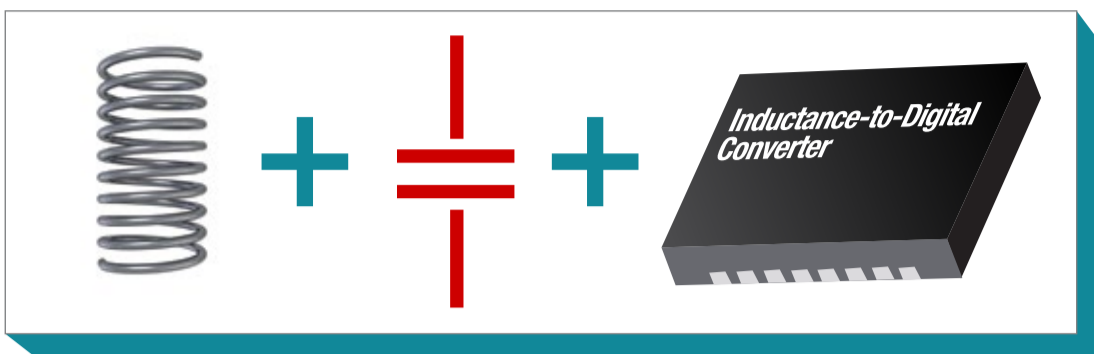# A GUIDE TO INDUCTIVE SENSING

HOW TO BUILD AN INDUCTIVE SENSOR WITH AN INDUCTANCE-TO-DIGITAL CONVERTER (LDC)
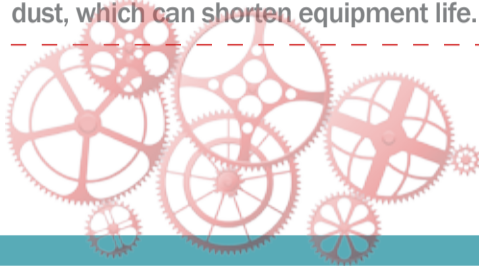
+ | + Inductance-to-Digital Converter

WHY USE AN LDC?

HIGHER RESOLUTION
Enables sub-micron resolution in position-sensing applications with 16-bit resonance impedance and 24-bit inductance values.

INCREASED RELIABILITY
Offers contactless sensing that is immune to nonconductive contaminants, such as oil, dirt and dust, which can shorten equipment life.

GREATER FLEXIBILITY
Allows the sensor to be located remotely from the electronics, where PCBs cannot be placed.

LOWER SYSTEM COST
Uses low-cost sensors and targets and does not require magnets.

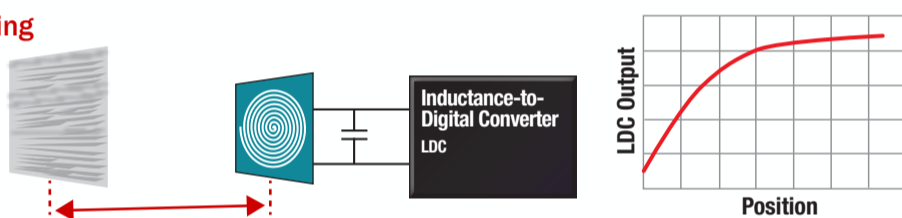**LIMITLESS POSSIBILITIES**
Supports pressed foil or conductive ink targets, offering endless opportunities for creative and innovative system designs.

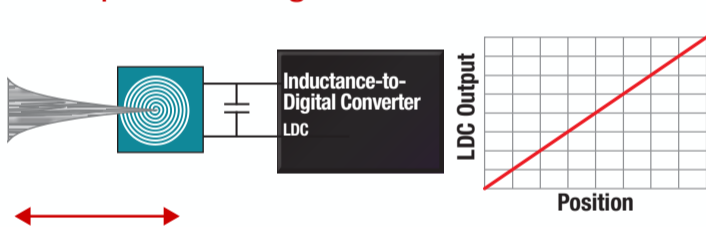## HOW CAN YOU USE AN LDC?

