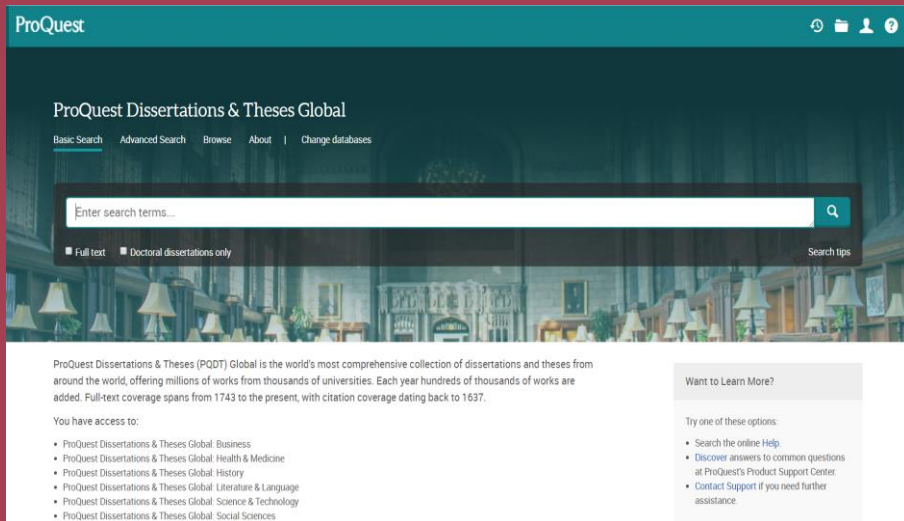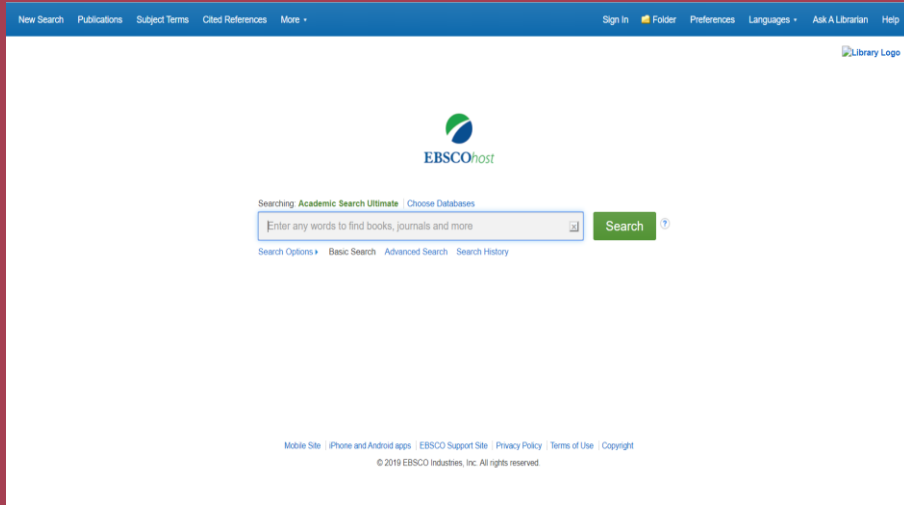
• <u>Additional Databases</u>

• Academic Search Ultimate – MSOE's largest database of peer reviewed scholarly journals. The full text of more than 13,000 academic journals are available, representing a large range of subject disciplines

• Proquest Dissertations and Theses Global – Two million full-text Ph.D. dissertations and master's theses in all subject areas, including engineering

Library Database Research – Journal/Serial Literature

- Additional Databases

  - **Proquest Dissertations and Theses Global** – Two million full-text Ph.D. dissertations and master's theses in all subject areas, including engineering

