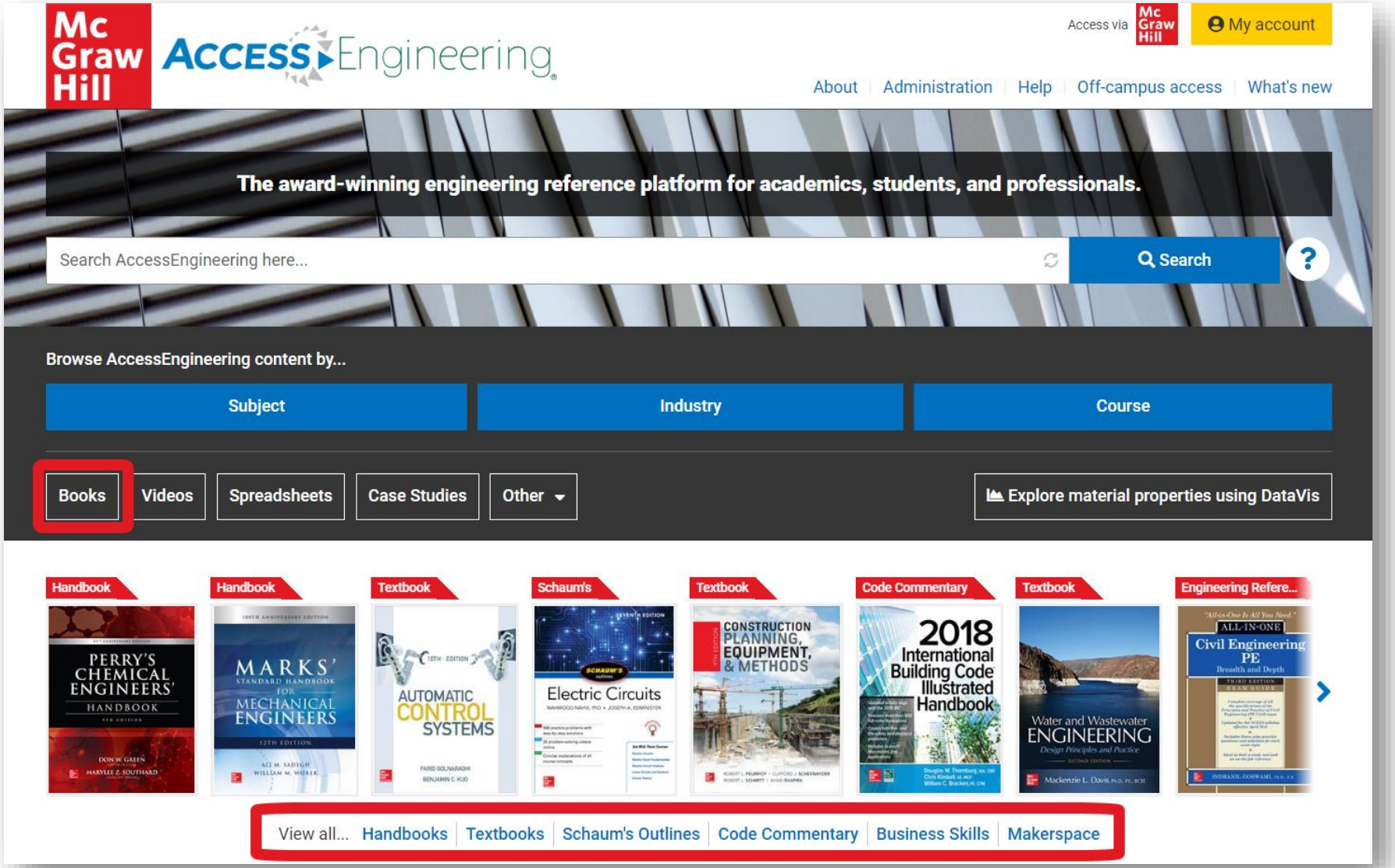
AccessEngineering Overview

A Tour of the Site and Content

AccessEngineering provides full access to over 700 titles across all engineering disciplines, including popular handbooks and upper level textbooks.

All titles are available at no additional cost to your students through an institutional subscription.

Enhanced Book Content

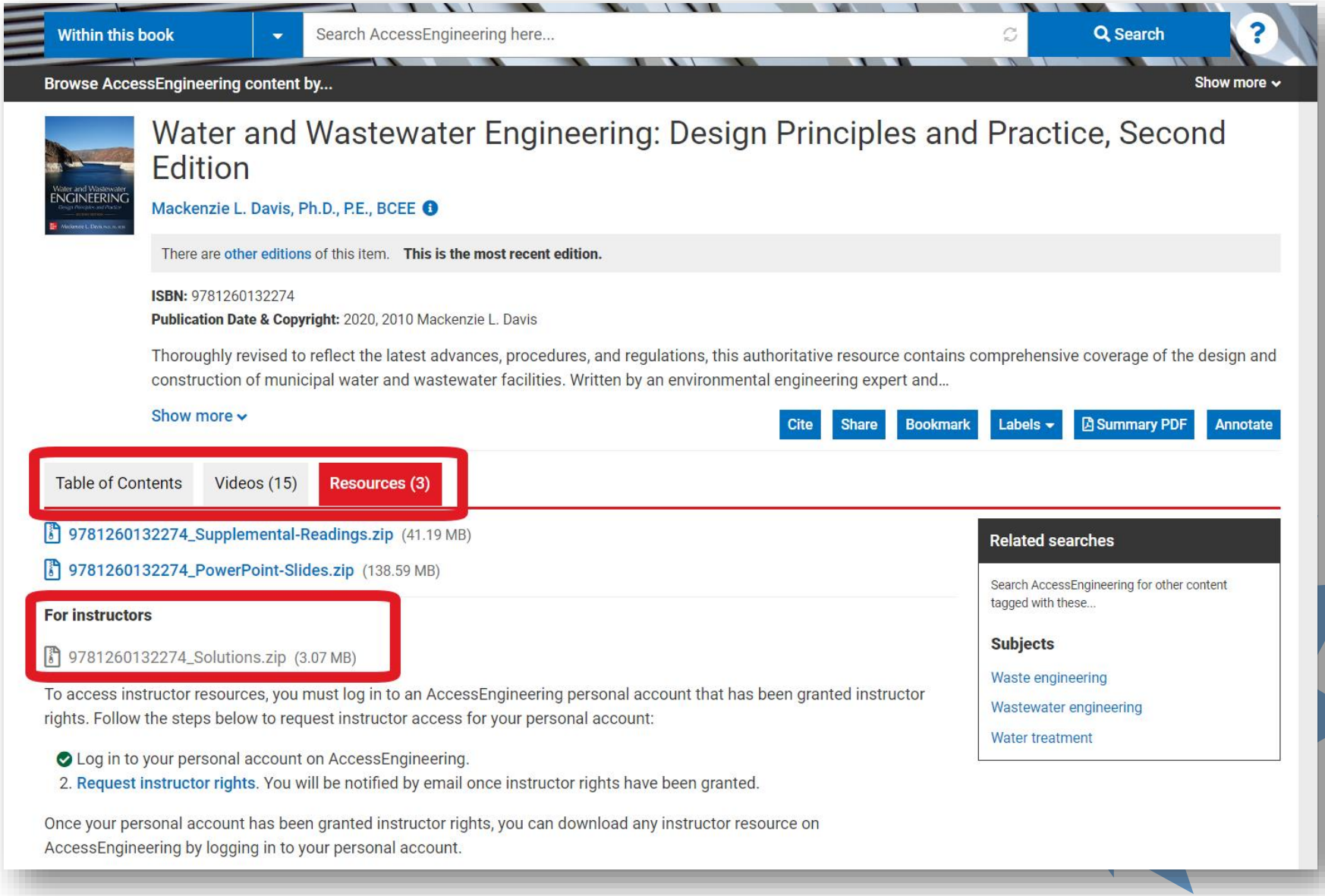


Top titles are displayed on the homepage, and lists are available by book type to browse through titles