LDCs can be used to measure the position, motion, or composition of a metal or conductive target, as well as to detect the compression, extension, or twist of a spring. Uses within automotive, white goods, consumer electronics, industrial and medical are wide-ranging and seemingly endless.
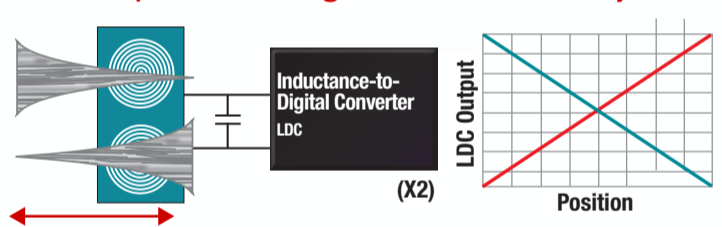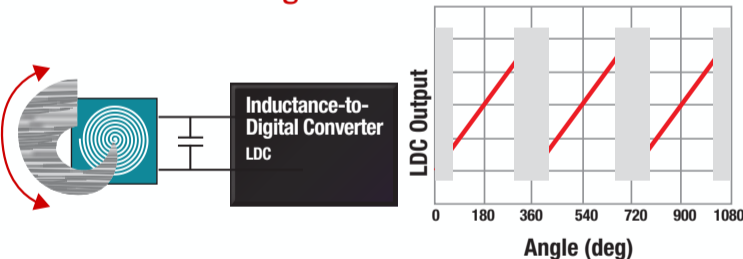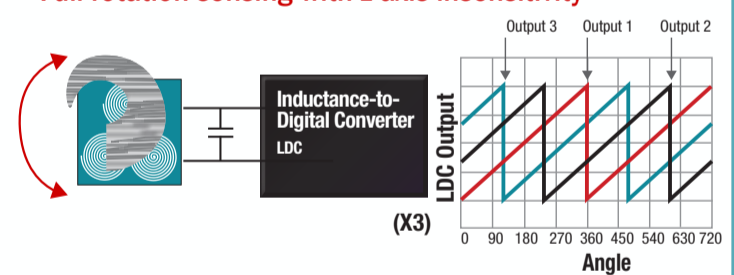
Axial position sensing
Inductance-to-Digital Converter LDC
LDC Output / Position

Lateral position sensing
Inductance-to-Digital Converter LDC
LDC Output / Position

Lateral position sensing with z-axis insensitivity
Inductance-to-Digital Converter LDC
(X2)
LDC Output / Position

Partial rotation sensing
Inductance-to-Digital Converter LDC
LDC Output
0 180 360 540 720 900 1080
Angle (deg)

Full rotation sensing with z-axis insensitivity
Inductance-to-Digital Converter LDC
(X3)
Output 3   Output 1   Output 2
LDC Output
0 90 180 270 360 450 540 630 720
Angle

Gear-tooth counting – perpendicular to coil
Inductance-to-Digital Converter LDC
LDC Output / Gear Count
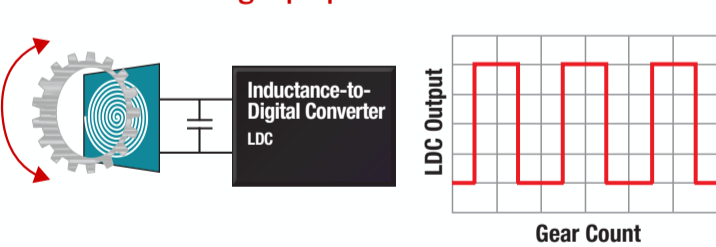
Gear-tooth motion – parallel to coil
Inductance-to-Digital Converter LDC
LDC Output / Gear Count
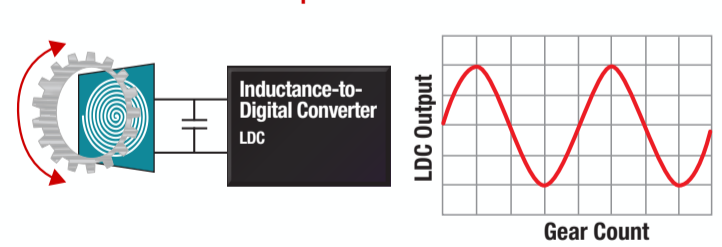
Compression, extension, and twist using a spring as a sensor
Inductance-to-Digital Converter LDC
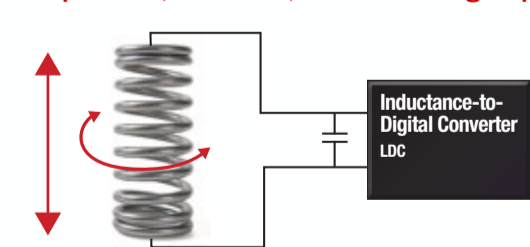
Metal composition identification
Inductance-to-Digital Converter LDC

In 1820, Johann Schweigger invented the **galvanometer** – the first instrument used to detect and measure electric currents and what many credit as the **world's first sensor**.
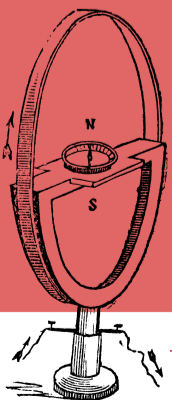
According to **Popular Science** a crash test dummy has nearly **200** sensors to gather **70,000 data points** per second.

Global sensor demand expected to reach **USD$11.5 billion** by 2017 – 9.3% CAGR from 2012. (source: IHS)
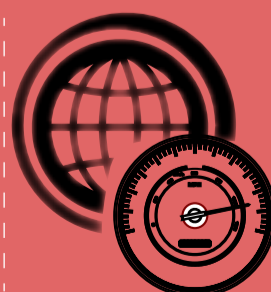
Learn more about LDCs at **www.ti.com/ldc-info**

TEXAS INSTRUMENTS