    - Including "Excimer Laser Fragmentation Fluorescence Spectroscopy for Real-Time Monitoring of Combustion Generated Pollutants," the Ph.D. dissertation by Dr. Damm, completed at the University of California-Berkeley
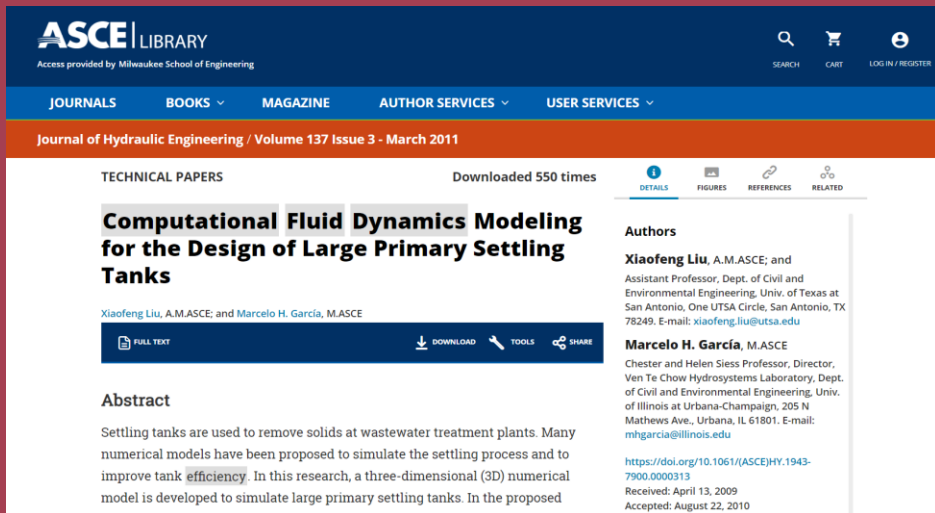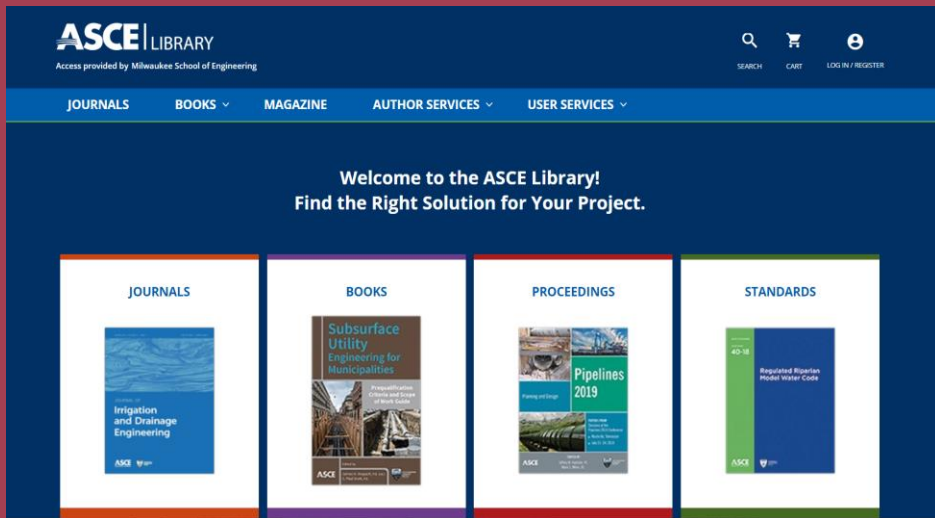
Library Database Research – Journal/Serial Literature

- <u>Additional Databases</u>

  - **ASCE Digital Library** – Full-text access to the books, journal articles, conference publications, and standards produced by the American Society of Civil Engineers (ASCE)

  - Consider this database for appropriate multidisciplinary projects

Library Database Research – Interlibrary Loan
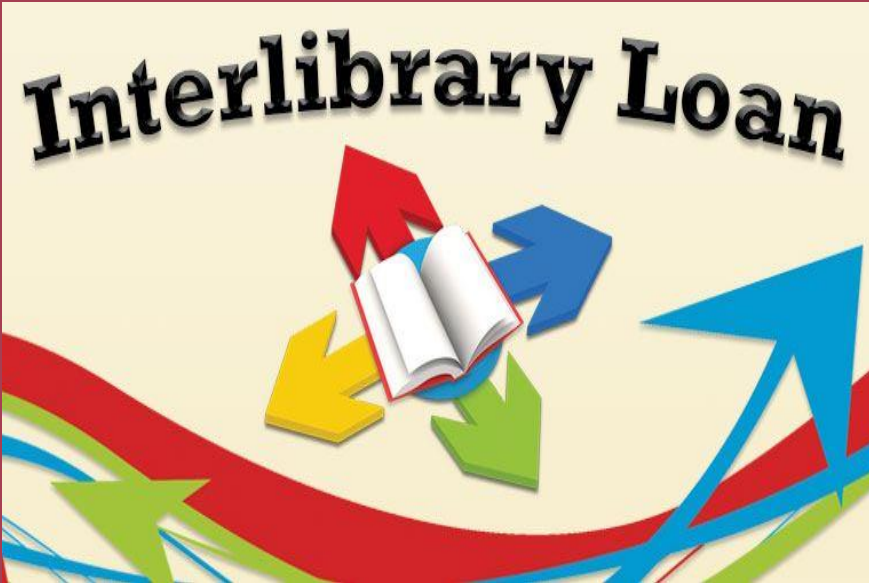
- Interlibrary Loan and Document Delivery