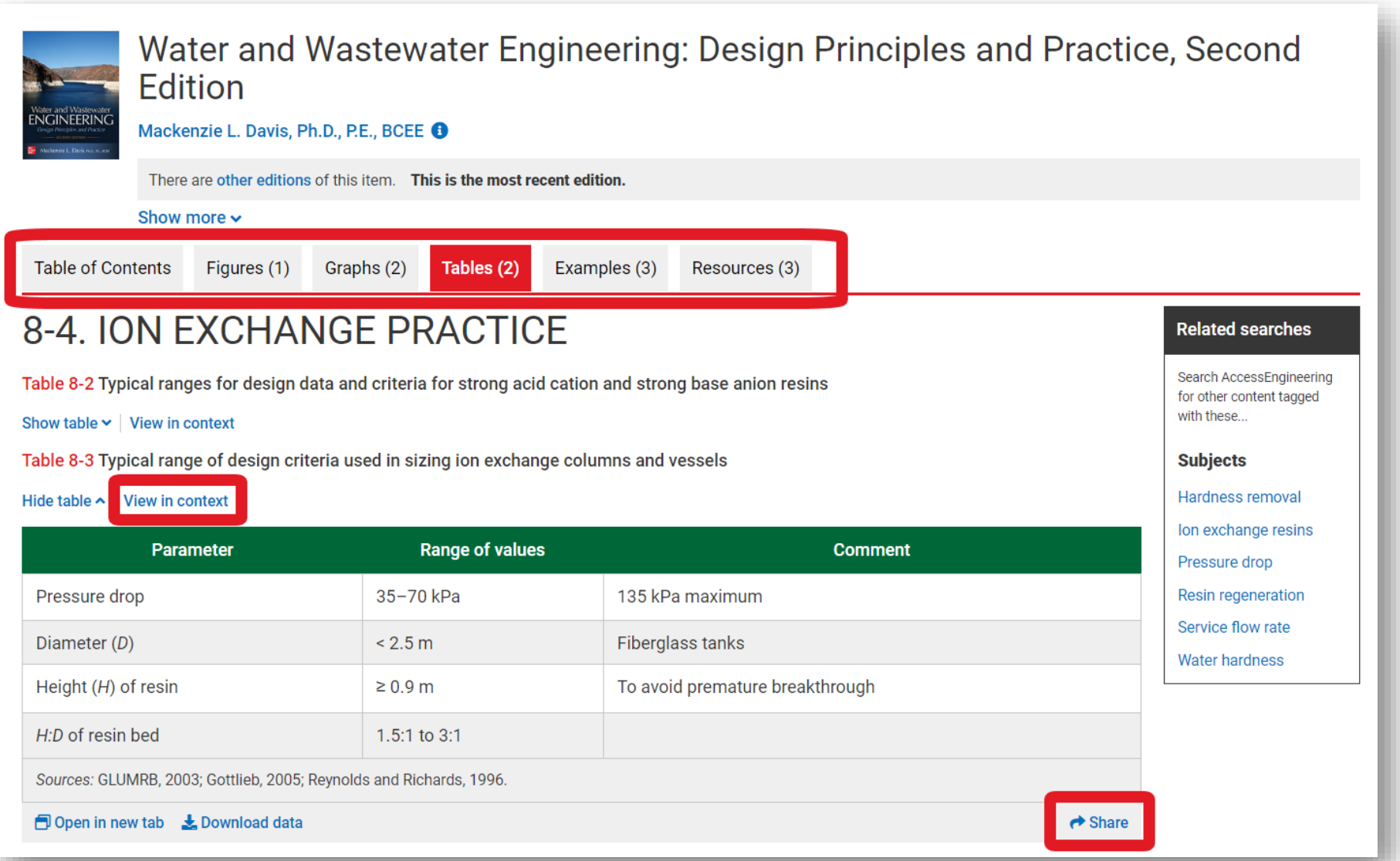
Enhanced Book Content

Instructor resources and videos are available for many titles

[See the full list of titles with instructor resources]



Enhanced Book Content

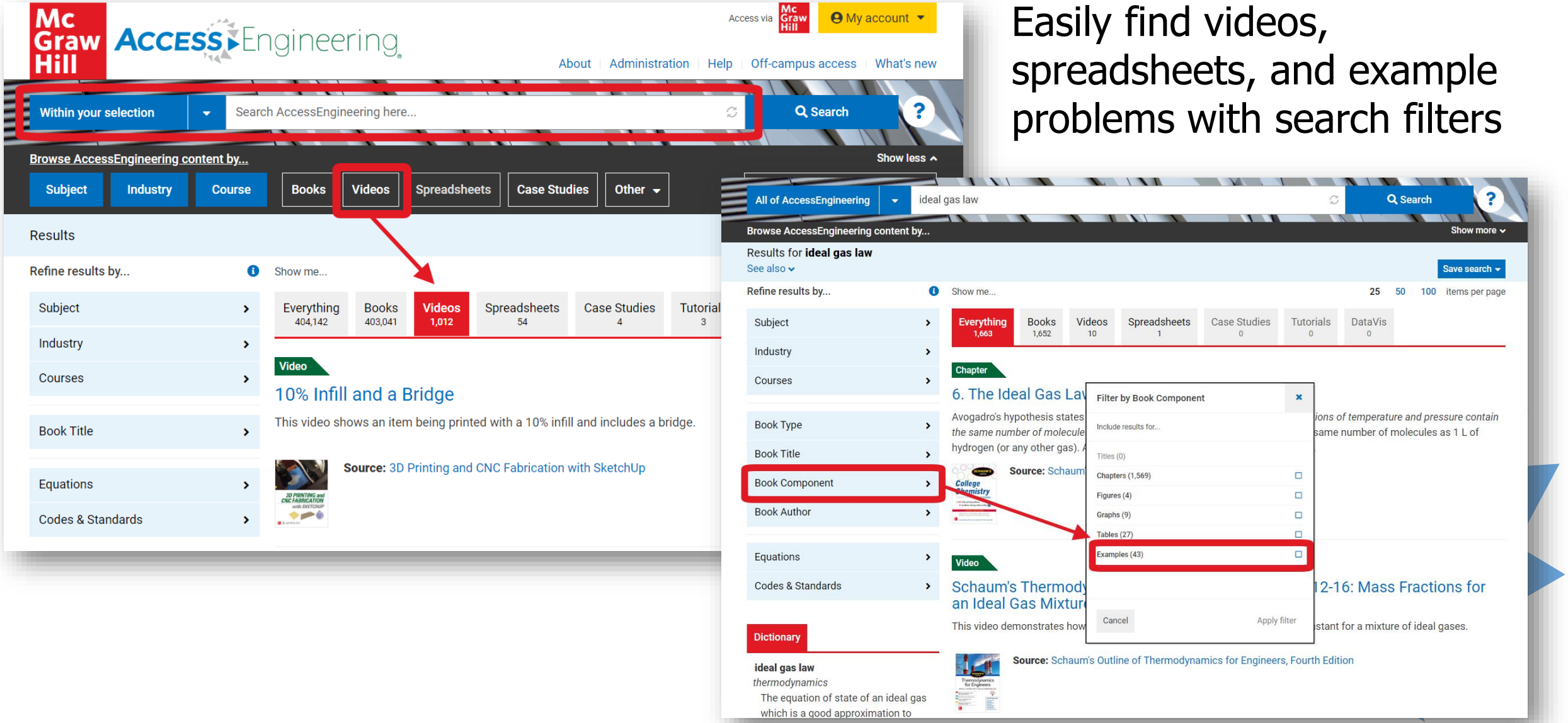


View videos, figures, graphs, tables, and examples in each book section and share direct links to content

