Knovel Database Training

applying in scientific research and learning
Knovel
Database Introduction
Academic research is increasing international, collaborative and challenging

Global R&D expenditure in science & engineering is rising, with sources shifting to Asia

- South Korea doubled funding over last 20 years
- China tripled funding over last 7 years
- R&D funded by US and EU has flattened or decreased

Engineering publications output is rising and increasingly international

- Publications with authors from >1 country
  - Geosciences: 25.9%
  - Engineering: 14.0%
  - Chemistry: 19.5%

- South Korea doubled funding over last 20 years
- China tripled funding over last 7 years
- R&D funded by US and EU has flattened or decreased

Engineers must ensure the relevance of their research and academic programs to remain competitive in an international landscape

Source: SEI 2016, AAAS
Concurrently, engineering teaching programs are asked to produce more graduates

Number of degrees granted in science and engineering worldwide is growing


In the US, nearly 90% of employed engineers have an associate degree or higher

Educators must prepare students with all skills necessary to succeed in an engineering career
And graduates must succeed in a highly competitive job market

The engineering job market is growing slowly compared to all occupations, powered primarily by position replacements.

**Projections of US employment and job openings in engineering 2012–2022**

- Growth in total employment, 2012–2020:
  - All occupations: 10.8%
  - Engineering: 8.6%

- Job openings 2012–2022 as percentage of 2012 employment:
  - All occupations: 34.8%
  - Engineering: 34.2%

**Labor statistics from EU (27 countries)**

- 4% Decline of employees in engineering 2008–2011
- Recovery in engineering employees 2011–2012: +1.1%
- 10.4 million Total employees in engineering in 2012

**Only 17%**

- Engineering employees in Europe are under 30 years of age.

Easily accessible information, data, answers & insights is the key to impactful research and education

<table>
<thead>
<tr>
<th>Information at your fingertips to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promote innovation, novel research ideas and applications</td>
</tr>
<tr>
<td>Provide hands-on experience exploring literature, testing ideas &amp; using data</td>
</tr>
</tbody>
</table>

Knovel brings current and targeted information to engineers and supports the preparation of future generations with **up-to-date knowledge and real-world skills development.**
What is Knovel?

A technical reference solution that quickly delivers trusted, accessible and relevant engineering answers & insights, to accelerate foundational engineering knowledge, build expertise and better prepare for a career in Engineering – in research as well as in industry.

**Over 9,000 Resources, more than 74 Million Answers**

**Our Value proposition**

Enable Engineering Education To Prepare The Next-Gen Engineer

**What we do for your Institution**

- Applied learning for better skills & theories
- Enhanced industry preparedness
- Improved research capabilities

**What we do for your Students**

- Find and learn relevant engineering concepts more efficiently
- Complete projects and problem sets with greater confidence

**… such as**

- Heat transfer & heat exchangers
- Fluid dynamics
- Capstone projects
- Co-ops & Internships

**How we Deliver value**

- Comprehensive Data & Technical Information
- Visualization & Interactive Analytical Tools
- Seamless Access & Speedy Discovery

Our Value proposition

What we do for your Institution

What we do for your Students

… such as

How we Deliver value
What is Knovel?

Simply the best way to empower engineers to solve problems.

A uniquely structured database and information tool with:

- Content from 140+ trusted engineering sources, curated for industry needs
- Actionable data for the analysis and selection of materials & substances
- Interactive data and analytical tools for direct problem solving and validations
- Powerful search capabilities & taxonomy-based filters to get targeted results
- Mobile access and connections with engineering software and other information discovery platforms

WHO IS USING KNOVEL?

>15 years on the market

700+ Clients in industry, academia and government worldwide

TOP 10 Engineering firms in Chemistry, Oil & Gas, Aerospace & Defense, and Engineering Design & Construction

TOP 20 World’s best Engineering & Technology Universities

WHO IS USING KNOVEL...

- Mechanical Engineers 26%
- Chemical Engineers 19%
- Civil Engineers 13%
- Electrical Engineers 11%
- Structural Engineers 8%
- Other* 23%

* Includes Petroleum, Aerospace, Materials, Nuclear, Software, Manufacturing, and Environmental Engineers
Knovel’s Academic Users Leverage Inter-Disciplinary Engineering-Related Answers & Insights To Drive Education & Research

What disciplines do Knovel users leverage in their research, studies, and teaching?

