

Using Globalspec® in the Classroom

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Abstract

In this paper we introduce Globalspec, a web-based engineering tool and search engine that simplifies the task of specifying engineering parts and components by using powerful parametric searches. GlobalSpec presents detailed product information provided by a broad base of manufacturers of optical components, mechanical parts, electrical products, semiconductors, materials, manufacturing systems, instruments, sensors, process systems and many other industrial products. The authors present the techniques used in two classes where the students select components for engineering designs using the tools available at Globalspec. The design details will be discussed along with the design examples. Also outlined are the powerful resources GlobalSpec provides for engineering users or students to explore or learn about products and their specifications.

Introduction

Globalspec (www.globalspec.com) is an Internet-based engineering search engine and the largest online database of technical catalogs. Users can search the huge engineering database of technical components by specifications, part numbers, patents, application notes, government and industry standards, and thousands of manufacturers. Since its inception in 1996, Globalspec has seen a steady increase in registered engineers and technical buyers that daily use the free service to look for parts and other information for design, testing and other purposes.

Globalspec has become a one-stop location where engineers and technical buyers meet, and can search for products, services, technical articles, standards, application notes, and more.

Globalspec has amassed the largest online community of engineers and technical professionals in the history of the Internet with over 2.5 million registered users at the time of this writing. Nowadays engineers and technical professionals use the Web throughout their work process to search for and locate products and services, learn about suppliers and access comprehensive technical content on standards, patents, design, specifications, materials, application notes, and many other important activities in their daily professional life. Without Globalspec, or a tool similar to it, the essential task of locating a specific component for a design would take many hours of browsing in manufacturer's catalogs.

All these tasks are accomplished by just linking to the Globalspec site. This is the reason why many important industrial manufacturers use the Globalspec site for all engineering tasks. Some of these companies include 3M, IBM, Motorola, Alcatel, Boeing, Cisco, NASA, Fermilab, Nokia, Intel, National Instruments, Siemens, Lucent, Los Alamos National Laboratory, and many more. The engineering community, represented by engineers at these companies require a specialized search engine offering precise, relevant results and easy access to the comprehensive engineering-related information to succeed in these times with shortening product design and development cycles.

Finding Engineering Components with GlobalSpec

For the last four years, we have been using Globalspec's area-specific advanced search technology, SpecSearch®, in consulting works and we have been teaching these techniques in classes. With Globalspec we can search by specification more than 120 million product

specification representing over 1 million product families from more than 18,000 supplier catalogs. By using the Globalspec search capabilities and tools, engineers can save countless of hours of non-productive time because there is no need to use the old way of manually searching for precise products attributes by browsing print or PDF catalog after catalog for many hours, in order to find the precise electronic part needed for a given project. Often individual suppliers would present their product specifications using different formats or terminology. On GlobalSpec, specifications and features are standardized within an area, which facilitates faster head to head product comparisons.

A typical part search using Globalspec can be summarized in the following steps:

1. Link to Globalspec (www.globalspec.com). See Figure 1, below.



Figure 1: Globalspec Main Page.

2. Enter the component you are looking for (Op-amp, Temperature Sensor, Transistor, FPGA, Analog-to-Digital Converter, Bluetooth Chips, etc.) in the “Find” box and select “Go” or enter. Alternatively, a user more experienced with the GlobalSpec site can browse through the taxonomy of industrial product categories.

3. Step 2 will bring an area or product specific advanced search form (or filter) and a list of manufacturers. At this point you may select a company that manufactures the component or you may want to narrow your part search by selecting parameters from the filter, as shown below in Figures 2 and 3. The search specifications shown are for a Power MOSFET where values of the drain breakdown voltage $V_{(BR)DSS}$ (at least 15.00 volts) and the steady state drain current I_{DSS} (at least 12.00 mA) are required. Note that all the specifications in the filter have a “No Preference” default value. This feature allows engineers to search for the most important or most needed parameters.