  - See policies and procedures at

  https://libguides.msoe.edu/library/borrowing

  - Send requests to interlibraryloan@msoe.edu

  - When making Interlibrary Loan requests, try to include complete

  bibliographic citation (if possible, copy and paste)

Library Database Research – Remote Database Access

• The MSOE Proxy Server

- Use the MSOE proxy server to remotely access the library databases

- The proxy server is part of MSOE's single sign-on (SSO) service

- When using the proxy server, do <u>not</u> login to MyMSOE and the MSOE VPN

- Because of firewall issues, the MSOE proxy server may not function when you try to connect from a workplace
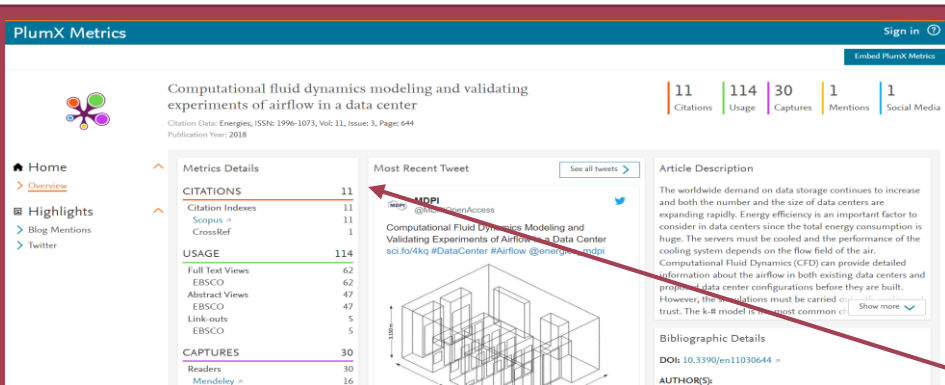
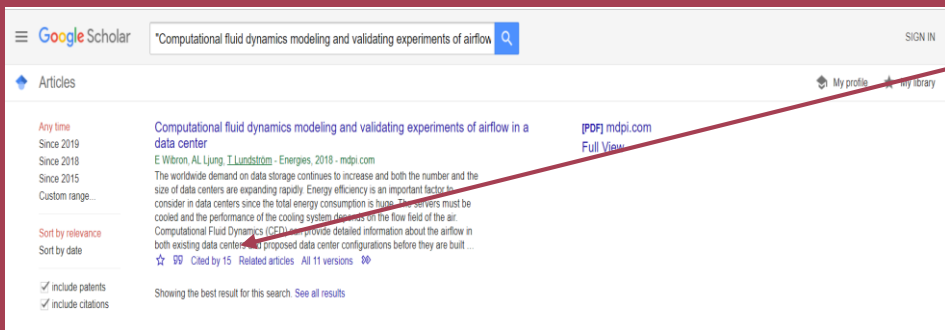# Library Database Research – The Citation Network
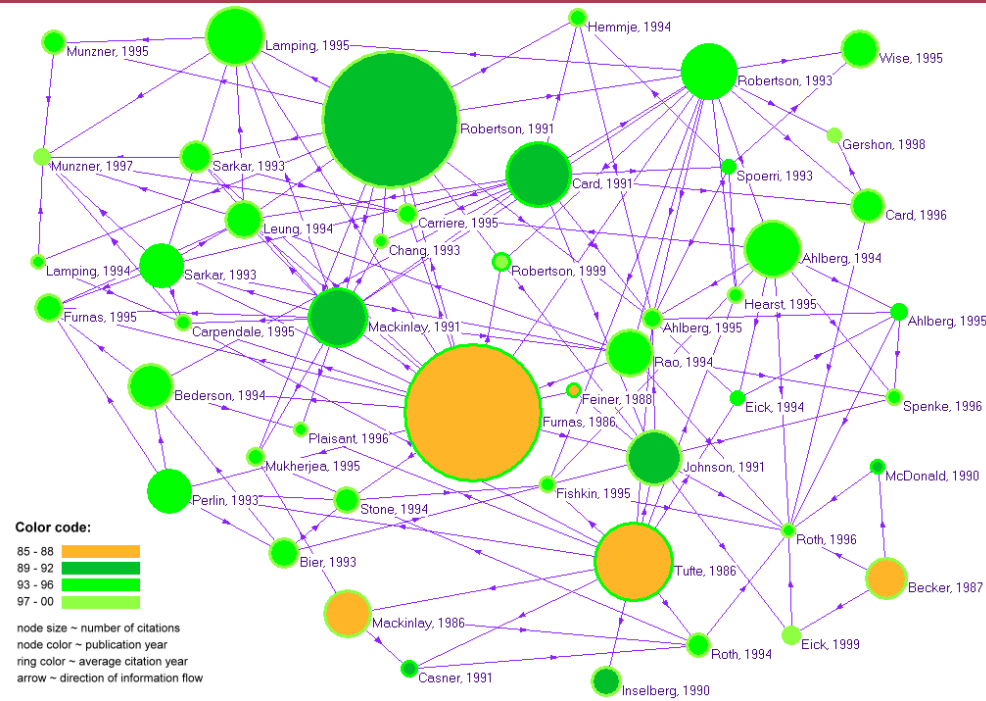
- The Citation Network in Literature Research