Others Include:
- Systems Engineering
- Manufacturing Engineering
- Environmental Engineering
- Process Engineering
- Civil Engineering

- Mechanical Engineering
- Material Science
- Industrial Engineering
- Electrical Engineering
- Chemical Engineering
Knovel Helps Engineers Make Impact in Research & Education

According to our academic users, the top 5 areas that Knovel helps make an impact are in:

- Gaining background information on an engineering topic
- Performing a literature review
- Completing assignments for a course
- Staying informed about advances in my field
- Defining research objectives

Source: 2018 Survey conducted via TechValidate
Prepare students for their careers by infusing a tool into the curriculum that is used widely by Industry

86% SURVEYED INDUSTRY USERS CONSULT KNOVEL AT LEAST MONTHLY¹
93% SURVEYED INDUSTRY USERS RECOMMEND CONTINUED SUBSCRIPTION¹

¹810 Users from industry surveyed in 2016; >1000 users from industry surveyed in 2017.
Knovel User Guide

1. Create a User Account
2. Search
3. Key Features
4. Find Help and Support
Knovel

What Knovel gives you >>>

ESSENTIAL ANSWERS

- **Access** Reference titles, Interactive Equations, Graphs & Tables & More with content from over 150 international content providers
- Easily **Manipulate** & Use Data – within Knovel
- **Personalize** your Knovel experience – **Save** your Notes, Searches, Titles, Data, Alerts – and **Share** with your colleagues

ACCELERATED DISCOVERY

- **Smart Search** capabilities that understand the engineering language
- Search results filtering based on **Engineering concepts** to find what you need – **Fast**!
- Choose the **Type of Search** you need – Material Property Search, Advanced Search or KDA

CONTINUOUS ACCESS

- **Mobile App** (iOS & Android): Offline access to your selected reference resources
- **Seamless** use with Excel add-in and software plug-ins (Inventor, Revit)
- Enhanced **Discoverability** through EBSCO, SUMMON & PRIMO

How Knovel delivers >>>

What you can do with Knovel >>>

LEARNING / KNOWLEDGE MANAGEMENT

- **Learn:** Find engineering best practices and foundational knowledge to come up to speed on a topic

PRODUCT DEVELOPMENT & ENHANCEMENT

- **Solve:** Find data-rich answers and insights essential to solving engineering problems with high business impact

EHSQ RISK MANAGEMENT

- **Operational Excellence**

- **Continuous Access**

- **Essential Answers**

- **Accelerated Discovery**

- **Continuous Access**

- **Learning / Knowledge Management**

- **Product Development & Enhancement**

- **EHSQ Risk Management**

- **Operational Excellence**

What Knovel adds value >>>

- **Learning / Knowledge Management**
- **Product Development & Enhancement**
- **EHSQ Risk Management**
- **Operational Excellence**

- **Continuous Access**

- **Essential Answers**

- **Accelerated Discovery**

- **Continuous Access**

- **Learning / Knowledge Management**

- **Product Development & Enhancement**

- **EHSQ Risk Management**

- **Operational Excellence**

- **Continuous Access**

- **Essential Answers**

- **Accelerated Discovery**

- **Continuous Access**
1. Login / Create Account

2. “Persistent Toolbar” gives you access to key features wherever you are in Knovel

3. Knovel Search

4. Feed is customized per your usage & preferences

The Knovel home page

SAVE TIME WITH AN ACCOUNT
Work smarter, faster, and more conveniently... your place and your pace.

- Anywhere, anytime access
- Organize bookmarks
- Share links with colleagues
- Add personal notes to documents

Search for Pure Compounds
Visually search for pure compound chemicals from the NIST Thermodynamic database that meet your requirements.

Solve Equations
Use Knovel’s browser-based calculation tool with a collection of hundreds of ready-to-use equations to solve your problems faster.
1. Create a User Account

Getting Started With Knovel — Registration


Benefits of registering:

- Print & Download content for offline use
- Share content with colleagues
- Create notes & highlights on content
1. Create a User Account: Now, also on your Mobile device!

1. Download the MyKnovelToGo app on your iOS or Android device.

2. Select “Register Instantly”.

3. Enter registration information.

4. If Knovel recognizes the email domain or user’s IP, then address registration will be successful.
2. Search
Search Knovel with precision and ease

Knovel offers engineers two different search techniques:

1. Search broadly and then filter

2. Advanced Search to find using Keyword, Book Title or Author

OR

3. Use Material Property Search to locate information that may be hidden in large, complex tables

Use our Search bar to find what you need
2.1 Search
Just type into the search bar

Auto Suggest:
As you type your query, Knovel automatically suggests relevant search terms
2.1 Search
Use filters to narrow down the results

1. Content Type Filters: Looking for data in a table? Or need to work in an equation? Just click on the type you need.


3. Click on a Search result for Full-Text access.
2.1 Search Results: Text / Content Viewer

1. Save what you need to ‘My Knovel’ for easy future reference, OR for sharing with colleagues.

2. Highlight the text (multiple colors available) and save for easy access later.

3. Annotate (make notes) and save for future reference, OR share with colleagues.
2.2 Advanced Search
Find book titles with precise search parameters

1. Click on the Advanced Search link.

2. Enter your search term(s) in the appropriate field(s) provided.

3. Optional: Select ‘More’ to display additional search fields. **Note**: One of these two additional fields may be included in an advanced search query.

