

SPREADSHEETS

What are spreadsheets and how are they related to Data Knowledge & Analysis?

A spreadsheet is a file created using software such as Microsoft Excel to capture, display, and manipulate data arranged in rows and columns. Technicians collect data as part of their normal daily workflow to install and configure systems, diagnose problems, and perform maintenance. Spreadsheets are a convenient and simple tool with which to store this data. Once the data is stored, the technician can use spreadsheet features to analyze data, including summaries, trends, and patterns. Spreadsheets can also be used to create data visualizations.

Vocabulary

- **CSV** – the file extension indicating that data will be displayed separated by commas and line breaks; compatible with all spreadsheets
- **Data visualization** – represents information in the form of a chart, diagram, or infographic so that data can be quickly and easily understood
- **Export** – to copy or move data from one program or computer to be saved or imported into another program; exporting can be used to back up and save important data or to move data between versions of a file
- **Pivot table** – a Excel tool used to reorganize and summarize data from specific rows and columns of data, making it easier to spot trends and patterns

- **TSV** – the file extension indicating data will be displayed separated by tabs; used when data is stored in tables
- **XLS or XLSX** – the file extension that indicates a spreadsheet can be opened in Microsoft Excel

How will technicians use spreadsheets?

Shanice is a Solar Technician on a solar farm. Recently her company installed sensors on each panel. The sensors collect data including voltage, current, temperature and the amount of sunlight reaching the panel. When there was a problem with the system in the past, Shanice would need to walk through the solar farm and examine each panel to determine which panels were malfunctioning. Now the sensors on the panels transmit readings to a database available on a computer at her workstation. When there is a system problem, Shanice logs into the database, exports the data to a CSV file, or a comma separated file, clicks on “Save As,” and selects the “xlsx file” option where it’s converted to an Excel spreadsheet. She then can review data that is displayed in with rows and columns (or use the program to create data visualizations) where she can easily spot the specific panel that is the source of the issue. Shanice can go directly to that panel and service it.



SPREADSHEETS

Skills Needed for a High-Paying Career

- Creating spreadsheets
- Manipulating data cells using copy/cut/paste
- Analyzing data
- Organizing and formatting related data
- Sorting data
- Creating charts
- Importing data from an external source

Education

Your local community college provides the advanced technology classes you will need. STEM technicians often use spreadsheet programs that are unique to their field. Spreadsheet skills are most often taught within Information Technology, Computer Science, Data Science, Data Analytics, or Business programs offering associate degrees and one-year certificates. You'll also find applicable skills in technical specializations, such as agriculture, cybersecurity, biomedical, energy, engineering, and environmental technologies. Community college course schedules are designed to accommodate the needs of working students and often include online and hybrid delivery formats. [Find your nearest community college here.](#)

Future Trends

In the future, spreadsheets will be able to:

- Work seamlessly with Big Data
- Analyze and correct unreliable and missing data
- Join external datasets together
- Provide analysis tools which utilize machine learning

Learn More

- [What is a Spreadsheet?](#)
- [Microsoft Excel Video Training](#)
- [Google Sheets Tutorial](#)
- [Creating Pivot Tables in Excel](#)



Preparing Technicians for the
FUTURE OF WORK



SPREADSHEETS

What are spreadsheets?

A spreadsheet program stores data in a grid of rows and columns and a file in the program may contain multiple worksheets used for organization, analysis, and storage of data in tabular form. Data may consist of numbers, formulas, or text. Spreadsheets have features that enable users to store, analyze, model and visualize data. Common spreadsheets include Microsoft Excel and Google Sheets.

Spreadsheet Competencies

- Creating spreadsheets
- Performing basic functions, including sums and averages
- Manipulating data cells
- Analyzing data
- Organizing and formatting related data
- Sorting data
- Creating charts
- Importing data from an external source

Cross-disciplinary Skills

- Applying computational thinking
- Using basic statistics
- Utilizing analytics tools, such as Excel
- Managing data
- Demonstrating data literacy
- Creating data visualizations
- Communicating the implications of the data

Advanced Manufacturing Scenario

Mohammed is a Manufacturing Technician for a plastics manufacturing company where he works with an injection molding machine. Mohammed uses an HMI, a touch screen with that allows him to control the machine and track various functions, such as the temperature of the molds and the operation of the hoses. Since maintaining machinery is part of his responsibilities, Mohammed needs to periodically collect data that provides insight into the machine's functioning over time to determine when to do preventive maintenance. When Mohammed's company installed the HMI for his machine, they were able to set up a reporting feature where he can download the data directly into an Excel format. He views the data in rows and columns by date and function and uses that information to determine whether maintenance will be needed to ensure his machine is functioning properly.

Engineering Technologies Scenario

Lisa is a Materials Technician in a plasma lab where they are studying how to the shrink the size of chips used in electronics. She is responsible for setting up test fixtures, conducting materials and component tests, and collecting data. Lisa needs to share data on her materials testing with her supervisor weekly. She finds charts the most effective way to visually summarize the data. To accomplish this, she tracks and stores data daily exported to an Excel spreadsheet. On Fridays, Lisa creates charts by highlighting the data she wants to share, clicking on "Insert-Recommended Chart" and then selecting Bar or Pie charts. She then emails them to her supervisor or prints them out before discussing the week's testing results.

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Activity

This activity is designed to give students hands-on experience with creating a simple spreadsheet that a technician might use in real life. It can be done in pairs in a classroom or by individual students via distance learning.

Warm-Up

Remind students that technicians collect data as part of their daily workflow to record, organize, and store data. Technicians then can use spreadsheet statistical tools and application features, such as Excel's Power Query or pivot tables (not introduced in this activity), to analyze, combine, and refine the data. Ask students:

- Who has created and/or used Excel spreadsheets?
- What did you use the spreadsheets for?

Activity Steps

1. Have students get into pairs. Each pair needs at least one computer with Excel. If they do not have Excel loaded, students can sign up for a free account at <https://www.microsoft.com/en-us/microsoft-365/free-office-online-for-the-web>.
2. Pairs are going to watch the video [Calculating Wind Power in Excel](#) and create the same spreadsheet as demonstrated in the video. They can stop the video or go back, as needed, so they are able replicate all the steps.
3. The pairs will need to have some basic cells ready in the spreadsheet as shown in the video.
 - a. Click on “new spreadsheet.”

- b. Type “Wind Velocity (meters and seconds)” in the first cell.
 - c. In column A, type the numbers 1-11 in each cell going downwards.
 - d. In column B, type “Wind Power (watts/meter²).”
4. The pairs follow the steps in the video to add the data.
 5. Ask students what they learned from the activity about how spreadsheets function.

Tools Available

- Excel is a common spreadsheet program. Users with a school email can set up a [free account](#).
- Google Sheets offers similar tools and is [free to those who have a Google log-in](#).
- On an iPad, Numbers is the free spreadsheet app.

Read More

- [Twelve Best Spreadsheets to Try](#)
- [Is the Age of the Spreadsheet Over?](#)



Preparing Technicians for the
FUTURE OF WORK



ABOUT THE PROJECT

Preparing Technicians for the Future of Work, funded by the National Science Foundation Advanced Technological Education program, recognizes that technicians need an expanded skill set to remain competitive. The project's Framework for a Cross-Disciplinary STEM Core outlines recommendations for incorporating knowledge and skills in Advanced Digital Literacy, Data Knowledge and Analysis, and Business Knowledge and Processes. Learn more about implementing the Framework at preparingtechnicians.org.