    - Read references and bibliographies and track down potentially useful sources

    - Track down other publications by a researcher who has published important literature in a subject area

    - For important documents, find out the other documents they have subsequently been referenced in – this is the intellectual network with respect to a subject area

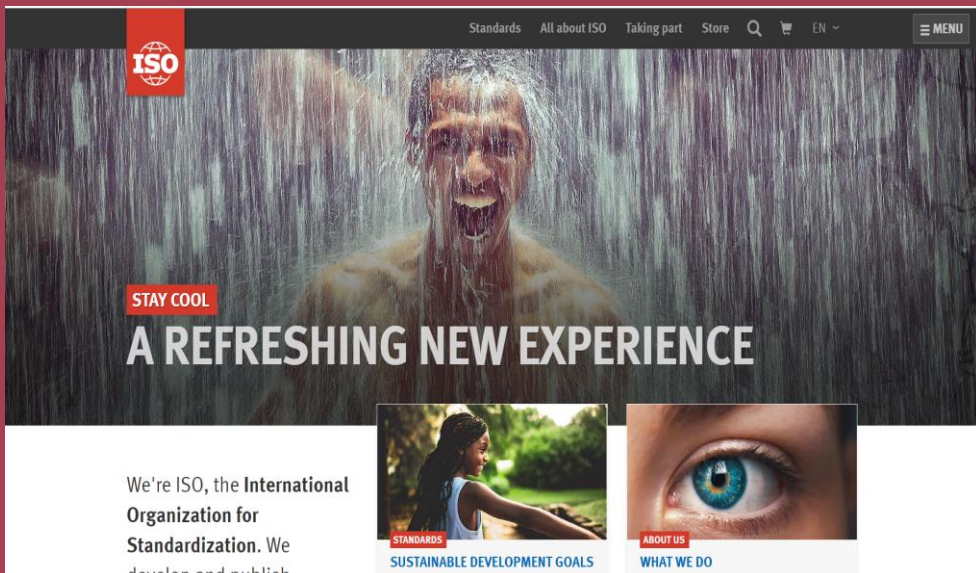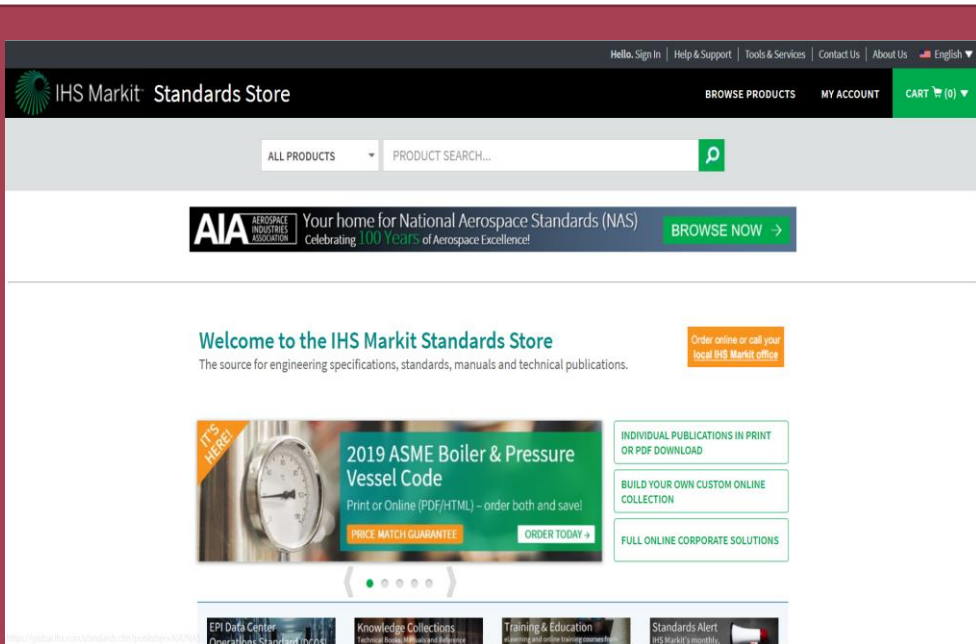# Library Database Research – The Citation Network

