

DataVis

Material Properties

by **ACCESS**  Engineering

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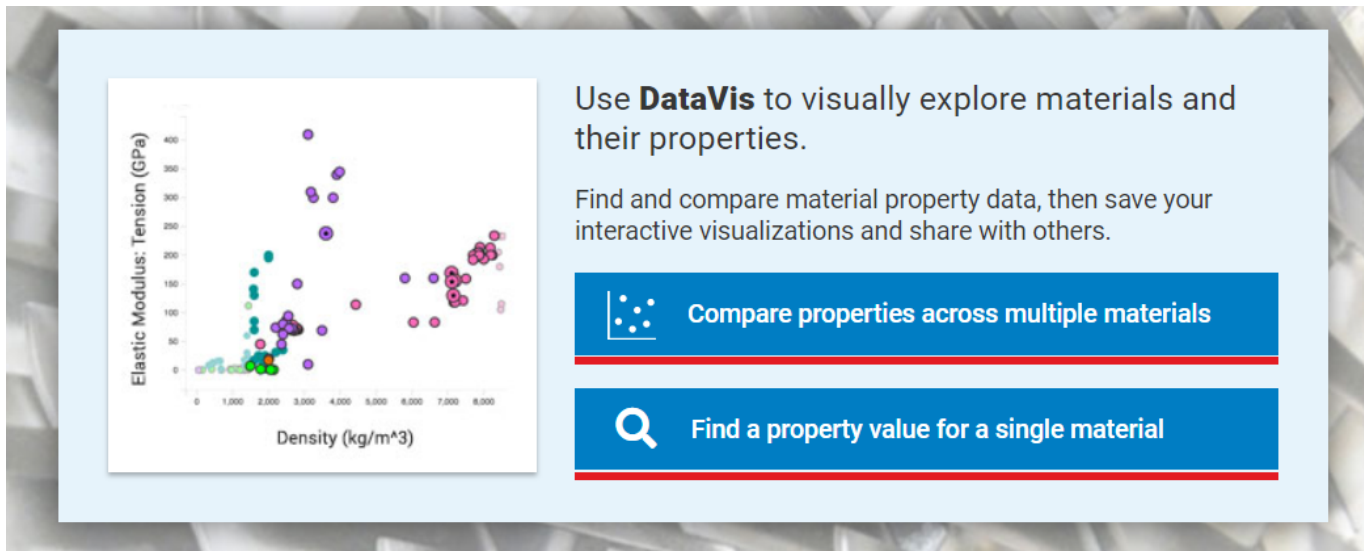
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What is DataVis?

- DataVis is an interactive, web-based data visualization tool that transforms the way students learn about material properties.
- Users can instantly visualize property data in an interactive dot-plots and scatterplots across a wide range of materials.
- DataVis includes a curated dataset of 200 materials and 65 properties.



Available Visualizations

- Compare materials for a single property in a dot plot or compare two properties against each other in a scatterplot.
- In the top visualization to the right, you can see the density of all 200 materials being compared across material classes.
- In the bottom visualization to the right, you can see a comparison of fracture toughness vs. shear strength across all material classes (represented by different colors)
- Up to five visualizations can be added to a page in DataVis



Use **DataVis** to visually explore materials and their properties.

Find and compare material property data, then save your interactive visualizations and share with others.

1 [Compare properties across multiple materials](#)

[Find a property value for a single material](#)

DataVis Project Library

Materials: More than a Name

This project investigates materials with similar names (aluminum, alumina, alumina (sapphire)), focusing on the fundamental differences between them.

Designed by Dr. Susan P. Gentry, University of California, Davis.

[Open Project](#)

Analysis, Stresses and Deflection of Beams

This project investigates analysis, stress and deflection calculations in beams made of different materials. Students will determine if the bending stress and shear stress of each beam is satisfactory for given factor of safety requirements.

Designed by Mustafa Mahamid, University of Illinois at Chicago.

[Open Project](#)

Properties for Aerospace Structures

This case study looks at properties for Aerospace applications.