AccessEngineering provides real-world examples applying fundamental concepts in context.

Problem-solving tools including video tutorials and spreadsheet calculators help support student learning.

Problem-Solving Tools

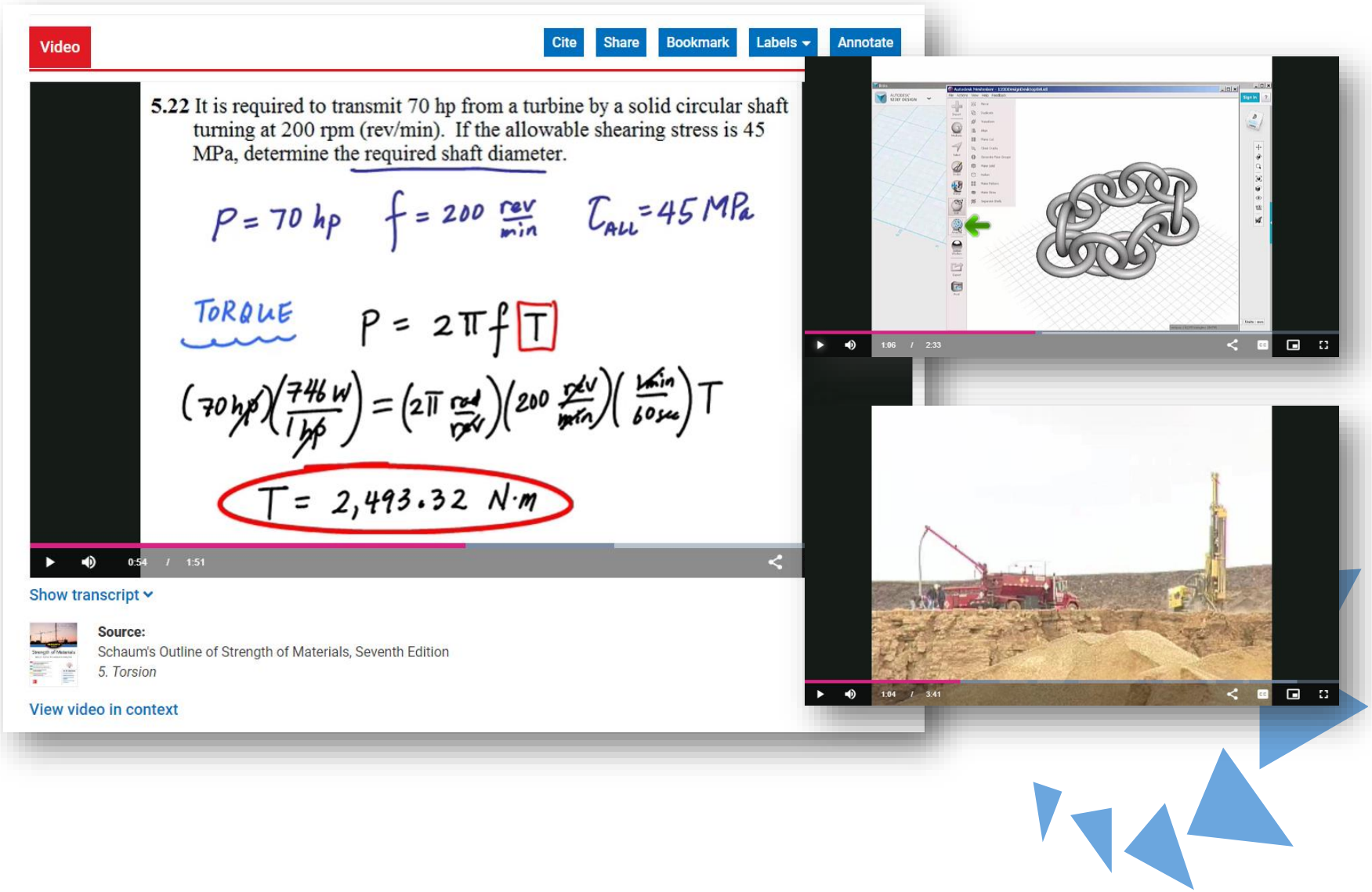


Easily find videos, spreadsheets, and example problems with search filters

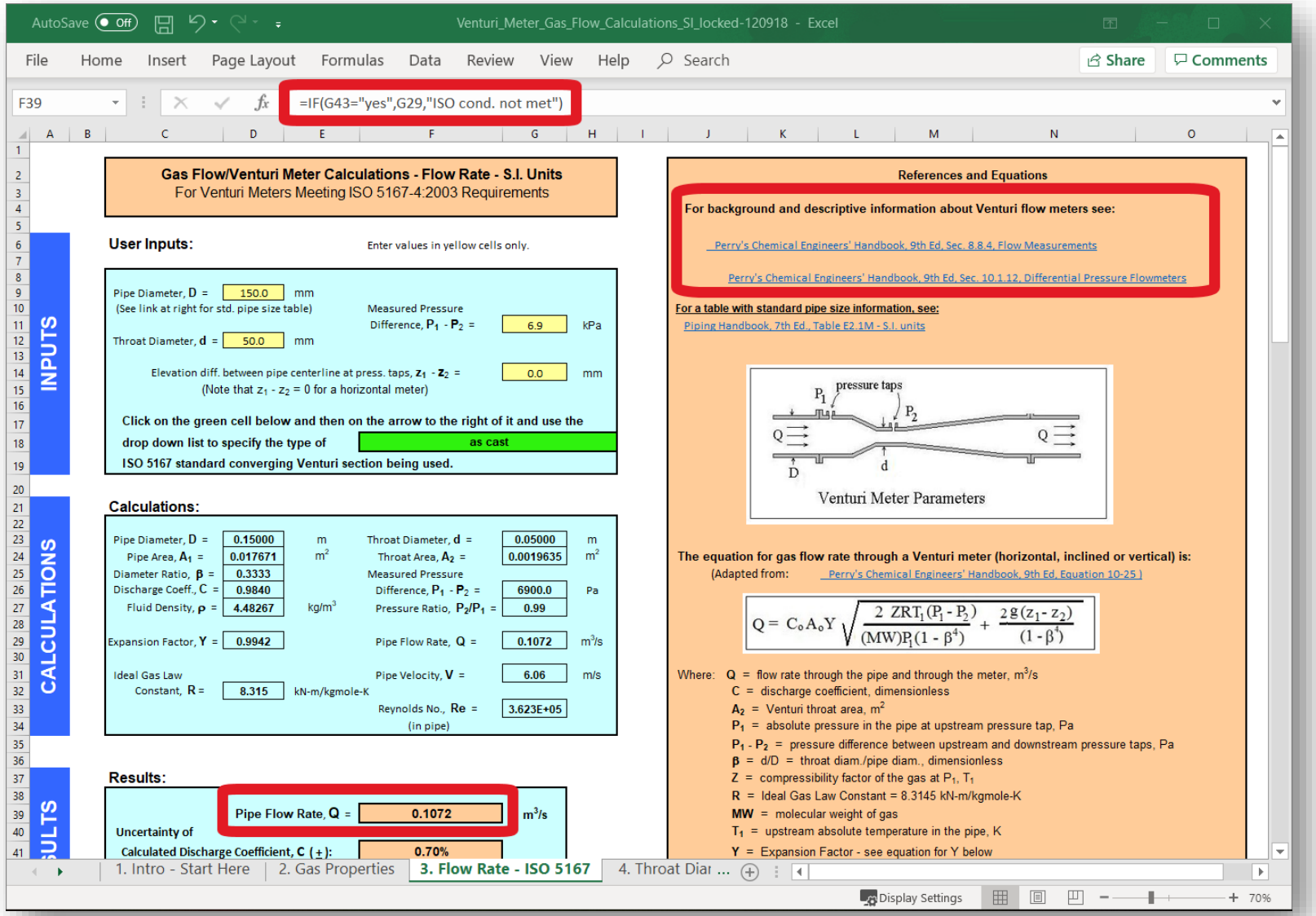