- <u>Find Out Where Else a Document Has Been Referenced</u>

    - For some library databases, click on the "Cited" link or other tool (e.g., PlumX) to see other documents that have referenced the document

    - Download, install, and use **Publish or Perish** (see https://harzing.com/resources/publish-or-perish). Look up a document and see if it's been referenced. If so, right-click and select the option for loading the references in a browser

    - In Google Scholar, click on the "Cited by" link

Library Database Research – Standards

• <u>Research and Use Relevant Standards</u>

  • IHS Markit Standards Store (https://global.ihs.com/?rid=IHS) to identify potentially relevant standards

  • Search the websites of standards-producing organizations (e.g., ASME, ANSI, ISO, ASTM, ASQ)

  • Department of Defense ASSIST Database for military standards and other publications -- see http://dodssp.daps.dla.mil/

Library Database Research – Standards
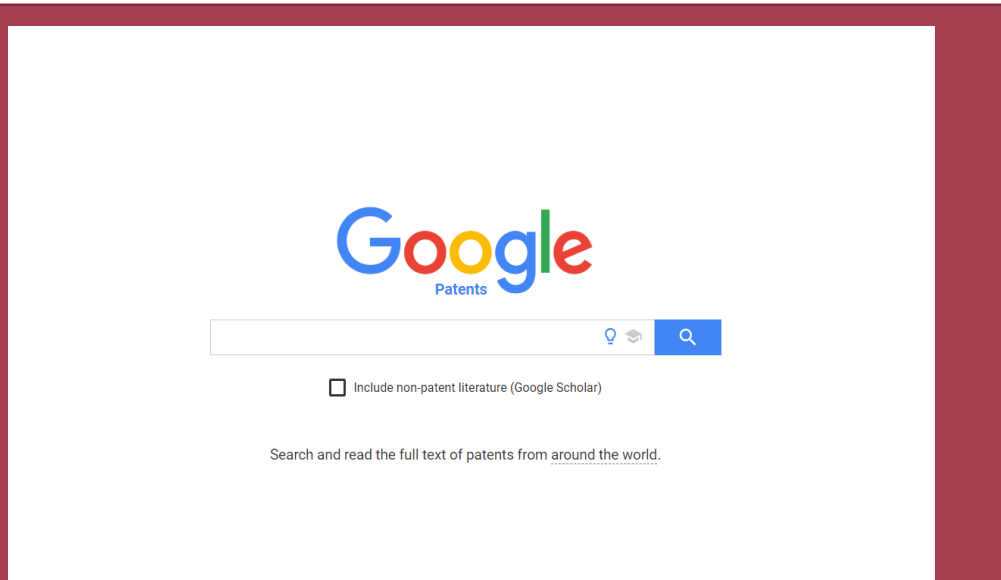

- <u>Research and Use Relevant Standards</u>

  - The MSOE library will attempt to borrow or purchase relevant standards for senior design projects (e.g., ISO, SAE). The request form for codes and standards is at https://libguides.msoe.edu/codes/request. (Standards costing more than $100 are the property of the MSOE library)

  - Full-text standards available at MSOE: ASTM (older versions, print, first floor; download service available for new versions); NFPA (National Electric Code); IEEE (full text)

Library Database Research – Patents

- Research and Use Relevant Patents

    - Patent literature is outstanding technical literature!