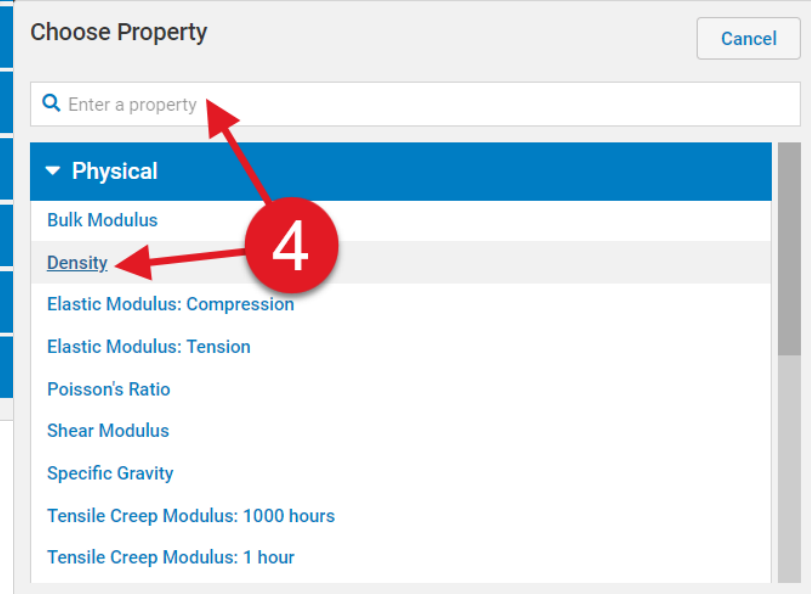
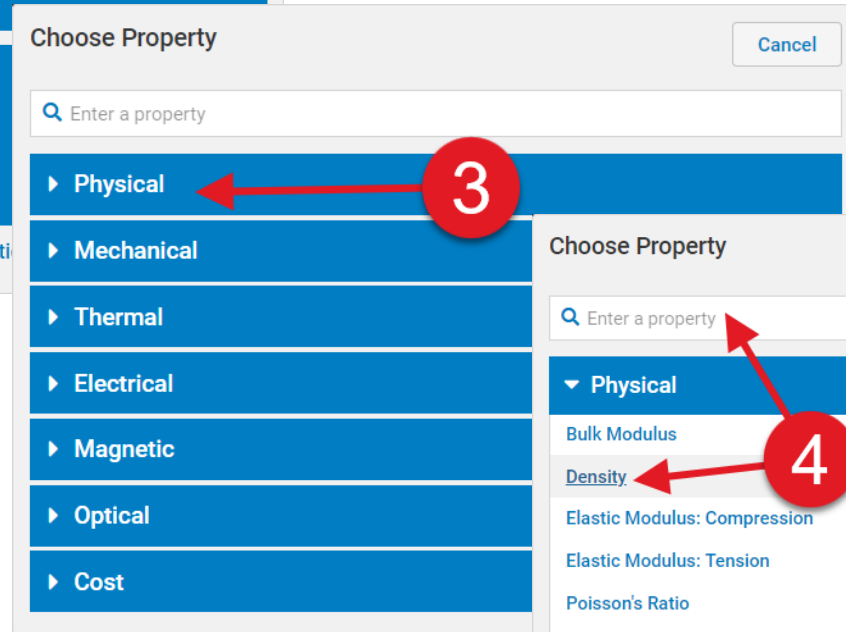
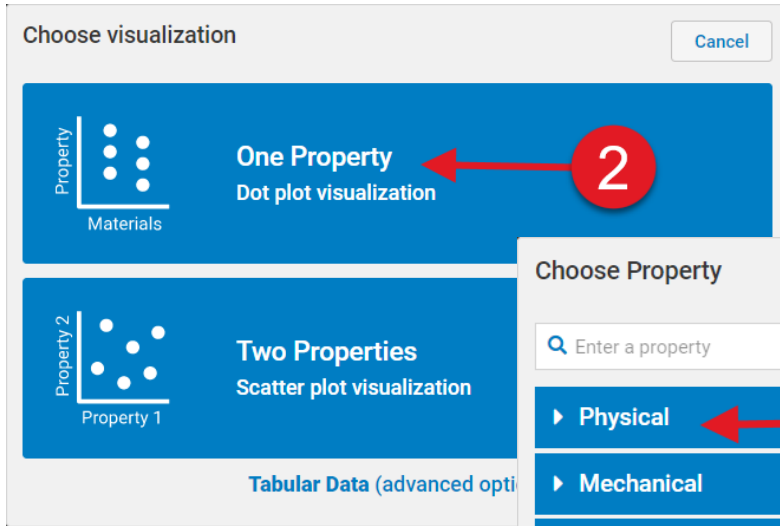
Designed by Kathleen Kitto, Western Washington University.

[Open Project](#)

[View all sample visualization projects](#) ▾

Creating a DataVis Project

1. From the DataVis homepage, select the option to compare properties
2. Choose a visualization (dot-plot or scatterplot)



3. Choose a property (or properties)
4. Use the menu to select a property from a category or search for a property using the search box

Creating a DataVis Project

The density dot plot has now been added to your project.