Problem-Solving Tools

Problem-solving videos walk step-by-step through worked examples

Other videos show equipment and processes



Problem-Solving Tools



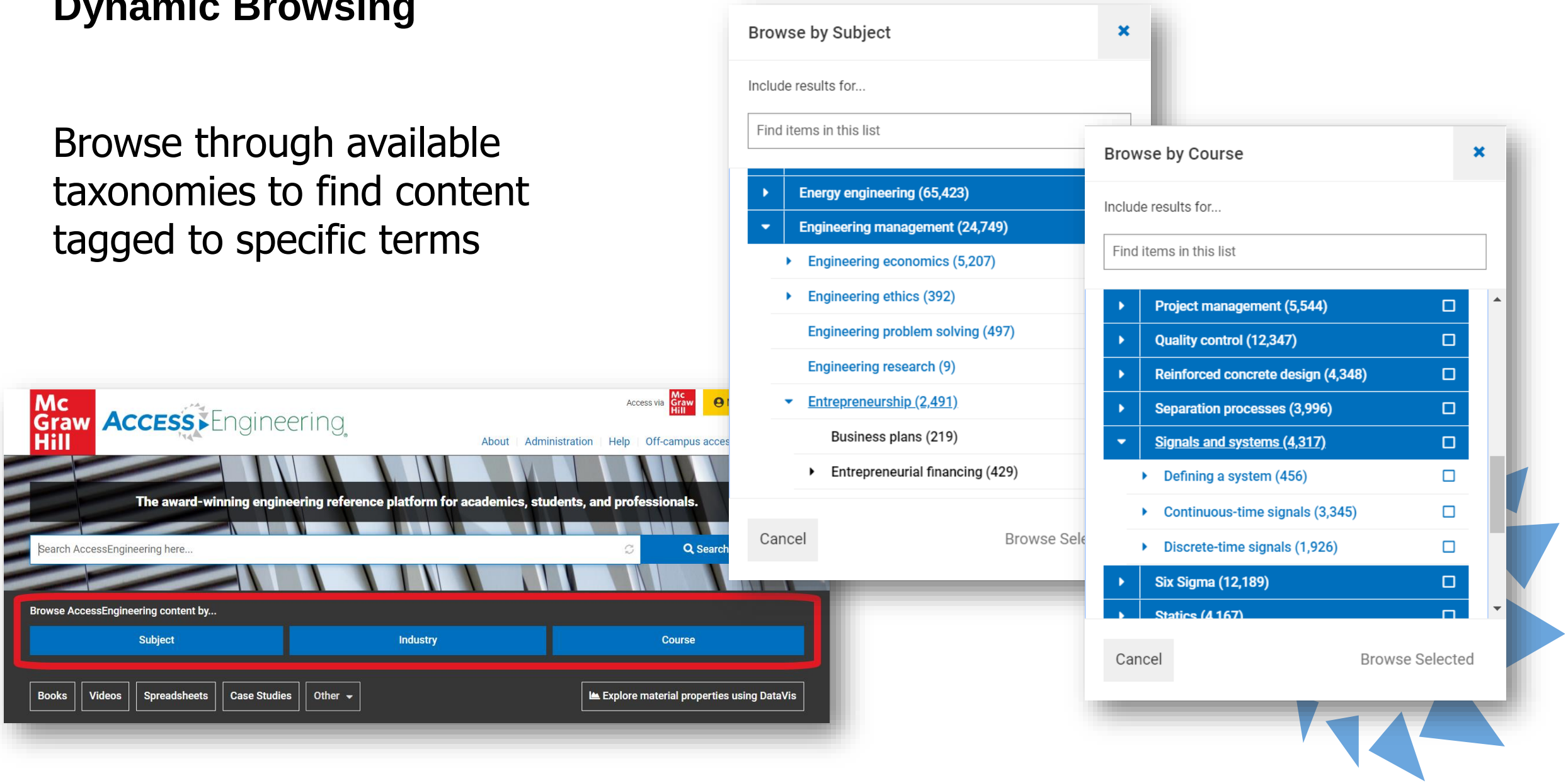
Spreadsheet calculators streamline complex engineering calculations with full transparency of formulas and equations used

AccessEngineering has dynamic browsing options to easily find relevant content.