    - Google Patents at https://patents.google.com/

    - United States Patent Full-Text and Image Databases at http://patft.uspto.gov/

    - Espacenet European and International patents at https://www.epo.org/searching-for-patents/technical/espacenet.html#tab-1

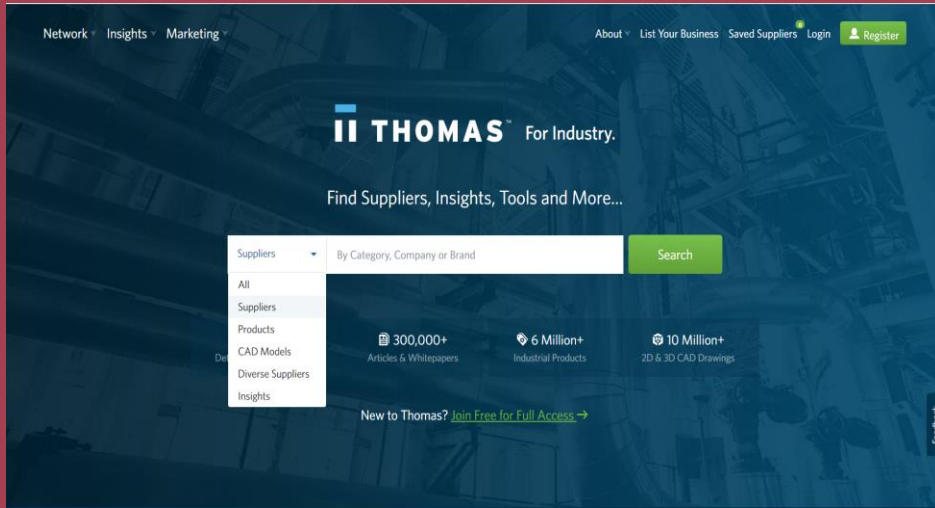   - Patentscope at https://patentscope.wipo.int/search/en/search.jsf

Library Database Research – Patents
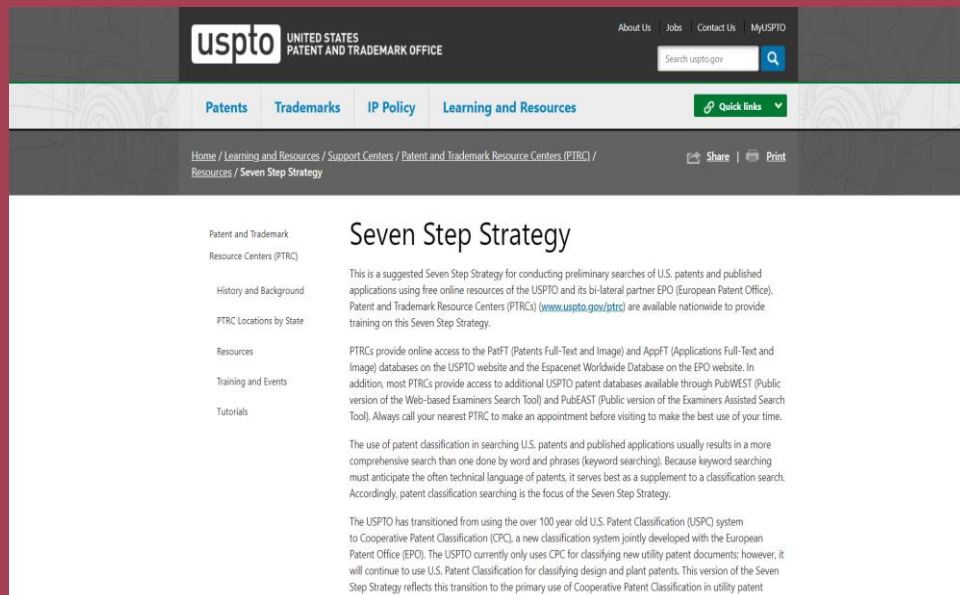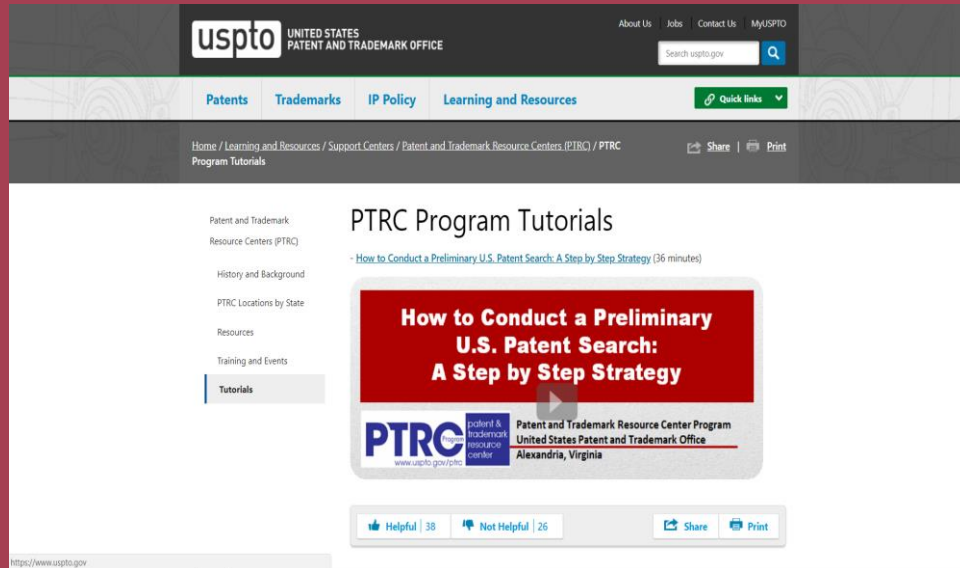
- <u>Research and Use Relevant Patents</u>