From here, you have several options:

1. Add another visualization
2. Name your project and add a description
3. Name your page and add a page description
4. Add more pages to your project
5. Add links to related materials to create context or provide references

The screenshot illustrates the DataVis interface with five numbered callouts:

- 1:** Points to the 'Add Visualization' button in the top navigation bar.
- 2:** Points to the 'Example Project' header area, which includes 'Add Description' and 'Hide Page Navigation' options.
- 3:** Points to the 'Density of materials' page title area, which includes 'Add Description' and a 'View Tabular Data' button.
- 4:** Points to the '+' icon in the page navigation bar, used to add new pages.
- 5:** Points to the 'Related Content' section at the bottom, which includes an 'Add/Edit' link.

The main visualization area displays a dot plot titled 'Density (kg/m³)' showing data points for five material categories: Metal, Polymer, Ceramic, Composite, and Advanced. The y-axis ranges from 100 to 1.93e+4 kg/m³. A legend below the plot shows the density range for each category.

Material	Color	Approximate Density Range (kg/m³)
Metal	Pink	2000 - 18000
Polymer	Green	1500 - 2500
Ceramic	Purple	3000 - 6000
Composite	Blue	1000 - 2500
Advanced	Orange	1000 - 2000

Creating a DataVis Project

Once you have finished editing your project, you can save it to your personal account, share it with others, or export pages as a PDF.

Use the dropdown menu under My Account to view all your saved DataVis projects.

The screenshot shows the DataVis interface for an 'Example Project'. At the top right, there is a navigation bar with 'Access via McGraw Hill' and a 'My account' dropdown menu. Below this, a red box highlights a toolbar containing 'Save', 'Save As', 'Share', 'Export Page', and 'New' buttons. A red arrow points to the 'My account' dropdown menu. The main content area shows a breadcrumb trail: 'Density of materials' > 'Mechanical properties'. Below this, there is a section titled 'Mechanical properties' with a 'View Tabular Data' button. The main visualization area contains three charts: 'Elongation (%)', 'Tensile Strength (MPa)', and 'Flexural Strength (MPa)'. Each chart shows data points for different material classes. On the left, there is a 'Select Materials' panel with 232 materials selected, including 'Metal (128)' and 'Polymer (32)'. An 'Add Visualization' button is also visible.

