New Knovel Interface

Abstract

In the past year Knovel interface has undergone several facelifts and some more serious changes. This paper discusses user centric approach to design and implementation of new graphic user interface. New features, including Knovel Lab, Data Search, autocomplete, spell checker, browse interface, My Knovel and Knovel Math are discussed. Current work and plans for the future enhancements, including expansion of content coverage, are discussed as well.

What's New at Knovel?

First a brief overview of Knovel for those who are not familiar with this award-winning, Web-based library of e-references (e-books and databases) for applied scientists and engineers.

Knovel adds value to e-books by making them interactive. Interactive book tools include tables, graphs and equations. There are several interactive tools, including:

- Graph Digitizer for digitizing graphs displayed as calibrated raster images stored in Knovel database
- Graph Plotter for plotting graphs using X,Y coordinates stored in Knovel database
- Equation Plotter for calculating and plotting functions F=Y(X) stored in Knovel database
- Phase Diagram Viewer for determining phase composition of binary systems by digitizing diagrams displayed as calibrated raster images stored in Knovel database
- Excel Spreadsheet for calculating equations programmed in Excel
- Interactive Tables for sorting, filtering, etc. of tabular data stored in Knovel database
- Knovel Math for calculating equations using PTC's Mathcad software

Interactivity improves an engineer's productivity by enhancing searchability and allowing analysis and manipulation of otherwise static data.

Starting in 2000, we have digitized over 2300 STM titles from over 30 publishers including industry leaders such as Elsevier, Wiley, McGraw-Hill and Springer, and 25 engineering societies, including ASME, IEEE and SAE. The topics range across 23 subject areas, including chemistry, mechanical engineering, electronics, oil and gas, sustainable development and construction materials. Many titles, e.g., in the chemical industry safety area, are unique to Knovel and cannot be found anywhere else.

In 2009, we introduced 3 new subject areas:

Industrial Engineering & Operation Management

Nanotechnology Transportation Engineering

with hundreds of new titles in each.

Some Knovel titles are multi-volume publications. The total number of pages in all Knovel titles, excluding databases, exceeds 1,000,000. The collection is growing at a rate of 35-40 new titles per month. In 2009 alone, we have added 455 new titles.

Users can browse and simultaneously search all titles via a single interface. Basic and Fielded (Data) searches are fast and optimized for technical users.

At the end of 2008, Knovel embarked on a new and exciting project: Mathcad-enabling Knovel content. The product, called Knovel Math, was released last summer and includes over 4,000 Mathcad worksheets with over 20,000 pages of engineering solutions for structural and civil engineers.

Below we describe in detail this new product as well as the following new Knovel Interface features and products released in 2009:

Knovel Lab My Knovel Data Search Search Enhancements Browse Enhancements Engineering Cases

Knovel Math

Engineers across all industries perform engineering calculations and document their design and analysis work. While performing these tasks, they often reference standard calculations, solutions and other pertinent information from titles such as *Roark's Formulas for Stress and Strain* and (*Hicks*) *Handbook of Civil Engineering Calculations*. Knovel introduced Mathcad-enabled versions of these two leading engineering reference titles to allow engineers to design and document engineering calculations with increased efficiency.

Mathcad is a desk-top Computer Aided Design (CAD) platform with calculation, graphing, text formatting and reporting capabilities and is produced by Parametric Technology Corp. In Knovel Math, it is seamlessly integrated with standard engineering content online by transcribing engineering calculations and design examples in the above titles. Using our precision search tools in an easy to use interface, Knovel search results identify examples that are fully interactive, integrate directly into Mathcad for easy data manipulation, and are available in U.S. Customary and Metric units.

There are several points of access to Mathcad worksheets in the Search and Browse modes. Users can access the worksheets and the corresponding PDF reports via links in the original source (see below), or access worksheets from the links in the reports.

determination of beam deflections. By superposition, the formulas can be made to apply to almost any type of loading and support. The use of the tabulated and fundamental formulas given in this article is illustrated in the following examples.