    - Use searches that combine keywords and class (and sub-class) codes

    - U.S. Patent Office Video: "How to Conduct a Preliminary U.S. Patent Search: A Step-by-Step Video" at **https://www.uspto.gov/learning-and-resources/support-centers/patent-and-trademark-resource-centers-ptrc/ptrc-program**

    - U.S. Patent Office Seven-Step Search Strategy at **https://www.uspto.gov/learning-and-resources/support-centers/patent-and-trademark-resource-centers-ptrc/resources/seven**
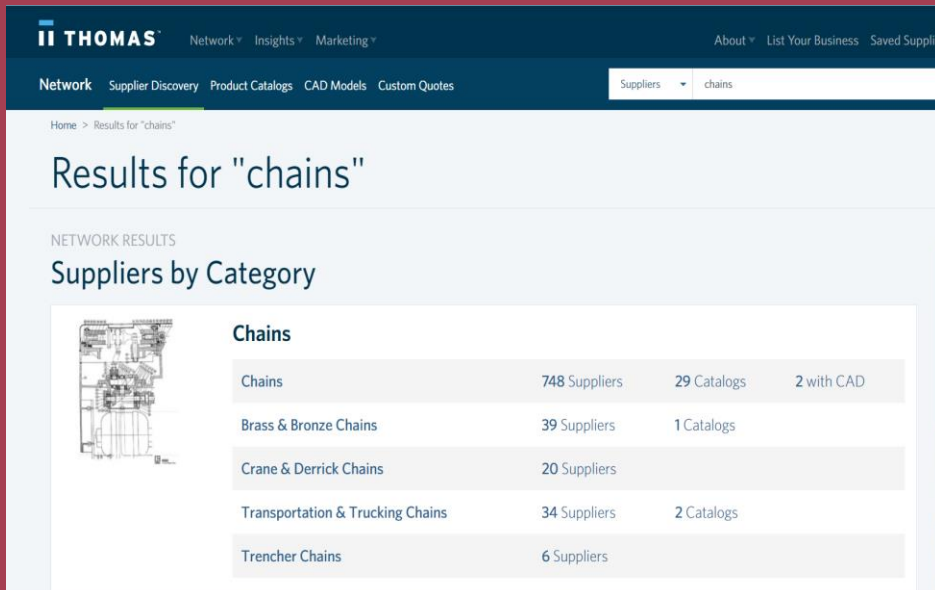
Library Database Research – Product Resources

• Finding Products/Components

    • **ThomasNet (Thomas Register)** – https://www.thomasregister.com

    • Free site

    • Products searchable by: suppliers – products – CAD models – articles and white papers

Library Database Research – Product Resources

• <u>Finding Products/Components</u>

      • <u>ReferenceUSA Database</u> – MSOE library databases

            • Advanced search: Search by SIC codes or NAICS codes

      • Wisconsin Manufacturers Register (Reference Book)

      • NAICS Association free NAICS and SIC codes lookup --

https://www.naics.com/search.htm

      • U.S. Securities and Exchange Commission SIC code lookup at

https://www.sec.gov/info/edgar/siccodes.htm

      • IBISWorld – In-depth industry reports – Library Databases

      • ABI/Inform and Business Source Complete – Library business

databases

Library Database Research – Previous Mechanical Engineering Senior Design Projects