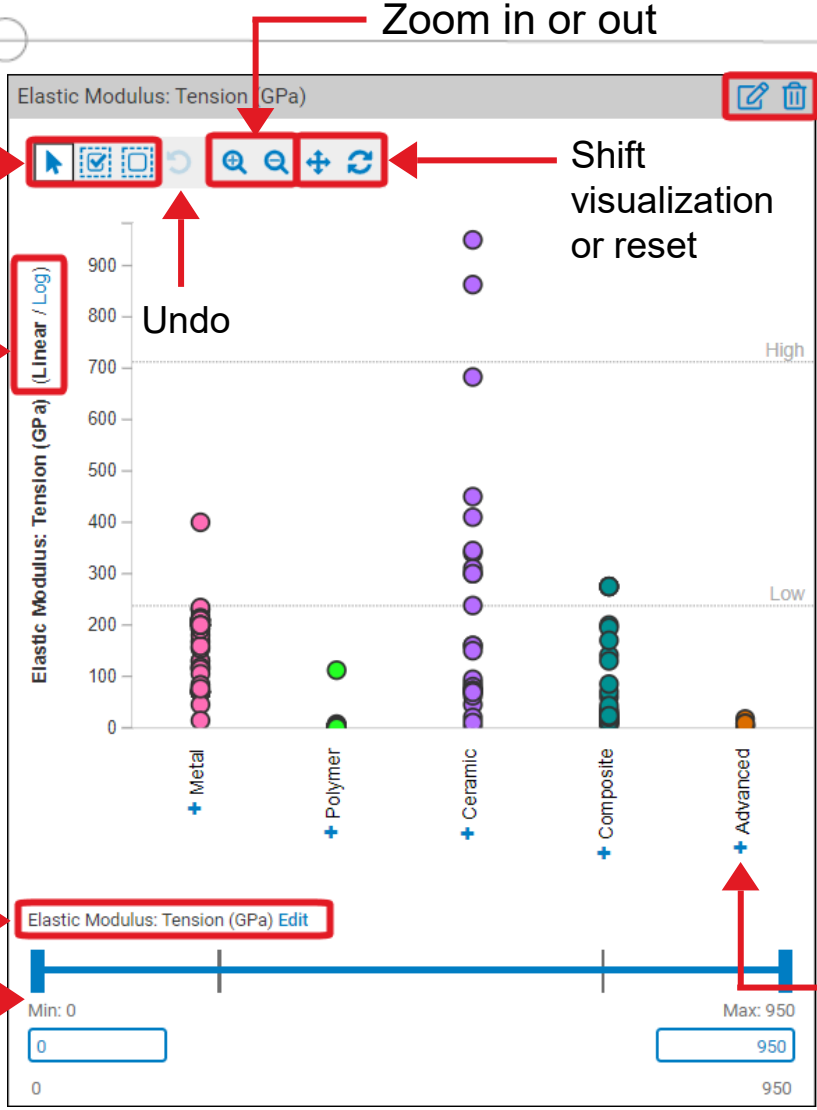
Visualization Tools

Browse materials or drag to select/deselect

Set axes to Linear or Logarithmic scale

Click Edit to open More Settings

Adjust the range for property values



More Settings ✕

Set unit system

Display Settings

Default Units: S.I. U.S. ⓘ

Reference Lines: Show Hide ⓘ

Change units

Elastic Modulus: Tension GPa ⓘ

0 950

Min: 0 Max: 950

[Manage Reference Lines](#)

View Tabular Data for All Properties in Project

Breakout material categories

Visualization Tools

Search for materials or browse by category

Select or star materials

Select Materials 226 selected

Search: Clear

Expand All Select All

- ▼ Metal (128)
- ▼ Ferrous (81)
- ▼ Iron (12)
- ▼ Cast (11)
- ▼ Gray (4)
 - ★ Gray Cast Iron: ASTM A48, Class 40
 - ☆ Gray Cast Iron: Automotive: SAE J431, SAE G1800
 - ☆ Gray Cast Iron: Automotive: SAE J421, SAE G2500

[Exclude unselected materials from dataset](#)

Display Settings

- Show all included
- Show selected and in range only
- Show starred only

More Settings



Click on a dot to see material details

Select or star this material

Select Range: In Star ✕

Material
Tungsten

Elastic Modulus: Tension
400 GPa

Source
Matweb, matweb.com

Material Classification
Metal > Non-Ferrous > Refractory Metal > Other

Material Structure
Metal > Polycrystalline > Cubic > Body Centered

Processing step 1
Metal > Alloyed

Overall Chemical Composition (by mass)
W 100%

Close details

Display options to show all materials, only selected and in range, or only starred materials

Tabular Data

See the full list of materials in a table below the visualizations

Reorder columns or export data as a CSV file

Tabular Data						Reorder Columns	Export CSV
Select	Range	Star	Material	Sort by any column	Classification	Elastic Modulus: Tension (GPa)	
<input checked="" type="checkbox"/>	Out	☆	Acetal Copolymer		Polymer	2.83	
<input checked="" type="checkbox"/>	Out	☆	Acrylonitrile Butadiene Styrene (ABS): Molded		Polymer	2.30	
<input checked="" type="checkbox"/>	In	★	Alloy Cast Iron Overview		Metal	156	
<input checked="" type="checkbox"/>	In	☆	Alumina (Al2O3): 96%		Ceramic	300	
<input checked="" type="checkbox"/>	In	☆	Alumina (Al2O3): 98%		Ceramic	340	
<input checked="" type="checkbox"/>	In	☆	Alumina (Al2O3): Sapphire: MarkeTech, Single Crystal		Ceramic	345	
<input checked="" type="checkbox"/>	In	☆	Alumina Oxide - Silicon oxide (3(Al2O3)-2(SiO2)): Mullite		Ceramic	1.50e+02	
<input checked="" type="checkbox"/>	Out	☆	Aluminum: 1100-H14		Metal	68.2	
<input checked="" type="checkbox"/>	Out	☆	Aluminum: 1100-H16		Metal	68.9	
<input checked="" type="checkbox"/>	Out	☆	Aluminum: 1100-O		Metal	68.9	

See if a material is in range and select, deselect, or star the material

See more information on this material

Search for a Property Value

1. Select “Find a property value for a single material” from the DataVis homepage
2. Enter the material and property to see the value (change the units using the dropdown menu)

Use **DataVis** to visually explore materials and their properties.

Find and compare material property data, then save your interactive visualizations and share with others.