EXAMPLES MUS Customary US Customary Metric Metric

1. For a beam supported and loaded as shown in Fig. 8.2, it is required to determine the maximum tensile stress, maximum shear stress, and maximum compressive stress, assuming, first, that the beam is made of wood with section as shown in Fig. 8.2(a) second, that the beam is made of wood with section as shown in Fig. 8.2(b); and third that the beam is a 4-in, 7.7-lb steel I-beam.

Solution. By using the equations of equilibrium (Sec. 4.1), the left and right reactions are found to be 900 and 1500 lb, respectively. The shear and moment equations are therefore

Mathcad worksheets and PDF reports along with all the chapters of the books can be also accessed from the Table of Contents as users browse thought the site. A single click on

the Filter: Math Documents conveniently exposes all Mathcad links by expanding the Table of Contents (see below).

Roark's Formulas for Stress and Strain (7th Edition) [Mathcad-enabled]



By: Young, Warren C.; Budynas, Richard G. @ 2002 McGraw-Hill

Description: All examples in Part III: Formulas and Examples, over 75 in total, have been made interactive using Mathcad. Each example is available in US Customary and Metric units. Examples cover straight and curved beams, plates and shells. [Mathcad 14.0 or higher is required.]

Title Details | Citation

Filter: Close Knovel Math Documents

Table of Contents	Data (Records)	Text
Front Matter		Text
•List of Tables		Text
Preface to the Seventh Edition		Text
Preface to the First Edition		Text
• Table of Contents		Text
Part I. Introduction		
⊕ Part II. Facts; Principles; Methods		
Part III. Formulas and Examples		
☐ 7. Tension, Compression, Shear, and Combines Stress		Text
■7.1 Bar under Axial Tension (or Compression); Common Case		<u> Text</u>
Example 7.1.1 (US Customary Units)	Mathcad	<u> Text</u>
Example 7.1.1 (Metric Units)	Mathcad	<u> Text</u>
☐ 7.2 Bar under Tension (or Compression); Special Cases		Text

Overall the design of Mathcad-enabled titles follows the standard design of all interactive content on Knovel. Clicking on a Mathcad link in the Table of Contents opens the application with the fully parameterized example (see below). To view it, users must have Mathcad 14.0 or higher installed on their desktops.

Each Mathcad worksheet (see Example 16.2.1 from *Roark's Formulas of Stress and Strain* below) and corresponding PDF report exists in both US Customary and Metric units for a total of 4 files, i.e., native units (as found in the source document), one translated units to its counterpart and a PDF rendering of both Mathcad files. To access, the users must subscribe to the Mathcad-enabled title as it is not part of the standard Knovel subscription. Mathcad worksheets can be downloaded and modified without any restrictions. Users can copy and paste desired calculations from Knovel produced worksheets into their own Mathcad worksheets.

Searchability of Mathcad-enabled content has been enhanced by indexing the keyword 'mathcad' for each page of Mathcad content. As a result, users can retrieve this content very precisely by a Boolean query containing this keyword, e.g., 'beam bending AND mathcad'. To further assist users in browsing and searching Mathcad-enabled content,

each case and example has been labeled with meaningful titles which include measurement system used.

Knovel Mathcad Solution. Copyright @ 2009 Knovel Corp.

Roark's Formulas for Stress & Strain, Seventh Edition. Copyright © 2002 McGraw-Hill Chapter 16: Dynamic and Temperature Stresses

16.2 Body in a Known State of Motion

EXAMPLE 16.2.1

▶ Disclaimer

▶ User Notices

The conical steel disk shown in section in **Fig. 16.4** rotates at 2500 rpm. To its rim it has attached buckets whose aggregate mass amounts to w = 0.75 lb/linear in of rim; this mass may be considered to be centered 30 in from the axis. It is desired to determine the stresses at a point 7 in from the axis.