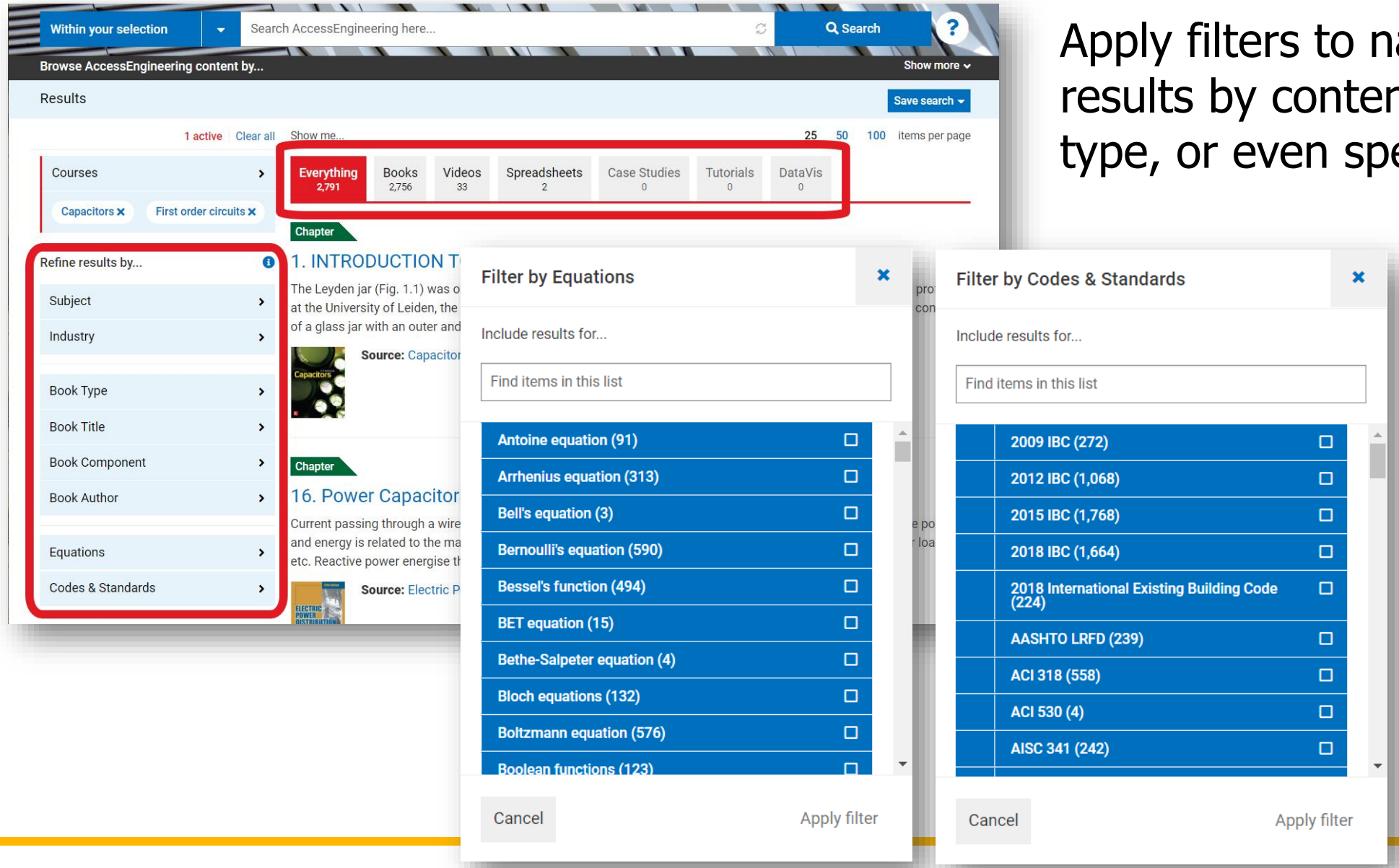
Browse by Course to map our content to syllabi for common engineering courses across all disciplines and grade levels.

Dynamic Browsing

Browse through available taxonomies to find content tagged to specific terms



Dynamic Browsing



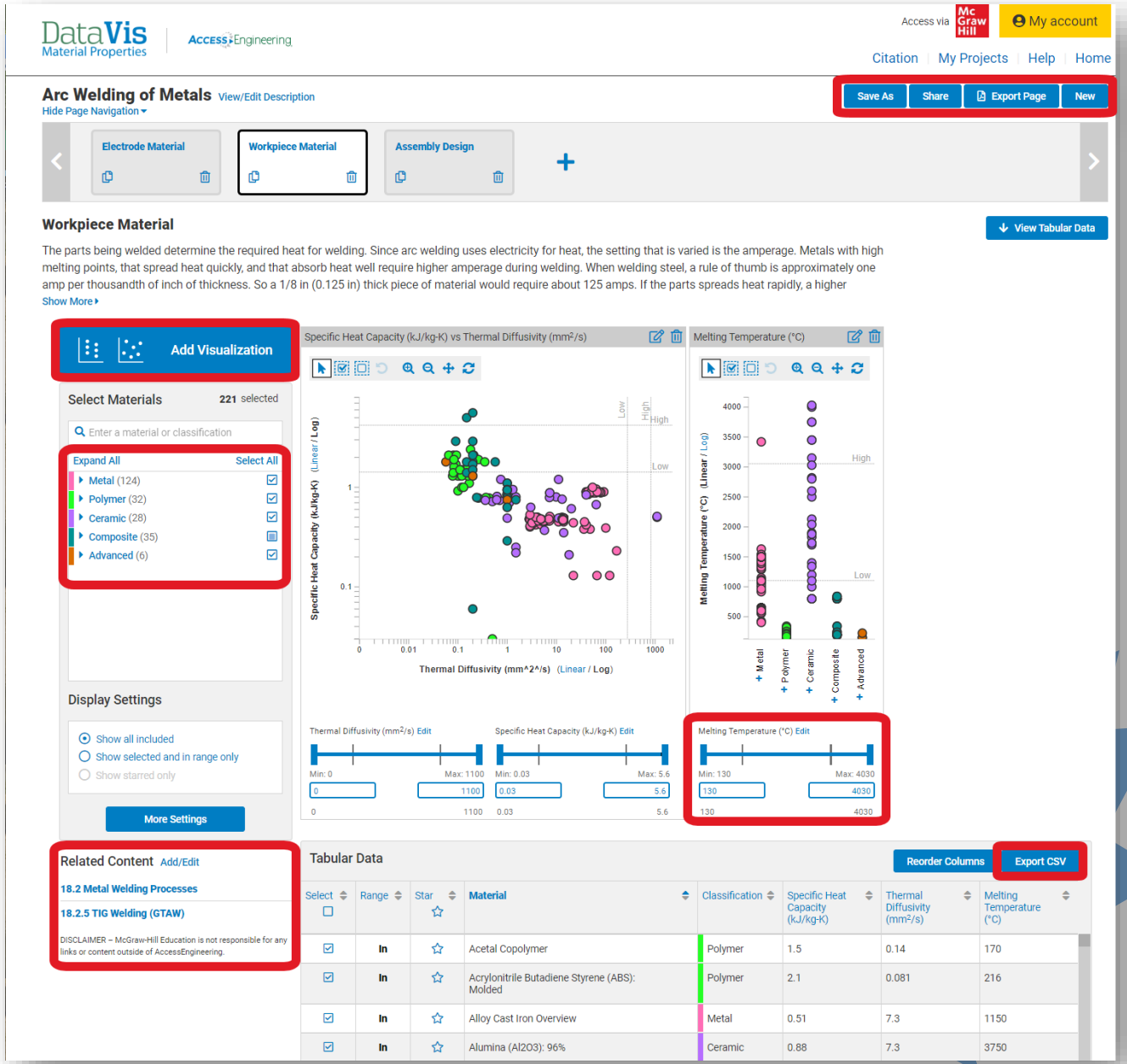
Apply filters to narrow down results by content type, book type, or even specific equations

AccessEngineering further supports teaching with interactive instructional tools.

Use DataVis to visually explore material properties, or incorporate active learning with problem-based Case Studies.

