

Introduction to TIMSS

TI Precision Labs – TI Magnetic Sense Simulator

Presented and prepared by Scott Bryson

TI Magnetic Sense Simulator

TEXAS INSTRUMENTS

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Why are magnetic simulation tools necessary?

Magnetic sensors produce electrical outputs that correlate to mechanical input:

- Magnetic fields vary with geometry, distance, material and temperature

Options for system level design:

Why are magnetic simulation tools necessary?

Magnetic sensors produce electrical outputs that correlate to mechanical input:

- Magnetic fields vary with geometry, distance, material and temperature

Options for system level design:



Hardware experimentation through trial and error

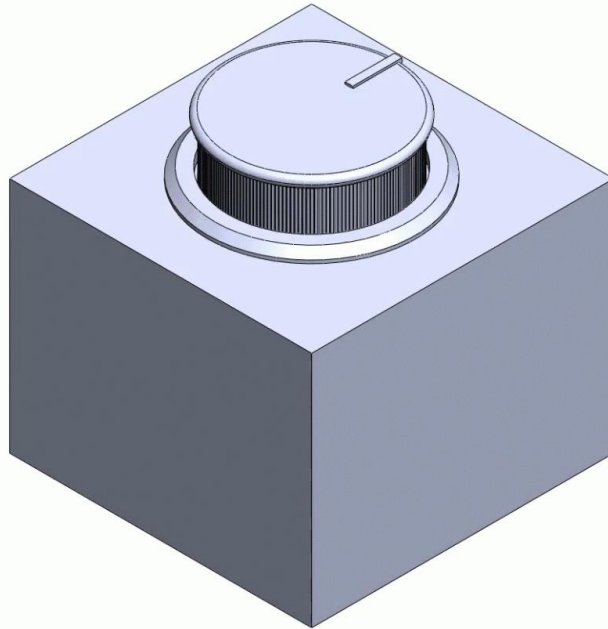


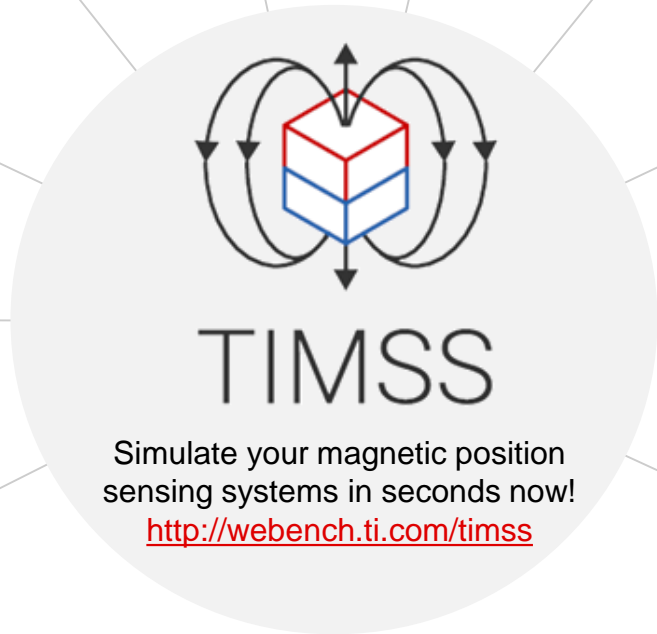
Accelerate design using simulation tools to analyze combinations of system tolerances

TI Magnetic Sense Simulator

Model your magnetic design in TIMSS

- No license
- Easy parameterized inputs for common motion types
- Fast simulation results





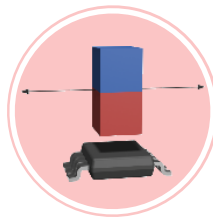
Save and share

Store and share project designs and export results to .csv or .pdf reports



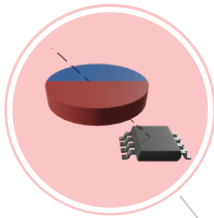
Reference examples

Example reference designs provide a starting point to explore



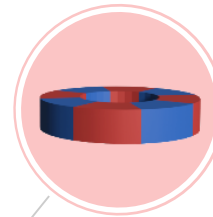
Animated visualization

3D animations show magnet movement



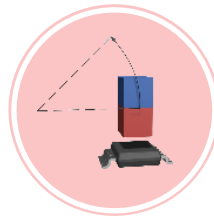
Magnet selection

Included library of magnetic materials provides common magnet grades or customization