- Previous ME Senior Design Projects

    - In the MSOE library catalog, do a Subject Keyword search on **ME Project**

    - Paper copies of project reports available on library first floor (in the **Special Collections** Creepy Oscar Werwath Room)

    - Not all projects available – library is dependent on each academic program to deliver project reports

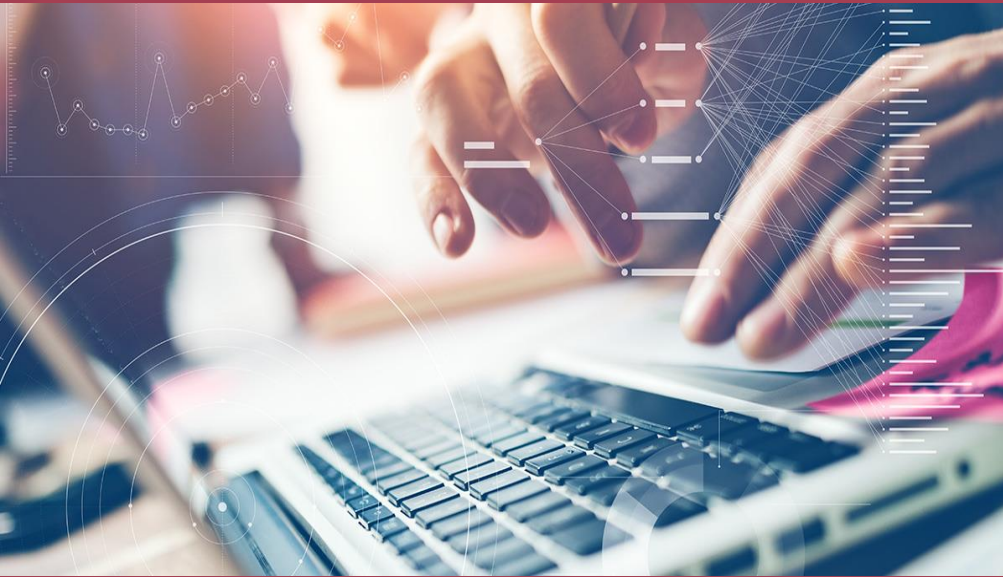   - You can use filters to additionally refine results (e.g., dates)

• And don't forget: No matter what your Senior Design Project is concerned with, always remember to reference your advisor in your report!

Here are the results of a search in Summon on publications by Dr. Damm!
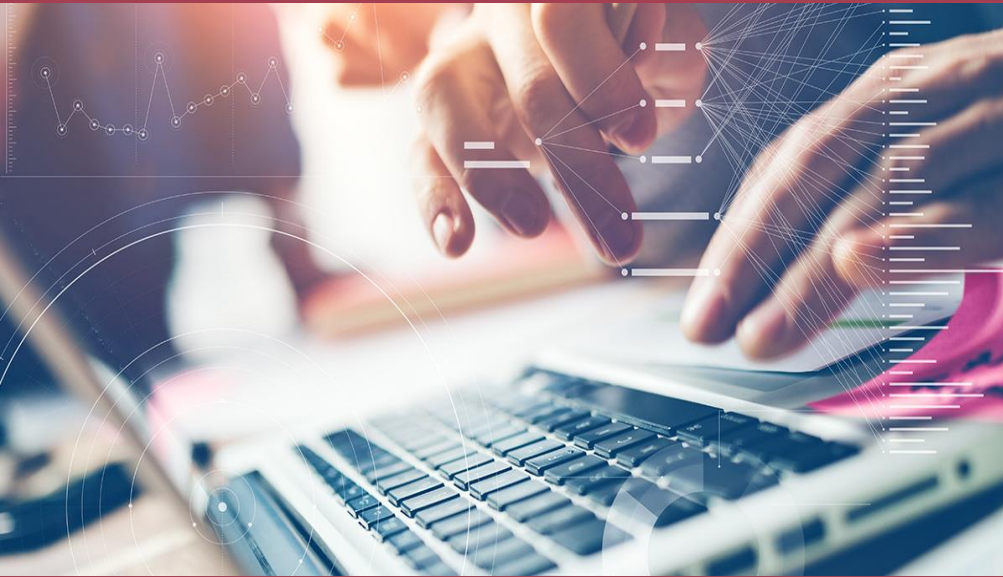
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THANK YOU

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