Instructional Tools

DataVis helps students understand material properties with an interactive visual display comparing property values across material classes



Instructional Tools

QUESTIONS

Select Questions for Engineering Design

1. What are the current solutions for at-home BP monitoring
2. Develop a new solution to monitor BP continuously and in market. Incorporate the following design considerations: 1 power and be lightweight), 2) the device must provide cont insensitive to movement artifacts. You can review the follc monitoring systems: Meidert, Agnes S., and Bernd Saugel. pressure." *Frontiers in Medicine* 4 (2018): 231.
3. Review the following standard:

   ANSI/AAMI/ISO 81060-2:2018: American National Standar Instrumentation. International Organization for Standardiz

   a. Provide an example solution for at-home blood pressu

   b. Use the standard to propose the design requirements table that identifies your design criteria and you accep

   c. Using the standard, propose the validation and verifica solution. See the following standard for standard clini

Select Questions for Commercialization and Business Strategy

1. Unmet Clinical Need: Evaluate the global, economic, ethica monitors for continuous BP monitoring in those with hyper
2. Regulatory: Review the FDA Website: https://www.fda.gov/ documents/non-invasive-blood-pressure-nibp-monitor-gu Guidance".

   What would be the appropriate FDA path to market for your new BP monitoring device?
3. Reimbursement: A reimbursement landscape assessment is an important activity to do prior to performing research and development of a new medical device. This is the process of identifying how healthcare providers receive payment for services provided to the patient.

   a. Identify who your target demographics would be for your BP monitoring device.
4. Market Analysis: Given your new at-home BP monitoring solution, answer the following questions for your company:

   a. How do you determine how much a company is worth? How do you determine the percent market share a company has in the healthcare industry?

   b. How will your company make money? What is the revenue model and pricing tactics?

   c. Who are your key partners and suppliers?

Select Questions for Biosignal Processing

You've decided to design a cuffless BP monitor for continuous monitoring. To do this you've decided to use the volume clamp method to estimate the pulse transit time, the time interval that a heart beat transfers to a body peripheral. It has been found that there is a strong correlation between pulse transit time (PTT) and BP. However, this relies on many factors that vary among individuals.

To estimate the pulse transit time, we use the following equation [1]:

$$PTT = 1\sqrt{LC\,(P)}$$

Continuous Blood Pressure Monitoring: Addressing Unmet Clinical Needs

Christine E. King

2020-04-08

Blood pressure (BP) monitoring has become important, as rates of cardiovascular disease have increased due to our aging society. Hypertension is a common condition leading to cardiovascular disease and can potentially impair the functioning of vital organs. Home BP monitors can improve hypertension through continuous monitoring during treatment.

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Case Study | Resources (2)

Focus View | Related searches

INTRODUCTION

The ability to monitor blood pressure (BP) over an extended period of time has beco
cardiovascular disease is the leading cause of mortality in developed countries [1].
condition that leads to cardiovascular disease. Hypertension is characterized by an
which causes stress on the heart, also known as hypertensive heart disease. Since
years without any symptoms, damage to blood vessels and the heart can continue
of heart attack and stroke [2]. Conversely, low BP, or hypotension, is characterized b
arteries, which can cause syncope (i.e. fainting) or even shock [3]. Both conditions
properly monitored and maintained, as BP is important for a healthy heart and orgar

LEARNING OBJECTIVES

1. *Clinical.* Evaluate the deficits in existing blood pressure monitoring solutions and clearly define the unmet clinical need for a new medical device with consideration of global, economic, ethical, and societal cont Outcome 4)
2. *Physiology*. Determine the physiological and engineering principles required to develop a continu monitoring device. (ABET Student Outcome 7)
3. *Biosignal Processing.* Determine the electrical and signal processing requirements of the new m apply these principles to monitor blood pressure in real time. (ABET Student Outcome 6)
4. *Engineering Design.* Design an innovative technology to continuously monitor BP in accordance engineering standards. (ABET Student Outcome 1)
5. *Commercialization & Business Strategy*. Determine the appropriate path to market for a new mec the regulatory and reimbursement strategy.

MISSION

As a recent biomedical engineering graduate, you were hired by the critical care division at a leading medical technology company, Heart Sciences Corporation, to expand their current hemodynamic mo an at-home continuous BP monitoring device for those with hyper and hypotension. Heart Sciences originally established as the developers of artificial heart valves. Although the company is well know leaders of heart valve technologies, they have recently expanded to other technologies, such as hem (i.e. continuous monitoring of the movement of blood and pressures being exerted in the veins, arter new employee entering the critical care division, you have identified a clear, unmet clinical need for c BP monitoring, which would expand the company's current solutions beyond hemodynamic monitori your responsibility to understand the clinical need and existing solutions, to innovate beyond these c prepare a development plan for your manager in the critical care division.

RECOMMENDED PRE/CO-REQUISITES: physiology, biomedical signals and systems, biomedical ele design

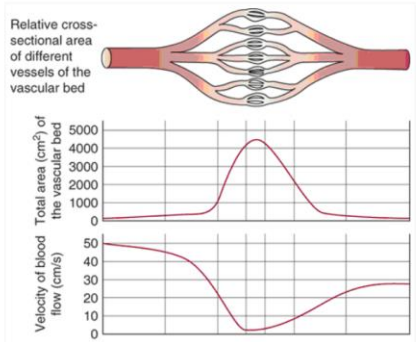
BACKGROUND

Physiology

Blood Flow

Blood flow is initiated by the contraction of ventricles in the heart, which ejects blood into the major arteries and allows the flow of blood from high pressure regions to low pressure regions. Pressure of the blood decreases as blood flows from large arteries to smaller arteries and arterioles then capillaries and venules and veins of the venous system. This is because the total area of the blood vessels decreases as blood travels from fewer but larger diameter vessels to many but smaller diameter arterioles and capillaries, causing a decrease in blood pressure since pressure is inversely proportional to area (Figure 1). Hydrostatic pressure is the force exerted by a fluid due to the force of gravity against the wall of the container in which it is being held in. BP is a form of hydrostatic pressure, as it is measured using the force