4. Select ‘Search’.

Knovel®
2.3 Material Property Search

Finding materials with the required properties is easy – Just Drag & Drop!

1. To get to Material Property Search, either click on it on the home page, OR dedicated, intelligent search "wizard" guides you through searching for materials or substances.

2. Select a Property, and Knovel’s taxonomy lets you pick from relevant properties to complete your data query. Easy, drag-and-drop functionality, to quickly find the data you need.

3. Click on Results to find what you need.
2.3.1 Material Property Search: Knovel Data Analytics (KDA)**

1. Find chemical & physical property data of thousands of compounds – with the reliability of NIST data.

2. Find what suits your requirements – look for compounds that satisfy your criteria.

**KDA is available for Knovel subscriptions that include the “Chemistry & Chemical Engineering” Subject Area
2.3.1 Material Property Search: Knovel Data Analytics (KDA)**

1. Use KDA's new-age tools to compare side-by-side, and find what you need.

**KDA is available for Knovel subscriptions that include the “Chemistry & Chemical Engineering” Subject Area
3.1 Key Features: My Knovel

1. Annotate, save and share content.

2. Save the content, notes and data you need most often – to ‘My Knovel’.

3. Pick up where you left off.

View video tutorials in support center.
3.1 Key Features: My Knovel

1. Save a search result, e.g. a title, to your 'My Knovel' for easy access later.

2. Save time and effort - save search queries to 'My Knovel'.

3. Share a search with your colleagues.
3.2 Key Features: The ‘MyKnovelToGo’ Mobile App

1. In the Table of Contents, save a book title to Mobile.

2. Download the book on your MyKnovelToGo app.

Option 1: On the Knovel site find the book you need
3.2 Key Features: The ‘MyKnovelToGo’ Mobile App

Option 2:
Search on the MyKnovelToGo app for mobile devices

1. On the mobile app, tap ‘Add Titles’ from the menu

2. Search by Title, or Browse the full list, and download the Book you need.

3. Enjoy Anytime-Anywhere access, Online or Offline!
3.3 Key Features: Interactivity

Interactive Equations

1. Filter the search results for interactive equations.

2. Click the required equation.

3. Click ‘Open Worksheet’.

4. Use the solver to compute exact values.

View video tutorials in support center
3.3 Key Features: Interactivity

Interactive Tables

1. Filter the search results for Interactive Tables.

2. Click the required Table.

3. Manipulate the Table - move or remove Columns & Rows – all within Knovel.

4. Save / Export data.

View video tutorials in support center
3.3 Key Features: Interactivity

Interactive Graphs

1. Filter the search results for Interactive Graphs.
2. Click the required Graph.
3. Click on Graph directly to plot X & Y coordinates.
4. Save / Export data.
4. Find Help and Support

Support

1. For Video Tutorials, FAQs and more, access the “Support Center”.

2. Contact Us
While we strive to make Knovel easy and intuitive to use, sometimes help is required. Our customer support team is here to help and you can contact us in various ways.
Knovel
Usage Scenario
Scenario 1: Teaching and Learning

Knovel provides you with links to the Ei database: reference books, relevant chapters, conference articles, teaching cases and extracted definitions from books.
Full text of books in PDF format – basic knowledge
A Gentle Introduction to Machine Learning

Introduction - classic and adaptive machines

In the last few years, machine learning has become one of the most important and prolific IT and artificial intelligence branches. It’s not surprising that its applications are becoming more widespread day by day in every business sector, always with new and more powerful tools and results. Open source, production-ready frameworks, together with hundreds of papers published every month, are contributing to one of the most pervasive democratization processes in IT history. But why is machine learning so important and valuable?
Conference – advanced information

[CONFERENCE PROCEEDING] Prediction of Plastic Injection Molding Using Simulation Tools and a Support Vector Machines Classifier

[CONFERENCE PROCEEDING] A Study of Using Internet Technology to Improve Learning Efficiency of Injection Molding Technology
...of polymer materials, (4) structure of injection mold and (5) shooting trouble solving. And avoiding operate the real machine, we designed the virtual reality machine of injection molding... More

[CONFERENCE PROCEEDING] Challenges in Teaching E-Learning Courses for Plastics Engineering Technology
...mechanisms, technology, courses can be effectively offered to students in an online setting. There are themselves to an online format, such as those that contain lab sections, but some labs or portions of