Compare properties across multiple materials

Find a property value for a single material

Find a property value for a material

Concrete: Steel Reinforced Clear

Density Clear

2400 kg/m³ ▼

Source: [Matbase](#), [matbase.com](#)

Compare Density for all materials



Tabular Data					Reorder Columns	Export CSV
Select	Range	Star	Material	Classification	Density (kg/m ³)	
<input checked="" type="checkbox"/>	In	☆	Concrete: Steel Reinforced	Composite	2400	
<input type="checkbox"/>	In	☆	Acetal Copolymer	Polymer	1420	
<input type="checkbox"/>	In	☆	Acrylonitrile Butadiene Styrene (ABS): Molded	Polymer	1060	
<input type="checkbox"/>	In	☆	Alloy Cast Iron Overview	Metal	7190	

3. Use the “Compare” button to generate a new project
4. The result for the material searched is highlighted in the visualization and listed at the top of the tabular data.

Pre-existing DataVis projects were created by faculty to demonstrate specific concepts.

Select from the library on the DataVis homepage or use the DataVis tab in search or browse results to view relevant projects.

All content in the projects can be edited to create your own version, which can then be saved to your projects or shared.

DataVis Project Library

<p>Materials: More than a Name</p> <p>This project investigates materials with similar names (aluminum, alumina, alumina (sapphire)), focusing on the fundamental differences between them.</p> <p><i>Designed by Dr. Susan P. Gentry, University of California, Davis.</i></p> <p>Open Project</p>	<p>Analysis, Stresses and Deflection of Beams</p> <p>This project investigates analysis, stress and deflection calculations in beams made of different materials. Students will determine if the bending stress and shear stress of each beam is satisfactory for given factor of safety requirements.</p> <p><i>Designed by Mustafa Mahamid, University of Illinois at Chicago.</i></p> <p>Open Project</p>	<p>Properties for Aerospace Structures</p> <p>This case study looks at properties for Aerospace applications.</p> <p><i>Designed by Kathleen Kitto, Western Washington University.</i></p> <p>Open Project</p>
<p>Exploring Basic Material Properties</p> <p>This project explores the fundamental material properties of Density, Specific Gravity, Modulus: Tension and Yield Strength.</p> <p><i>Designed by Kathleen Kitto, Western Washington University.</i></p> <p>Open Project</p>	<p>Torsion of a Compound Shaft</p> <p>This project investigates the torsional behavior of a compound shaft.</p>	<p>Swing Set Material Selection</p> <p>This sample project shows how DataVis can be used to select materials for a swing set.</p>

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DataVis

1. Explore material properties using DataVis

1. Explore material properties using DataVis
Designed for teaching and learning about material properties, DataVis is an interactive data visualization tool that visually displays property data across more than 200 materials and 65 properties, including cost. DataVis can be used to search for a property for a particular material, or to compare...

DataVis Project

3D Printing Filament

This project examines the various factors that influence performance of filament used in extrusion-type additive manufacturing processes. Both thermal and mechanical properties are discussed, including glass transition temperature, melting temperature, thermal expansion coefficient, specific heat capacity, flexural strength, hardness, maximum...

DataVis Project

Analysis, Stress and Deflection of Beams

This project investigates analysis, stress and deflection calculations in beams made of different materials, including steel, wood, aluminum and concrete. Students will determine if the bending stress and shear stress of each beam is satisfactory for given factor of safety requirements. The project incorporates several material properties...

All content in the projects can be edited to create your own version, which can then be saved to your projects or shared.

Projects have their own landing page in AccessEngineering, with a description, related searches, links to other projects in a series, and instructor resources including answer keys.

Arc Welding Metals

Mark Atwater

DataVis Project Resources (1)

This project examines the various properties that influence arc welding of metals. Electrical and thermal factors are examined in regard to the electrode, the workpiece, and assembly design. Both thermal and electrical properties are explored, including melting temperature, electrical conductivity, specific heat capacity, thermal diffusivity, and thermal expansion coefficient. Students will determine which material is best suited for an electrode based on these material properties.

Access project in DataVis Download DataVis Project

For more information on DataVis, visit our [FAQ's](#) or watch our [video tutorial](#).

This project is part of a 10-project series that accompanies the [Materials and Manufacturing textbook](#) by Mark Atwater. Click [here](#) to see all of the projects in the series.

Cite Share Bookmark Labels Annotate

Related searches

Search AccessEngineering for other content tagged with these...

Subjects

- Electrodes
- Metals
- Thermal conductivity
- Thermal diffusivity
- Thermal expansion coefficient
- Welding



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Questions?

Contact McGraw Hill's Customer Success Team at
customersuccess@mheducation.com

for questions on using DataVis or
requests for additional training