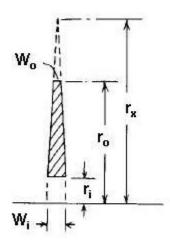


Fig. 16.4: Cross sectional view of the disk

Geometry

Mean radius: R.,

Inner rim: $r_i := 4 \cdot i$

Outer rim: $r_a := 20 \cdot i$

Circumference: r, := 7 i

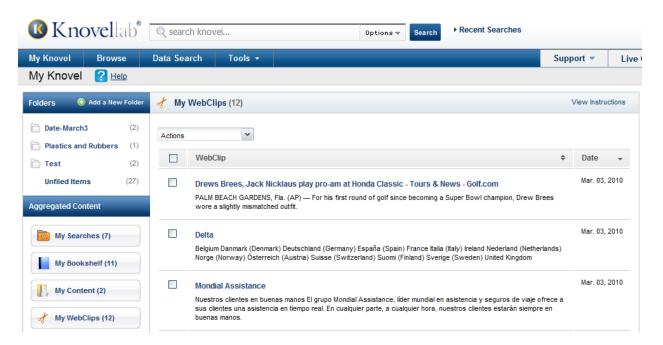
Currently, Knovel Math content is derived from these 3 important titles:

- Roark's Formulas for Stress and Strain (7th Edition), 2002, McGraw-Hill
- Handbook of Civil Engineering Calculations, 1999, McGraw-Hill
- Foundation Engineering Handbook Design and Construction with the 2006 International Building Code, 2007, McGraw-Hill

Future Knovel Math packages will focus on Mechanical, Electrical, Chemical and Engineering Math. We are currently working on Mathcad enabling venerable *Handbook of Mathematical Functions with Formulas, Graphs, and Mathematical Tables*.

Knovel Lab

The release of Knovel Lab in 2009 allowed Knovel to include users in the design process. Users who sign up for Knovel Lab can see prototypes and new functionality under development and comment on these, providing valuable feedback to Knovel's Product Management and IT teams. Below is Knovel Lab interface with some of the new features related to My Knovel (see below):



The feedback is optional and provided in the form of a survey.

Knovel Lab and related Design Partner Program showcase new customer-driven approach to product development at Knovel, that also include focus groups, advisory boards and independent studies of user experiences aimed at better workflow integration and usability of the product.

My Knovel

My Knovel is the most important feature released in 2009. It allows personalization of Knovel interface. Users can now save multiple search queries, links to the titles and links to the individual content files in the Aggregated Content folders called My Saved Searches, My Bookshelf and My Saved Content, respectively. The content files that can be saved include text in PDF and HTML formats and interactive tables.

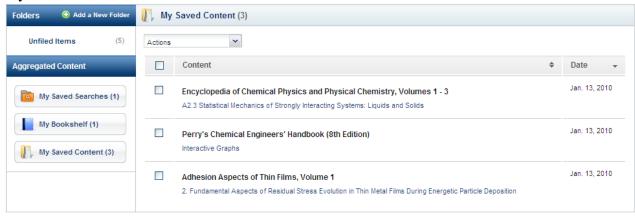
My Saved Searches



My Bookshelf



My Saved Content:



Any item in Aggregated Content folders can be selected to be removed, e-mailed or moved to a new folder. A click on any item opens this item or executes a query (in the case of My Saved Searches).

New, custom named folders can be added by using the Add a New Folder feature. Users can move content from generic Aggregate Content folders to new folders.



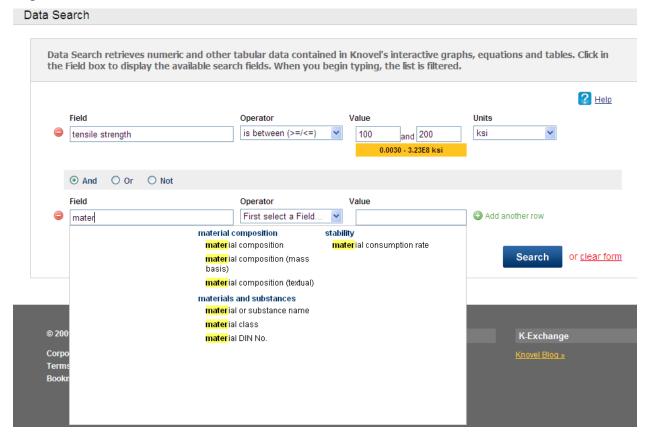
Data Search

Data or Fielded Search has been improved to make it more dynamic and easy to use by introducing several new features, including field lookup. When users click the Data Search link on the main toolbar they are taken to this page:

Data Search					
Data Search retrieves numeric and other tabular data contained in Knovel's interactive graphs, equations and tables. Click in the Field box to display the available search fields. When you begin typing, the list is filtered.					
Field	Operator	Value	? Help		
Click to select a search field	d. First select a Field 💌		Add another row		
			Search or <u>clear form</u>		

A click in the Field box displays a drop down with classified list of available search fields. Typing in this box activates the lookup feature and highlights matched character sting in field names on the drop down list. Then just select the desirable field, operator and input the value and the unit (for most numeric fields).

To add other search criteria, click on the Plus button designated Add another row as demonstrated below, select Boolean operator (AND, OR, NOT) and repeat the previous steps. Then click the Search button.



Search Enhancements

The following search enhancements have been introduced in the past several months and available for Basic Search only.

Autocomplete – suggested keywords and keyword terms are displayed as users start to type in the Basic Search box. The keywords are selected from most frequently used search terms used on Knovel. Users must click on the displayed term for it to appear in the box and then click the search button.

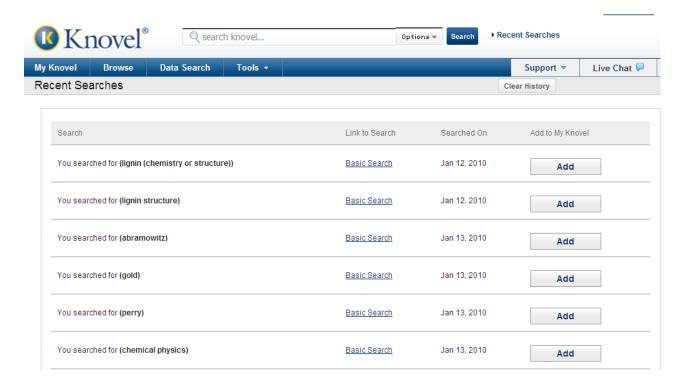


Spell Checker – if you made a mistake typing a keyword in the basic search box and run the search that resulted in no hits, a suggested correct spelling of your keyword could be displayed. If you are in agreement, select this keyword and the query will be re-run automatically with selected keyword.



There are no results matching your search criteria. Please consider using fewer query terms, and/or using more general query terms.

Recent Searches – you recent searches are saved on the pages displayed when you click on the Recent Searches link located next the Basic Search box. Click on any of the search queries listed on this page to execute it. You can also add any of these searched to My Knovel from this page. Clicking on the Clear History button removes all the queries from this list.

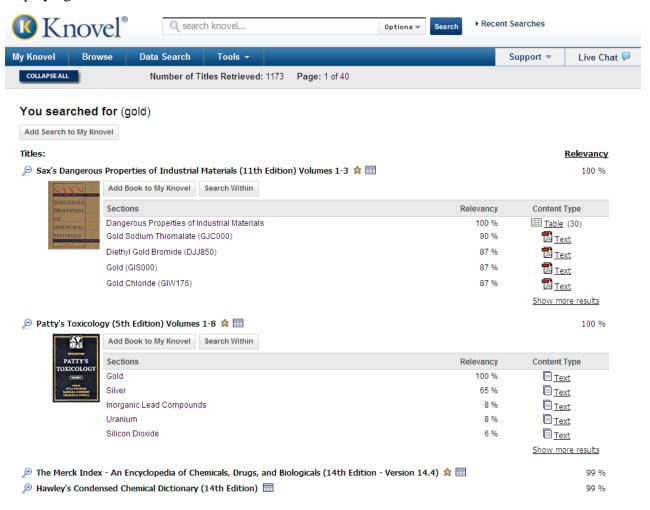


Some features formally available on Knovel have been restored by popular demand. These include Search Within – basic search within a title, and Basic Search by the Author name.