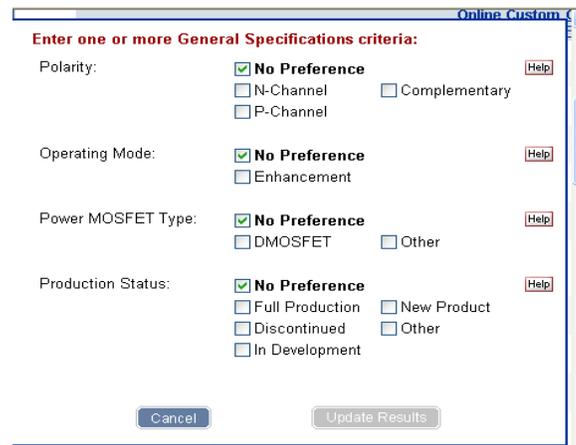


Figure 2: One section (General Specifications) of Power MOSFETs Filter.

4. After selecting the required specifications, a list of manufacturers that sell the specified component will be shown. By selecting one of the manufacturers a *catalog or matching products table* will present the results, as shown in Figure 4. The matching table will show all the components from the selected manufacturer. In our example we found 717 power MOSFETs from STMicroelectronics, Inc. that fit our search criteria. Suppose that you want to narrow the search by selecting an N-type MOSFET with a power dissipation (P_D) of no more than 30.00 Watts. This new set of criteria will produce a matching table for STMicroelectronics of

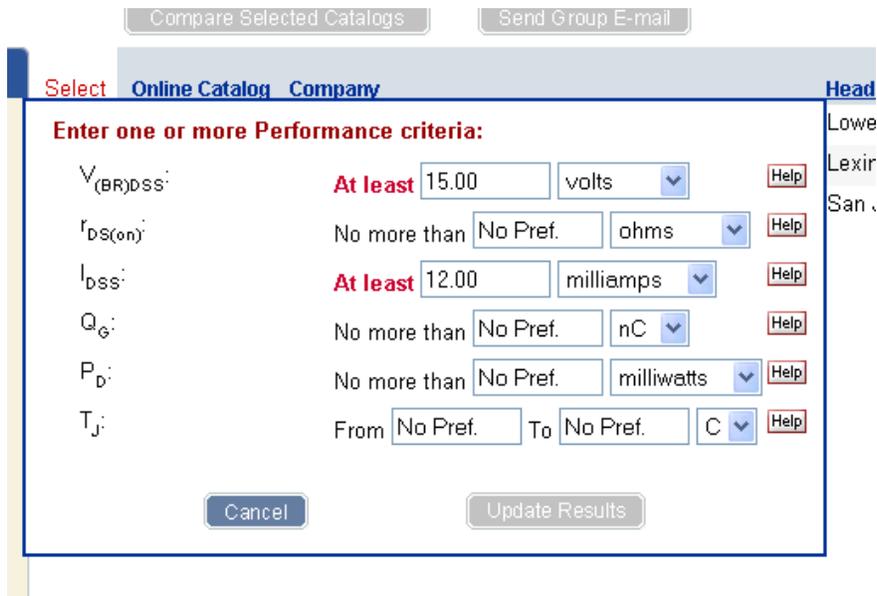


Figure 3: Another Section of the filter (Performance Criteria).

Power MOSFET
STMicroelectronics, Inc.

15 of 717 that meet your specifications Page: 1 2 3 4 5 6 7 8 9 10 Next»

Product Name	Get Product Information			Contact the Manufacturer			General Specifications					
	Product Spec Sheet	Info on Company Web site	Request for Quotation	Order Sample	Send an E-mail	Polarity	MOSFET Operating Mode	Production Status	Type	$V_{(BR)DSS}$ (volts)	$r_{DS(on)}$ (ohms)	(mi)
000	• See specs	• Go to Web site	• Request quote	• Order Sample	• Send E-mail	N-Channel		Full-Production		60.00	5.00	
002	• See specs	• Go to Web site	• Request quote	• Order Sample	• Send E-mail	N-Channel		Full-Production		60.00	5.00	
320	• See specs	• Go to Web site	• Request quote	• Order Sample	• Send E-mail	N-Channel		Full-Production		100	0.1300	
330	• See specs	• Go to Web site	• Request quote	• Order Sample	• Send E-mail	N-Channel		Full-Production		100	0.1600	
340	• See specs	• Go to Web site	• Request quote	• Order Sample	• Send E-mail	N-Channel		Full-Production		100	0.0700	
320	• See specs	• Go to Web site	• Request quote	• Order Sample	• Send E-mail	N-Channel		Full-Production		200	0.8000	

Figure 4: Matching Table for criteria $V_{(BR)DSS}$ at least 15 V, and I_{DSS} at least 12.00 mA.

only 19 products instead of the original 717. See Figure 5.

