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Machine Vision and Quality Control with Cognex - Virtual

COURSE OUTLINE

Catalogue Number	77-3030-0000
Category	Mechatronics
Duration	15 Hours
Prerequisite Courses	None

Activity 1: Introduction to Vision Systems

Defining Quality Control and Quality Assurance

Machine Vision Systems

Introduction to Image Processing

Enhancement vs Analysis

Activity 2: How Cameras Work

Film vs Digital Photography

Digital Camera Anatomy

Image Sensors and How They Operate

Image Sensor Types

Analog to Digital Conversion

Activity 3: Digitalization

Photon to Voltage Conversion

Analog and Digital Signals

Conversion to Digital

Pixels

Gain and Offset

Activity 4: Types of Vision Systems

Review of Vision System Components

Overview of Vision Systems Types (1D, 2D, and 3D)

Activity 5: Vision Systems and Manufacturing

Integration of Vision Systems in Manufacturing

Processing Steps

Applications in Manufacturing

Results and Communications

Activity 6: Introduction to In-Sight Explorer

Connecting Vision Sensors

Troubleshooting Connectivity

The In-Sight Explorer Interface

Image Acquisition Overview

Activity 7 (Virtual Lab): Emulators

Introduction to the Emulator

Applications of Emulation

Getting Connected

Using the Emulator for the First Time

Exploring Emulated Cameras

Activity 8: Image Types

Bits and Bytes

Bit Depth and File Size

File Compression

Digital Image File Formats

Activity 9 (Virtual Lab): EasyBuilder

Application Steps

Creating a New Job

Setting up Location Tools

Setting up Inspection Tools

Running a Job

Adjusting Tolerances

Activity 10: Optics and Lighting

The Importance of Lighting

Optics Explained

Focal Length and Related Parameters

Resolution and Contrast

Distortions

Lens Types

Types of Reflection

Activity 11: Lighting Techniques

Bright and Dark Field Lighting

Diffusion and Condensation

Constant and Strobed Lighting

Lighting Techniques Overview

Optical Filters

Activity 12: Histograms

Histograms – Overview

Histograms – Simplification and Examples

How Histograms Aid in Quality Control

Regions of Interest

Activity 13: Blobs

Defining Blobs

Identifying Blobs

Edges

Blob Analysis, Features, and Measurements

Activity 14 (Virtual Lab): Filters

Defining Digital Noise

Types of Noise

Defining Filters

Neighborhood Operations

Point Operations

In-Sight Filter Types

Applying Filters in In-Sight Explorer

Activity 15 (Virtual Lab): Calibration

Review of Edge Detection

Gauging Applications

Calibrating with An Emulated Camera

Activity 16 (Virtual Lab): Identification Tools

OCR and OCV

Types of Identification Tools

Applications of Identification Tools

In-Sight Identification Tools

Activity 17 (Virtual Lab): Logic Tools

Logic Statements and Functions

AND, OR, & NOT Logic

In-Sight Math and Logic Tools

Applying Logic to EasyBuilder jobs

Activity 18: Introduction to General Spreadsheets (Optional)

General Overview of Spreadsheets

Dealing with Spreadsheet Data

Referencing

Charts and Graphs

Activity 19 (Virtual Lab): Introduction to Spreadsheet View: Part 1

Spreadsheet View Quick Tour

Adding Vision Tools, Functions, and Snippets

Tool Property Sheets

Constructing Tool Logic

Locating Parts with the FindPatterns Tool

Activity 20 (Virtual Lab): Introduction to Spreadsheet View: Part 2

Defect Detection with the ExtractHistogram Tool

Measuring with the FindSegment Tool

Gauging Holes with the ExtractBlob Tool

Error Handling

Creating a User Interface