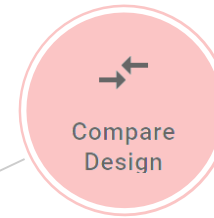
Magnet motion

Supports motion including rotation, hinge, joystick, and linear



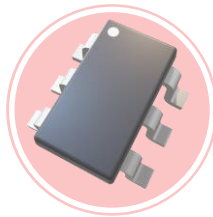
Optimization

Comparing results from design variants helps with system optimization



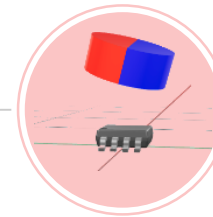
Parts library

Included parts library has over 400 device variants



Customization

Simulate rotation or mechanical offsets to evaluate tolerances



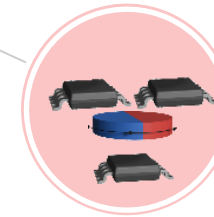
Fast simulations

Capable of running nested parametric sweep permutations in moments

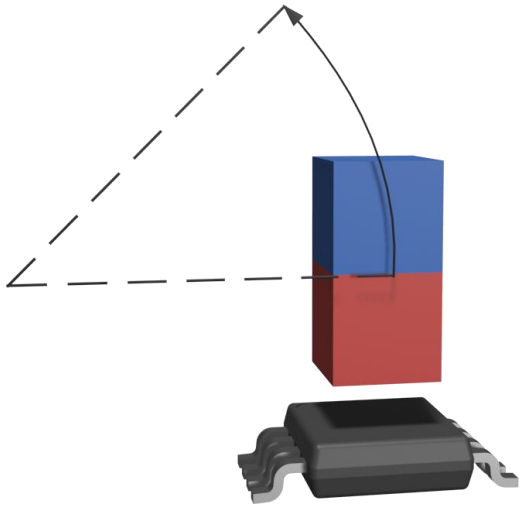


Device selection

Simulate up to 6 devices simultaneously to compare results

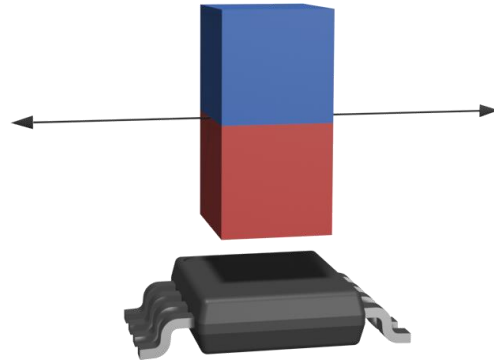


Types of Motion



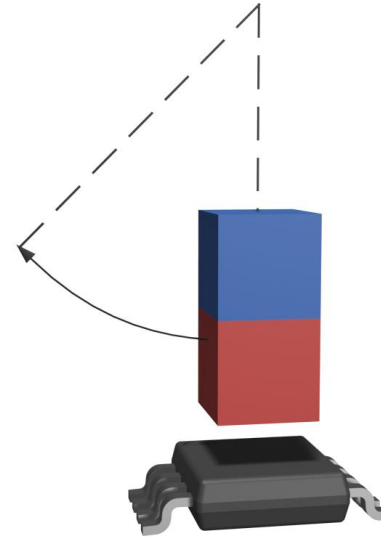
Pivot on a hinge

- Lid and door closures



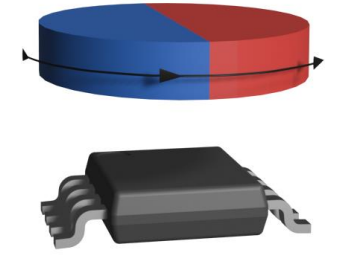
Glide on a linear path

- Linear encoding
- End of travel