- To look at a particular component or part from the matching table, press the *View PDF* or *Go to Web site* link for the part that you need, and you will be in the precise specification page of the manufacturer's catalog, as is shown in Figure 6. This selection corresponds to the first component listed in Figure 5.

As you can see, this process takes less time and it is more accurate than catalog searches or

searches using generalized web-based search engines.

The authors has been using Globalspec in some of the courses taught at Hudson Valley Community College in order to show the students new techniques and new tools to deliver accurate parts for design purposes. The next section of this paper will present a simple student project where the Globalspec search engine plays an important role in *bringing the final product to the market* in a short period of time. In particular, we will detail the solutions to the following project: The design of a Class B Power Amplifier.

Too many choices? [Filter your results](#)

Products 1 - 15 of 19 that meet your specifications Page: 1 2 Next»

Compare Selections Now		Get Product Information		Contact the Manufacturer		General Specifications		
Product Names	Product Spec Sheet	Info on Company Web site	Request for Quotation	Send an E-mail	Polarity	Operating Mode	Type	V _{DS}
<input type="checkbox"/> SD1107BD	• See specs	• Go to Web site • View PDF	• Request quote	• Send E-mail	N-Channel, P-Channel*, Comp*	Enhancement	DMOSFET	
<input type="checkbox"/> SD1107DD	• See specs	• Go to Web site • View PDF	• Request quote	• Send E-mail	N-Channel, P-Channel*, Comp*	Enhancement	DMOSFET	
<input type="checkbox"/> SD1107HD	• See specs	• Go to Web site • View PDF	• Request quote	• Send E-mail	N-Channel, P-Channel*, Comp*	Enhancement	DMOSFET	
<input type="checkbox"/> SD1117BD	• See specs	• Go to Web site • View PDF	• Request quote	• Send E-mail	N-Channel, P-Channel*, Comp*	Enhancement	DMOSFET	

Figure 5: Table for criteria N-type MOSFET, $V_{(BR)DSS}$ at least 15 V, I_{DSS} at least 12.00 mA and P_D of no More than 30.00 watts.



SD1107/1117
N CHANNEL
ENHANCEMENT MODE
DMOS POWER FETS

FEATURES

- Gate Standoff Voltage
- Available in a wide variety of packages
- Low capacitances
- Low ON resistance
- P-Channel Complement Available.

APPLICATIONS

- High Speed Pulse Amplifier
- CMOS Logic to High Current Interfaces
- High Speed Switching
- Line Drivers

ABSOLUTE MAXIMUM RATINGS (TC = 25°C unless otherwise noted)

Drain-Source Voltage	
SD1107.....	100V
SD1117.....	60V
Drain-Gate Voltage (RGS = 1M)	
SD1107.....	100V
SD1117.....	60V
Gate-Source Voltage	
SD1107.....	140V
SD1117.....	100V

Figure 6: Manufacturer's PDF file of selected part from Figure 5.

Class B Power Amplifier Design

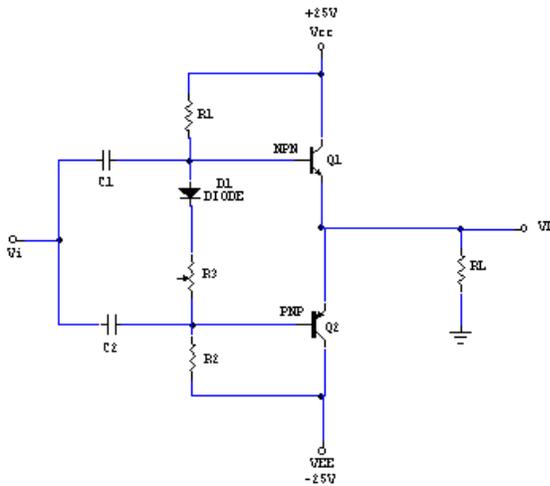


Figure 7: Class B Power Amplifier.