Browse Enhancements

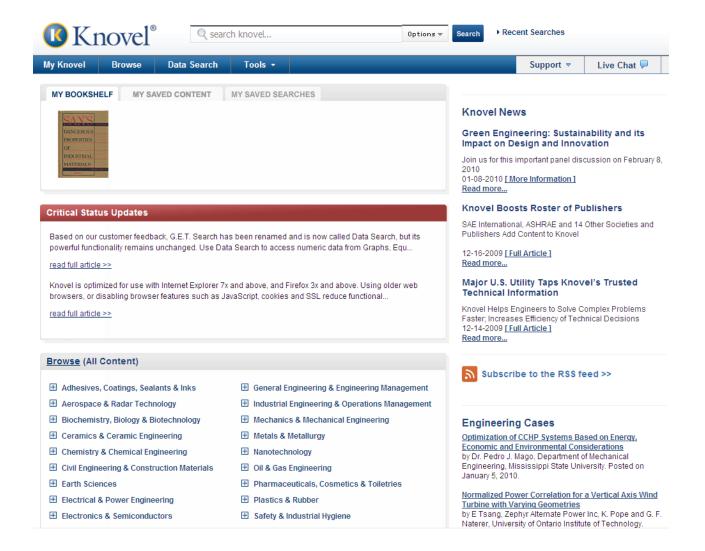
Browsing experience for the users of Knovel interface has been enhanced in several ways in 2009. In the browse mode, browsing has been simplified by removing some rarely used features. The features that stayed include views by Topic, All Titles, New Titles, and Titles with interactive tools. All these available either classified by Subject (Titles by Subject view is default), or as an alphabetical listing (Titles A-Z view).

In the search mode, top ranking two titles have an expanded display with up to 10 retrieved sections accessible from the title search results page. This eliminates the need to click on the title name to display search results on the table of contents page before displaying the content.



Engineering Cases

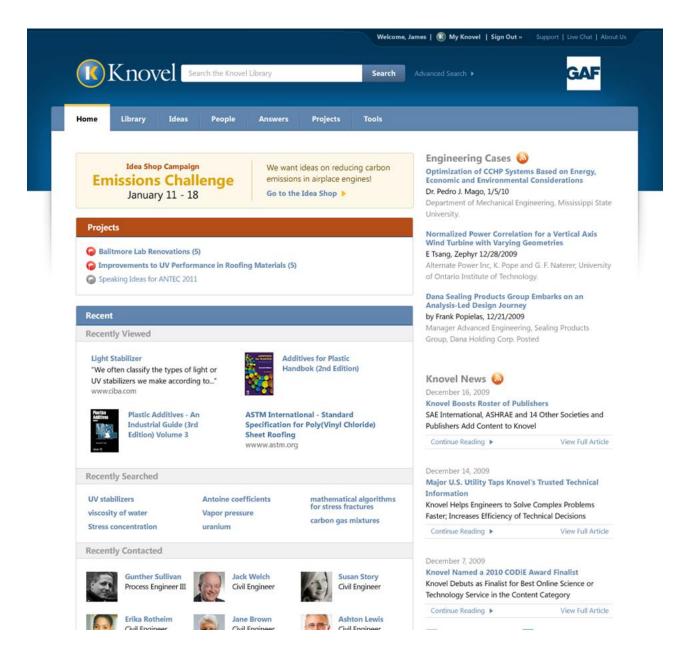
The Home for Knovel has been redesigned recently to highlight new products, new publisher relationships, and new product enhancements (Knovel headlines) and stories written by engineers in the field (Engineering Cases). Engineering Cases highlight engineering solutions in a number of subject areas covered by Knovel and intended to demonstrate the use of information in engineering.



Current Work and Future Plans

Knovel innovates continuously. Currently, we work on a new feature that would enable users to cut and paste snippets from text found on Knovel and on the web into My Knovel. The Product Road Map for 2010 is focused on personalization. Below is a sneak preview of updates to Knovel interface.

In terms of technology, we'll be moving away from PDF and toward HTML presentation of the text.



Conclusions

In 2009-10, Knovel has embarked on the whole new user-centric approach to interface and product design. Several tools have been developed to assist in this approach including Knovel lab. New interface features and products were well received by the customers. Monthly usage and the number of site visits have increased. Positive user feedback results in a steady flow of new releases.