- Switch and button



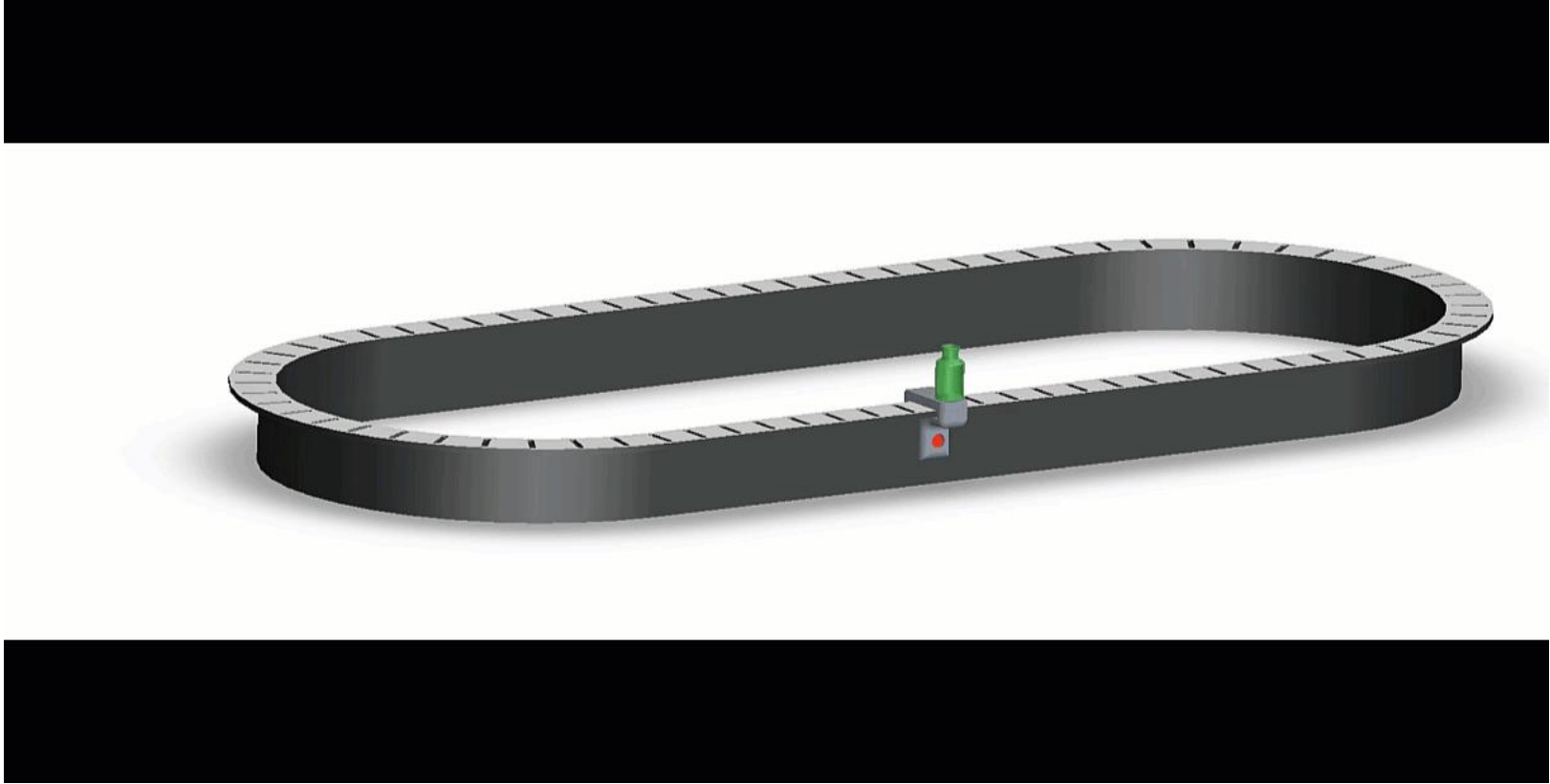
Tilt and swing

- Joystick and lever control



Rotate in place

- Angle encoding
- Motor position
- Knob and dial



Getting started

1. Register for a MyTI account

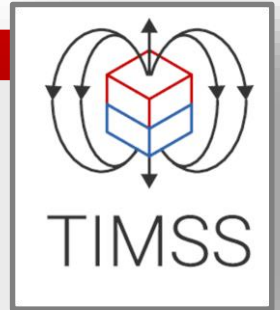
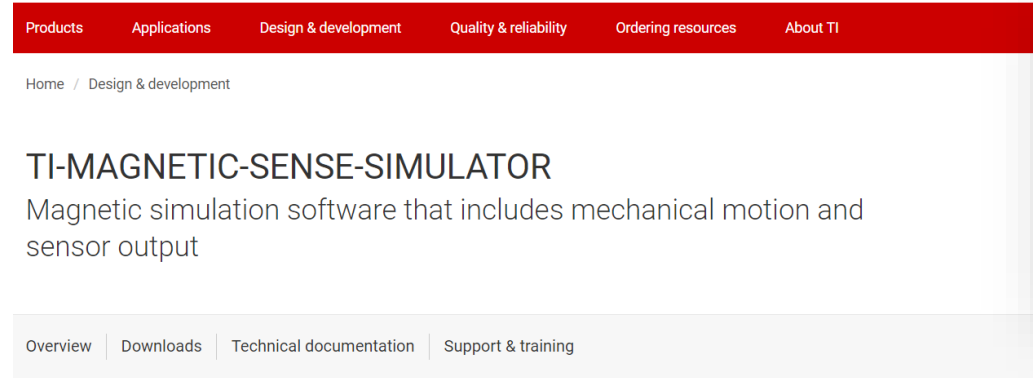
- <https://www.ti.com/myti/nsdocs/register>

2. Navigate to TIMSS

- <http://webench.ti.com/TIMSS>

3. Start designing

- Create a new design
- Select your magnet and sensor
- Model your system

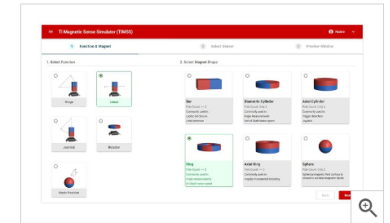


Overview

The TI-MAGNETIC-SENSE-SIMULATOR (TIMSS) webtool estimates magnetic flux density and TI magnetic sensor outputs for magnetic position sensing systems. Select from our portfolio of magnetic sensors to thoroughly emulate electro-mechanical performance of your design. The tool supports various magnet shapes, grades and motion types to easily customize your design.