Figure 7 represents the circuit of a Class B Push-Pull Power Amplifier. An analysis of this circuit shows that the amplifier has a voltage gain of unity. If we assume that the input voltage $V_i = 12 V_{rms}$ ($V_{i(p)} = 17 V$), then the peak value of the output voltage will be $V_{L(p)} = 17 V$ as well. If we choose $R_L = 4 \Omega$, we can determine the output power across the load ($P_{O(ac)}$), the peak load current ($I_{L(p)}$), the dc current from the supply (I_{dc}), the dc input power ($P_{i(dc)}$), and the power dissipated by each transistor (P_Q) as follows:

$$P_{O(ac)} = V_{L(p)}^2 / 2R_L = 36.125 W$$

$$I_{L(p)} = V_{L(p)} / R_L = 4.25 A$$

$$I_{dc} = 2 I_{L(p)} / \pi = 2.71 A$$

$$P_{i(dc)} = V_{cc} I_{dc} = 67.75 W$$

$$P_Q = (P_i - P_o) / 2 = 15.8 W$$

In order to build the circuit using real standard parts found in the industry, the students were asked to find the part numbers and the manufacturers of those parts found in the real world. The most important parameters in this simple case are the bias current and the power dissipation of the transistors. We would like to

have transistors that can stand a bias current (I_{dc}) of at least 2.71 A and transistors that can dissipate at least 15.8 W. To be on the safe side, let's choose as our goal values of 3.00 A and 30.00 W for the current and power respectively of the transistors. We can find the corresponding parts by using the parametric search for Bipolar Power Transistors found in the Globalspec site. Figures 8 and 9 show the parametric search criteria and the resulting matching table generated when selecting Shindengen America, Inc. as the supplier.

Figure 8: Parametric search criteria.

You are here: [GlobalSpec.com](#) > [Semiconductors](#) > [Transistors](#) > [Power Bipolar Transistors](#) > Shindengen America, Inc. Your Stuff | Your

Catalog: [Power Bipolar Transistors](#)
from: [Shindengen America, Inc.](#)

Too many choices? [Filter your results](#)

Products 1 - 15 of 16 that meet your specifications Page: 1 2 Next»

Compare Selections Now

Select:	Product Names	Get Product Information		Contact the Manufacturer		Polarity	Transistor Grade / Operating Range	h_{fe}	V_{CE0} (volts)	V_{CE} (vol)
		Product Spec Sheet	Info on Company Web site	Request for Quotation	Send an E-mail					
<input type="checkbox"/>	FS Series -- 2SC4663	• See specs	• Go to Web site	• Request quote	• Send E-mail	NPN	Commercial, Industrial, Automotive	10.00	200	25
<input type="checkbox"/>	FS Series --	• See specs	• Go to Web site	• Request quote	• Send E-mail	NPN	Commercial, Automotive	10.00	200	25

Figure 9: Matching table for search criteria of Figure 8.

Sixteen part numbers satisfy these criteria. A side effect of using Globalspec for the students is the fact that by accessing the parametric search filters they will be able to discover most

of the important parameters of engineering components even if they are only interested in selecting a few parameters, as is the case in this example. We were concerned with finding a transistor with certain bias current and certain power dissipation, but the search filter (see Figure 8 above) contains the description of other important parameters related to power BJT transistors. Searching students or users can access and study help descriptions of each parameter available in the parametric search. This feature of Globalspec is particularly useful in a teaching or academic environment.

There are other features available at Globalspec that can be used as tools for teaching technical matters, as we will see in the next section of this paper.

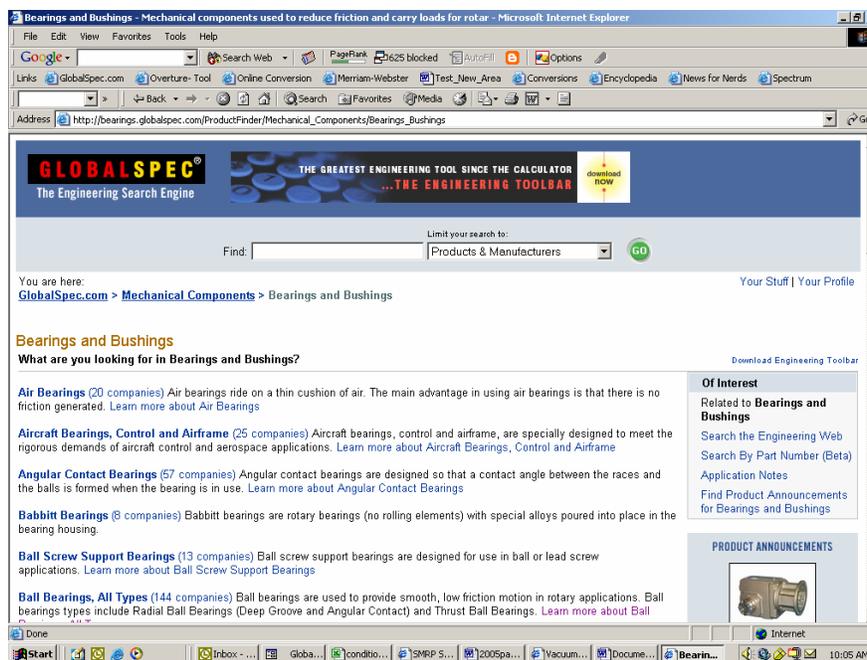
Product Exploration and Learning with GlobalSpec