Table 2. Paired samples test for the "N" group

<table>
<thead>
<tr>
<th>Sample</th>
<th>Mean Score</th>
<th>Standard Deviation</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test</td>
<td>18.76</td>
<td>17.66</td>
<td>-1.848</td>
<td>.080</td>
</tr>
<tr>
<td>Post-Test</td>
<td>18.59</td>
<td>14.34</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Definitions - Fast discovery of reliable definitions

**Machine Learning Approach**

**Machine learning** refers to algorithms that automatically learn (i.e., set tuning parameters) based on experience or training data. Two very popular methods in the area of machine learning are decision trees and artificial neural networks. When compared to the methods of statistical approach, these two can be characterized as model...  

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**BN Learning**

Known as structural EM, that presumably converges to a local maximum of the BIC score (7, 13). probabilistic models It is well known that classic machine learning methods like Hidden Markov models and Kalman filters can be considered as special cases of BNs (4, 13). Specific types of BN models were as solving the classification, regression, and clustering problems, even though there are other categories of tasks that the data mining methods can be applied to: summarization of data and data reduction; problem-solving, and knowledge-discovery tasks (Milne and others, 1996).

It is difficult to draw the precise boundaries of data mining, because it is basically interdisciplinary, merging into statistics, database technology, machine learning, pattern recognition, artificial intelligence, visualization, and other knowledge discovery techniques. In later sections, some of the major data mining methods are reviewed from the machine learning and statistical approaches.

### 3.1 Decision Trees

Decision trees represent the decision rules, which partition the data (or the feature space) into a set of groups (or a set of regions) with hierarchical and sequential structures. A decision tree is used to perform classification or regression according to the types of the class labels (i.e., categories or dependent variables). Decision trees are also classified according to the type of dependent variables (i.e., discrete or continuous). An example of a decision tree is shown below:

#### 3.2 Artificial Neural Networks

An artificial neural network is a computational model that consists of a network structure, and linking and neural processes. Tzouaras and Usher (1997) defined an artificial neural network as “a data processing system consisting of a large number of simple, highly interconnected processing elements (artificial neurons) in an architecture inspired by the structure of the cerebral cortex of the brain.” These processing elements (or neurons) usually belong to three kinds of layers: an input layer, one or more hidden layers, or an output layer — and are interconnected in a feedforward network structure, in which neurons in a given layer have no lateral connections with each other and no connections back to the previous layers. The connection weights are unknown parameters, which are estimated by a training method. The most popular training method is backpropagation, which repeatedly distributes training errors from output neurons proportionally back to their connection weights until training error reaches a given threshold.

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**Save Result**
Scenario 2: Numeric retrieval - locate query answers in seconds

Initial main interface, in the absence of search keywords, the right side lists all conditional search

Set common optical fiber search

The system automatically selects the conditions that meet the fiber and automatically removes the irrelevant conditions
Numerical search

Add only one conditional search for an optical attribute

Drag “intensity” to a blank

Search results are reduced to 2 items in seconds
## Interactive tables

<table>
<thead>
<tr>
<th>x-axis label</th>
<th>y-axis label</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wave number, $\nu$ (cm$^{-1}$)</td>
<td>Loss 0 (dB/km) (top)</td>
</tr>
<tr>
<td>Energy, E (eV)</td>
<td>Loss 0 (dB/km) (top)</td>
</tr>
<tr>
<td>Wavelength ($\mu$m)</td>
<td>Loss 0 (dB/km) (top)</td>
</tr>
</tbody>
</table>

**Value of optical fiber related attributes**

**Click on the interactive table**

**Check out the full article**
Interactive graphics

The coordinate data of the capture point is automatically filled.

Drop-down menus make it easy to export data in a variety of formats.

Click the mouse to easily draw according to scientific research or experimental needs.
Results output

The results can be exported to Excel tables that can be shared or used directly for papers, and the literature is automatically generated — easy and quick.

Print interface design is reasonable, can be directly used for experimental reports.
Scenario 3: The interactive equation
The interactive equation of cloud computing

Directly fill in the numbers to calculate or edit the formula, so that the equation becomes a daily indispensable tool for engineers.

\[
\begin{align*}
\phi &= \text{the pressure of steam} \\
\alpha &= \text{the dimensionless pressure of steam} \\
\gamma &= \text{the specific entropy of steam} \\
\delta &= \text{the dimensionless specific entropy} \\
\rho &= \text{the temperature of steam} \\
\alpha_1 &= \text{the dimensionless temperature} \\
\end{align*}
\]
Thank you