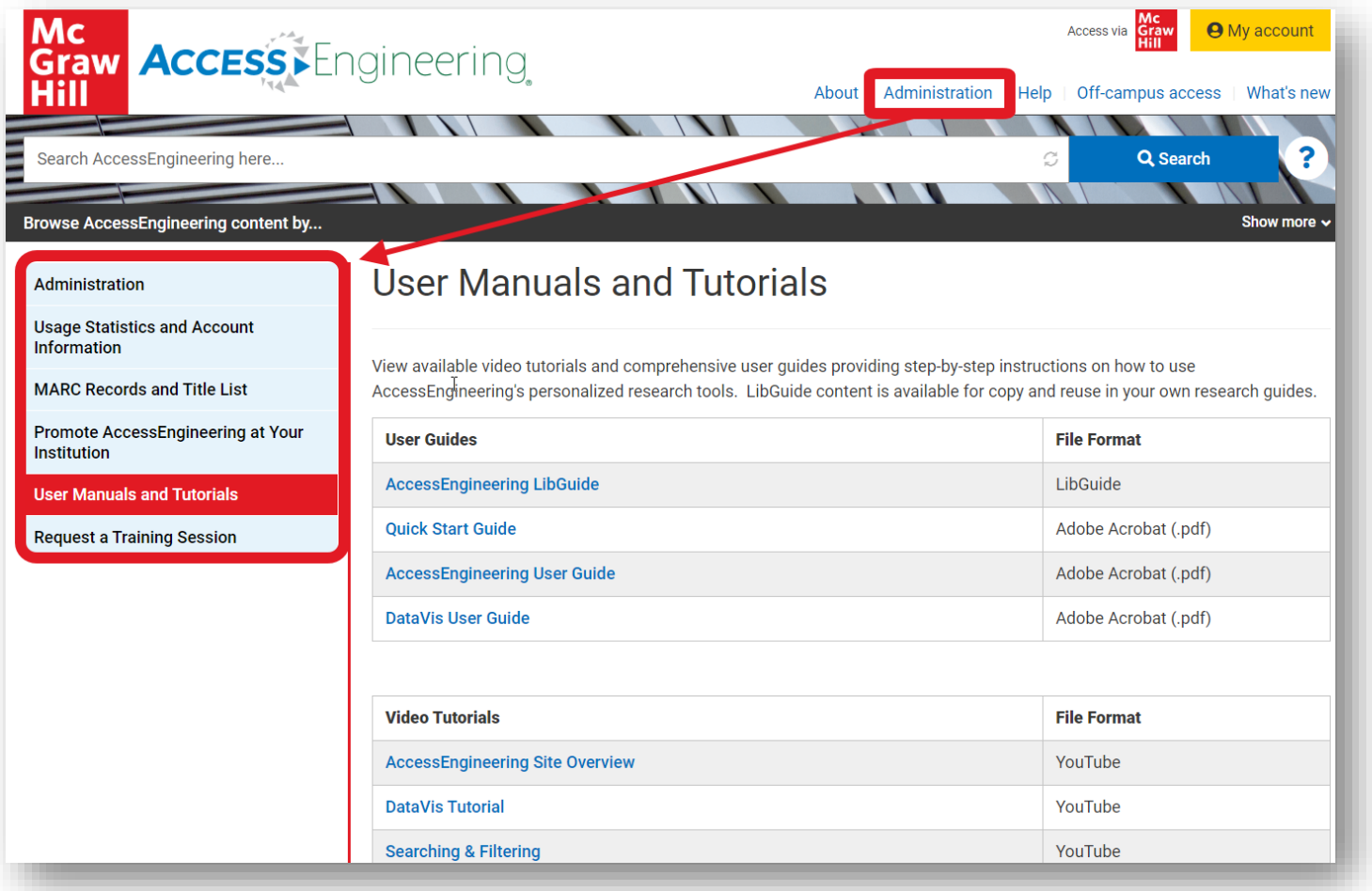
Figure 1 **The total area of the vessels (i.e. vascular bed) as blood travels from the heart to the capillaries to deliver oxygen to the muscles, the velocity of blood flow, and the blood pressure as a relationship of the vessels in the circulation system. (Reproduced with permission from K. Valentin Fuster, et al., *Hursts's The Heart, 14th Edition*, New York, NY: McGraw-Hill, 2017).**



Case Studies present a real-world scenario and guide students through various technical, design, economic, and ethical considerations

AccessEngineering supports librarians with administrative features and outreach resources to help your institution get the most from your subscription.

