

# INTRODUCTION TO MACHINE VISION

**Machine vision basics: Machine vision helps solve complex industrial tasks reliably and consistently**

Machine vision encompasses all industrial and non-industrial applications in which a combination of hardware and software provide operational guidance to devices in the execution of their functions based on the capture and processing of images..<sup>1</sup>



Figure1

At its simplest, the goal of a vision system is to allow a machine to process, analyze, measure and understand images taken by a camera system for rapid decision making. The approach is to mimic human vision, for seamless operation and 100% accuracy.

As an example, consider a fill-level inspection system at a cola company (Figure 1). Each bottle of cola passes through an inspection sensor, which triggers a vision system to flash a strobe light and take a picture of the bottle. After acquiring the image and storing it in memory, vision software processes or analyzes it and issues a pass-fail response based on the fill level of the bottle. If the system detects an improperly filled bottle—a fail—it signals a diverter to reject the bottle. An operator can view rejected bottles and ongoing process statistics on a display.

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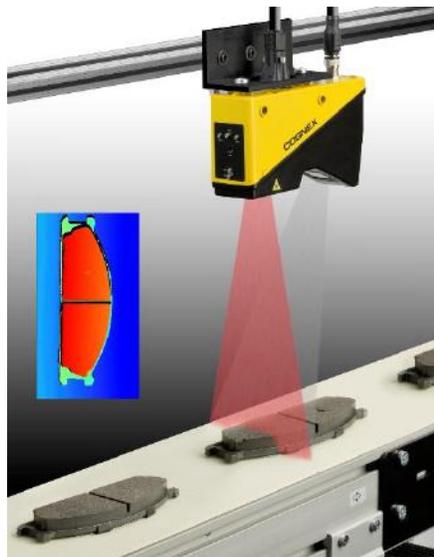
<sup>1</sup> What is machine vision, Cognex corporation

## UNDERSTAND MACHINE VISION SYSTEMS AND APPLICATIONS

### Machine vision system benefits

*Vision improves quality and productivity, while driving down manufacturing costs*

Where human vision is best for qualitative interpretation of a complex, unstructured scene, machine vision excels at quantitative measurement of a structured scene because of its speed, accuracy, and repeatability. For example, on a production line, a machine vision system can inspect hundreds, or even thousands, of parts per minute. A machine vision system built around the right camera resolution and optics can easily inspect object details too small to be seen by the human eye.



In removing physical contact between a test system and the parts being tested, machine vision prevents part damage and eliminates the maintenance time and costs associated with wear and tear on mechanical components. Machine vision brings additional safety and operational benefits by reducing human involvement in a manufacturing process. Moreover, it prevents human contamination of clean rooms and protects human workers from hazardous environments.



## UNDERSTAND MACHINE VISION SYSTEMS AND APPLICATIONS

Machine vision makes it possible to achieve specific objectives

<b>Intro Head Table Row</b>	<b>Machine Vision Applications</b>
Higher quality	Inspection, measurement, gauging, and assembly verification
Increased productivity	Repetitive tasks formerly done manually are now done by Machine Vision System
Production flexibility	Measurement and gauging / Robot guidance / Prior operation verification
Less machine downtime and reduced setup time	Change-overs programmed in advance
More complete information and tighter process control	Manual tasks can now provide computer data feedback
Lower capital equipment costs	Adding vision to a machine improves its performance, avoids obsolescence
Lower production costs	One vision system vs. many people / Detection of flaws early in the process
Scrap rate reduction	Inspection, measurement, and gauging
Inventory control	Optical Character Recognition and identification