Beyond gaining the ability to perform parametric searches to find and select the correct components needed for a new design, engineering students can learn a great deal by browsing through the GlobalSpec site. The site

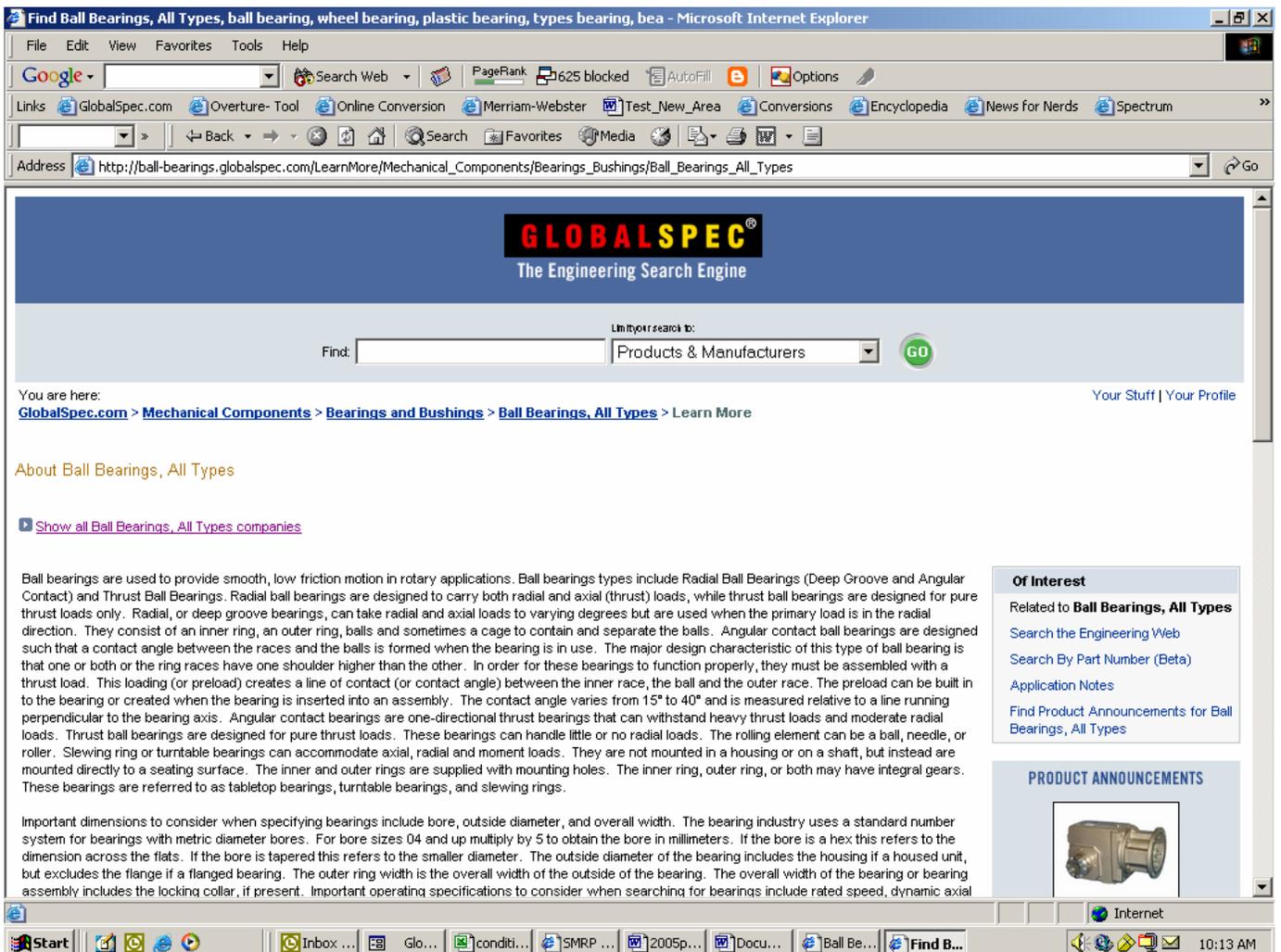
provides many opportunities for users to explore and learn about technical products. The following sub-sections introduce some of these tools that can be accessed through the main Globalspec page.