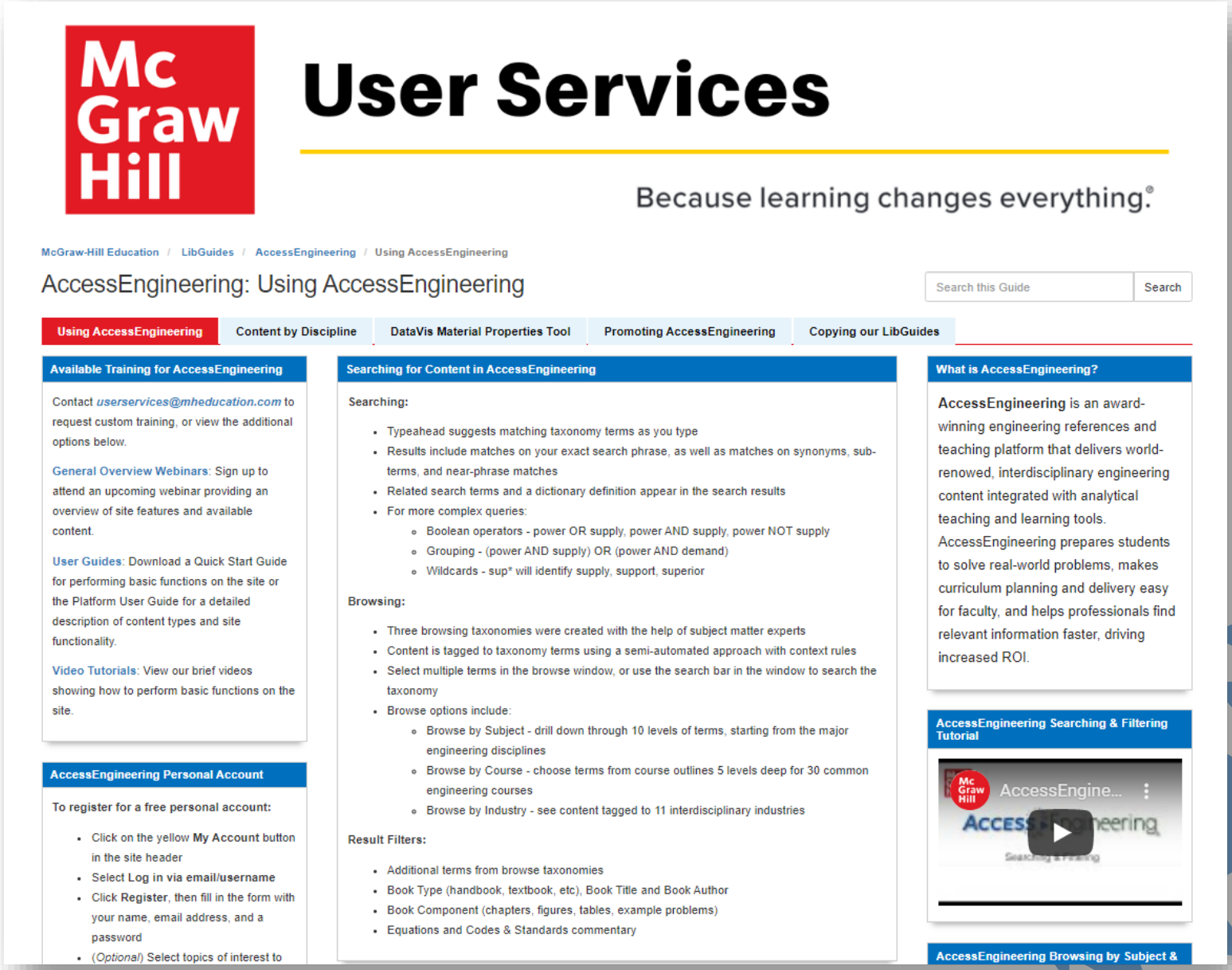
Librarian Support



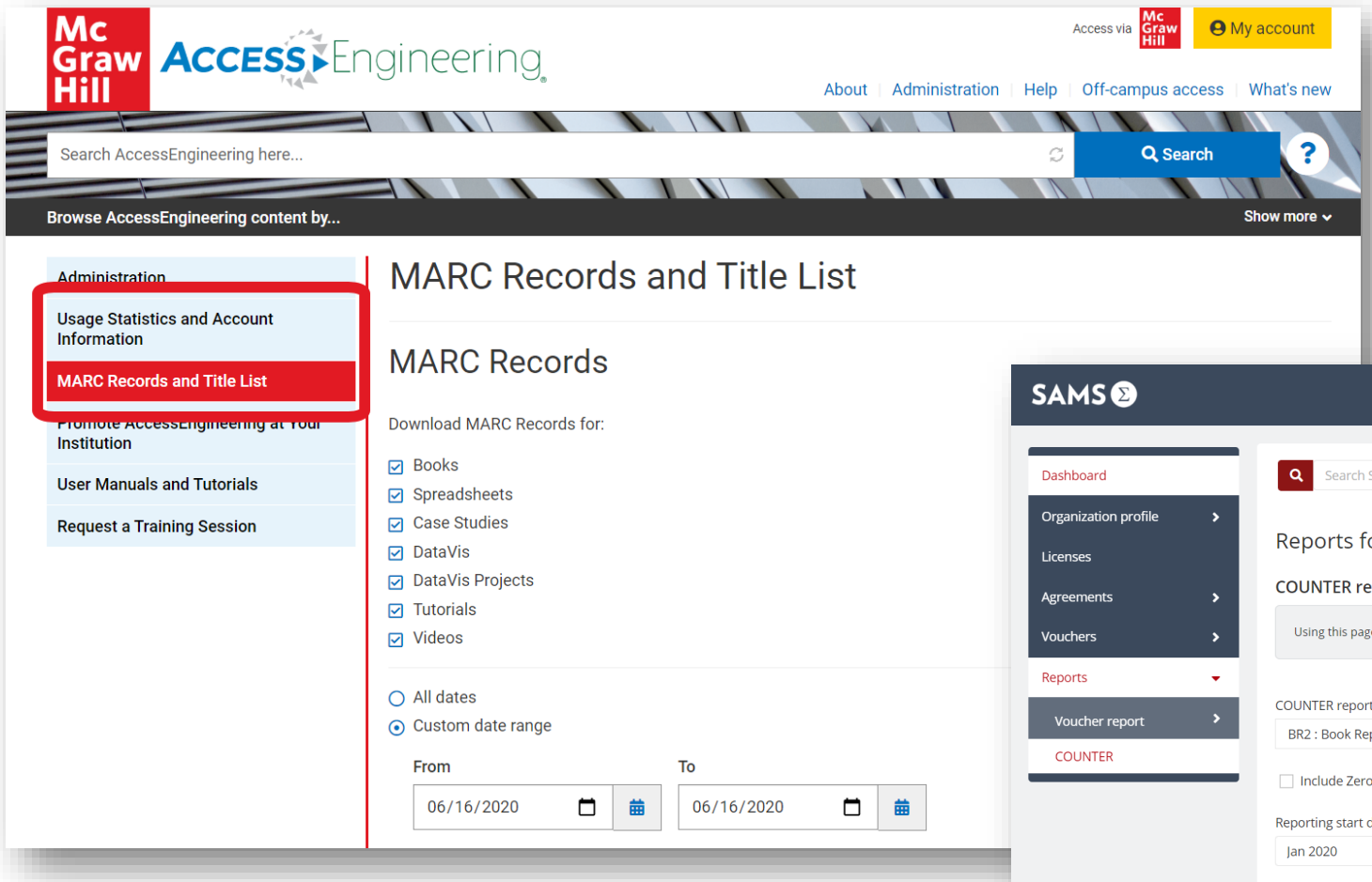
Use promotional materials to create awareness of AccessEngineering and direct users to our guides and video tutorials for tips on using the site to it's full potential

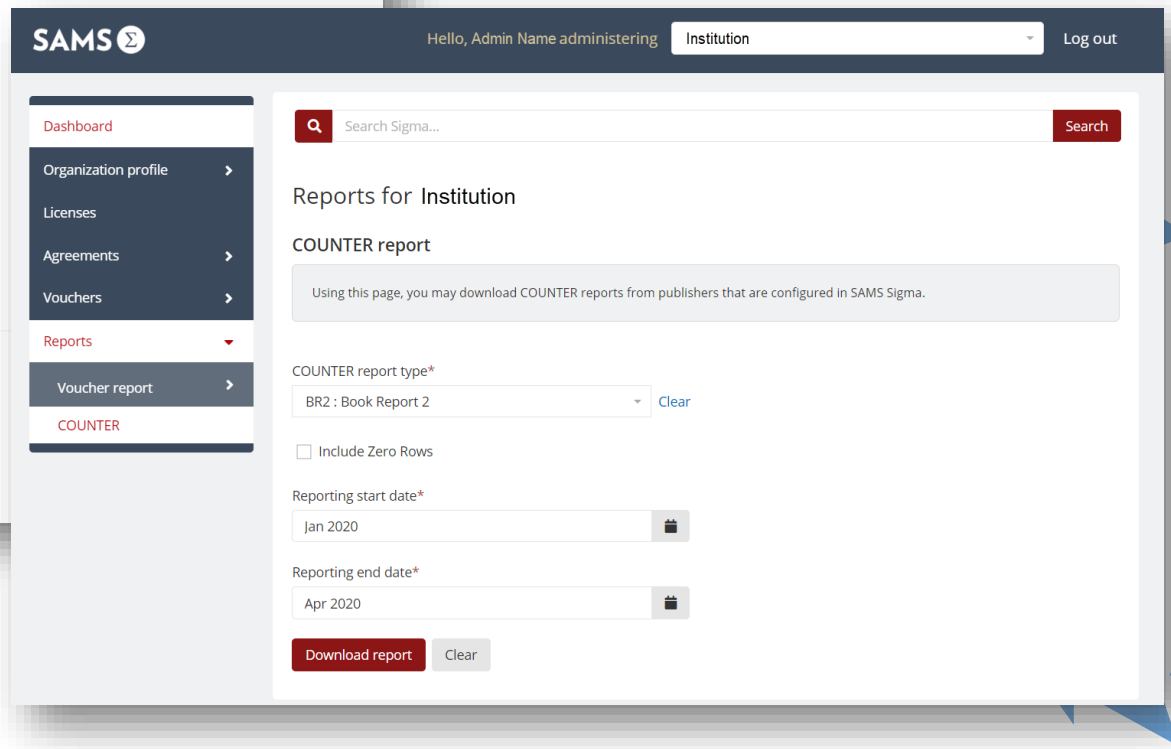
Librarian Support

See resources available on the AccessEngineering LibGuide and incorporate into your own guides



Librarian Support





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Tips for Preparing for Your Presentation

Tips for Preparing for Your Presentation

Questions to Consider:

- What products are they using now?
- Are they currently using any digital resources?
- Why do they need this?
- Can our products help save them time, save them money, or make their lives easier?
- What problem are we solving?
- What problem do you think they have?
- How can McGraw Hill help?

Tips for Preparing for Your Presentation

Information to Gather:

- See what resources their library has now
- Review everything on the website about the program you're meeting and recent news related to the program
- See what their adopted textbooks are (by entering individual courses into the bookstore site)
- Review usage statistics and especially review access denied stats if they have a current subscription or prior trial
- Know your numbers – research enrollments, research exam scores/graduation rates, have a history of what they've been quoted, and know your own penetration numbers (i.e. 50% of programs in New York currently use XYZ)

Tips for Preparing for Your Presentation

Additional Tips:

- Familiarize yourself with the faculty and their background. This could come in handy. For example, if you know the Chair of a program graduated from NYU. Then you can sprinkle in the fact that NYU is currently using this to help establish credibility and buy-in.
- Rehearse your presentation at least five times out loud and standing. This will help you not only identify potential places you'll get hung-up, but it'll reinforce the phrasing you'd like to use.