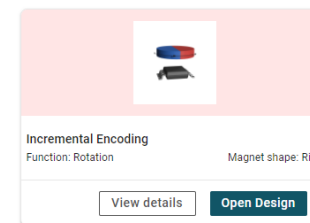
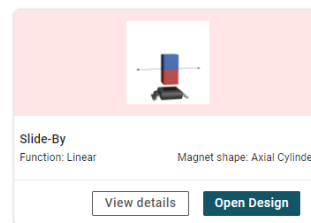
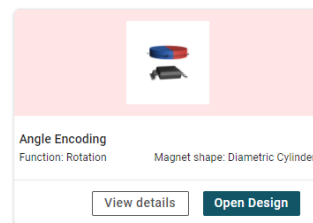
Features

- Fast simulation results
 - Sweep up to three parameters simultaneously
 - Simulate up to six devices simultaneously



Don't know where to begin?

Example Reference Designs

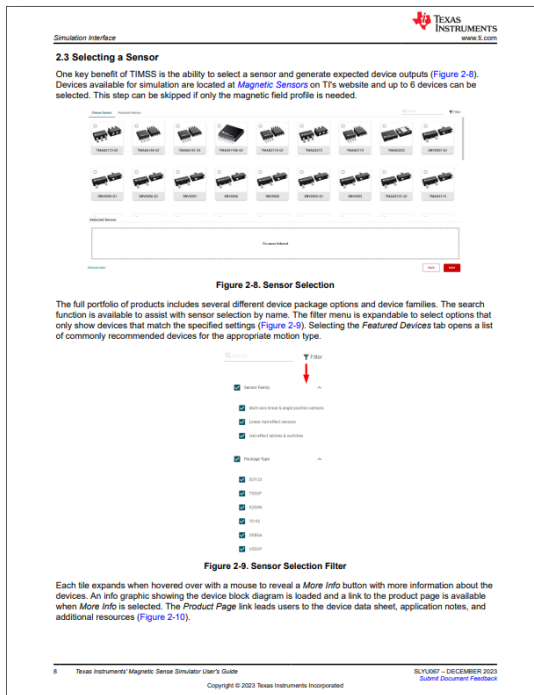


Learn more

For more resources to get started:

<https://www.ti.com/tool/TI-MAGNETIC-SENSE-SIMULATOR>

- User's guide



The screenshot shows a web interface for selecting a sensor. It includes a search bar, a list of sensor options with images, and a filter menu. The filter menu is expanded to show various options like 'Sensor Type' and 'Package Type'. The text below the filter menu explains that each tile expands when hovered over with a mouse to reveal a 'More Info' button with more information about the devices.

2.3 Selecting a Sensor

One key benefit of TIMSS is the ability to select a sensor and generate expected device outputs (Figure 2-8). Devices available for simulation are located at [Magnetic Sensors](#) on TI's website and up to 6 devices can be selected. This step can be skipped if only the magnetic field profile is needed.

Figure 2-8. Sensor Selection

The full portfolio of products includes several different device package options and device families. The search function is available to assist with sensor selection by name. The filter menu is expandable to select options that only show devices that match the specified settings (Figure 2-9). Selecting the **Featured Devices** tab opens a list of commonly recommended devices for the appropriate motion type.

Figure 2-9. Sensor Selection Filter

Each tile expands when hovered over with a mouse to reveal a **More Info** button with more information about the devices. An info graphic showing the device block diagram is loaded and a link to the product page is available when **More Info** is selected. The **Product Page** link leads users to the device data sheet, application notes, and additional resources (Figure 2-10).

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- Demos and videos



The video thumbnail features a 3D rendering of a liquid level sensing setup on a green surface. The setup includes a white control unit, a blue sensor assembly, and a clear container. A large play button is overlaid on the image. The text 'LIQUID LEVEL SENSING' is prominently displayed in white on a black background, and 'DESIGNING WITH HALL-EFFECT SENSORS' is displayed in white on a red background.

LIQUID LEVEL SENSING

DESIGNING WITH HALL-EFFECT SENSORS

To start your simulation now, visit:
webench.ti.com/TIMSS.