1.) Product Categories – Product or components are organized in a technology based taxonomy or directory. A tour through the sections such as Bearings , Motors , Temperature Sensing , Diodes or Vacuum Equipment will provide a new engineer or student an indication of the common types of components used in industry along with short descriptions of these products or components. The following figure shows products related to Bearings and Bushings.

2.) “Learn more about” pages – By drilling down deeper into specific categories and selecting a “Learn more about” link for an area, students can delve further into a particular component, service or product type. “Learn more about” pages provide a more in-depth description with additional details of the product or component.



a. Learn more about Ball Bearings. See the following figure:

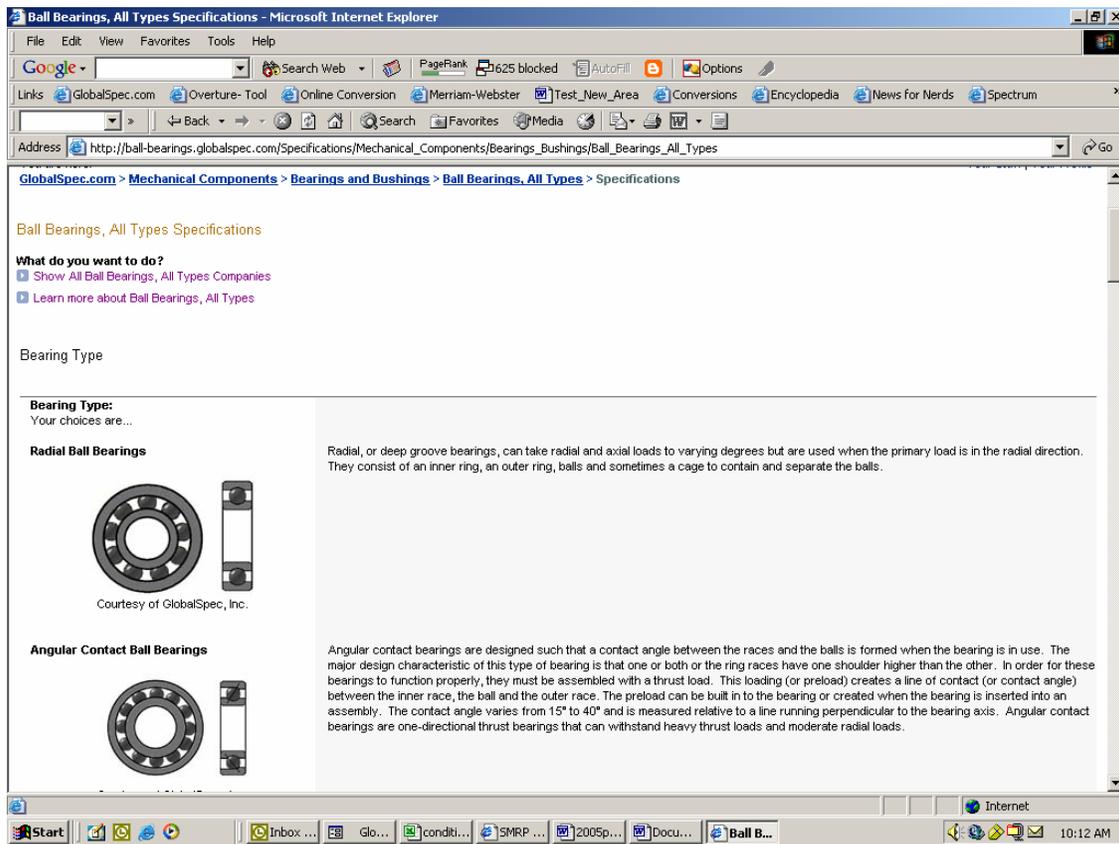


- b. Learn more about DC Motors
- c. Learn more about Dial Thermometers
- d. Learn more about Diodes
- e. Learn more about Vacuum Flanges and Fittings

3.) Specification Pages or Help Links – The young engineer, scientist or technologist can gain a better understanding of the specifications or attributes for a particular component or product by accessing Specifications pages located at the bottom of

the “Learn more about” pages (use Ctrl+End or scroll to the bottom the Learn more about page selected). Often an engineer or student new to an area does not know where to start or how to narrow searches because the specifications or attributes are unfamiliar. Help links to these specifications guides are also provided in the parametric advanced search forms.

View Ball Bearings Specifications. See the following figure.



4.) Engineering WebSM Searches – Web searches using the GlobalSpec search engine will return results more pertinent to the young engineer compared to the general-purpose search engines. To access the menu of Engineering WebSM search categories, select Advanced Search to the right of the find box on the Globalspec homepage. An Engineering WebSM search for “Pumps” will return links only on industrial pumps, while a search on a general-purpose search engine

returns results high heeled shoes as well. An Engineering WebSM search for “strippers” will return links on cleaning agents or chemicals as we would expect, while a search on a general purpose search engine returns results, which educators hope are not of interest to good engineering students.

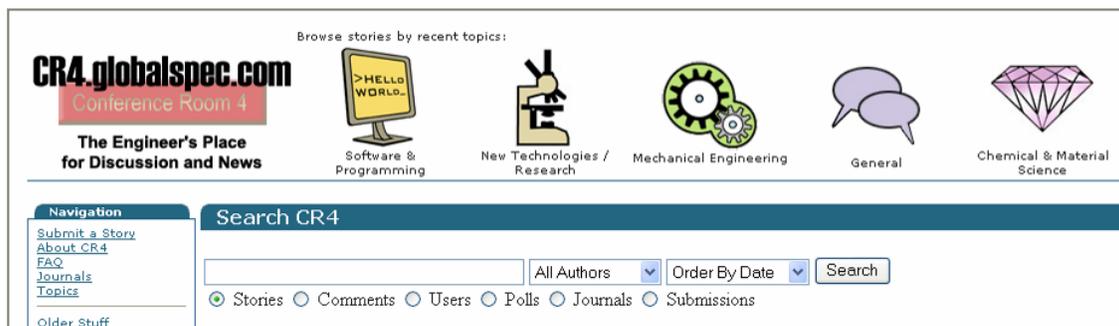
Users can also search for product specific white papers or application notes to gain a

better understanding of the use or implementation of a product or component in certain designs, under specific industrial conditions or within larger engineering systems. These documents may list detailed design specifications, as well as data describing how the product functions in different situations.

5.) Technology Exploration Tools - The GlobalSpec search engine also provides a “Refine Your Results” tool for exploring the space around or within a technical subject area or topic. For example, after performing an Engineering Web search on the term “composites” and clicking on “more” in the “Refine Your Results” box, the student or users will get list of links on related terms. Students or engineers learning about a subject can drill down into specific subsets of a technical topic such as “metal matrix

composites” or branch out into links on terms that are related to the initial subject area such as “fibers” or “adhesives”.

6.) While there are many forums for software and other topics, the engineering community really needs a place on the web to discuss engineering topics and news. GlobalSpec has started an engineering forum and news site, Conference Room Four (<http://CR4.globalspec.com>) where engineers, scientists and technologists can discuss topics, ask or answer technical questions and hear about new developments in their fields. Over time, the CR4 site may be just the place for engineers and engineering educators to meet and exchange information. For example, the CR4 forum might serve as a place where engineering educators could present a course outline and request input from engineers in industry during the development of a new engineering curricula.



CR4 The Engineer’s Place for Discussion and News

Conclusion

In conclusion, engineering hubs and search engines such as GlobalSpec provide a wealth of tools to enable engineers to perform their jobs more efficiently. The GlobalSpec website also contains many resources to useful in educating engineering and technology students. Proficiency in online searching of industrial components is a useful skill for new engineers to acquire and can be integrated into engineering curricula.

References

1. Boylestad, Robert L. and Nashelsky, Louis. *Electronic Devices and Circuit Theory*, 7th edition, Upper Saddle River, NJ: Prentice Hall, 1999.
2. <http://www.globalspec.com/SiteMap>

Biographical Information

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